When and How Do Message Matching Interventions Work?

Exploring Principles to Guide the Use of Message Matching Through a Systematic Review and Meta-analysis, and an Experimental Study

A DISSERATION

SUBMITTED TO THE FACULTY OF THE

UNIVERSITY OF MINNESOTA

BY

Keven Joyal-Desmarais

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR

THE DEGREE OF DOCTOR OF PHILOSOPHY

UNDER THE SUPERVISION OF

Mark Snyder & Alexander J. Rothman

August 2020

Acknowledgements

I am sincerely grateful to all the individuals who have provided me with guidance and support throughout my training in psychological research.

I would like to begin by extending special thanks to my doctoral advisors, Mark Snyder and Alexander Rothman, who were always available to meet with me and give me feedback. I thank Mark for helping me keep a broad theoretical perspective, and supporting me to always learn new ideas from personality psychology and functional theory to merge with my training in social psychology. I also thank Alex for making me a stronger and better-rounded methodologist and health psychologist, and for nourishing in me a strong interest and appreciation for methodological theory and open science.

In addition to my doctoral advisors, I extend thanks to others who advised me along the way and introduced me to diverse areas of research in clinical psychology, health psychology, and relationship science: Jeffry Simpson, David Zuroff, Zeev Rosberger, and Daniel Kopala-Sibley. I similarly extend thanks to Traci Mann and Marco Yzer, for helping nourish my interests and learning in health behavior change, and for being part of my dissertation committee. I also thank Nidhi Kohli and Nathaniel Helwig for teaching me statistical theory and modeling techniques, and further extend thanks to all members of the social psychology area at the University of Minnesota for helping provide me with a strong education in social psychology.

With particular relevance to Project 1 of this dissertation, I thank Alexandra Scharmer, Molly Madzelan, and Jolene See for the countless hours of coding they contributed towards the project. I also thank Amy Riegelman, Hannah Becker, Melanie Iversen, and Claire Pardubsky for their contributions as well.

I am thankful to my colleagues, collaborators, and good friends Hyun Euh and Richie Lenne, for all our insightful discussions and collaborations throughout graduate school. I also thank members of the many research groups I was part of at the University of Minnesota, who helped inform my research and thinking over the years. I would like to further acknowledge members of the Council of International Graduate Students, and in particular Noro Andriamanalina, Takehito Kamata, Jason Tham, and Juhong Ren, for their friendship and efforts in promoting services and events for the international community at the University of Minnesota, as well as Teresa Norris for welcoming me as a member of HPV Awareness, which helped me keep a strong footing in applying research to help benefit diverse communities.

I am further indebted to the everlasting support of close friends and family members throughout the years. I am particularly grateful for the emotional and moral support provided by Midori Nishioka and Mina Joyal-Desmarais, who have never stopped inspiring me to become a better researcher and person.

Lastly, I wish to acknowledge that the research I conducted during my doctoral degree would not have been possible without the generous support that was afforded by the Social Sciences and Humanities Research Council of Canada, the University of Minnesota's Doctoral Dissertation Fellowship program, and the Center for the Study of the Individual and Society. I also thank the numerous participants that took part in my research, as well as in the numerous studies that have been conducted over the years on message matching. I am likewise appreciative of the hard work and contributions that have been made by the many researchers, both current and past, that have dedicated large amounts of time to studying message matching phenomena.

I declare no conflict of interest for the work describe in this dissertation. No funding agency, including the sources listed here, had any involvement in the current research.

Abstract

One of the most common techniques behavioral scientists use to influence people's attitudes, intentions, and behaviors is *message matching*—the systematic design and distribution of persuasive messages such that their features (e.g., themes emphasized) are maximally congruent with the characteristics (e.g., motives) of their audience. Despite its popularity, the effectiveness of the technique varies greatly, and there are few established principles on how to best use it. My dissertation addresses this gap through a theoretical review and two empirical projects. The ***theoretical review*** summarizes four distinct literatures that use message matching (functional matching, message framing, message tailoring, and context matching), and proposes several principles. For example, I argue that messages vary along a continuum from positive matches (that are congruent with a person's motivations) to negative matches (that are in opposition to people's motivations), and that the success of interventions depends on both achieving positive matches and avoiding negative matches. I also discuss how targeting certain types of characteristics (e.g., motivational orientations) should lead to stronger effects than targeting other characteristics (e.g., demographics). ***Project 1*** presents results from an ongoing registered systematic review (PROSPERO CRD42019116688; osf.io/rpjdg) that explores these principles. A three-level meta-analysis of 604 experimental functional matching studies (covering 4,228 effect size estimates) finds that matching messages to motivationally-relevant characteristics leads to effects around r = .20 on attitudes, intentions, and behaviors. The results demonstrate larger effects than works focused on matching to less motivationally focused characteristics (e.g., demographics), and provide evidence that avoiding negative matching while achieving positive matching leads to

larger effects than achieving positive matching alone. These comparative inferences, however, depend on correlational differences between matching studies. ***Project 2*** therefore complements the meta-analysis by presenting a registered (osf.io/yqmsd) experiment (N = 1,101) that directly evaluates the relative effects of positively and negatively matched messages (as these compare to neutral messages), in the context of promoting a non-profit organization by targeting people's political orientation. The results show that both positive matches and negative matches impact persuasion, but that the detrimental effects of negative matches are greater than the beneficial effects of positive matches.

Table of Contents

List of Tables

List of Figures

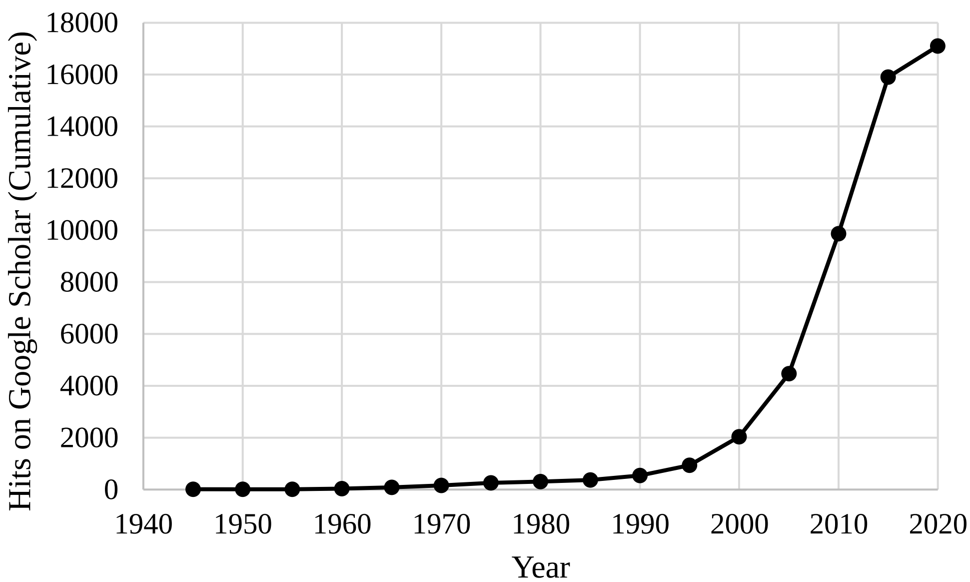
1. Introduction

The scientific study of persuasive communication has a long and rich interdisciplinary history, with a core focus of research on delineating and refining techniques to maximize the persuasive success of interventions (e.g., Abroms & Maibach, 2008; Allen, 1991; Bohner & Dickel, 2011; Cialdini & Goldstein, 2004; Eagly & Chaiken, 1993; Hovland, Janis & Kelly, 1953; Huang & Shen, 2016; Keller & Lehman, 2008; Petty & Cacioppo, 1996). One technique that has received considerable attention over the last decades is that of message matching. *Message matching* refers to a range of persuasive techniques whereby a message's *features* (e.g., types of arguments used, themes emphasized, delivery method) are systematically altered to *match* (i.e., be congruent with) the *characteristics* of the people to whom they are delivered (e.g., their needs, concerns, preferences, demographics, situations, or contexts: Carpenter, 2012; 2013; Joyal-Desmarais, Rothman, & Snyder, 2020a; Kreuter, Strecher, Glassman, 1999; Lavine & Snyder, 2000; Maio & Olsen, 2000; Noar, Benac, & Harris, 2007; Noar & Harrington, 2016; Rothman & Updegraff, 2010).

Matched messages are generally thought to evoke greater experiences of motivational fit and are perceived as more salient than their unmatched counterparts, contributing to greater message processing and greater persuasive success (e.g., Huang & Shen, 2016; Lustria et al., 2013; Motyka et al., 2014; Carpenter, 2013). For example, a message emphasizing the social aspects of a volunteer opportunity is more effective for individuals who are highly motivated to act in accordance with their peers' thoughts/behaviors; whereas a message emphasizing how volunteering can fulfill a person’s moral values is more effective for individuals who are highly motivated to act in accordance to their personal beliefs/values (e.g., Clary, Snyder, Ridge, Miene, & Haugen, 1994b; Clary et al., 1998; Clary & Snyder, 1999; Snyder & DeBono, 1985). Similarly, messages that contain themes of independence from others are more effective when administered to members of individualistic cultures, whereas messages containing themes of interdependence with others are more effective for members of collectivistic cultures (e.g., Gardner, Gabriel, & Lee, 1999; Han & Shavitt, 1994; Xue, 2015). In addition to matching messages to personal attributes (e.g., one’s personality or demographic), messages can also be matched to the decisional context in which individuals find themselves. For instance, a message’s features can be matched to the specific behavioral domain people must make a decision towards (e.g., whether they must engage in risk-seeking or risk aversive behaviors; Rothman & Salovey, 1997), the objects they are evaluating (e.g., whether they are choosing to buy an object that allows them to express their values compared to an object that allows them to make social connections to others; Shavitt & Nelson, 2002), or to their stage in the behavioral decision-making process (e.g., whether they are contemplating beginning an action versus trying to maintain a habit; e.g., de Vet, de Nooijer, de Vries, & Brug, 2007).

Overall, several distinct literatures exist on message matching. These literatures have to some extent operated in different domains of study (e.g., consumer advertising vs behavioral medicine; e.g., Lustria et al., 2013; Motyka et al., 2014), and use different terminologies from one-another (e.g., “message matching”; “message framing”; “message tailoring”; Huang & Shen, 2016; Lustria et al., 2013; Motyka et al., 2014; Carpenter, 2013; I will describe these literatures in greater depth in Section 2). Over the last 30 years, research across these areas has grown exponentially; Figure 1 shows the number of hits returned on Google Scholar published between 1940 and 2020 when searching for common terms related to message matching research. Prior to the 1990s, there were only a small set of studies explicitly studying message matching; today, however, hundreds of studies on the topic have been published. Since the late 2000s, several reviews and meta-analyses have also been published supporting the general effectiveness of message matching in improving the persuasiveness of messages (e.g., Carpenter, 2012; Gallagher & Updegraff, 2012; Huang & Shen, 2016; Krebs, Prochaska, & Rossi, 2010; Lustria, Cortese, Noar, & Glueckauf, 2009; Lustria et al., 2013; Noar et al., 2007).

Figure 1. Growth of Research on Message Matching.



Note: This figure represents the number of Google Scholar results when using the following search string: "message framing" OR "message matching" OR "message tailoring" OR "framed messages" OR "matched messages" OR "tailored messages". Search conducted on July 8th, 2020. The vertical axis represents the cumulative number of results published up to a given year.

Overall, there exists a general consensus among researchers that matching the content of messages is an effective way to improve the success of a communication-based intervention. This conclusion is to some extent rooted directly in the large body of research that has accumulated on the technique, but the relative confidence of researchers has been evident even prior to the development of most research on the topic. For example, even before any type of matching effects had been systematically reviewed, researchers have commonly applied message matching as a *criterion* against which to evaluate new psychological constructs. For instance, when authors develop scales to measure new constructs, it is common for them to evaluate the validity of their constructs/scales by demonstrating how the scales can be used to obtain message matching effects (e.g., Maki, Vitriol, Dwyer, Kim, & Snyder, 2017; Strathman, Gleicher, Boninger, & Edwards, 1994).

With the large range of message matching studies, and researchers' apparent strong confidence in the technique, it would be reasonable to expect that message matching is generally well understood. Unfortunately, this is not yet the case, and there is considerable cause to believe that researchers' confidence in the phenomenon has not been qualified enough. Although there is considerable evidence that, on average, message matching generally improves the effectiveness of persuasive messages, reported effect sizes are commonly quite small (e.g., less than $r = .10$; Noar et al., 2007; Gallagher & Updegraff, 2012) and highly heterogeneous. For example, some authors report effects sizes as large as $r > .70$, whereas many other authors obtain effects sizes narrowly estimated around $r = 0$ (Carpenter, 2012; Noar et al., 2007; Gallagher & Updegraff, 2012). Occasionally, authors even report the technique to backfire, with matched messages reducing intervention success relative to messages that are not matched (e.g., Jibaja-Weiss, Volk, Kingery, Smith, & Holcomb, 2003). Given this heterogeneity, it is imperative for interventionists to understand *when* they can expect matching effects to emerge, and *how* they can design message matching interventions to maximize their impact. Although several authors over the last 20 years have called attention to these questions (e.g., Abrams, Mills, & Bulger, 1999; Hawkins, Kreuter, Resnicow, Fishbein, & Dijkstra, 2008; Joyal-Desmarais et al., 2020a; Noar & Harrington, 2016; Rothman, Joyal-Desmarais, & Lenne, 2020; Updegraff & Rothman, 2013), surprisingly little consensus persists surrounding principles on how and when to design and use message matching interventions. The works presented in this dissertation seek to address this gap in several ways.

First, I argue we can learn more about the general phenomenon of message matching by drawing connections between areas of message matching research that have been traditionally isolated into distinct literatures. A theoretical review will therefore be presented to delineate, summarize, and draw connections between such areas. After discussing each literature, the review will then describe several principles that can help guide our understanding of the circumstances that lead to more versus less successful message matching interventions.

Second, to provide empirical evidence concerning the principles outlined in the theoretical review, a systematic review and meta-analysis of message matching research will be presented. This meta-analysis will focus on summarizing findings from the area of functional message matching. The meta-analysis will also conduct a series of subgroup analyses to explore evidence for each of the principles from the theoretical review.

Lastly, I will supplement the meta-analysis with a primary experimental study to explore circumstances when message matching principles may not only account for increases in message persuasion, but also for active resistance *against* persuasion (e.g., leading to *more* negative attitudes, rather than failing to improve attitudes).

1.1. Connecting Disparate Literatures on Message Matching to Achieve an Understanding of General Principles Underlying the Technique

As mentioned, the first part of this dissertation will focus on providing a theoretical mapping and discussion of the key literatures that fall under the broad umbrella of message matching. Through this review, I will then seek to derive principles that can be used to guide message matching research across the key literatures that concern the technique.

Taking a broad perspective on message matching is needed as although message matching encompasses a broad array of interventions, prior syntheses of research have only focused on evaluating the effectiveness of message matching effects of specific forms (e.g., print-based or web-delivered messages; Noar et al., 2007; Lustria et al., 2013), for specific behavioral domains (e.g., health behaviors), and on specific types of outcomes (e.g., attitudes) at a time. For example, Carpenter (2012) examined the effect of matching messages to five specific types of motivational factors, and only evaluated the impact of doing so on attitudinal outcomes. In contrast, Sohl and Moyer (2007) included interventions that matched messages on a larger set of possible characteristics (although excluding the five examined by Carpenter, 2012), but only evaluated effects on mammography screening behaviors. Other syntheses (e.g., Gallagher & Updegraff, 2012;

O'Keefe & Jensen, 2007) have evaluated the effects of message matching interventions across a wider set of outcome types (attitudes, intentions, behaviors), but only focused on the effects of matching message frames (gain frames vs. loss frames) to behaviors in the health domain (focusing on illness prevention/detection behaviors). These syntheses have all been informative and useful in their respective areas, but their specificity makes it difficult to draw conclusions about broader principles and patterns of effects. This issue is compounded by the fact that moderator analyses between syntheses have also produced mixed and contradictory findings. For example, Noar and colleagues (2007) find evidence that message matching may be more effective for female and non-U.S. samples, but Krebs and colleagues (2007) report trends in the opposite direction.

To reconcile heterogeneous patterns of results across areas of message matching, it is necessary to first understand how each area relates to one another. Consequently, what kind of organizational framework can we use to make sense of the literature? One candidate framework is already implicit in most message matching reviews. Specifically, most reviews and meta-analyses of message matching delimit their scope according to one of three dominant traditions, which have each crystalized into their own distinct literatures. These traditions/literatures include: *functional matching*, which focuses on matching messages to motivationally-relevant factors; *message framing*; which focuses on predicting when gain and loss frames are differentially effective, and; *message tailoring*, which focuses on matching messages to person-specific characteristics. In addition, a fourth tradition can readily be identified in the literature, which focuses on the impact of matching to situational variables (e.g., matching to primed states, or elements of a person's entourage). This fourth paradigm, which I refer to as *context matching*, has not previously been explicitly reviewed, it is sizeable and exists as a direct counterpart to message tailoring—specifically, whereas tailoring focuses on matching to characteristics that are generally internal to a person, context matching focuses on characteristics that are external to a person.

Taken together, the four traditions I have described can be said to encompass the entirety of message matching research. Interestingly, however, no review or theoretical discussion to date has explicitly sought to integrate the four traditions. In fact, reviews from each tradition (e.g., message tailoring vs. message framing: Noar et al., 2007; O'Keefe & Jensen, 2007) have instead operated largely independently of one-another, using different terminologies, and frequently focusing on different aspects of matching (e.g., focusing on different moderators, and different ways of achieving matches). As an unintended consequence, the actual research reviewed across syntheses from each of the traditions has shown a surprising lack of overlap. For example, over half a dozen meta-analyses have focused on message framing effects (all within the health domain), and over a dozen meta-analyses have focused on message tailoring research (also including only health research). Despite a common interest in health-related behaviors, few studies make it into reviews from both traditions. The systematicity in this non-overlap is puzzling for several reasons. First each literature relies on message matching principles and invokes similar rationales to explain why matched messages outperform mismatched messages. For instance, there is a common claim in each literature that matched messages are more personally salient, evoke a sense of motivational fit, and/or generally attract higher attentional processing than their counterparts (e.g., Huang & Shen, 2016; Lustria et al., 2013; Motyka et al., 2014; Carpenter, 2013). Second, the boundary between the literatures in primary empirical research has been much more ambiguous than syntheses would make it appear. Specifically, matching studies generally fall at the intersection of at least two of these literatures. For example, matching message frames (e.g., gain and loss frames) to measured individual differences in motivational orientation (e.g., chronic regulatory focus) is a form of functional matching, message framing, *and* message tailoring (Cesario et al., 2013; Mann, Sherman, & Updegraff, 2004). When researchers match message frames to the receipt of primes instead (e.g., to induce certain regulatory foci), these are instances of functional matching, message framing, and context matching (e.g., Bertolotti & Catellani, 2015). Several articles even report a mixture of studies that cover all four traditions (e.g., Cesario et al., 2013), and it is even possible for a singular study to simultaneously belong to all four traditions (e.g., by varying message frames and simultaneously matching to a measured and a manipulated characteristic, at least one of which is functional; McAuley, Henry, & Tuft, 2011). Lastly, ideas and terminologies from each literature also frequently spill into empirical research in the other literatures. For instance, although Dutta-Bergman (2003) almost exclusively locate their study within the functional matching literature, they use the term “message tailoring” to refer to it. Consequently, beginning this dissertation by drawing connections between each literature will set the stage for an exploration of principles that may hold across all four literatures, while also providing guidance for when matching effects operate differently across them.

In synthesizing research from the literatures described above, I will also pay close attention to research that has been done outside of the physical health domain, as these domains have been largely overlooked in syntheses to date. Overall, nearly two dozen meta-analyses have been conducted in health-specific domains of research. (e.g., Gallagher & Updegraff, 2012; Lustria et al., 2013; Noar et al., 2007; O'Keefe & Jensen, 2007). In contrast, only three meta-analyses have included domains outside of health research, and each of these meta-analyses were designed only to examine very specific forms of matching effects at a time (e.g., focusing on matching to only one specific type of characteristic), and did not evaluate whether the domain of application had any impact on their results (Carpenter, 2012; Grewal et al., 2011; Hornikx & O'Keefe, 2009a; 2009b; Motyka et al., 2014). The lack of works synthesizing research across areas is notable given the wide breadth of applications of message matching paradigms. For instance, apart from health behavior research, there exists message matching research in areas such as consumer behavior (e.g., Han & Shavitt, 1994; Kim & Kim, 2018; Petty & Wegener, 1998), prosocial behavior (e.g., volunteerism & help-giving: Clary, Snyder, Copeland & French, 1994a; Clary et al., 1994; Lee, 2017), proenvironmental behaviors (e.g., Pelletier & Sharp, 2008; van der Broek, Bolderdijk, & Steg, 2017), help-seeking in mental health contexts (e.g., Lienemann, 2015; Lueck, 2017; 2018), political decision-making (e.g., Malka & Lelkes, 2010; Voelkel & Feinberg, 2017), tourism decisions (e.g., Zhang, Zhang, Gursoy, & Fu, 2018), and even in domains such reducing human-animal conflict (e.g., Lu, Siemer, Baumer, & Decker, 2018; Lu, Siemer, Baumer, Decker, & Gulde, 2016), among others. No reviews or theoretical discussions to date have captured this breadth of applications for message matching.

Given that research on message matching effects is fragmented along the lines described above (e.g., across the four literatures, and; health vs. non-health domains), efforts to create connections between these literatures may allow us to delineate broader shared principles on message matching as a whole. Such a strategy would not only benefit from a more representative sample of message matching studies to draw broader, and more generalizable conclusions about message matching as a whole, but it would also provide a unique opportunity to identify how message matching functions both similarly and uniquely across different literatures. For example, might matching messages to an individuals' political orientation have larger effects when determining decisions in pro-environmental domains (where decisions are quite commonly politicized) than in health domains? Having a broad review can also allow us to consider the broader range of methodologies that are used across literatures, and how those methods may impact the effectiveness of interventions. For instance, we can consider how different literatures have tended to use different types of comparison groups in order to evaluate message matching effects; for example, it has been common for research in message tailoring to compare matched messages to *generic* messages (i.e., message that take the same form regardless of who receives them; Lustria et al., 2013), whereas functional matching more commonly compares messages targeting people's dominant motivational function (i.e., a matched message) to messages targeting motivational functions of lesser importance (mismatched messages; Carpenter, 2012). Additionally, we can compare different procedures that have been used in research to increase the specificity with which messages are made to match people's characteristics. For instance, the message tailoring literature has examined the idea that messages could be created to match multiple characteristics at a time (e.g., Strecher et al., 2008), whereas works on functional matching and message framing have typically focused on matching messages to only a single characteristic (Joyal-Desmarais et al., 2020a). Taken together, the literatures have also varied in the degree to which they focus on matching messages to the characteristics of groups, or to the characteristics of individuals, a factor which has long been theorized to impact message persuasiveness (Kreuter et al., 1999), but has yet to be systematically examined. Finally, exploring the breadth of designs used in different areas of research can inform our understanding of which characteristics should be targeted to achieve maximal effectiveness. For instance, research on matching to self-monitoring has been uncommon in the health literature but has been common in the volunteerism domain (e.g., Lavine & Snyder, 2000; Snyder & DeBono, 1985). However, matching messages to behavior stage (e.g., such as delineated by the transtheoretical model; e.g., de Vet et al., 2007) has been more common in health than in volunteerism research. By bringing these literatures together, we may begin to compare the relative effectiveness of matching to these different types of variables, which could provide inspiration and incentives to consider new characteristics to target in particular domains. For example, if matching to self-monitoring has been more successful in eliciting volunteerism behavior than has matching to behavior stage been in eliciting health behaviors, health behavior research may wish to examine whether it is also possible to benefit from matching to self-monitoring.

Questions such as these, and more, are explored using a theoretical review of the message matching literature to derive principles to guide our understanding of when and how to use message matching to maximize its effectiveness. Principles derived in this review will then be evaluated using two empirical projects: Project 1 will offer meta-analytic evidence for the matching principles, and Project 2 will offer experimental evidence.

1.2. Using Meta-Analytic Methods to Empirically Examine Principles of Message Matching

The theoretical review portion of my dissertation will map out the different message matching literatures and will present a number of key principles that should guide the effectiveness of message matching for improving persuasion. However, these principles need to be empirically evaluated and quantified. One way to achieve this goal is to rely on the very large number of message matching studies that have already been produced to summarize what we have learned from decades of research on message matching. Consequently, the second part of my dissertation will focus on meta-analytically pooling pre-existing experimental studies. Specifically, Project 1 will offer a protocol for systematically identifying, coding, and reviewing the full range of experimental studies that fall under the idea of message matching. This protocol will ultimately allow for an empirical synthesis (i.e., meta-analysis) that is just as rich in scope as the theoretical review I present; that is, it will seek to cover research from each of the four main literatures that make up message matching, and will incorporate research across a wide variety of behavioral domains, and using a wide variety of designs.

Given the immense scope of the message matching literature, however, the current dissertation will only implement the protocol to synthesize studies that belong to the functional matching tradition (with future plans to expand the meta-analysis to the other literatures). Functional matching is the oldest of the four message matching literatures, but has yet to be the focus of a large, comprehensive meta-analysis. Furthermore, functional matching contains a large sample of studies that overlap with message framing, message tailoring, and context matching studies, offering a unique opportunity for comparisons across literatures, especially when results can be compared to past meta-analyses (which have already synthesized large amounts of research in message tailoring and message framing).

1.3. Primary Studies Need to Focus on Elucidating Principles of Matching Effects

Although systematic reviews and meta-analyses provide valuable insights and summaries of the literature (and are often considered by many the highest type of scientific evidence; Pandis, 2011), they are not without their limitations. In particular, inference made by systematic reviews and meta-analyses are constrained by the set of studies they review. For instance, inferences made by meta-analyses are only optimal to the degree that the research reviewed is high quality *and* representative of the phenomenon of interest (Cooper, Hedges, & Valentine, 2009). Further, in interpreting the inferences made by syntheses, we must make a distinction between study-generated evidence, and synthesis-generated evidence (Cooper, 2009). *Study-generated evidence* concerns the extraction of effects directly evaluated by primary studies. If high quality studies use experimental designs to derive an effect estimate, then the synthesis of such estimates (e.g., extracting the average effect in a meta-analysis) provides a more precise estimate of a causal inference. In contrast, *synthesis-generated evidence* is not directly contained in primary studies but is generated by comparing how certain effects vary according to study-level characteristics. Unlike study-generated evidence, synthesis-generated evidence leads to weaker causal claims. For example, if a meta-analysis concludes that message matching effects are generally larger in studies that use fully female samples compared to mixed-gender samples, this inference is correlational, and it is possible that confounders explain the underlying association.

The bulk of primary studies offer study-generated evidence of whether a message matching intervention works. However, the bulk of primary studies do not systematically assess questions such as how to build message matching interventions, or when message matching interventions have larger vs. smaller effects. Consequently, systematic reviews and meta-analyses can typically only provide synthesis-generated evidence on these questions. Although such inferences are highly important, syntheses built on current message matching research should not be interpreted as providing final answers regarding the moderators of matching effects. They should instead be interpreted as initial efforts and useful guides for more precise primary studies on such questions. Consequently, in addition to conducting a systematic review and meta-analysis, the current dissertation also includes a primary study to examine a specific principle for increasing our understanding of how matching effects operate. Specifically, I focus on the idea that message matching effects can be applied not only to understand forces that increase persuasion, but how we can also use the same principles to understand how and when people are inclined to resist and react against persuasion attempts.

1.4. Structure of the Current Dissertation

This dissertation is structured as follows. I first provide a theoretical review in Sections 2 and 3. In section 2, I delineate and compare the four major message matching literatures: functional matching, message framing, message tailoring, and context matching. For each literature, I outline major themes in the questions and methods researchers have used, and further give a brief overview past syntheses. After reviewing each literature, I devote Section 3 to an in-depth discussion of three sets of principles I believe are key to moving forward our scientific understanding of how to optimize message matching interventions. These three principles concern: (1) reconceptualizing message matching as existing along a continuum that both facilitates and hinders persuasion; (2) considering various intervention elements that dictate the degree to which messages match characteristics, and; (3) considering which types of characteristics are the most/least useful in achieving strong matching effects.

Sections 4 to 7 describe Project 1, a registered systematic review and meta-analysis of matching effects. For the purpose of this dissertation, Project 1 will focus specifically on functional matching (over research on the other three literatures), but is part of a larger meta-analysis that will eventually incorporate all four literatures. Section 4 gives an overview of Project 1 and delineates hypotheses and research questions that the registered meta-analytic protocol was designed to address. In doing so, Section 4 will describe how each hypothesis and research question ties to the three principles described in the theoretical review (Section 3). Section 5 will then provide extensive details on the methodology underlying the meta-analytic review, covering the generation and implementation of the search strategy, coding and data extraction procedures, as well as how meta-analytic methods were applied. Section 6 will then provide the results of the meta-analysis, along with guidance on how to interpret findings. Section 7 will end my report of Project 1 by providing a discussion of the implications of the meta-analytic findings, while placing them in the context of the broader message matching literature.

Project 2, described in Sections 8 to 10, consists of a registered experimental study that was designed to provide strong study-generated evidence towards the first principle from Section 3. Section 8 will begin by providing an overview of the goals and hypotheses for the experiment, and Section 9 will describe the methods of the study. Section 10 will then provide the results of the experiment, and Section 11 will end with a discussion of the findings, once again taking into account the broader message matching literature, as well as results from Project 1.

Section 12 will be the final segment of this dissertation and will summarize the key themes and findings from the theoretical review, Project 1, and Project 2.

2. Theoretical Review: Overview of Literatures on Message Matching:

Most discussions of message matching are organized around one of three literatures, each reflecting a particular tradition of research. These are: functional matching, message framing, and message tailoring. A complementary literature to message tailoring can also be identified, focusing on context matching. For each literature, I describe the key themes and ideas that have been of interest to authors, along with any important subdivisions that have qualified them (i.e., sub-traditions within each of the four broader literatures). For each of the four literatures, I also give an overview of published syntheses with a special focus on any existing meta-analyses. Table A1 of Appendix A lists a sample of the more comprehensive meta-analyses that have been performed to date. This table summarizes the types of questions each meta-analysis has sought to answer, and presents their findings in a common metric using the correlation coefficient r.

2.1. Functional Matching

The first major area in which message matching has been examined is known as *functional matching* (Carpenter, 2013; Lavine & Snyder, 2000). According to this perspective, individuals' decisions and attitudes operate to serve a number of underlying functions—goals, needs, values, and/or motivations an individual finds important. To the extent a message successfully targets these underlying functions (rather than target less important functions), it is more likely to be successful in changing a person's attitudes or decisions (Lavine & Snyder, 2000; Maio & Olsen, 2000; Shavitt & Nelson, 2002; Snyder, Omoto & Smith, 2009). The basic idea behind functional matching was introduced in the mid-1900s by researchers of attitude change processes (e.g., Katz, 1960; Katz, McClintock, & Sarnoff, 1957; Kelman, 1958; Smith, Bruner, & White, 1956). Unfortunately, after their initial developments, functional attitude theories fell out of favor for over two decades, largely due to lack of systematic, objective, and high-quality methods to study them, which often led to debated and inconsistent results (Carpenter, 2013; Kiesler, Collins, & Miller, 1969; Shavitt, 1990). Starting in the 1980s, new approaches to studying functional approaches emerged, leading to a revival in their popularity, which has been maintained ever since. Generally, four methodological paradigms have gained popularity in the functional matching literature. Each of these paradigms follow a pattern of: (1) establishing the dominant motivational function to target in a given situation; (2) assigning individuals to view messages that are either matched to that function or mismatched to an alternative function, and; (3) evaluating the relative effectiveness of matched versus mismatched messages.

2.1.1. The Neofunctional Approach: Matching to an Attitudinal Object/Domain. The first approach that contributed to the revitalization of functional matching ideas was outlined by Herek (1986; 1987), who advanced the idea that attitudes towards an object could serve multiple functions. Herek maintained that by doing content analyses on thought-listing tasks associated with an attitude object, we could derive typologies of functions associated with attitudes towards the object(s) and quantify the importance of each function to identify the predominant function associated with it. This idea was termed a "neofunctional" approach and advocated that message content should be matched to the predominant functions associated with attitudinal domains/objects. For example, neofunctional research found that attitudes towards air-conditioners frequently served utilitarian functions and could therefore be more effectively changed via messages targeting utilitarian themes rather than social-adjustive themes (Shavitt, 1990). In contrast, attitudes toward friends have been found to be predominantly associated with social-adjustive functions (Herek, 1986), and should therefore be most easily changed by messages advocating social-adjustive values. Overall, the popularity of the neofunctional approach has been most pronounced in psychology during the 1990s and early 2000s (e.g., Herek, 2000; Maio & Olson, 1994; 2000; Shavitt & Nelson, 2002).

Outside of psychology, the idea of matching to an attitudinal object/domain has maintained a steady popularity in marketing and consumer behavior research ever since the 1990s. This research was not directly inspired by Herek's writings, but has similar roots in functional research (e.g., Katz, 1960; Katz et al., 1957; Smith et al., 1956), and was revitalized with a series of publications that emerged in the late 1980s and early 1990s (Johar & Sirgy, 1991; Shavitt, 1989; 1990). Some of the more popular distinctions in this literature have focused on comparing the differential effectiveness of adverts for pairs of products/services, one of which serves predominantly utilitarian functions, whereas the other serves either value-expressive (Johar & Sirgy, 1991; Schlosser, 1998) or hedonic (e.g., Kim, Cheong, & Zheng, 2009a; Stafford, Stafford, & Day, 2002) functions.

2.1.2. Measuring Individual Differences in Functional Orientations. Around the same time as early works on the neofunctional approach, an alternative method emerged focusing on matching messages to assessed individual differences in motivational orientations. Snyder and DeBono (1985) popularized this idea in their study of individual differences in self-monitoring. Specifically, the authors argued that high self-monitors' decisions were motivated by social-adjustive functions, whereas low self-monitors were guided by value-expressive functions. They then showed that messages using image-based appeals were more successful for high self-monitors, whereas product-quality-oriented ads were more effective for low self-monitors. One of the most important contributions of this line of work has been the provision of a clear procedural paradigm for message-matching research. First, one would assess individual differences in a functional domain (or correlates thereof), and then, messages would be systematically or randomly matched to either an important or less important motivation. Then, an interventionist could evaluate the direct benefits of messages that matched an individual's dominant motivational orientation, compared to messages that did not.

A related approach to this paradigm incorporated elements similar to that advocated by neofunctional research. Specifically, instead of relying on individual differences in *general* motivational orientations, several authors have advocated the use of message matching to individual differences in motivations regarding *specific* types of behaviors or objects. The two most commonly cited sets of works using this approach include Clary and colleagues' (1994a; 1994b; 1998) research that matched messages to the dominant reasons people gave for deciding to engage in volunteerism (e.g., Clary et al., 1994a; 1994b; 1998), as well as a line of early research that focused on individual differences in motivational orientations towards types of consumer products (e.g., Locander & Spivey, 1978; Spivey, Munson, & Locander, 1983).

Since these early works, matching messages to individual differences in either general or specific motivational orientations has been one of the most popular methods of achieving functional message matching effects (Maio & Olsen, 2000; Shavitt & Nelson, 2002; Snyder, Omoto, & Smith, 2009).

2.1.3. Inducing Functional Orientations through Priming. A third approach that has contributed to the revival of functional approaches was the application of priming methods/principles (e.g., Meyer & Schvaneveldt, 1971) to increase the psychological accessibility of a given attitudinal function (e.g., Maio & Olson, 1995; Shavitt & Fazio, 1991; Shavitt et al., 1994). Unlike previous paradigms, priming does not require assessments of predominant functions (either of an individual or an attitude object/domain), and helps accommodate fully experimental designs that allow the outcome domain (the object/behavior being promoted) to be held constant across conditions. Priming procedures are now regularly used in many areas of functional matching research (e.g., priming self-construal and/or regulatory focus; Cesario et al., 2013; Gardner et al., 1999).

Both the use of priming techniques and the neofunctional approach operate through similar theoretical processes; that is, they rely on the idea that specific functional systems (e.g., utilitarian motives) are activated when individuals make decisions under specific contexts (e.g., when considering a utilitarian product; after being exposed to a utilitarian prime), based on how strongly those contexts are associated with the functional system.

2.1.4. Inferring Functional Orientations According to Group Membership.

Finally, a fourth approach to have emerged in the study of functional matching effects concerns the study of matching messages to group-based differences in values. Most commonly, this has taken the form of matching messages to assumed cultural values (e.g., collectivism) based on individual’s nationalities (e.g., Ko & Kim, 2010) or ethnic groups (e.g., Huang & Shen, 2016). Occasionally other group memberships are also used, such as inferring participants values based on their age (e.g., Zhang, Funcg, & Ching, 2009) or gender (e.g., Chang & Lee, 2011).

Of note, research interested in matching to value-based systems has also taken some of the previous approaches, such as matching to individual differences (e.g., in independent and interdependent self-construal variables: Lalwani & Shavitt, 2009), or using priming methodologies to make certain cultural values more or less salient (e.g., Gardner et al., 1999).

2.1.5. Systematic Reviews and Meta-Analyses. Although functional matching is the eldest of the literatures on message matching, it has received very little attention when it comes to systematic syntheses of research. To date, only three such systematic syntheses exist.

First, Carpenter (2012) has examined the effects of matching messages to five different types of motivational functions: utilitarian, social-adjustive, value-expressive, knowledge, and ego-defensive defensive functions. The author found that the effect of functional matching was around r = .37. A major limitation of this meta-analysis, however, is that it only reviewed effects from 16 published articles, with a cumulative N of 1,460, which makes it difficult to compare the relative effectiveness of targeting any specific function, and also makes it less likely that the estimates are highly stable. Further, as the author points out, a large portion of the reviewed studies focused specifically on matching to individual differences in self-monitoring as a way to indirectly infer the dominant functional orientation of participants. The second meta-analysis (Hornikx & O’Keefe, 2009a; 2009b) focused on the impact of matching messages to cultural values in the domain of consumer advertising. In so doing, it focused predominantly on matching messages to differences in individualistic/collectivistic values as they emerge in North American and Asian samples (finding a small advantage for matched messages: r = .07). The third meta-analysis in this area was not specifically limited to message-based interventions, but focused on evaluating interventions that either matched or mismatched people's salient regulatory focus orientations (Grewal et al., 2011; Motyka et al, 2014). Like Carpenter (2012), they found an overall moderately-sized matching effect (r = .27 to .33).

At the moment, a broad synthesis of the literature on functional effects has not been conducted. Because each of these meta-analyses focus on specific sub-areas of functional matching (i.e., matching to fairly specific sets of motivational functions), and differ substantially in their methods and coding choices (e.g., using different outcomes such as attitudes vs. behaviors and focusing on different types moderators), it is difficult to make direct comparisons in their findings. Given the actual size of the literature on functional matching, a more comprehensive systematic review and meta-analysis would therefore be highly informative.

2.2. Message Framing

A second large literature which relies on matching effects is that of *message framing* (O'Keefe & Jensen, 2007; O'Keefe & Jensen, 2008; Rothman, Bartels, Wlaschin, & Salovey, 2006; Rothman, Salovey, Antone, Keough, & Martin, 1993; Rothman & Updegraff, 2010). The basic principle in message-framing works is that messages can take one of at least two basic forms, referred to as "frames": (1) *Gain frames* emphasize the benefits of compliance with a particular behavioral recommendation, while (2) *loss frames* emphasize the costs associated with failure to comply with the recommendation. Occasionally, authors also distinguish between (3) *non-gain frames*, emphasizing benefits that are not obtained by a failure to comply, and (4) *non-loss frames*, which emphasize costs that are avoided via a recommendation (Cesario et al., 2013; Gray, 1990; O'Keefe & Jensen, 2007; Rothman et al., 2006; Rothman & Salovey, 1997; Wilson, Gray, & Barrett, 1990).[1] The overarching goal of message framing studies and theories is to delineate the conditions when one frame will outperform the others. To accomplish this, researchers rely on message matching principles.

Overall, there are three major perspectives that have examined the effects of message framing: (1) a risk perceptions approach, focusing on when people adopt risk-seeking versus risk-averse orientations; (2), theories aiming to understand personal predispositions using a Regulatory Focus perspective, and; (3) theories regarding an approach/activation versus inhibition/avoidance orientation.

2.2.1. The Risk Perceptions Approach. Perhaps the most well-documented approach in message framing research is one that emerged in health behavior research in the late 1980s and early 1990s, and proposed that different frames should be differentially effective depending on the degree of risk individuals associate to particular health behaviors (Meyerowitz & Chaiken, 1987; Rothman et al., 1993). This perspective was

---

[1]Although most authors recognize these distinctions, the literature contains a large degree of heterogeneity in the terminology used to describe different frames. For example, it is common for research to subsume both non-gain and non-loss statements as either “loss-frames” or “gain-frames”. For example, some may focus on the fact that a non-loss message still focuses attention on the possibility of a loss, thereby subsuming the concept under loss frames, whereas others argue that it refers to a desirable outcome, thereby subsuming it under the concept of gain frames. Others still, forego these labels and make distinctions between “positive/negative frames”, or “promotion/prevention focused messages”.

largely inspired from Prospect Theory research, which had demonstrated that when a proposal emphasized the costs of an action, people were more willing to take risks, but would become risk-averse when a proposal instead emphasized the benefits of a behavior, even when the outcomes themselves were objectively identical (Tversky & Kahneman, 1991). From this basic finding, it was argued that because loss frames are linked to risk-taking decisions, loss-framed messages should be more effective when promoting behaviors that individuals deem risky. In contrast, because gain frames are associated with risk aversion, gain frames may instead be more suitable when one aims to promote behaviors that are perceived as lower in riskiness (Rothman & Salovey, 1997).

Although this area of research has developed independently from research on functional matching, we find similar methodological paradigms in use. The most popular paradigm was proposed by Rothman and Salovey (1997) and shares many features with the neofunctional approach in functional matching. Rothman and Salovey (1997) argued that message frames could be matched to the typical "function"[2] associated with different classes of behaviors. Specifically, they maintained that illness *detection* behaviors (e.g., cancer-screening, tests for sexually transmitted diseases) are typically associated with risk-seeking orientations and should therefore be matched to loss-framed messages. In contrast, illness *prevention* behaviors (e.g., using sunscreen, practicing safe sexual practices) are typically associated with risk-aversive orientations and should therefore be matched to gain-framed messages.

---

[2]The term function in the message framing literature conveys a different meaning than that used in functional matching. Whereas the functional literature refers to the motivational function a person may achieve through their decisions/actions, the message framing literature refers to the typical role the behavior plays from a broader healthcare perspective.

One limitation of this approach (which is also shared with the neofunctional strategy) is that it relies on there being relative homogeneity in the risk-perceptions associated with a class of behavior. To the degree that specific prevention behaviors are seen as risky or that specific detection behaviors are seen as less risky, the general rule of determining which frame to use based on the type of behavior targeted should be expected to perform less well. To achieve greater specificity in message matching, researchers in this area have since proposed that interventionists can match directly to individuals' perceived risk levels towards a behavior (e.g. Bartels, Kelly, & Rothman, 2010; Gallagher, Updegraff, Rothman, & Sims, 2011; Rothman & Updegraff, 2010). This can be accomplished either by directly measuring individual differences in risk perceptions (e.g., Gallagher et al, 2011), by experimentally inducing such orientations (e.g., Bartels et al., 2010), or by matching to inferred group-level differences (e.g., assuming that women with a family history of breast cancer should perceive breast-cancer screening as riskier than those without a family history, and matching messages accordingly; Finney & Iannotti, 2002).

Although works on matching message frames to risk perceptions has relied on much of the same methodologies as research on functional matching, the two literatures have not generally intersected.

2.2.2. Regulatory Focus. A second considerable body of work within message framing corresponds to Regulatory Focus Theory (Higgins, 1996, 1997, 1998). Within a regulatory focus framework, individuals vary to the degree that they hold a promotion relative to a prevention focus. Individuals with a predominant promotion focus are concerned with furthering growth and nurturance needs, and achieving their ideals, whereas those in a predominantly prevention focus are concerned with meeting safety needs, and not failing to meet their responsibilities and obligations (Cesario et al., 2013; Higgins, 1997). Correspondingly, individuals with a promotion focus tend to respond more highly to gain-framed messages (and non-gain framed messages), whereas those with a prevention focus respond more highly to loss-framed messages (and non-loss-framed messages; Cesario et al., 2013). Message framing research has predominantly relied either on matching frames to chronic individual differences in regulatory focus (e.g., Joyal-Desmarais et al., 2020a), or to experimentally induced regulatory focus (e.g., Cesario et al., 2013). Several studies have additionally matched to group memberships that have been shown to differ in their mean regulatory foci (e.g., Uskul, Sherman, & Fitzgibbon, 2009). Conceptually, matching messages to regulatory focus has been situated in both the message framing literature, as well as the functional matching literature, as it involves matching messages whichever of two motivational functions (prevention vs. promotion) is dominant in driving people’s decisions.

2.2.3. Reinforcement Sensitivity Theory. Originally developed as a physiological explanation of extraversion and introversion, Gray’s behavioral theory of motivation, now known as Reinforcement Sensitivity Theory, (RST; Corr, 2004) has become one of the most popular in explaining hedonic motivational processes in behavior and has represented a third major framework in the message framing literature. The theory postulates two major behavioral systems: the Behavioral Approach/Activation System (BAS) regulating the activation of behavior, and the Behavioral Inhibition System (BIS), charged with regulating the inhibition of behavior (Fowles, 1987; Gray, 1970, 1990). Individuals are thought to vary in the extent to which they rely on each of these systems, and these differences can be assessed as chronic motivational predispositions (Carver & White, 1994). According to RST research (Amodio, Master, Yee, & Taylor, 2008; Caseras, Avila, & Torrubia, 2003; Gray, 1990; Wilson et al., 1990), the BAS is sensitive to cues of rewards (i.e., gains), as well as non-punishment (i.e., non-loss), and the BIS is sensitive to cues of punishment (i.e., losses), and non-reward (i.e., non-gain). In message framing works, researchers have often relied on measuring individual differences on BIS/BAS scales developed by Carver and White (1994), to indicate personal predispositions towards approach and avoidance motivations (e.g., Gerend & Shepherd, 2007; Mann, Sherman, & Updegraff, 2004), and determine which frames should be given to a particular person. Consistent with theory, research in this area has found that gain frames are more effective for individuals who have a BAS orientation and loss frames more effective for individuals with a BIS orientation (Gerend & Shepherd, 2007; Mann et al., 2004; Updegraff, Brick, Emanuek, Mintzer, & Sherman, 2015). Like research on matching message frames to regulatory focus differences, matching to BIS/BAS differences can be considered as falling under both functional matching and message framing research, but has generally been included in discussions of the latter more so than the former.

2.2.4. Systematic Reviews and Meta-Analyses of Message Framing. To date, all meta-analyses of message framing research have focused on the relative persuasiveness of gain and loss frames for illness prevention and/or illness detection behaviors (e.g., Gallagher & Updergraff, 2012, O'Keefe & Jensen, 2006; 2007; 2009). These meta-analyses have generally found significantly stronger effects of using gain frames over loss frames for *prevention* behaviors, but these effects have been fairly small (r between .03 and .08). When it comes to the relative impact of message framing for *detection* behaviors, meta-analyses find small effects favoring loss frames (r = .03 to .04), but these effects are not generally found to be statistically significant (Gallagher & Updergraff, 2012, O'Keefe & Jensen, 2006; 2007; 2009). These meta-analyses have also found effects to vary significantly between behaviors that fall under the broader classes of detection/prevention behaviors, suggesting that considerable heterogeneity may exist within the two types of behaviors.

Although the focus of message framing meta-analyses has been relatively narrow around the detection/prevention behavior distinction, there have also been a few systematic reviews looking at other types of message framing effects, albeit still exclusively in the health communication literature. The broadest of these reviews in scope was by Covey (2014), who specifically focused on the impact of matching message frames to individual differences (e.g., approach-avoidance motivations, regulatory focus), and found effects to be small to medium in size. Another fairly broad review, Ludolph and Schulz (2015), focused on matching health messages to measured or induced regulatory focus orientations, and although they did not exclusively focus on message framing effects, these were the most common studies included in their review. They report substantial heterogeneity in message framing effects but conclude that findings were generally in support for matching to regulatory focus. Of note, the apparent success of matching frames to functional characteristics implied by these reviews stands in strong contrast to the mixed findings of meta-analyses of non-functional message framing studies. The field would therefore benefit from a meta-analytic quantification of the functional message framing literature to compare it more directly to the findings of non-functional message framing studies.

Finally, although research on message framing exists in varied behavioral domains outside of health (e.g., environmental & consumer behaviors: Ganzach & Karsahi, 1995; Guo, 2017; Joyal-Desmarais et al., 2020a), no systematic review on message framing has considered non-health research to date.

2.3. Message Tailoring

2.3.1. General Overview. Message tailoring (also known as "tailored communication") refers to the practice of developing, selecting, and/or delivering individualized message interventions by considering data obtained from individual-based assessments (Kreuter & Skinner, 2000; Kreuter et al., 1999; Lustria et al., 2009). This is a fairly broad definition and conceptually encompasses many functional matching and message framing interventions that involve matching to individually-assessed characteristics (e.g., Snyder & DeBono, 1985). However, it conceptually excludes interventions based on matching to attitudinal or behavioral domains (e.g., the neofunctional approach) as well as interventions that match messages to experimentally primed characteristics. An additional element that distinguishes message tailoring from functional matching works (and also much message framing work) generally, is that characteristics used for matching need not be explicitly motivational in nature. Instead, they can reflect any individual difference variable deemed meaningful. These might include, for instance, a person's personality, ethnic background, or behavior stage (Hirsh, Kang, & Bodenhausen, 2012; Huang & Shen, 2016; Noar, Harrington, Van Steem & Aldrich, 2011; Prochaska, Norcross, & DiClemente, 2013; Weinstein & Sandman, 1992).

Much like functional matching, the initial ideas behind message tailoring have their roots in ideas that were established in the 1950s. Specifically, tailoring researchers trace their roots to marketing research on market segmentation which advocated dividing large heterogeneous markets into smaller relatively homogenous markets in order to better take into account the specific needs and preferences of individuals (Kreuter et al., 1999; Smith, 1956). However, despite this early theoretically foundation, a distinct literature on message tailoring would only emerge decades later, in the 1990s, as the result of a series of developments which made it easier for researchers to think about and systematically apply principles of market segmentation. The first development was the increased use and availability of computers (Kreuter et al., 1999). The second development was a growing interest in psychological theories that delineated key individual differences to consider in predicting and changing health-behaviors (e.g., Ajzen, 1991; Ajzen & Fishbein, 1980; Bandura, 1986; Prochaska, Diclemente, & Norcross, 1993; Rosenstock, 1974). By the early 1990s, several health communication researchers had been incorporating message tailoring ideas into their work and began formally using the term "tailoring" (Campbell et al., 1994; Meldrum et al., 1994; Prochaska, DiClemente, Velicer, & Rossi, 1993; Skinner, Strecher, & Hospers, 1994).

For example, in 1994, Campbell and colleagues presented a study on the effectiveness of "tailored messages" to improve patients' intake of fruit and vegetables and decrease their dietary fat intake. Their study was composed of three conditions. The first was a tailored message condition, based on the Transtheoretical model (Prochaska et al., 1993) and the health belief model (Rosenstock, 1974). This intervention summarized patients' previously-assessed diets, and gave feedback addressing their particular susceptibility beliefs towards diet-related illnesses and their perceptions about the benefits of changing diets (i.e., addressing variables outlined by the health-belief model). Additionally, the tailored messages presented different types of information depending on participant’s reported stage of change (e.g., contemplators received messages to increase their self-efficacy). This tailored message condition was then compared to a generic message that contained no individualized information, or to a no-treatment control group. It was found that the tailored group was more effective in reducing dietary fat intake compared to either comparison group.

Following this early wave of research, a special issue and several theoretical articles on message tailoring were published in 1999 and 2000, which outlined formal frameworks for defining and conducting message tailoring research in general (Kreuter & Skinner, 2000; Kreuter, Strecher, & Glassman, 1999; Rakowski, 1999; Skinner, Campbell, Rimer, Curry, & Prochaska, 1999), and motivated new waves of research on message tailoring. That said, the general design of message tailoring research has continued to follow patterns set by early studies such as Campbell et al. (1994). Specifically, in contrast to the functional matching and message framing literatures, message tailoring studies have been relatively more interested in evaluating effects on behaviors (rather than attitudes or intentions), and more commonly compare tailored messages to generic messages, generic non-message-based treatments, or to no-treatment controls (e.g., Krebs et al., 2010; Lustria et al., 2013; Sohl & Moyer, 2007), rather than to messages made to systematically mismatch people’s characteristics (e.g., Snyder & DeBono, 1985).

Over the last two decades, research on message tailoring has grown tremendously in health communication. Despite a slightly later development than either functional matching or message framing research, message tailoring has possibly become the most popular and extensive of the message matching literatures.

2.3.2. Systematic Reviews and Meta-Analyses of Message Tailoring. Much like research in message framing, systematic reviews and meta-analyses to date have focused exclusively on research conducted in health communication, and have generally found the message tailoring effects to be, on average, in the range of r = .06 to r = .10 in magnitude (e.g., Krebs et al., 2010; Lustria et al., 2013; Noar et al., 2007; Sohl & Moyer, 2007). Early reviews were interested predominantly in print-based interventions (e.g., Noar et al., 2007), but have moved over time to focus on computer- (e.g., Krebs et al., 2010) and web-delivered interventions (e.g., Lustria et al., 2013). Generally, interventions have been effective across different mediums, but effects have been slightly larger for in-person interventions than for print-, telephone-, or computer-mediated interventions (Krebs et al., 2010; Sohl & Moyer, 2007; Wanyonyi, Themessl-Huber, Humphris, & Freeman, 2011). To date, message tailoring has been consistently effective for some behavioral domains (e.g., smoking and diet-related behaviors; Krebs et al., 2010; Noar et al., 2007), but the relative effect size in different behavioral domains remains to be established. Similarly, syntheses to date only offer preliminary evidence towards whether matching to certain characteristics outperforms matching to others. The most popular characteristics to use for message tailoring involve variables from the Transtheoretical Model, Health Belief Model, and Social Cognitive Theory, along with varied demographic variables (e.g., Huang & Shen, 2016; Noar et al., 2007; Sohl & Moyer, 2007). Establishing the relative effectiveness of tailoring to different characteristics remains a major question for research in this area to address.

Finally, the primary goal of research syntheses in message tailoring have differed substantially from that of syntheses in functional matching and message framing, reflecting the general differences in the designs used in these different literatures. In particular, whereas functional matching and message framing syntheses have focused on examining the relative effectiveness of matched messages against mismatched messages (e.g., Carpenter et al., 2012; Gallagher & Updegraff, 2012), tailoring research has generally sought to evaluate whether a matched intervention is more effective than typical alternatives individuals may commonly be exposed to (i.e., generic messages, generic non-message-based treatments, or no-treatment controls; e.g., Lustria et al., 2013; Noar et al., 2007; Sohl & Moyer, 2007; Wanyonyi, et al., 2011), rather than systematically mismatched messages.

2.4. Context Matching

2.4.1. General Overview. Message tailoring considers data obtained from individual-based assessments in order to achieve matching (Kreuter & Skinner, 2000). Through this criterion, message tailoring unifies a substantial amount of research in both functional matching and message framing. A key aspect of the definition used for message tailoring, is that matching occurs to a characteristic that is inherent and/or internal to an individual, rather than external. Consequently, the literature on message tailoring has largely neglected certain areas of matching such as such as the neofunctional approach, the use of primes, and much of the message framing literature; that is, areas with a large focus on matching messages to the (external) context in which an individual finds themselves. This may be a context created by an intervention itself (e.g., such as in priming research), the decisional context an individual finds themselves in (e.g., choosing whether or not to purchase a utilitarian product),[3] or simply where and when the individual finds themselves at a given time (e.g., geographical location, time of day).[4] Consequently, I suggest that this large body of works can be organized around the concept of *context matching*, and act as a direct counterpart to message tailoring research.

The idea that context matching is a separate concept is implied at an increasing rate in the literature (e.g., Hühn et al., 2017; Lee, Kim, & Sundar, 2015; McCormick & McElroy, 2009; York, Brannon, & Miller, 2012), but no formal synthesis has given this type of matching effect unique consideration and outlined it relation to the other areas of message matching to date. This is an important omission as many context matching effects (albeit not all) bypass one of the biggest costs of message tailoring research; the need to assess individual differences between participants—a requirement that is often costly in terms of resources. In contrast, techniques such as including a prime prior to delivering a message may be less costly. If such a technique can create effect sizes approaching those found in the message tailoring literature, this would be invaluable knowledge for interventionists to consider.

2.4.2. Systematic Reviews and Meta-Analyses of Context Matching. No systematic review or synthesis has considered the unique contribution of context

[3] Decisional contexts are often themselves frequently manipulated in the context of studies/interventions (e.g., Shao, Grace, & Ross, 2015)
[4] Matching to location has sometimes been explicitly discussed in studies that have emerged from the message tailoring perspective (e.g., Müller, Blandford, & Yardley, 2017), but I suggest that it may be more meaningful to instead categorize them as context matching.

matching effects to date. The meta-analysis by Motyka et al. (2014) on the broad effects of regulatory fit (both within and outside the message-based interventions literature) touches on an aspect of this issue as it compares the effects of matching to a prime, compared to matching to chronic regulatory focus. They found that matching to a prime led to larger effects on product evaluations and behavioral intentions, but smaller effects on behavior (the latter not being significant). This meta-analysis provides useful insights, but it only concerned a very specific type of context matching.

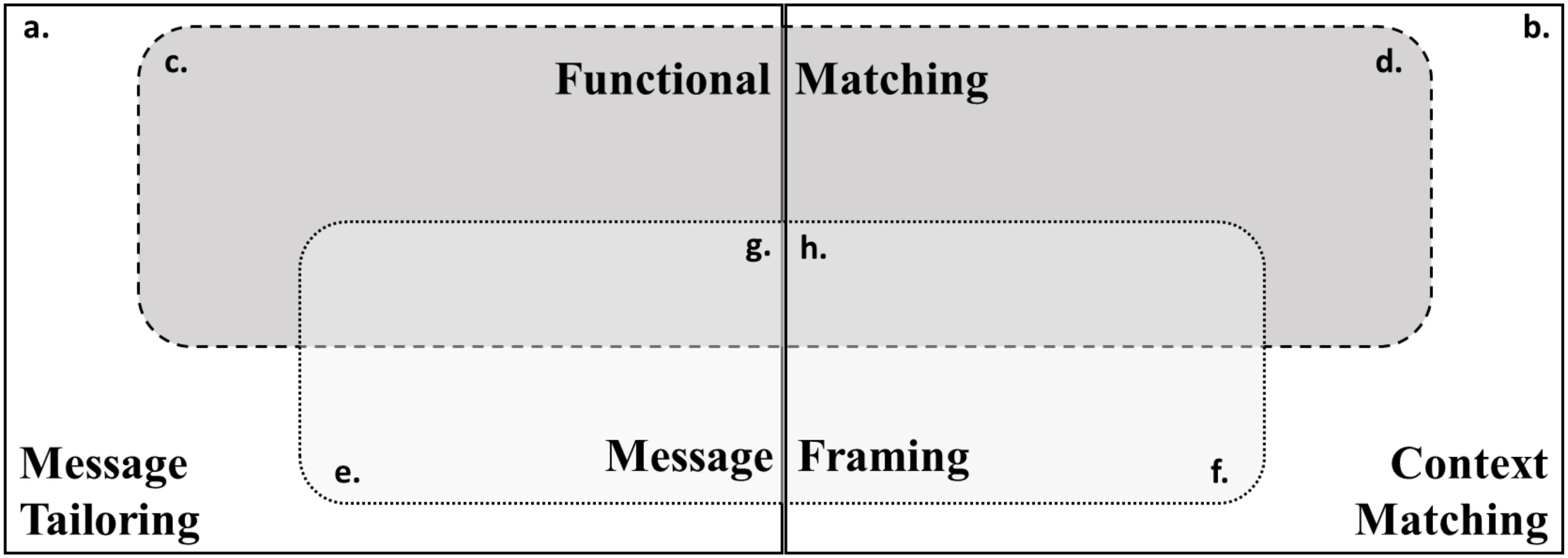
2.5. Summary and Map of the field of Message Matching Research

In my discussion of the four literatures that make up message matching research, I have outlined various ways in which different types of effects can belong to multiple literatures. For example, matching frames to chronic differences in regulatory focus consists of a mixture of functional matching, message framing, and message tailoring.

Figure 2 summarizes the relationship between the four types of literatures. Theoretically, every matching effect can be considered either message tailoring or context matching, depending on whether the characteristic matched to is internal to an individual or external (i.e., belonging to their context). Then, functional matching encompasses every matching effect that targets a motivationally-relevant functions, whereas message framing encompasses all matching studies that evaluate the differential effects of message frames. Because functional matching is defined in terms of the characteristic targeted, whereas framing is defined in terms of the message features manipulated, membership in these two literatures is largely orthogonal and independent, such that functional matching studies may or may not be message framing studies, and vice versa. In contrast, every functional matching effect, and every message framing effect, is either an instance of message tailoring or context matching, but the reverse is not true (e.g., a context matching effect may belong to neither the functional matching nor the message framing literatures).

With this mapping of the broader literature, we can see that despite the apparent large number of systematic reviews and meta-analyses published to date, we have only synthesized knowledge within a limited portion of Figure 2. Specifically, we have strong syntheses of literature that is only message tailoring (i.e., segment a of Figure 2), with message tailoring reviews typically excluding most works that are functional matching or message framing (i.e., message tailoring reviews have overlooked segments c, e, and g). However, this knowledge is limited to the health behavior domain. Similarly, we also have strong syntheses of literature that is a mixture of context matching and message framing (segment f of Figure 2), but which is not functional matching (i.e., excluding segment h). Like reviews of message tailoring, however, syntheses at the junction of message framing and context matching have also been limited to the health domain, and have further been limited to the risk sensitivity approach. My dissertation will therefore provide tools to review the full conceptual space outlined by Figure 2 (without limits to a particular behavioral domain), while providing a comprehensive systematic synthesis of the literature on functional matching (i.e., segments c, d, g, and h of Figure 2).

Figure 2. Conceptual and Organizational Map of Different Types of Matching Effects.



(a) Only Message Tailoring: e.g., matching images to a person's ethnic group; **(b) Only Context Matching:** e.g., matching to geographical location;
(c) Functional & Tailoring: e.g., matching to self-monitoring scores; **(d) Functional & Context:** e.g., matching to hedonic product;
(e) Framing & Tailoring: e.g., matching frames to measured risk perceptions; **(f) Framing & Context:** e.g., matching frames to risk-related primes;
(g) Functional, Tailoring, & Framing: e.g., matching frames to individual differences in approach motivation; **(h) Functional, Context, & Framing:** e.g., matching frames to regulatory focus primes

3. Theoretical Review: Delineating Candidate Principles to Guide Message Matching Effectiveness

As overviewed until now, there is a vast literature on message matching interventions. This research has worked to establish that message matching is often effective in improving the effectiveness of persuasive communication. However, this work also shows a wide heterogeneity in the success of different interventions. Consequently, most authors have agreed that the next generation of research should move from establishing whether message matching is effective, to delineating principles regarding when matching interventions should be used, how to optimally design matching interventions to maximize their impacts, and regarding the processes that underlie these effects (Hawkins et al., 2008; Joyal-Desmarais et al., 2020a; Noar & Harrington, 2016; Updegraff & Rothman, 2013).

One of the main goals of this dissertation is to focus on explaining when matching effects are expected to be smaller or larger in magnitude. In this section, I explore the impact of three broad themes I believe can help us achieve a deeper understanding of message matching interventions.

1. First, I propose an extension to the way in which we *conceptualize* message matching and call for a closer inspection of the types of comparisons we evaluate message matching effects against.
2. Second, I discuss themes associated with the *degree* to which messages are matched to a person's characteristics.
3. Third, I briefly discuss the specific *characteristics* to which can match messages.

I describe these three themes in turn.

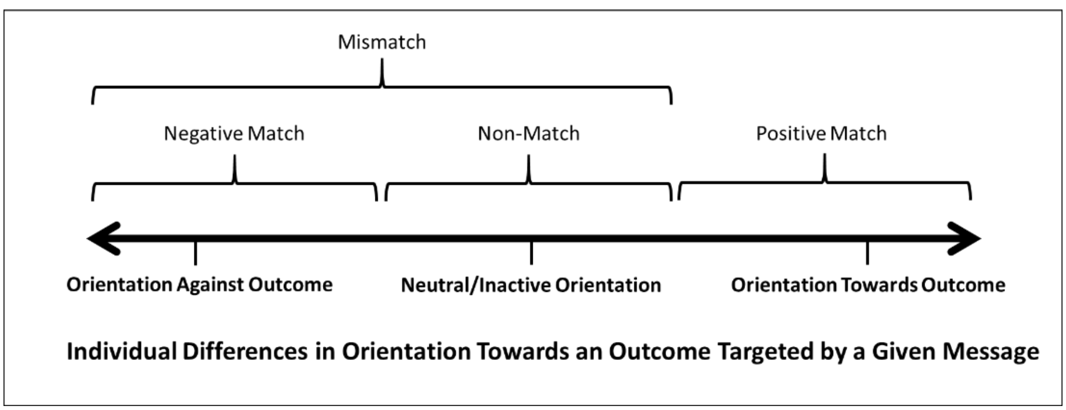
3.1. Principle 1: Conceptualizing Message Matching Effects along a Continuum

So far, I have conceptualized matched messages as messages whose features are congruent with a given characteristic of a person or their situation. Given this understanding, how do we define what constitutes a matching effect? Generally, a *matching effect* refers to the effect (on attitudes, intentions, behaviors, etc.) of delivering a message whose features are systematically selected to be congruent with a target characteristic, compared to effect of delivering a message that is not systematically selected for congruency (i.e., a comparison message condition). In some studies (e.g., commonly the functional matching and message framing literatures), the comparison message is conceptualized as one which is not congruent with a particular characteristic (i.e., a message that is “mismatched”), but in other studies (e.g., commonly in the message tailoring literature) comparison conditions also include other types of messages such as the use of a generic message that takes the same form regardless of whom it is delivered to. Although there is an implicit consensus among authors as to what characterizes a matched message (i.e., the intervention condition), there appears to be considerable heterogeneity in what is considered an appropriate comparison condition to a matched message. This can be problematic as different types of comparison conditions are likely to have different implications for inferences regarding the presence, direction, and magnitude of matching effects. Consequently, in this section, I present a way to think about matching effects, and provide a theoretical scheme for understanding, classifying, and understanding different types of comparison messages.

First, one of the main mechanisms thought to underlie matching effects is the degree to which messages appeal to people's motivational orientation. This logic is most explicit in the functional matching literature where messages are explicitly matched to motivational variables. However, it is also evident in the message framing literature, where messages are either matched to individual differences on explicitly motivational variables (e.g., BIS/BAS, regulatory focus), or to a motivational orientation we seek to induce (risk avoidance vs. risk-seeking). In the message tailoring literature, there are also instances where messages are matched to explicitly motivational characteristics (e.g., matching a smoking cessation program to people's stated motivations to quit; Strecher et al., 2008). However, we can also typically assume that motivational forces are at play even when matching is effected to a variable that is not explicitly construed as motivational. For example, variables in health behavior theories commonly entail motivational processes (e.g., risk- and benefit-perceptions entail elements that people want to avoid/achieve), and so do most identity-related variables (including virtually all group-membership; Austin & Vancouver, 1996; Higgins, 1996; Hogg, 2000; 2003; Markus & Kitayama, 1991; Tajfel, 1974).

Generally, it may be maintained that all characteristics targeted by a message matching intervention will rely at some level on the operation of an underlying motivational orientation. Theoretically, such motivational orientations will vary according to the degree to which people are *positively inclined towards* achieving a given outcome, or *negatively inclined against* achieving the outcome. For example, if we are considering a person's motivation to seek personal autonomy, individuals may vary to the degree that they find such a goal appealing or aversive (e.g., if they are instead seeking to increase interdependence with others). If they find the pursuit of autonomy appealing, then they should be *positively* inclined towards receiving a message that presents an opportunity to achieve such a goal. If they find the goal aversive, however, they should instead be *negatively* inclined towards the message. Finally, if a person is simply indifferent to the pursuit of autonomy, they will likely be relatively unaffected by the message. Traditionally, theorizing about message matching has only explicitly delineated the first of these three situations, assuming that message matching is a psychological phenomenon that mostly operates at the level of increasing the degree to which people are receptive to a given message intervention. However, I suggest that the same sort of mechanism can explain situations of *active resistance* to persuasion. Just as people may be actively more persuaded by messages that are congruent with their motivational characteristics, people may also be actively *dissuaded* by messages that are incongruent with their motivational characteristics. Using Figure 3 as a guide, I offer a typology of message matching conditions, and discuss the implications of using messages that vary in their levels of (in)congruency with the underlying motivational characteristic being targeted.

Figure 3. Continuum of Message Matching from Positive to Negative Matching.



3.1.1. Positive Matches. First, messages that are *positively matched* represent the prototypical matched message described in the literature, by which the features of a message are *congruent* with the characteristics to which they are matched. For example, a gain-framed message is a positive match if it is delivered to individuals who score highly in promotion focus, or if it is delivered in the context of a behavior that is perceived as low in risk. Generally, a positively matched message is expected to lead to the highest level of persuasion and reflects the intervention condition of most studies in the message matching literature. Given that these types of messages are typically the theoretical focus of works on message matching, and relatively well-understood, we focus most of our discussion on the types of message matching conditions to which positive matches are compared. I note that I have appended the word *positive* to qualify this type of message condition instead of simply using the term "match". This enables us to acknowledge that the act of "matching" a message need not deliberately aim for congruency with a given characteristic. To the extent that a message is deliberately assigned to "mismatch" a characteristic, this still reflects the act of active matching on the part of a researcher or interventionist. Additionally, there have been some, albeit rare, circumstances, where researchers have sought to actively match messages to *incongruent* levels of a characteristic (e.g., Fridman, Scherr, Glare, & Higgins, 2016; Joyal-Desmarais & Snyder, 2016).

3.1.2. Mismatched Messages. *Mismatched messages* are messages whose features *do not* correspond to the characteristics to which they are matched. For example, these represent messages that do not utilize gain frames when targeting individuals that are predominantly promotion-focused. Because such messages are not congruent with an individual's characteristics, mismatched messages are thought to elicit less successful change in attitudes, intentions, or behaviors, than are positively matched messages. Consequently, comparing a positively matched message to a mismatched message should generally lead to a matching effect (the differential effect of a matched vs. mismatched message) that will be in favor of the positively matched message relative to the mismatched message. Unfortunately, comparing a positively matched message to a mismatched message creates some ambiguity in interpretations. Specifically, a message matching effect could be significant because the positively matched message has a positive influence on a given outcome (but the mismatched message does not), because the mismatched message has a *negative* influence on the outcome (but the positively matched message has no influence), or a combination of these two types of effects. Most research that focuses on comparing a positively matched versus a mismatched message typically assume that effects reflect the former (i.e., that positive matches make a message more effective rather than a mismatch making the message less effective; e.g., Cesario et al., 2013; Updegraff & Rothman, 2013), but there are many circumstances that could potentially lead the latter pattern of effects to emerge as well. In order to disentangle these effects, it is helpful to break down mismatched message conditions into two subcategories: non-matched messages and negative matches.

3.1.3. Non-Matched Messages. The first category of mismatched messages is a *non-matched* message. This type of message targets characteristics that reflect relatively inert, and neutral, levels of a motivational orientation. For example, a message feature may be framed to describe the weight loss benefits of a particular behavior, but be delivered to individuals who show little to no motivation to seek out or pay attention to such outcomes (e.g., individuals with little to no interest in weight management). Because non-matched messages are delivered to theoretically inactive characteristics, these messages should have relatively low persuasive influence, but should not exert a negative influence either (i.e., they should not hinder persuasion success). This sort of comparison group is often theoretically implied in the message matching literature. For example, most message matching principles outlined by stage theories of health behaviors (e.g., Prochaska, Norcross, & DiClemente, 2013; Weinstein, Lyon, Sandman, & Cuite, 1998; Weinstein, Rothman, & Sutton, 1998; Yoda, Nahl, & Crosby, 2013) call for the comparison of a positively matched message (matched to the stage an individual currently is at) versus a non-match message (matching to another stage). Mismatching based on a stage in decision-making is not thought to influence individuals negatively (e.g., by shifting their intentions further way from the behavior), but is instead thought to simply fail to be effective at positively influencing individuals. For example, if a message is aimed at increasing awareness of an issue (e.g., via attention-grabbing visuals), it will be quite effective (i.e., be a positive match) for individuals who are not yet aware of the issue, but may not matter much to individuals who have already given the issue much thought (i.e., be a non-match for these individuals).

Another example where non-matches are likely prevalent comes in message framing effects when matching to individual differences in regulatory focus (Higgins, Shah, & Friedman, 1997). For example, imagine the comparison of a gain framed message given to individuals who are either predominantly prevention-focused or predominantly promotion-focused. For predominantly promotion-focused individuals, the message will represent a positive match. For individuals who are prevention-focused, however, the message will tend towards being a non-matched message. This should occur for two reasons. First, the two regulatory foci are typically construed as relatively independent of one another (Higgins et al., 2001; Higgins et al., 1997), and being highly prevention-focused is only described as influencing inclinations towards the presence and/or absence of losses, but not of gains. Second, being low in promotion focus is only described as lowering the degree to which one is responsive to gain frames, but isn't described as making such frames negatively influential. Therefore, giving a gain frame to a predominantly prevention focused individual, or to someone who scores low in promotion focus, should be related to less responsiveness to a gain frame message, rather than reversing the direction of influence by making them less likely to comply with a recommendation.

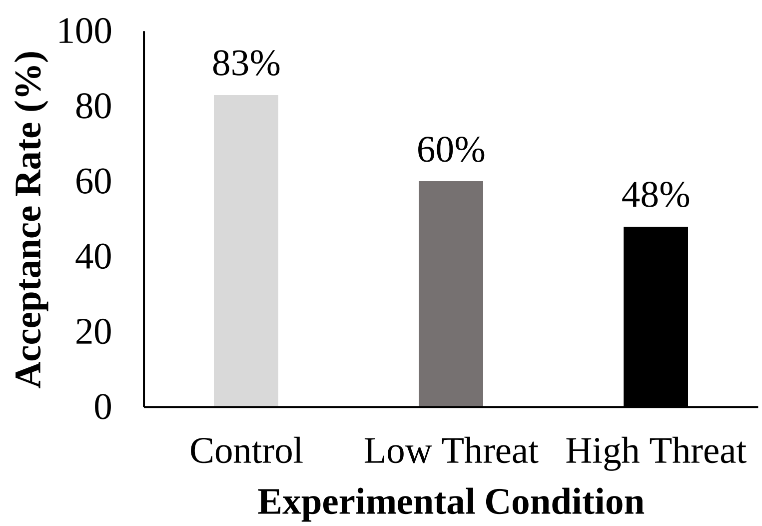
One of the interesting aspects of a non-matched message, is that their relatively neutral status could, under the right circumstances, potentially provide benefits over matched messages. Some authors have argued that because messages that are positively matched to a person's regulatory focus increase the intensity of their experiences processing a message, this can be problematic when the message involves information that a person may find distressing (Fridman et al., 2016). For example, messages that inform illness diagnosis, poor prognosis, or of important side effects to a treatment, may each be perceived as highly distressing. In such cases, using a message that reduces the likelihood that an individual experiences heightened emotions in response to a message can be an effective way to control distress, and help individuals be more open to the recommendations being communicated (Fridman et al., 2016). The key to these benefits, is that a mismatched message can induce weaker emotional reactions than positively matched messages. We can expect this to be true of non-matched messages, but there are types of mismatched messages that might lead to greater emotional reactivity, and negative reactivity. We turn to these next.

3.1.4. Negatively Matched Messages. The second category of mismatched messages reflects the idea of *negatively matched* messages. Generally, a message may be negatively matched when the features of the message were manipulated and delivered in such a way that they appeal to a motivational orientation that is *contrary* to a characteristic's own orientation. Imagine again a message promoting the weight loss benefits of a particular behavior. When administered to an individual who is strongly motivated to lose weight, such a message would represent a positive match. When administered to an individual who is indifferent to weight loss goals, this message would represent a non-match. However, when it is instead administered to an individual aiming to *gain* weight, the message would be considered a negative match. In contrast to non-matches, negative matches not only fail to improve persuasion, but may actually backfire and make individuals *less* likely to adopt a particular recommendation than if they had seen any other message, or even had they not seen any message at all.

Backfiring effects have a long history in the persuasive literature. The most well documented circumstance in which persuasion backfires is exemplified by the long-standing works by Brehm and colleagues on Reactance Theory (Brehm, 1966; Brehm & Cohen, 1962; Brehm & Brehm, 1981; Miron & Brehm, 2006). According to Reactance Theory (Brehm 1966), individuals are motivated to achieve and maintain a sense of freedom in their lives. When individuals sense that their freedoms are threatened, they experience a state known as psychological reactance, which motivates them to restore their threatened freedoms. In the case of persuasion, this dynamic typically emerges when an individual perceives a persuasion attempt to be encroaching on their need to determine their own decisions. Depending on how strongly a persuasion agent pushes to try and convince someone, the more the individual may feel like their freedom is being threatened, and react against the source.

In 2016, we argued and conducted a study (Joyal-Desmarais & Snyder, 2016) to extend the ideas of reactance theory to the message matching domain. In this study, we defined threats to a motivational orientation as information conveying/inducing outcomes that were contrary to a person's goals and argued that threats to other motivations than the need for freedom could also lead to feelings of reactance. Furthermore, we expected that the degree to which individuals would experience reactance would be directly related to the degree to which they endorse the motivation being threatened by a given message. In our study, individuals completed a measure of individual differences in 6 motivational dimensions that predict people's engagement in volunteerism (Clary et al., 1998). Then, participants were asked to read one of 7 short narratives describing an experience at a volunteer organization and were later asked whether they would be interested in joining the organization. Each narrative was almost identical in content and described generally neutral experiences with the volunteer organization in which both benefits, and disadvantages were discussed. In a control condition, the discussion of the benefits and disadvantages did not target any of the 6 motivational domains we assessed. However, in each of the 6 other conditions (the experimental conditions), the *disadvantages* were deliberately matched to target each of the 6 motivational domains. In this study, we found that individuals were generally more inclined to express interest in the volunteer opportunity than not, but that individuals were reliably less likely to express interest as the description they read threatened a motivation they valued more highly. These results are summarized in Figure 4. This study was unique in that it compared negatively matched to non-matched messages, and showed that matching effects could operate in the opposite direction than typically assumed in the message matching literature (e.g., it examined how negative matching can lead to reduced and/or reversed influence effects, rather than how positive matching leads to increased influence). Although the results of this study only offer preliminary evidence towards the existence of negative matching effects, the possibility of negative matching effects occurring elsewhere are likely to be high.

Figure 4. Persuasion at Different Levels of Threat Induced by a Message.



Note. Representation of findings by Joyal-Desmarais & Snyder (2016). Participants read a persuasive anecdote written to promote a hypothetical volunteer opportunity. In each condition, the anecdote acknowledged the existence of several downsides to the volunteer experience. In the control condition, these downsides were framed as relatively neutral criticisms. In the “low threat” condition, participants read criticisms invoked towards motivational functions they rated as less personally relevant. In the “high threat” condition, they read criticisms that invoked goals they rated as more personally relevant.

3.1.5. Why is it important to separate mismatched messages into two types?

One of the main reasons to consider these different types of matching effects is that current works may be confounding different types of message comparisons, which can influence the validity of our inferences, and, in turn, have important implications for practice.

Generally, when a message matching effect is observed and is positive in direction (i.e., authors find a positive advantage for a "matched message"), this could result from many different types of effects. First, it may be that a positively matched message is more successful than a non-matched message. This is the most typical interpretation made by authors and suggests that interventionists should expend resources to make use of positively matched messages to improve interventions. However, this pattern of effects can also arise from comparing positively matched to negatively matched messages. In such a situation, a significant difference is considerably more difficult to interpret. Such a difference could be due to: the positive effect of a positively matched message (the typical interpretation), the negative effect of a negatively matched message, or a combination of both. Consider a third scenario as well, whereby the "matched message" has been incorrectly specified, and is actually a non-match, and the comparison consists of a negatively matched. Once again, the true effect can represent a negative matching effect, rather than a positive one. These alternative interpretations are important to consider, as they have substantial implications for practice. Specifically, to the extent that matching effects are driven by negative matches rather than positive matches, this suggests that the goal of interventions could simply be to avoid negative matches, rather than seek out positive matches. This may be particularly useful to know as developing interventions that avoid negative matches may be less costly than ones that create positive matches. Achieving positive matching messages requires three steps. Interventionists must: (1) develop messages targeting multiple levels of a given characteristic; (2) either evaluate a target audience according to the levels of this characteristic, or manipulate the level of the characteristic contextually, and; (3) selectively distribute messages according to levels of the characteristic. Avoiding negative matches, however, may simply require neutral, non-matched messages, to be developed and distributed. When positive matches do occur, however, deploying resources to achieve them are likely worthwhile.

These distinctions are also going to play an important role when matching effects are observed such that increased positive matches lead to declines in message effectiveness. Take for example Fridman et al.'s (2016) study on the benefits of non-fit messages when delivering potentially upsetting information. To the degree that these benefits function by making use of less active (or reactive) motivational processes to their advantage, translating these findings from research to practice must also require careful crafting of messages as non-fit messages, rather than mismatched messages, generally. If negatively matched messages engender *negative* reactions in individuals, as I theorize, they may represent the worse possible message in the context of delivering distressing information, and it would be of utmost importance to make sure that mismatched messages are specifically operationalized as non-matches.

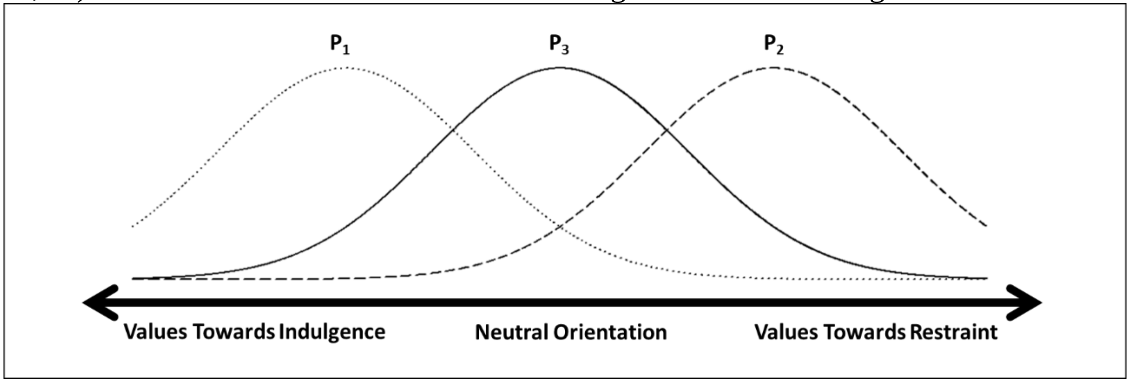
Overall, future research should more explicitly consider the distinctions I have made between non-matched and negatively matched messages to improve our inferences. In particular, both positively and negatively matched messages can benefit from comparisons to non-matched messages specifically, as comparing positive and negative matches directly to one another can be problematic in drawing inferences. Comparisons of all three types of messages may be especially informative as well.

3.1.6. Additional Comparison Groups. So far, I have classified messages according to the degree to which they are explicitly constructed to match (positively to negatively) a characteristic. However, in designing studies and intervention that use message matching, it is often common to use a different set of comparisons that are not necessarily mismatched messages. I discuss these types of comparisons and their implications next.

Generic Messages**.** Generic messages are messages that take the same form regardless of who receives them. For example, these may be messages developed for mass communication purposes. In many ways, generic messages are the most basic comparison group to establish the applied usefulness of using a message matching intervention, as they represent the typical alternative that are used in campaigns and intervention programs. Using generic messages as a comparison group answers the question: is using a message matching intervention more effective than distributing a singular, uniform message to an entire population?

When considering generic messages, it is important to consider that these are not necessarily non-matched messages, and can also represent varying degrees of negatively- and positively-matched messages. The degree to which they reflect a particular type of match is dependent on the average standing of an audience (i.e., population) on a characteristic of interest, and the spread of scores on that same characteristic. Consider for instance, the scenario depicted in Figure 5.

Figure 5. Hypothetical Depiction of the Distribution of Scores of Three Populations (P_1, P_2, P_3) on a Characteristic that Varies in Valuing Restraint vs. Indulgence.

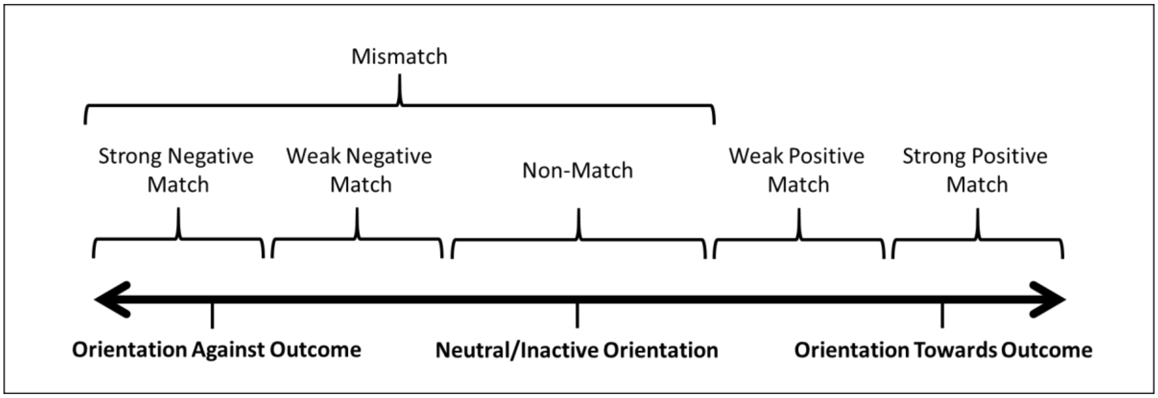


In Figure 5, the distribution of scores belonging to three populations (P_1, P_2, P_3) are displayed on a characteristic that varies in preferences between two opposing poles. In this example, the 3 populations may reflect three distinct countries, and the distribution of scores reflect scores on the cultural dimension of indulgence vs restraint (Hofstede, 2011). In one population, P_1, individuals dislike being restrained by social regulations, and want the freedom to live a more hedonistic lifestyle. People in a second population, P_2, adopt an opposite perspective, preferring social order to be strictly reinforced, and actively discourage the pursuit of strong personal experiences. A third population, P_3, is composed of a group of individuals with more moderate preferences. Now imagine two messages are designed. The first message contains appeals to indulgent values, whereas the second message contains appeals to values of restraint. If the first message is given to each population, it will be, on average, a positive match for members of P_1, a non-match for members of P_3, and a negative match for members of P_2. If the second message is given to each population, the pattern is reversed. It will on average be a negative match for members of P_1, a non-match for members of P_3, and a positive match for members of P_2. In this scenario, there are likely fewer benefits to using message tailoring for P_1 or P_2, as a single message can accommodate most members of either group. For P_3, using either message non-discriminately, however, is unlikely to be a very effective strategy. Instead, a message matching paradigm could be useful in assigning a restraint-themed message to those with personal leanings towards restraint, and an indulgence-themed message to those with personal leanings towards indulgence. We can probably expect that for most characteristics, populations will often lean relatively towards one side or the other (even if only a little). If we assume that interventionists developing generic messages for a specific population are aware of the general preferences of the population and that the messages are well-crafted, generic messages may function as positive matches for a larger portion of a given sample than the portion of the sample for which they are functioning as negative matches. Consequently, we could expect expertly-crafted generic messages to outperform messages specifically determined to be non-matches.

No-Treatment. No-treatment groups are a type of control group in which participants are not exposed to any intervention. In contrast to using generic messages as a control, which focuses on evaluating message matching relative to a common alternative strategy, the use of a no-treatment control group seeks to establish the absolute effects of exposing participants to a message matching intervention. The corresponding limitation is that effects attributed to message matching are confounded with every characteristic of the intervention that are separate from the *matching* protocol itself. For instance, any benefits of such an intervention could reflect receiving *any* intervention, rather than receive a matched message per se. No-treatment control groups have commonly been used in the message tailoring literature, and most message tailoring meta-analyses include no-treatment control groups when calculating overall effects in addition to mismatched and generic message comparison (e.g., Huang & Shen, 2016; Lustria et al., 2013; Noar et al., 2007; Sohl & Moyer, 2007). In contrast, meta-analyses and syntheses of functional matching and message framing typically exclude studies that use no-treatment controls in favor of other types of comparison groups (e.g., Carpenter, 2012; Gallagher & Updegrafff, 2012). Because no-treatment conditions do not allow us to isolate the benefits of the *matching* element of message-based interventions, I will not discuss this type of comparison further.

***Low Positive Match*.** A low positive match message represents a comparison group that only partially matches the characteristics of an audience, relative to the extent to which a positively matched message does. For example, in certain studies, the intervention group may be matched to multiple characteristics at a time (e.g., to a person's name, to their self-reported barriers to engaging in a behavior, and to their personal values), whereas the comparison group is matched to a smaller set of characteristics (e.g., only to self-reported barriers). This sort of design has been used in several message tailoring studies (e.g., Joyal-Desmarais et al., 2020a; Strecher et al., 2008), and allows us to examine the relative impact of using a larger degree of matching relative to a lesser degree (an idea discussed further in section 3.2.). Theoretically, the idea of "low positive matches" entails breaking down positive matches into stronger vs. weaker positive matches. We can also extend a similar logic to negative matches, which would result in Figure 6. That said, given that the literature has yet to distinguish negative matches from non-matches, it is likely premature to further divide negative matches.

Figure 6. Extension to Figure 3, Breaks Down Positive and Negative Matches into Weaker vs. Stronger Subtypes.



Mixed Appeals. Sometimes, interventionists are interested in the relative effectiveness of a positively matched messages, to a message that contains several elements meant to appeal to different segments of the population. For example, instead of assigning gain- or loss-framed messages based on a message matching paradigm, individuals could all receive a message composed of both types of frames. To the degree that mixed appeals are as persuasive as positively matched messages, incorporating mixed appeals into generic messages could be a more cost-effective means than message matching. Although a few studies have found that mixed appeals are less effective than using only one type of positively matched appeal (e.g., Gainforth et al., 2012; Lavine & Snyder, 1996), the relative effectiveness of mixed appeals relative to positively matched messages remains to be examined systematically.

3.2. Principle 2: Thinking about the *Degree* to which Messages are Matched.

Now that I have covered the theme of how we conceptualize message matching effects (and the comparison groups we use to evaluate them), I discuss a second large theme that impacts the creation and distribution of message matching interventions.

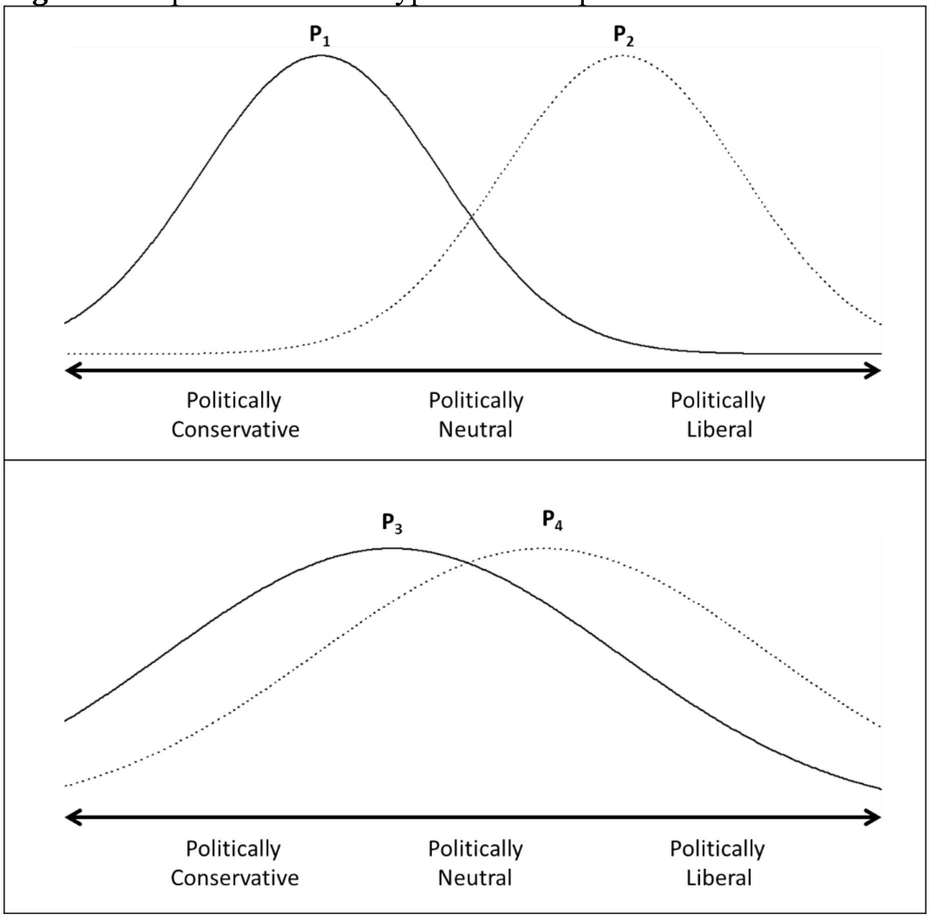
Specifically, when designing message matching interventions, a major decision that interventionists must make is the *degree* to which message features are altered to match characteristics. Theoretically, we can either increase the *specificity* to which altered message features match a person's characteristics, or we can increase the strength with which message features match a person's characteristics (in a sense, increasing the *dosage* of a message matching intervention). I discuss these two approaches in turn.

3.2.1. Specificity of Message Matching. Message matching interventions are predicated on interventionists' ability to accurately identify when and for whom a particular type of message should be utilized. Consequently, the specificity with which the characteristics of an individual, a group, or a situation can be accurately captured is essential to the process of creating optimal message matching interventions. Here, I describe two ways of increasing the specificity with which we ascribe characteristics to use for message matching. These include: (1) using more individualized assessments of individuals' characteristics, and; (2) obtaining a more nuanced assessment by considering multiple characteristics at a time.

a. Using Individualized over General Assessments. Theorizing in message tailoring has argued that message-based interventions can be classified according to the extent that their content is individualized to their audience based on individual-level assessments (Hawkins et al., 2008; Kreuter et al., 1999; Noar & Harrington, 2016). Along these lines, authors have commonly made distinctions between the use of *generic messages* that take the same form for an entire audience, messages that are targeted to the characteristics of a group (i.e., *group targeted*), and messages that are *individually tailored* to the characteristics of a given person (Hawkins et al., 2008; Kreuter et al., 1999; Noar & Harrington, 2016). The more individualized a message, the more persuasive potential it is thought to have. However, more individualized interventions also require a larger amount of resources to implement. Consequently, the cost-effectiveness of an intervention is a function of the gain in persuasion obtained relative to the increase in cost incurred thought greater individualization. Generally, message tailoring research has established that individually tailored interventions are more persuasive than generic messages, but the effect tends to be relatively small (around r = .07 to .10; Lustria et al., 2013; Noar et al., 2007; Sohl & Moyer, 2007). The relative persuasiveness between individually tailored and group targeted interventions, however, remains to be established.

The idea that message matching interventions vary in the extent to which they are individualized can also be applied to functional matching and message framing paradigms as well. In these literatures, we commonly find both matching to group- and individual-level characteristics. For instance, interventionists may allocate independence and interdependence-themed messages based on people's country of residence (e.g., giving a message containing themes of independence to a U.S. sample and a message containing themes of interdependence to a Japanese sample of participants). Alternatively, interventionists may assess an individual-level characteristic and assign messages based on individuals' scores (e.g., assigning independence/interdependence-themed messages according to whether individuals score higher on a measure of independent or interdependent self-construal). Theoretically, the relative benefit of matching to group- vs. individual-level variables depends on the degree to which groups display non-overlapping distributions on a trait of interest. For example, consider the scenarios depicted in Figure 7.

Figure 7. Depiction of Four Hypothetical Populations' Political Orientation Scores.

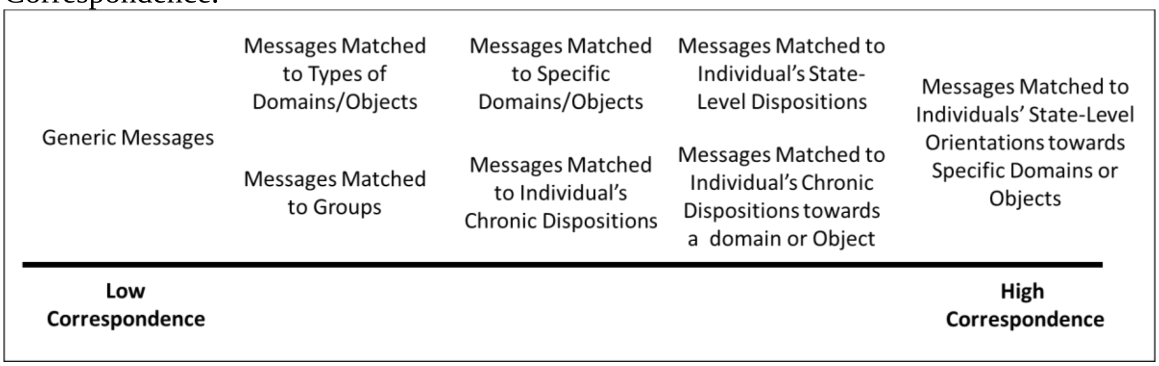


In the upper panel of Figure 7, the distribution of two groups' (P_1 and P_2) political orientations are depicted. The scores of individuals in both groups are normally distributed, and little overlap in scores exists between the two groups. Group P_1 is generally conservative, whereas Group P_2 is generally liberal. In such a situation, matching messages according to group memberships is likely to lead to similar levels of persuasion as matching directly to individually-assessed political orientations, and would likely be a much more cost-effective option. However, in the study of individual differences, such little overlap between group scores is often the exception rather than the rule. Many individual difference measures might instead vary between groups in a pattern like the lower panel of Figure 7. In such a case, group P_3 is generally conservative, and group P_4 is generally liberal. However, there exists a great deal of variability within each group, and the distribution of scores overlaps significantly between the two groups. In this situation, matching messages to groups may be more persuasive on average than using a generic message, but many individuals risk being misclassified as many members of groups P_3 may have liberal orientations, and many members of P_4 may have conservative leanings. Consequently, matching to individually-assessed differences is likely to be considerably more effective than matching to group memberships. Given that many psychological characteristics show a large amount of variability within groups, and that between group differences are often small, situations such as depicted in the lower panel of Figure 7 may be common. As such, we might expect that when matching is made to psychological variables, that matching to individuals is generally more effective than matching to groups.

We can also extend a similar logic to cases when matching involves attitudinal or behavioral domains/objects. For example, in message framing research, illness detection behaviors refer to a class of behaviors that are, on average, seen as riskier than an average prevention behavior. However, within that class, some behaviors likely entail higher and lower perceived risks (e.g., cancer screening may be perceived as especially risky, whereas cavity detections may be perceived as relatively less risky). Consequently, the usefulness of matching to a characteristic belonging to a class of behaviors is a direct function of the distribution of scores within that class, and its relative overlap with the distribution of a scores belonging to a different class. The more heterogeneity and overlap that exists between two classes (e.g., the more the distribution of risk perceptions associated with prevention and detection behaviors resembles the lower panel in Figure 7, rather than the upper panel), the more matching to the class (e.g., detection behavior) should be less effective than matching to the level of risk associated with a specific behavior (e.g., cancer screening).

By considering the case of matching to domains/objects in addition to the characteristics of an audience, we can formulate a more general conceptualization of matching than has been formulated in the message tailoring literature. Specifically, instead of speaking of the degree to which message matching is *individualized* (to the audience of an intervention), we can consider the degree to which matching is *correspondent* to the characteristics of the individuals *and* to the characteristics of contexts (i.e., attitudinal and behavioral domains/objects) in which interventions are applied. From this generalization, we can conceptualize additional ways of increasing the correspondence of message matching interventions, and possibly their effectiveness as well. For example, if an intervention matches messages to chronic predispositions (e.g., regulatory focus), it might be made more effective by matching to current state-level dispositions instead. Research that induces motivational orientations (e.g., via priming) may implicitly be operating in a similar way by manipulating state-level characteristics. We can also combine matching to a domain/object and to individual-based predispositions by matching to individually-assessed characteristics of domains/objects. For example, this might involve matching message frames to the risk-avoidance tendencies specific individuals take when considering the particular behavior of interest, instead of matching to such individual’s general risk-avoidance tendencies, or to the extent to which people generally adopt risk-avoidance tendencies when dealing with the behavior. Figure 8 gives examples of matching strategies at varied levels of correspondence. The idea here is similar to the principle of correspondence that has been discussed in the Reasoned Action Approach for predicting behaviors (e.g., Ajzen & Timko, 1986).

Figure 8. Different Message Matching Strategies Based on Their Degrees of Correspondence.



b. Considering Multiple Characteristics at a time. In addition to maximizing correspondence between message matching and the characteristic we are targeting, it is also possible to increase the specificity between a message and a person by matching messages to multiple characteristics simultaneously. Generally, research has argued that matching messages to a larger number of characteristics should lead increased relevance of the message for its recipient, and thereby increase the persuasiveness of the message (e.g., Strecher et al., 2008). However, evidence for this premise has been inconclusive. For example, a meta-analysis by Noar and colleagues (2007) found that matching messages to 4-5 characteristics was more effective that matching to 0-3 characteristics, but did not find differential effectiveness between interventions matching to either 0-3 characteristics or 6-9 characteristics. Additionally, research in this area has typically suffered from methodological limitations which have made it difficult to examine the degree to which effects are due to targeting larger/smaller numbers of characteristics, or due to targeting different types of characteristics altogether (Joyal-Desmarais et al., 2020a). Theoretically, we can still expect that matching to a larger number of traits generally has the potential to increase persuasion over matching to a very small number of traits. However, it is likely that the effect would level off at some point. It is also possible that increasing the specificity between matched content and personal characteristics too much could increase resistance to persuasion if people begin experiencing the message content as too personalized and intrusive (e.g., Van Doorn & Hoekstra, 2013; White, Zahay, Thorbjørnsen, & Shavitt, 2008). Consequently, determining the optimal number of traits to use for matching messages remains an important priority for future efforts.

3.2.2. Dosage of Message Matching. So far, we have discussed ways in which we can increase the specificity with which we select message features to vary according to the characteristics of individuals and their contexts. However, once we have determined what kinds of features to alter in a message, to what degree should we alter these features? For instance, if we determine that an individual may respond more positively to gain-framed messages, how do we decide the number of gain framed messages to use? Should we use gain frames only for strong arguments, or for weaker arguments as well? Should we use only gain-framed messages, or would including some neutral and/or loss-framed messages still be beneficial? Lastly, should we expose people to a set of gain-framed messages repeatedly over time, and if so, how often should we deliver such messages to obtain maximal impact? Theoretically, we can conceive these questions as dealing with the specific dosage of the message matching features we administer. *Message dosage* can be defined as the strength with which a message feature is being administered and manipulated to target a given characteristic (Rothman et al., 2020). I propose that message dosage can be divided into at least four types: (1) Dosage frequency; (2) dosage intensity; (3) dosage ratio, and; (4) dosage exposures. I discuss each in turn from a theoretical viewpoint, as these elements have not been empirically studied in a systematic fashion to date.

a. Dosage Frequency. Dosage frequency refers to the number of times a message intervention contains a feature that is altered to match a given characteristic. For example, in designing a gain-framed message, dosage frequency may be the number of gain-framed statements included in a booklet promoting a behavior.

Dosage frequency is unlikely to have a completely linear relationship to message persuasiveness. To start, at least some dosage frequency (i.e., at least a frequency of 1 framed statement) is needed to theoretically obtain a matching effect. If increased dosage frequency increases persuasion at low levels, it cannot lead to increased persuasion forever, and there will inevitably come a point at which increasing dosage frequency will no longer increase the effectiveness of a message. After this point, one of two things will occur. First, message persuasiveness may remain at a high level, and simply level off. Alternatively, it is possible that at some level, the effectiveness of messages begins to decline. If for no other reason, this may occur out of audience fatigue from being exposed to increasingly larger numbers of messages. After reading 10 gain-framed messages, an individual may buy into the recommendation, but after 100 gain-framed messages, the individuals may become tired, frustrated, or even annoyed with the persuasion attempt.

Such experiences would likely lead to increased resistance to persuasion. One element to consider with dosage frequency, is that this factor is likely to be highly related to overall message length. Research to date, however, has neither determined the effectiveness of message matching interventions according to either the length of such messages, or the dosage frequency controlling for the overall length.

b. Dosage Intensity. Dosage intensity refers to the extent to which manipulated features are designed to arouse strong experiences. For example, a statement urging individuals to eat fruits and vegetables to alter their chances of developing cancer may be experienced as more intense than a message urging individuals to eat fruits and vegetables to change their experiences of variety/boredom while eating (regardless of whether such messages are framed in terms of gains or losses). A message that mentions an outcome that a person has personal experience with, may also lead to greater intensity than a message that mentions an outcome a person does not have experience with. For example, a person is likely to experience a message that mentions odds of developing cancer as more intense if that person, or a close other, has experienced cancer before. Dosage intensity can be either a property of each given manipulated message element (e.g., each given statement will have a certain level of intensity), or a property of the overall message itself (e.g., the average intensity of each manipulated statement, or an overall property of the collection of statements containing the manipulation).

Theoretically, we may again expect dosage intensity to show a nonlinear relationship with message effectiveness. To the degree that acting on a message (changing one’s attitude, intention, or behavior) depends on experiencing at least some emotional response, increasing dosage intensity should improve persuasion. However, if a message reaches a point that the emotional experience associated with reading it is too intense, individuals may begin to feel fatigued by the experience and withdraw their involvement. Alternatively, they may also feel overwhelmed by the experience and disengage for that reason instead. These types of effects have long been discussed in domains like fear appeals, where concerns have been raised that higher fear-arousal can lead to defensive reactions and less effective persuasion (especially in the absence of coping information; Janis & Feshbach, 1954; Ruiter, Kessels, Peters, & Kok, 2014; Witte & Allen, 2000). It is possible that such dosage frequency effects may be more pronounced when messages involve negative information (e.g., when they use fear appeals, or loss frames) than when they use positive information (e.g., gain frames). However, they may still occur for positive messages if such messages are exhausting/overstimulating.

Although the effect of dosage intensity has not been studied systematically, there are a few related features of message matching interventions that have been varied across studies. In particular, dosage intensity may be related to the modality through which messages are presented. For instance, we can stipulate that messages delivered through more involved modalities (e.g., in-person communication or audio-visual presentations) may have higher intensity on average than messages delivered through less involved modalities (e.g., messages conveyed solely through text). Research syntheses to date provide some evidence that matching interventions using more involved modalities may have stronger effects (e.g., Huang & Shen, 2016; Krebs et al., 2010; Sohl & Moyer, 2007). However, because interventions effects are commonly evaluated relative to comparison groups that are not exclusively mismatched comparisons (e.g., comparisons may be to no-treatment controls), it is difficult to establish whether more involved modalities lead to stronger matching effects specifically, or simply to stronger intervention effects in general.

c. Dosage Ratio. Dosage ratio refers to the proportion of manipulated message features that correspond to a given level of the manipulation, relative to one or more of the other levels. For example, consider a message that contains 8 gain-framed statements, 4 loss-framed statements, and 4 statements not containing a frame (i.e., they may be neutral frames). This message could be said to have a ratio of 2:1 for gain vs. loss frames, 2:1 for gain vs. neutral frames, 1:1 for loss vs. neutral frames, 1:1 for gain vs. other frames, and so forth. Unlike dosage frequency and intensity, dosage ratio is a relative rather than an absolute measure of dosage.

In the functional matching and message framing literatures, researchers have most commonly aimed for a 1:0 (or 0:1) ratio between two levels of a particular message feature. For example, messages may be set to either contain several gain-framed messages but no loss-framed messages, or several loss-framed but no gain-framed messages. Alternatively, a message matched to high or low self-monitoring may contain only value-expressive arguments, or social adjustive arguments. As mentioned in the previous section on mixed appeals, some authors have examined the effectiveness of mixed content messages (e.g., containing both gain- and loss-framed arguments, or both value-expressive and social-adjustive content; Gainforth et al., 2012; Lavine & Snyder, 1996). Theoretically, one would expect such messages to be less effective, as they contain fewer matched elements, and several studies attest to this (e.g., Gainforth, et al., 2012; Lavine & Snyder, 1996). However, this idea has not been reviewed systematically.

Additionally, researchers have yet to examine whether the ratio of neutral content to matched content (e.g., ratio of neutral frames to gain frames) in a message dilutes the effectiveness of the matched content.

d. Dosage Exposures. Dosage exposure refers to the number of times individuals are exposed to a message matching intervention. In their meta-analysis, Noar and colleagues (2007) found that message tailoring interventions that consisted of more than one contact point with participants (i.e., interventions for which individuals were re-exposed to a message at least once) outperformed message tailoring interventions with only a single contact point. In another meta-analysis on computer-based message tailoring interventions, however, the use of multiple exposures to a message tailoring intervention did not lead to an increase in persuasion (Lustria et al., 2013). If anything, this latter meta-analysis found that using multiple message exposures was slightly less effective.

These mixed findings may be attributed to several factors. First, studies in reviews that used multiple exposure points often attempted to elicit more complex behavior change than interventions using single exposure designs (Lustria et al., 2013). Second, it is possible that dosage exposure effects may be nonlinear in nature. Generally, research on persuasive communication finds that repeated exposure to a persuasive messages is commonly characterized by two stages. The first stage, often called the “wearin” stage, involves a period when increased exposure leads to positive persuasion effects. The second stage, often called the “wearout” stage, typically entails repeated exposures to either cease having an effect, or to even trigger a negative response from an audience (Berlyne, 1970; Lehnert, Till, & Carlson, 2013; Shi & Smith, 2016). These two effects combine to create an inverted U-curve by which initial repetition leads to increased persuasion, and later repetition leads to a decline. Although such a curve has not been examined in the message matching literature, it is quite possible that repeated exposures to message matching interventions would similarly be characterized by two such phases. Given that neither of the meta-analyses by Noar et al. (2007) or Lustria et al. (2013) took into account how many additional exposures were used, it is unknown whether the effects may have captured wearin or wearout phases. That said, Noar et al. (2007) aggregated interventions with a median of three exposure points, whereas Lustria et al. (2013) included studies of computer-based interventions which likely made it easier for larger number of exposures to be effected. If Lustria et al. (2013) captured a larger amount of wearout effects through repetition, then the lack of benefits associated with using multiple exposures to message matching interventions would make sense. Future research should attempt to provide more nuance to this question by making finer distinction between the amount of times that individuals are re-exposed to intervention materials.

3.3. Principle 3: Characteristics Used for Matching.

The third and final large theme I will discuss is the *type of characteristics* that are used in message matching interventions. That is, what types of characteristics can we target in order to maximize the effectiveness of message matching interventions? For example, can we obtain larger effects by matching messages to a person's chronic motivational orientation, to people's evaluation of a behavior's risk level, or perhaps by matching messages to a demographic variable such as their race/ethnicity? Although the literatures on functional matching, message framing, message tailoring, and context matching have each demonstrated that message matching interventions can be effective when matching to a wide variety of possible characteristics, the relative usefulness of different characteristics to achieve larger or smaller effects remains to be established.

3.3.1. Targeting Psychologically Relevant Characteristics. One idea that has been discussed in the literature, is that matching messages to more psychologically meaningful characteristics may lead to "deeper" and more pronounced matching effects (e.g., Abrams et al., 1999). For example, one might expect more pronounced matching effects when matching messages to a person's personal motivations, or to key values from their cultural group, compared to matching messages to basic demographic variables, or superficial elements of cultural groups (e.g., norms with less importance). Few primary message matching studies have directly evaluated this proposition, but there is some evidence for the proposition in the form of past meta-analyses. In works on matching to ethnic and racial groups in the U.S., a meta-analysis by Huang and Shen (2016) found that targeting deeper cultural characteristics led to larger effects than targeting more surface-level cultural characteristics. Additionally, when looking across meta-analyses of various message matching effects, the largest overall effects have been found in works specifically tied to functional matching. Carpenter (2012) and Motyka et al. (2014) reported overall matching effects around $r = .30$, whereas overall matching effects in both message framing and message tailoring meta-analyses have typically been below $r = .10$ (e.g., Gallagher & Updegraff, 2012; Lustria et al., 2013; Noar et al., 2007). These comparisons, however, provide only indirect evaluations of this association, and may not be representative. Future primary research and research syntheses should therefore pay particular attention to the type of characteristics targeted.

3.3.2. Targeting Bipolar, Unipolar, and Categorical Characteristics. In addition to considering a distinction between more and less directly psychologically relevant characteristics, the nature of the characteristics as unipolar continuous, bipolar continuous, or categorical variables may also be informative to consider. Such distinctions can allow us to identify which types of variables may be more or less likely to produce different types of mismatches. Specifically, bipolar characteristics should be more likely to produce negative matching effects than are unipolar and categorical variables, which should be more likely to only produce non-matches. If we can expect larger benefits from an intervention that avoids negative matches relative to one that only avoid non-matches (assuming an equal likelihood of achieving positive matches), then targeting bipolar characteristics should be a more effective strategy than targeting other types. I outline my rationale in more detail below.

First, it is important to define what different types of characteristics consist of. A *unipolar characteristic* is one where a high score typically represents the strong presence of a characteristic, whereas a low score represents the absence of it. For functional characteristics, a high score therefore translates to a disposition towards seeking a particular outcome, whereas a low score represents the absence of the disposition. For example, a person’s inclination towards seeking positive experiences (e.g., approach motivation as measure by the BAS scale; Carver & White, 1994), is typically conceived of as unipolar, and is distinct from the degree to which individuals seek to avoid negative outcomes (e.g., as measured by an independent BIS scale; Carver & White, 1994). In contrast, a *bipolar characteristic* is a variable where two categorically different poles exist; that is, high and low scores represent fundamentally different states, rather than just the absence of the opposite pole. For motivationally imbued characteristics, one pole indicates a predisposition towards an outcome, whereas the other pole represents a predisposition against the same outcome, and often a predisposition towards a conflicting outcome. Political orientations, for instance, represent a bipolar construct. For unipolar constructs, mismatches can take the form of a non-match, but generally do not act as negative matches. For instance, someone who scores highly on the BAS should find potential gains appealing, but should be relatively indifferent to losses or non-gains (which are theoretically guiding by BIS scores). For bipolar constructs, however, both non-matches and negative matches are likely to be common. For example, when considering a trait such as political orientation, messages that promote liberal goals, conservatives are likely to reject. Messages that promote conservative goals, liberals will reject. In this dynamic, what one group finds appealing, the other finds aversive. However, non-matches can still be obtained if a message is presented that is politically neutral—theoretically, neither liberals or conservatives should generally react with disdain, but neither are they likely to find such messages appealing. Consequently, when considering the range of matching effects from Figure 3, we could say that bipolar characteristics are commonly capable of eliciting the full continuum of matching effects, whereas unipolar constructs are more likely to be constrained from positive matches to non-matches.[5]

---

[5]There is a caveat to this prediction when it comes to the current literature. Specifically, many researchers artificially create bipolar dimensions by computing difference scores (e.g., subtracting prevention focus scores from promotion focus scores or vice versa: Chang, 2009; Han, Park, & Khang, 2018). Although the resulting dimension is technically bipolar in nature, it lacks the key feature I describe that the poles exist in opposition to one another. Consequently, it is more difficult to make a prediction for matching to such artificially bipolar characteristics.

What about categorical constructs? These are a little more difficult to classify and may reflect a few possibilities. First, each level of a construct may be relatively distinct from one each other in a way that is non-exclusive. For example, if we consider a variable such as membership in different types of volunteer organizations, an individual may be simultaneously part of multiple groups, and membership in one group does not necessarily interfere with membership in another. Therefore, a message signaling membership with one category should be unlikely to generate aversion (and effects of such messages would likely be constrained from positive matches to negative matches). Second, it is possible that each level of a categorical construct reflect mutually exclusive groups, or that memberships in specific groups are associated with conflict with other groups. Such a dynamic has a higher potential to lead to negative matches. For example, in the United States, people's identification as being a Democrat or Republican could lead to a perception of conflict with the other group. Consequently, a mismatch between a message and an individual's own political identity (e.g., if the message comes from a source affiliated to the other Party) could lead to an aversive experience. Because categorical characteristics may conceptually reflect very different type of matching dynamics, their relative ability to lead to stronger or weaker matching effects is less clear than the comparison between bipolar and unipolar characteristics.

4. Project 1: Overview of Systematic Review and Meta-Analysis of Message Matching, with a Focus on Functional Matching

In the preceding theoretical review, I outlined and mapped out the main literatures that make up the field of message matching. I also presented three broad principles that researchers and interventionists can use when thinking about message matching interventions. Through this content, the review provided a framework for organizing past research, and for guiding future research to improve our understanding of the message matching technique, with a particular focus on when and how to design message matching interventions to improve their effectiveness. The next step of this dissertation is to begin applying the framework empirically through two projects.

The first research project I report is a systematic review and meta-analysis of the functional matching literature.[6] Through this synthesis, I organize findings from past experimental studies, evaluate the overall effectiveness of message matching interventions, and also offer insights on when message matching is most effective, and how to use message matching by using the three principles I outlined in the last section as guides. The empirical results of my dissertation focus on *functional matching* specifically, as I have mentioned that it is much less well-reviewed than the literatures on message framing and message tailoring, despite its highly prominent role in psychological research/theorizing ever since the 1950s. However, the literature search protocol and coding scheme consider the broader message matching literature. This feature will allow this meta-analysis to be expanded in the future to cover the full

[6] This project was accomplished with a team of nine individuals. Appendix I lists the unique contribution of each person.

theoretical space outlined by Figure 2; in fact, Research Project 1 is only a step in a larger systematic review and meta-analysis that has been registered (Joyal-Desmarais, Rothman, & Snyder, 2018; 2019), and will review the entire message matching literature.

4.1. Primary Hypotheses: How Effective is Functional Message Matching?

Research Project 1 for my dissertation provides initial estimates of the average effect of functional matching effects. It also seeks to qualify the distribution of functional matching effects in the literature. The examination of these questions is grounded in PICOS principles (Delineating the Population, Intervention, Comparisons, Outcomes of interest, and Study Design; see: Methley, Campbell, Che-Graham, McNally, & Cheraghi-Sohi, 2014; Miller & Forrest, 2001; Richardson, Wilson, Nishikawa, & Hayward, 1995). First, the project concerns the human population, and is not delimited to a specific demographic. Second, the intervention of interest is defined as a positively matched message condition, which is designed to explicitly match a motivational function. Third, the comparisons of interest include mismatch message conditions (including both non-matched and negatively matched message conditions), generic message conditions, low positively matched messages, and mixed appeal conditions. Fourth, the outcomes of interest involve attitudes, behavioral intentions, self-report behaviors, and objective behavior assessments. Fifth, only studies making use of experimental designs (i.e., random allocation) have been included. Given that most prior meta-analyses have found overall small-to-moderate effect sizes, I made the following hypotheses with relevance to the overall effects (Hypotheses H1-H21 were all registered with the protocol: Joyal-Desmarais et al., 2019):

H1-H4: I expected to find small-to-moderate effect sizes of functional matching interventions on attitudes (H1), behavioral intentions (H2), self-report behaviors (H3), and objective behavior assessments (H4).

All analyses are reported separately for these four outcome types. These four outcomes represent some of the most commonly reported outcomes used to evaluate the effectiveness of message matching interventions. Division of results into these categories was inspired by a few previous meta-analyses which explicitly divided their results between attitudes, intentions, and behaviors (e.g., see Appendix A: Gallagher & Updegraff, 2012; Huang & Shen, 2016; Motyka et al., 2014). This synthesis, however, is the first to make a distinction between self-reported behaviors, and objective behavior assessments, thereby building on the design of these past meta-analyses.

Within the primary goals of the synthesis, I also seek to provide meta-analytic estimates for each of the four sub-literatures making up the functional matching literature, defined by the ways studies overlap with message framing, message tailoring, and context matching, as delineated by Figure 2. Overall, I expected to find small-to-moderate effect sizes within each of the following literatures:

(1) Functional matching effects that are part of message tailoring, but *not* message framing;

(2) Functional matching effects that are part of message tailoring *and* message framing;

(3) Functional matching effects that are part of context matching, but *not* message framing, and;

(4) Functional matching effects that are part of context matching, *and* message framing

These hypotheses are not formally numbered as they were not formally specified in the registered protocol for Project 1.

4.2. Moderation Hypotheses and Questions.

In addition to examining the overall size of functional matching effects, another major goal of the meta-analysis is to delineate moderators of when functional matching effects are expected to be more versus less persuasive. Moderators examined are tied to each of the principles from Section 3. They concern: the comparison groups used to evaluate matching effects (e.g., negative matches vs. non-matches), the degree to which matching is effected (e.g., specificity to which characteristics are matched, number of characteristics targeted, matching dosage), and the type of characteristics targeted (e.g., unipolar vs. bipolar constructs). Additionally, I also examine the moderating effects of a few other factors (e.g., study design, types of outcomes examined, behavioral domains).

4.2.1. Moderators: How do Different Types of Comparison Groups Influence the Persuasiveness of Functional Message Matching Interventions?

Comparison Group Type. The first set of moderation analyses this meta-analysis explores concerns the first of the three principles outlined in the theoretical review. Specifically, the current review examines the impact of using different types of comparison groups on the observed effects of functional matching interventions, with a specific focus on the use of mismatches (including non-matches and negative matches), generic messages, low positively matched conditions, and mixed appeals. Drawing on where different types of comparison messages are expected to be located relative to one another on the continuum from positive matches to negative matches (as exemplified in Figure 3), I made the following *a priori* hypotheses:

> **H5-H9**: Functional matching effects would be larger when comparison groups are *negative matches* compared to when comparison groups are *non-matches* (H5), *mismatches* (H6), *generic messages* (H7), *low positive matches* (H8), or *mixed appeals* (H9). These predictions reflect the idea that negative matches are the furthest away from positive matches on the continuum in Figure 3.
>
> **H10-H11**: Functional matching effects would be larger when comparison groups are *non-matches* compared to when comparison groups are a *generic messages* (H10), or *low positive matches* (H11). This is because, on average, both generic messages and low positive messages are expected to achieve some limited amount of positive matching (only to a lesser extent than messages made to systematically be positive matches).
>
> **H12-H13**: Functional matching effects would be larger when comparison groups are *mismatches* compared to when comparison groups are *generic messages* (H12), or *low positive matches* (H13). This follows the same logic as hypotheses H5-H11, as mismatches are composed of a mixture of non-matches and negative matches.
>
> **H14**: Functional matching effects would be larger when comparison groups are *generic messages*, compared to *low positive matches*. This reflects the idea that low positive matches guarantee a minimal amount of positive matching, whereas generic messages do not.

Although I expected the use of mixed message conditions to produce matching effects (i.e., be less effective than positive matches), I adopt an exploratory stance on their relative effect compared to most other comparison groups, apart from negative matches (H9). Although there is a good theoretical claim to state that negative matches should lead to the largest effects, it is not clear where mixed messages stand relative to other types of comparison groups. This is because the use of mixed messages is theoretically tied to the idea of dosage ratio (outlined in Section 3.2.2), and may therefore not have a set relative effect size compared to other comparison conditions. Lastly, I also did not state a hypothesis regarding the comparison between mismatches and non-matches, as whether these two comparison conditions are expected to differ depends on the composition of mismatched messages (e.g., if this group is composed predominantly of non-matches, it may be similar in performance to non-matches).

4.2.2. Moderators: How does the Degree of Functional Message Matching Affect the Persuasiveness of Interventions? The second set of moderation analyses explored concern the second principle outlined in the theoretical review. Specifically, I examine how factors tied to the degree to which matching is achieved impact the success of matching interventions.

Specificity of Characteristic Determination. There are three general ways in which characteristics can be determined for the purpose of creating matching effects. First, one can directly measure a person’s orientation. In functional matching, this typically denotes the methodological tradition of matching to chronic individual differences in motivation (e.g., Snyder & DeBono, 1985). Second, an orientation can be induced through an experimental manipulation, commonly by using of priming methods.

Third, a person's orientation can be inferred indirectly. This is typically done by matching messages to the dominant function associated with a domain/object (i.e., the neofunctional approach to functional matching; e.g., Shavitt, 1990), or by matching messages to the dominant function associated with a particular group of individuals (e.g., matching to cultural groups; Huang & Shen, 2016). These different ways of determining characteristics correspond to different levels of correspondence, as discussed in Section 3.2.1.a. Furthermore, directly measuring or indirectly inferring characteristics correspond closely to the message tailoring tradition of message matching, whereas manipulating an orientation corresponds closely to the context matching tradition.

We can hypothesize that when message matching is accomplished at the individual-level—either by matching to individually-measured differences, or by matching to a function that has been experimentally induced at the individual-level— the technique should be more effective than when matching is based on a characteristic inferred indirectly. This hypothesos rests on the assumption that indirectly inferred characteristics are more prone to error, as they rely on the extent that members of two or more groups of individuals show more similarity within groups than between groups. To the extent that a population is heterogeneous, and that mean differences between any two groups is small, inferring characteristic levels by proxy of group memberships can lead to misclassification. Consequently, I hypothesized that:

H15: Functional matching effects would be larger when they target characteristics that are *directly measured* than when they target characteristics that are *indirectly inferred*.

H16: Functional matching effects would be larger when they target characteristics that are experimentally *manipulated* than when they target characteristics that are *indirectly inferred*.

The relative efficacy of interventions that match messages to directly measured and manipulated characteristics is examined in an exploratory way. Theoretically, the relative success of these two techniques depends on the success of the manipulations to induce a strong motivational orientation.

Number of characteristics targeted for matching. In Section 3.2.1. b, I argued that simultaneously matching messages to a larger number of characteristics should lead to a more specific, and typically more persuasive, message matching intervention. However, the impact of targeting an increasingly larger set of characteristics is unlikely to always produce larger persuasive effects, and the effectiveness of this strategy is likely to level off at some point (and could potentially backfire if messages begin being perceived as too individualized and intrusive; e.g., van Doorn & Hoekstra, 2013; White et al., 2008). Research to date suggests that matching to a small set of characteristics is more effective than matching to only one characteristic (e.g., Noar et al., 2007; Joyal-Desmarais et al., 2020a), but it remains unclear what might be the optimal number of characteristics to target in order to obtain the optimal impact from a message matching intervention. One of the goals of this meta-analysis is therefore to provide a description of how message matching interventions vary in effect size as a function of the specific number of characteristics they use for matching purposes.

Message Length. In Section 3.2.2., I outlined the implication of dosage frequency, defined as the number of times a message feature is altered to match a given characteristic. Unfortunately, most message matching interventions do not provide the full set of messages they use, and it is therefore difficult to evaluate this factor directly. However, dosage frequency is likely to be correlated with the overall length of a message matching intervention. Consequently, I examine message length as a proxy to dosage frequency as most interventions give some information on the approximate length of their interventions. The impact of message length on the size of functional matching effects is examined in an exploratory manner.

***Message modality*.** Dosage intensity was defined in section 3.2.2. as the extent to which manipulated message features are designed to arouse strong experiences. As with dosage frequency, it is generally impossible to obtain a direct measure of dosage intensity as this is not usually reported in primary studies. However, we can use the specific modality through which message matching interventions are delivered as a proxy for intensity, assuming that the level of involvement elicited by the media (e.g., audio-visual materials vs. print-based communication) will be correlated with higher dosage intensity. There is some prior evidence that using more involved media in delivering message matching interventions may influence the effectiveness of the intervention (e.g., Sohl & Moyer, 2007; Huang & Shen, 2016), but the effects of message modality have only been examined in specific contexts (e.g., mammography behavior, Sohl & Moyer, 2007). Additionally, it is unclear whether message modality simply impacts the overall effectiveness of interventions (e.g., for both positively matched and mismatched messages), or whether this factor would interact with matching (e.g., increase the relative influence of a positively matched vs. a mismatched message). Therefore, I examine the impact of message modality on the size of functional matching effects in an exploratory fashion.

Number of intervention contacts. I defined dosage exposure as referring to the number of times individuals are exposed to a message matching intervention, and argued that theoretically, the impact of repeated intervention exposures should follow an inverted U shape. In a message tailoring meta-analysis, Noar et al. (2007) found that multiple exposures to an intervention led to larger effects than interventions that exposed participants to messages on only a single occasion, but this effect was not replicated in a more recent meta-analysis by Lustria et al. (2013). Given that primary research has not been specifically concerned with delineating the specific trajectory of effects tied to increasingly larger numbers of exposures to an intervention, it is unlikely that a review can obtain a precise estimate of this trajectory via a synthesis of the literature. However, I can make an incremental contribution over past meta-analyses by making a distinction between three general designs interventions commonly take. First, we can distinguish between designs that expose participants to an intervention on only a single occasion. These were expected to characterize the bulk of matching studies. In addition, we can distinguish between two types of studies that provide opportunities for multiple contacts. First, studies may use a design that ensures participants will be exposed to an intervention multiple times by building exposure into interactions with the research teach or into assessment periods. I refer to such designs as ensuring multiple contacts. Second, some interventions offer the *possibility* of multiple intervention contacts without ensuring it. For example, they may give participants materials for consultation, or send out invitations to view materials, but leave it up to participants to consult them again. Overall, I expected that:

H17: Functional matching effects would be larger when interventions use *multiple* *contacts* (ensured or not) than when they only make use of a *single contact*. The relative performance of potential multiple contacts that are ensured or not was to be examined in an exploratory fashion.

4.2.3. Moderators: How does the Type of Characteristic Targeted Influence the Persuasiveness of Functional Message Matching Interventions? The third set of moderator variables I examine deal with the third principle outlined in the theoretical review I conducted (Section 3).

Type of Characteristic. In Section 3.3.1., I maintained that directly targeting more psychologically relevant characteristics (e.g., cultural values) may be more effective than targeting surface-level characteristics such as a person's name. Because the current meta-analysis is focused on functional matching research, we can anticipate that the effects I obtain will be larger than those generally found in previous meta-analyses of message tailoring and message framing effects (which commonly match messages to less psychologically-central characteristics). Examining the results of the overall estimates produced in the current meta-analysis to those produced in previous meta-analyses will therefore provide some evidence towards whether targeting different types of characteristics matters or not. Ideally, it would be good to also directly examine the impact of matching to more versus less central characteristics *within* the current meta-analysis, but given that this dissertation focuses on functional matching studies only, this limits the general types of characteristics included in the review (e.g., I cannot compare matching to personality traits to matching to a person's name, as the latter type of effect is not covered in this review). That said, we can also look at another variable to learn whether targeting different types of characteristics matters; that is, we can compare the effects of matching to characteristics that differ in being bipolar, unipolar, or categorical.

Nature of Characteristic as Bipolar, Unipolar, or Categorical. In Section 3.3.2., I argued that matching messages to bipolar characteristics may be more likely to lead to comparisons that include negatively matched messages than matching messages to unipolar characteristics. Given that a comparison between positively matches messages and negatively matches messages is theorized to lead to larger effects than a comparison between positively matched and non-matched messages, I made the following prediction:

H18: Functional matching effects would be larger when interventions target *bipolar* characteristics than when they target *unipolar* characteristics.

Because categorical characteristics may be a more heterogeneous type of characteristic relative to unipolar and bipolar characteristics, I did not make predictions concerning the relative impact of targeting these characteristics.

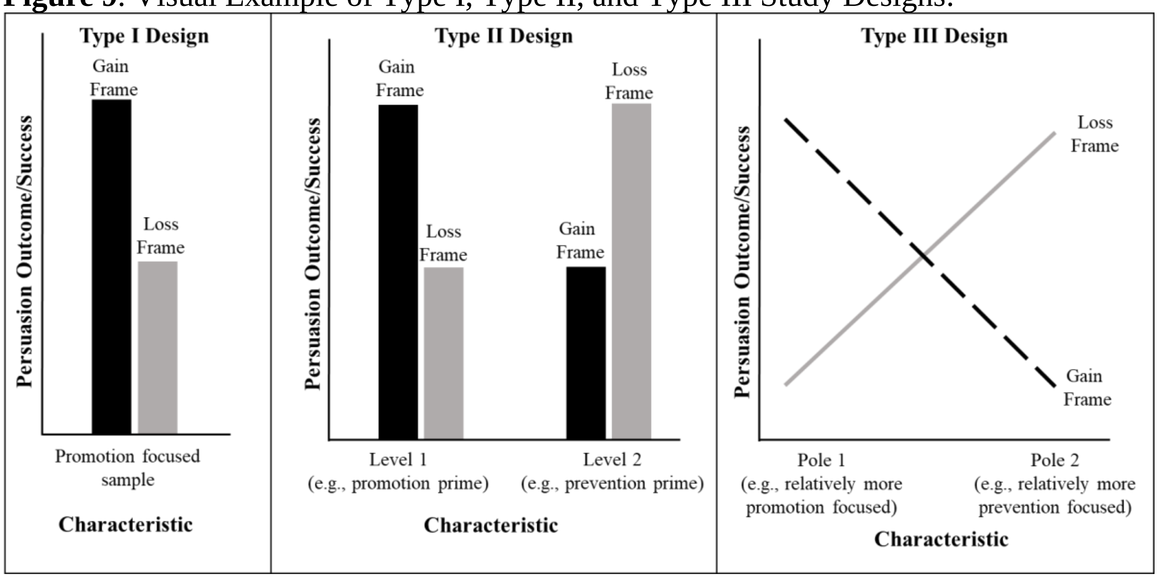
4.2.4. Additional Moderators: How does the Design of Experimental Studies Influence the Effects of Functional Message Matching Interventions? The fourth set of moderator variables goes beyond the three principles from Section 3, and concerns keeping track of common ways in which effect sizes produced in the literature are tied to different study designs authors use, and different types of effects authors report when making inferences.

Study Type. In the message matching literature, there are three dominant types of study designs that researchers use, and each design impacts the nature of the inferences authors can make. Each design is depicted visually in Figure 9.

Type I delineates studies where individuals are assigned to either a positive match or to a comparison condition. For example, if a study relies on a sample of participants from an individualistic country, individuals may be assigned to either an individualistic appeal condition (positive match) or a collectivistic appeal condition (a non-match).

In contrast, *Type II* corresponds to a design in which individuals are randomly assigned to one of at least 2 message conditions, independently of the level of a characteristic. The prototypical Type II study is a 2 x 2 factorial design in which two message conditions exist, and the status of either message condition as a positive match is dependent on the level of a dichotomous characteristic. For instance, individuals may be randomly assigned to an individualistic appeal or a collectivistic appeal, as well as either to an individualistic or a collectivistic values prime. When the priming condition is congruent with the message condition (e.g., individualistic appeal with individualistic prime), this represents the positive match, whereas when priming and message conditions are incongruent (e.g., individualistic appeal with collectivistic prime), this represent a comparison condition.

Figure 9. Visual Example of Type I, Type II, and Type III Study Designs.



The major advantage of a Type II study over a Type I study, is that the crossed design allows us to disentangle the relative advantage of achieving a positive match regardless of which of the two messages participants receive. In the above example of a Type I study, the relative benefits of assigning an individualistic appeal could be attributed to achieving a positive match, but it is also possible that the individualistic appeal was simply a higher quality persuasive appeal than the collectivistic appeal used, thereby introducing a confound into the design. Type II designs address this confound through their factorial experimental design; in a Type II study, making a strong inference that receiving a positive match is the key mechanism also requires seeing a relative advantage of the collectivistic appeal in the collectivistic prime conditions. In other words, what matters is an interaction effect that favors conditions of congruity (e.g., individualistic appeal with individualistic prime, and collectivistic appeal with collectivistic prime) over conditions of incongruity (e.g., individualistic appeal with collectivistic prime, and collectivistic appeal with individualistic prime), rather than the main effect of one message condition over the other (e.g., individualistic appeal showing an advantage regardless of which prime is received). That said, the ability of Type II studies to avoid the confound of Type I studies also makes them less flexible in accommodating different types of comparison messages. Specifically, control groups such as generic messages cannot be crossed into a Type II deign such that the role of the message conditions flips from being a positive match to a comparison group depending on levels of the characteristic (i.e., a generic message never takes on the role of a positive match).

Finally, *Type III* studies are designed such that individuals are randomly assigned to a message condition (e.g., individualistic vs. collectivistic appeals), but the characteristic (e.g., collectivistic values) is assessed as a *continuous* rather than a categorical variable. Type III designs introduce a key challenge in meta-analytic reviews as: (1) it is often unclear whether studies report standardized versus unstandardized effects in their models, and; (2) there is disagreement in how to best extract statistical estimates in models with continuous predictors such as regression analyses (e.g., Becker & Wu, 2007; Roth, Le, Oh, Iddekinge, & Bobko, 2018). For simplicity, Type III designs are consequently excluded from the present synthesis, and will not be discussed further in this document.

I did not make specific predictions according to the relative success of Type I compared to Type II effects. Meta-analyses to date have not captured this distinction, and have either limited their reviews to Type I studies, or re-organized findings from Type II studies to correspond to Type I effects. This factor is instead examined in an exploratory fashion. Additionally, because Type I and Type II studies tend to be fundamentally different in the types of inferences they afford, the results of my analyses are always reported broken down by type of study type (rather than attempting to aggregate effects from both Type I and Type II studies).

Types of Effects. Another fundamental difference between Type I and Type II designs, is that they produce very different sets of results. Specifically, Type I designs produce a singular effect size, comparing two groups. In contrast, Type II designs produce an interaction effect, two main effects, and six possible pairwise comparisons. Careful consideration is required in terms of how to code these different types of effects, as not all effects are relevant for understanding message matching (e.g., pairwise comparisons in a Type II study between two mismatched messages is of little value).

At a conceptual level, three meaningful categories of effects are typically used in research as ways to operationalize and evaluate message matching effects; consequently, only these three categories are considered in the current meta-analysis. First, one can operationalize matching effects as the difference in the effectiveness between two or more message conditions, conditioned on a particular characteristic level. For example, one could assess the benefits of using an independence appeal, compared to an interdependence appeal, for a group of individuals characterized as individualistic. The singular effect produced in Type I studies is of this type, and two of the pairwise comparisons in a Type II study also represent this type of effect. The second way authors operationalize matching effects is as the effect of differences on a characteristic, given a particular level of a message feature. For example, what is the impact of being high versus low in self-monitoring, when receiving a persuasive message focused on value-expressive themes. Type II produce two pairwise effects of this type, and authors frequently rely on comparisons like this (either alone or in addition to the previous type of effect) when making inferences about the presence of matching effects. Finally, the third way authors commonly operationalize a matching effect is via the *interaction effect* between a message feature and a characteristic. This type of effect can be examined in Type II studies (never Type I), and uniquely captures the idea that what constitutes a positively matched message for some, does not operate as a positively matched message for others.

Ideally, the three types of effects should converge, and I therefore do not *a priori* hypothesize differences between these three types of effects. Much as with outcome type and study design type, analyses reported in this dissertation are always broken down by type of effect to (as the three types of effects conceptually answer different questions).

4.2.5. Additional Moderators: Does the Persuasiveness of Functional Message Matching Interventions Vary Depending on the Outcomes Being Evaluated? The final set of moderator variables this meta-analysis will examine also goes beyond the three principles from the theoretical review, but is nevertheless of high importance to applied researchers and interventionists. Specifically, this set of moderators examines how matching effects vary depending on the outcomes an intervention is designed to elicit (e.g., attitude vs. behavior change; immediate vs. future change; health behaviors vs. consumer behaviors).

Type of outcome. Because I examine the effect of functional message matching on four distinct types of outcomes (attitudes, behavioral intentions, self-report behaviors, and objective behavior assessments), it is possible to examine whether matching effects vary across outcome. Although I expected functional matching effects on each outcome measure (H1-H4), the relative effect on each outcome is examined in an exploratory fashion.

Assessment time. Do functional matching effects persist over time? Multiple studies in message matching evaluate the impact of their interventions not only immediately after an intervention, but also at various follow-up assessments. I expected that functional matching effects would have more prominent immediate effects, but that some benefits would persist over time. Specifically:

H19-H20: Functional matching effects would be positive for both *immediate* (H19) and *non-immediate* (i.e., more distal; H20) outcomes.

H21: I expected some decay in effects, such that functional matching effects would be larger for *immediate* than *non-immediate* (i.e., more distal) outcomes. In addition to these two hypotheses, I explore how the amount of time that has passed (e.g., weeks, months) influences the strength of the effects observed.

Outcome domain. Message matching has been applied across a wide variety of behavioral domains, ranging from health behavior research, to work promoting various prosocial, environmental, or consumer behavior outcomes. Despite this diversity, previous meta-analyses have heavily focused on health outcomes, and it is currently unclear how well the strategy performs in other domains. Therefore, this question is examined in an exploratory fashion.[7]

Behavioral change type targeted. Finally, I use the current synthesis to explore a distinction between interventions that seek to *promote* a behavior (e.g., increase fruit and vegetable consumption, encourage people to buy a product), compared to interventions that seek to *limit* or behavior (e.g., smoking cessation, lowering junk food consumption, discouraging environmentally wasteful behaviors). Research in health behavior has found that different factors often play a role in promoting (healthy) versus limiting (unhealthy) behaviors (e.g., Conner, McEachan, Lawton, & Gardner, 2017; Richetin, Conner & Perugini, 2011), and it is quite possible that this applies to other behavioral domains as well. The effect the type of change intervention sought to entail (i.e., seek to promote vs. limit a behavior) is examined in an exploratory manner.[8]

---

[7] In contrast to other research questions, exploring the effect of outcome domain was not registered.
[8] Again, in contrast to other research questions, exploring the effect of change type targeted was not registered.

5. Project 1: Methodology

5.0.1. Protocol, Registrations, and Compliance with PRISMA Standards. A protocol for the systematic review and meta-analysis was registered using both the Open-Science Framework (OSF; Joyal-Desmarais et al., 2018) and the International Prospective Register of Systematic Reviews (PROSPERO; Joyal-Desmarais et al., 2019). Furthermore, a detailed prospectus for this dissertation was approved on November 1st, 2018, which was compliant with, and included a completed annotated checklist for the Preferred Reporting Items for Systematic Reviews and Meta-Analysis Protocols (PRISMA-P; Moher et al., 2015; Shamseer et al., 2015) guidelines. The current report is compliant with the checklist of Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA; Liberati et al., 2009; Moher, Liberati, Tetzlaff, Altman, & The PRISMA Group, 2009).[9] An annotated copy of the PRISMA checklist is included in Appendix B (see Table B1).

5.1. Search Strategy

Because this review is part of a larger ongoing review that will ultimately seek to include the full message matching literature (Joyal-Desmarais et al., 2018; 2019), the search strategy was developed to be highly inclusive.

The relevant literature was identified via an electronic search strategy (using *PsycInfo* via Ovid, *MEDLINE* via Ovid, and *Scopus*), followed by a systematic use of backward and forward citation searches (using *Web of Science*) to identify further articles

[9] A few requirements are impossible to meet given the scope of the current meta-analysis. Table B1 includes notes on which elements were omitted, details why, and provides information about where in this text each element is discussed in more depth.

for inclusion, as well as less formal attempts to identify additional literature. Extensive details on the nature, development, and evaluation of the strategies are provided in Appendix C.

The final electronic search strategy used a large set of terms related to message matching research generally (e.g., including variants of *message matching*, *functional matching*, *attitude functions*, *framing*, *tailored communication*, *targeting*, *congruency*, *personalization*, *message fit*), and terms related to specific forms of message matching (e.g., *gain-frame*, *loss-frame*, *cultural appeal*, *individualistic appeal*, *collectivistic appeal*, *self-monitoring congruency*, *value-expressive congruence*, *utilitarian congruence)*. The backward citation search made use 81 key sources on message matching, including narrative reviews, systematic reviews, meta-analyses, chapters, dissertations, and editorials. The forward citation search used the same set of 81 sources and an additional set of 33 influential and/or foundational studies in the message matching literature. Appendix D provides the full electronic search queries for *PsycInfo*, *MEDLINE*, and *Scopus* (presented exactly as registered; see Tables D1, D2, and D3). Appendix D also provides the 114 sources used for citation searches (Table D4).

On November 18, 2018, an evaluation of the electronic search strategy examined its ability to identify a predetermined set of 60 message matching articles. This evaluation found a coverage rate of 82% using this strategy alone (i.e., without the implementation of the citation searching and informal searches. See section C.5 and Tables C9 to C11 of Appendix C for details).

5.2. Study Selection Procedure

5.2.1. Selection Procedure. Records/studies were selected into the current systematic review and meta-analysis using the following procedure (results of this procedure are reported in Figure 10 and Section 6.1.1.). First, records were identified using the search procedures described in section 5.1 (and in Appendices C and D). Results from these searches were compiled into a single database using the *EndNote X7.8* software. Second, *EndNote*'s feature for finding duplicate records was used to identify and remove duplicate records.

Third, record titles were screened for relevance and to further remove duplicate records missed by *EndNote*. A title was deemed relevant if it contained any themes possibly related to a message matching design. Selection at this stage was highly inclusive; for example, I retained all cases with titles referring to message matching-related terms (e.g., tailoring, personalized, framing), and any titles referring to interventions, experiments, scale-development, marketing, behavior change, etc. Records were excluded if titles explicitly identified the record as a review article or protocol paper. Whenever a title was ambiguous as to whether or not it should be excluded, it was retained. Fourth, record abstracts were screened for relevance. This step was more selective and required abstracts to refer to the evaluation of at least one intervention, experiment, or persuasive message, which could feasibly include a message matching paradigm. Again, whenever an abstract was ambiguous as to whether or not it should be excluded, it was retained. I personally conducted all the steps above.

After step four, a spreadsheet was created to index every retained article, and coders were assigned to code sections of this spreadsheet at a time . Records were re-organized into a random order to ensure that each coder would evaluate a random subset of articles.

The fifth step required coders to download full texts of the records they were assigned, to screen the full text records, and to code them. At this stage, selection was made at the study-level, rather than at the record-level. Studies were marked for exclusion if they failed to meet any inclusion/exclusion criteria from Section 5.2.2. below. If a study was excluded based on *any* inclusion/exclusion criterion, it was marked as excluded in coding along with the reason(s) for exclusion. Coders were only required to identify at least one reason for exclusion (but could mark more than one as well).[10]

The sixth and final step involved coding in full all studies that met inclusion/exclusion criteria, and to attempt to extract all relevant effect from each article (see Section 5.3.). Ultimately, only studies that included at least one extractable effect size were included into meta-analytic models.

5.2.2. Inclusion and Exclusion Criteria. Exclusion/inclusion criteria for this review were primarily determined at the study-level, with only a few criteria operating at the record level.

To be eligible, *records* were required to meet the following inclusion criteria:

1. Be reported in the *English language*
2. Take the form of a published *peer-reviewed journal article*[11]

[10]Coders were not asked to extensively evaluate all inclusion/inclusion criteria for every study, as this was deemed too labor intensive.
[11] Due to the large scope of the message matching literature, it was not deemed feasible to include grey literature (e.g., dissertations, conference presentations) in the current synthesis. The coding procedure labelled all grey literature for possible inclusion in the future.

3. Describe at least 1 *empirical study* (e.g., we excluded reviews, protocols)
4. Describe findings from at least 1 *novel study* (i.e., must not duplicate content from another record)
5. Must not have been *retracted*

In addition to these theoretical inclusion criteria, an implicit requirement included that records be accessible to coders through the University of Minnesota library subscriptions.[12] Additionally, coders could petition the coding team to have an article excluded for other reasons than stated above (e.g., if writing quality made it impossible to reliably evaluate inclusion, or impossible to conduct coding with any reliability).[13]

Once a record was deemed eligible, each individual *study* within it was evaluated using the following criteria:

1. Must follow a *message-based experimental design* (i.e., random allocation to at least 2 message-based conditions)
2. Must follow a message *matching paradigm* (i.e., message variations must be such that what is considered a positive match can theoretically vary. Message-based experimental studies were excluded if they evaluated a technique that was simply thought to increase message persuasiveness under all circumstances; e.g., regardless of individual differences)
3. Must contain at least one *functional matching effect*; that is, an instance of matching a message to a characteristic that is explicitly motivational in

[12] Records that were not accessible to coders were flagged as such. Efforts to locate such records can be made in a future extension of the current synthesis.
[13] Petitioning procedure is described in the codebook, in Appendix F

nature.[14] Only effects associated with instances of functional matching were extracted from studies.

4. The message conditions must contain at least one *valid comparison* between a *positive match condition* (i.e., message congruent with the characteristic level it is being matched to) and an *eligible comparison condition* according to our PICOS framework (i.e., mismatched message, non-match, negative match, generic message, low match, mixed appeal)
5. Must evaluate at least one of the four *outcomes of interest* outlined by our PICOS framework (attitudes, intentions, self-report-behaviors, objectively assessed behaviors)
6. Comparisons had to be the result of a *between-person* (rather than a within-person) message manipulation.[15]
7. Matching *design type* had to be either of Type I or Type II (as delineated in Section 4.2.4.).

All articles that met the above inclusion criteria were coded in full. Once coding was complete, the following final steps were applied for inclusion into the meta-analytic synthesis. First, at least one effect size estimate had to be successfully extracted from a study for it to be included. Second, prior to computing models, analyses were conducted

[14]As mentioned previously in this manuscript, this dissertation focuses explicitly on conducting a meta-analysis of the functional matching literature. However, the search procedure, and coding procedure, were largely developed to accommodate a larger synthesis project that considers the entire field of message matching.
[15]Within person experiments were theoretically meaningful, but studies of this type rarely provide enough information to extract a standardized effect size; consequently, these were generally excluded from the project.

to identify and exclude any evident outliers from the dataset (see section 6.1.1).

5.3. Coding and Data Extraction

5.3.1. Coding Team, Training, and General Coding Procedure. To conduct this systematic review and meta-analysis, I was assisted by a team of coders. Between January and July of 2019, six coders and myself participated in an extensive training period, during which we coded several records in groups ranging from three to seven raters per record coded. Coders completed coding individually, and then met as groups to compare codes, resolve discrepancies, and suggest/make adjustments to the codebook to be used for the project. During the summer of 2019, coders continued to become more familiarized with the coding procedure, but transitioned to working in pairs. Each pair would code the same records independently, and they would then hold weekly meetings supervised by myself, during which they summarized/justified their coding, and resolved any discrepancies. Once coders felt confident in their ability to code individually, and once they showed high interrater reliability in their codes (i.e., agreeing at least 90% of the time for most coding items), they transitioned to coding individually. The final team of coders retained after the training phase consisted of myself and three coders: Alexandra Scharmer (AS), Molly Madzelan (MM), and Jolene See (JS).

The bulk of coding occurred between the Fall of 2019 and the Summer of 2020. Each coder reviewed records individually, and held weekly supervisorial meetings with myself to review their coding. Weekly meetings included tasks such as reviewing decisions for inclusion/exclusions, resolving ambiguities in coding decisions, and scanning coding files for any apparent mistakes/omissions. Weekly meetings also served to monitor and reduce potential coder drift/fatigue (i.e., idiosyncratic biases and changes in the ways one coder applies coding over time, which can reduce interrater reliability: e.g., Raffle, 2006; Ratajczyk et al., 2016).

5.3.2. Codebook & Coding Procedure, and Data Extraction. Raters each used an online spreadsheet to perform coding, which was equipped with drop-down menus for every coding variable that required a choice between a predetermined set of options. The spreadsheet was organized in a long format, with each row corresponding to a potential effect size estimate to be extracted. Figure E1 in Appendix E provides an example of the spreadsheet interface.

Coders were provided with a detailed and streamlined *codebook* (reproduced in full in Appendix F), which described each variable to be coded, listed all response options, and provided tips for coding. Coders were additionally provided with an extensive *coding dictionary* (reproduced in full in Appendix G) that provided details and definitions for each element contained within the codebook.

5.3.3. Effects Extraction and Metric Choice: r. Because of the heterogeneity in the types of designs studies use in message matching research, authors report effects along a wide variety of metrics. Therefore, it is necessary to use a standardized effect size metric to make meaningful comparisons between studies. The most common standardized metrics used in meta-analytic works include Cohen's *d*, Pearson's correlation coefficient *r*, or variants of these two metrics (e.g., Borenstein et al., 2009; Schmidt & Hunter, 2014).

For this project, we extracted the correlation coefficient *r* as a common metric for effect sizes across coded studies, as this metric has an intuitive interpretation across different types of designs (e.g., r^2 as the proportion or variance accounted for by an effect). Cohen's *d* is particularly less intuitive when extracting interaction effects.

The effect size extracted from studies was established to represent the differential effect of a positively matched message condition compared to a comparison condition. A positive correlation coefficient indicates an advantage of the positively matched messages over the comparison condition. Appendix H provides additional details on the general procedure that was used to extract *r* for studies.

5.4. Meta-Analytic Statistical Procedure

5.4.1. Three-Level Meta-Analysis. Commonly, meta-analyses are divided between fixed effects models and random effects models (Borenstein et al., 2009; Borenstein, Hedges, Higgins, & Rothstein, 2010; Hedges & Vevea, 1998; Hunter & Schmidt, 2000). Fixed effects models assume that all effects are estimating a *single* underlying effect, and that variation between studies can be attributed to sampling error. In contrast, random-effects models assume that there is meaningful heterogeneity in the effects estimated by different studies. Consequently, random effects meta-analyses attempt to estimate the average value of a broader population of effects. When studies have little heterogeneity in their estimated effects, the two types of models will typically converge, and fixed effects models will provide a more precise estimate (Villar, Mackey, Carroli, & Donner, 2001); however, when substantial heterogeneity exists between effects, fixed effects models can lead to overly narrow estimates and thereby contribute to false positive inferences (Hunter & Schmidt, 2000).

Given that message matching effects represent a broad category of effects, it is expected there will be substantial heterogeneity in the effects estimated by different studies. This expectation not only concerns heterogeneity in empirically observed effect sizes, but also heterogeneity in the theoretical effects being examined. For example, the effects of a message matched to political orientation is thought to be meaningfully different from a message matched to the hedonic quality of a consumer items (e.g., alcohol). However, both types of effects belong to the larger class of message matching effects and are thought to follow similar principles of operation. From this logic, a random effects meta-analysis is theoretically more appropriate than a fixed effects meta-analysis.

In addition to using a random effects framework, I propose to conduct a *three-level meta-analysis* (i.e., a multilevel meta-analysis; Konstantopoulos, 2011; Van den Noortgate, López-López, Marín-Martínez, & Sánchez-Meca, 2013; 2015; Van den Noortgate & Onghena, 2003). This approach builds on random effects models, and allows a meta-analysis to explicitly consider the presence of dependent effect size estimates. Dependent effect size estimates are extremely common in message matching studies. For example, they arise from the use of multiple outcome measures (e.g., multiple indices of intentions reported separately for the same sample; Detweiler et al., 1999; Kwon, Seo, & Ko, 2016), multiple intervention or control groups (e.g., two positively matched groups each compared to a single generic message group; Alexander et al., 2010), the presence of multiple time point assessments (e.g., looking at immediate and long-term outcomes; Lavine & Snyder, 1996), and the presence of multiple subgroups (e.g., breaking results down by whether initially had plans or not to enact a given behavior; Detweiler et al., 1999).

To date, most meta-analyses use traditional univariate methods (e.g., see: Tipton, Pustejovsky, & Ahmadi, 2018). Because univariate meta-analyses assume independence between observation, meta-analysts typically engage in strategies such as aggregating effect sizes (e.g., calculating mean effects per study), excluding effect sizes (e.g., using a single estimates based on some decisions rule), or subgrouping effect sizes (e.g., classifying effects by measure type, or separately extracting effects for each subgroup present in an analysis). For example, Tipton, Pustejovsky, and Ahmadi (2019b) reviewed current practices in psychology, education, and medicine, and found that although meta-analyses included an average of 4.5 estimates per study, the vast majority relied on one of these three techniques instead of using modeling capable of handling dependence between effects (e.g., multivariate meta-analysis, multilevel modeling, robust variance estimation). Similar practices have also been the norm in meta-analyses of message matching effects to date (e.g., Gallagher & Updegraff, 2012; Huang & Shen, 2016; O'Keefe & Jensen, 2006). Although these types of strategies allow observations to become independent, they lead to substantial loss of information, and it is now well-documented that they underperform relative to newer meta-analytic techniques that explicitly model dependent effects (e.g., Moeyaert et al., 2017; Tipton et al., 2019a; 2019b). Of these newer techniques, a three-level meta-analysis model is particularly alluring as the method is relatively simple to implement and does not require the imputation of unknown sampling covariance to yield valid and unbiased results (Van den Noortgate et al., 2013; 2015).

In the current project, all meta-analytic estimates are derived using three-level modeling that nests dependent effect sizes within studies. Analyses were conducted using the *metafor* (Viechtbauer, 2010; 2020) and *dmetar* (Harrer, Cuijpers, Furukawa, & Ebert, 2019) packages in *R* (R Core Team, 2020). Consistent with general meta-analytic guidelines, models used the Knapp-Hartung adjustment (Knapp & Hartung, 2003; Tipton et al., 2019a; 2019b). For each estimate, a 95% confidence interval is made available. Additionally, as a measure of heterogeneity in effect sizes, I also make 95% prediction intervals available. Prediction intervals have an intuitive interpretation (compared to indices such as τ and I), which carries meaningful information for practice. Specifically, prediction intervals represent the expected range of true effects one would find in a population of effects (IntHout, Ioannidis, Rovers, & Goeman, 2016). For the purpose of the current review, this effectively means the range in which we expect 95% of similar matching effects to fall. Lastly, to ensure the reliability of the estimates provided in analyses, I will only provide estimates derived from the aggregation of at least four studies (following the recommendation by Fu et al., 2011).

As specified in Section 4, results were computed separately by outcome type (i.e., attitudes, intentions, self-report behaviors, and objectively measured behaviors), study design type (i.e., Type I vs. Type II studies), and by effect type (e.g., interaction effects vs. main effects of receiving different messages given a specific level of a characteristic).

5.4.2. Primary Findings – Study-generated evidence. Each of the individual estimates I present for Project 1 represents a synthesis of study-generated evidence of the effectiveness of using message matching (see Section 1.2 for a discussion of study-generated evidence), conditional on a particular set of conditions. For example, an estimate may answer the question, "what is the average effect of functional matching effects on attitude measures, when the effect is derived from Type I studies, and reflects the comparison of receiving a positively matched message over a comparison message?”. These estimates are derived from only experimental studies, allowing them to provide high quality causal inferences.

5.4.3. Evaluations of Moderation – Subgroup Analyses. In the context of this meta-analysis, research questions and hypotheses regarding the *moderation* of message matching effects will necessarily rely on synthesis-generated evidence (see Section 1.2), thereby limiting the degree to which most estimates can be used to make causal claims on moderation. Consequently, interpreting the factors associated with an increase/decrease in the effect sizes of message matching studies is approached from a predominantly descriptive perspective.[16]

To examine moderation effects, I made use of sub-group analyses to provide estimates and confidence intervals within each levels of moderating variables. Description of moderation relies on comparisons across the 95% confidence intervals obtained across levels. Direct moderation tests of the difference in effect size between levels were not computed for two reasons. First, they were deemed outside the scope of the current report, given the extensive number of tests they would require computing. Second, and more importantly, subgroup analyses were prioritized to reinforce the notion that moderation effects in this synthesis should be interpreted from a predominantly descriptive perspective.

[16] It is possible to draw causal inference based on such correlational information, but this requires careful selection and consideration of covariates/confounders (e.g., Hernán, Hernández-Díaz, Werler, & Mitchell, 2002; Rohrer, 2018; Tipton et al., 2019b). Given that separate covariates would need to be examined for each causal question of interest, and the large number of questions examined in this dissertation, this was seen as beyond the scope of the current dissertation.

5.4.2. Examinations of Bias. I have made use of several strategies to examine the potential for biases to influence the analyses I present.

***Sensitivity Analyses*.** The primary tool I have used to evaluate bias in this review is the use of sensitivity analyses. These tests involve evaluating the moderating influence of several variables that are suspected to possibly bias results. Coders evaluated each study according to a set of potential biasing factors.

First, the codebook included a version of the Cochrane Collaboration's *Tool for Assessing Risk of Bias* (Higgins & Green, 2011). This is a set of criteria by which to code studies as having low, high, or unclear levels of risk for five types of bias: (1) *selection bias*, which involve bias in the way participants are allocated into different conditions; (2) *performance bias*, which involves bias in the delivery of an intervention in ways that are unintended by the allocation—e.g., failure of blinding/masking participants and personnel; (3) *detection bias*, which involves potential bias in the way outcomes are assessed—e.g., failure of blinding/masking individuals coding for outcomes; (4) *attrition bias*, which involves systematic differences in who withdraws from a study, and; (5) *reporting bias*, which involves bias in the findings that are reported and unreported by researchers. Of these, detection bias showed too little variance in coding (coder picked the same response option 99.3% of the time); it will therefore not be discussed further.

In addition to above variables, coders also evaluated several other factors that could indicate bias in our findings. First, they coded various indicators of open science practices, including whether authors made their *messages fully available* (i.e., their intervention materials), whether analyses were registered, and whether their data and script files were publicly available. Of these factors, only message availability showed much variance (the other factors will not be discussed further). Second, coders also noted whenever analyses *included covariates*. Given that every study reported experimental findings, the use of covariates was not deemed necessary to obtain unbiased results, and was treated as a degree of freedom researchers could possibly use to alter the significance of their findings. After coding was completed, a third variable was created to note the *percent of effects that were extracted within a study*, relative to the number of theoretically extractable effects that could be extracted if coders had complete access to data. Finally, in addition to the above, sensitivity analyses were also conducted to assess the effect of *sample size* (both of the sample size used to extract each effect, as well as the overall sample size of the study from which the effect was extracted).

***Additional Tools*.** In addition to sensitivity analyses, I also made use of funnel plots–considering both traditional (Begg & Mazumbar, 1994; Egger, Davey Smith, Schneider, & Minder, 1997) and contour-enhanced funnel plots (Palmer, Sutton, Peters, & Monteno, 2008; Peters, Sutton, Jones, Abrams, & Rushton, 2008)–as well as p-curve analyses (considering both full and half p-curves; Simonsohn, Nelson, & Simmons, 2014a; 2014b; 2015) to examine publication bias. The results of these tests are provided mostly for descriptive purposes, as such statistics (and related tools such as Egger's regression test, or trim and fill methods) have not been adequately adapted for use with dependent effect size estimates, and therefore cannot be expected to provide highly reliable inferences (Fernández-Castilla et al., 2019; Rodgers & Pustejovsky, 2019).

6. Project 1: Results and Interpretations

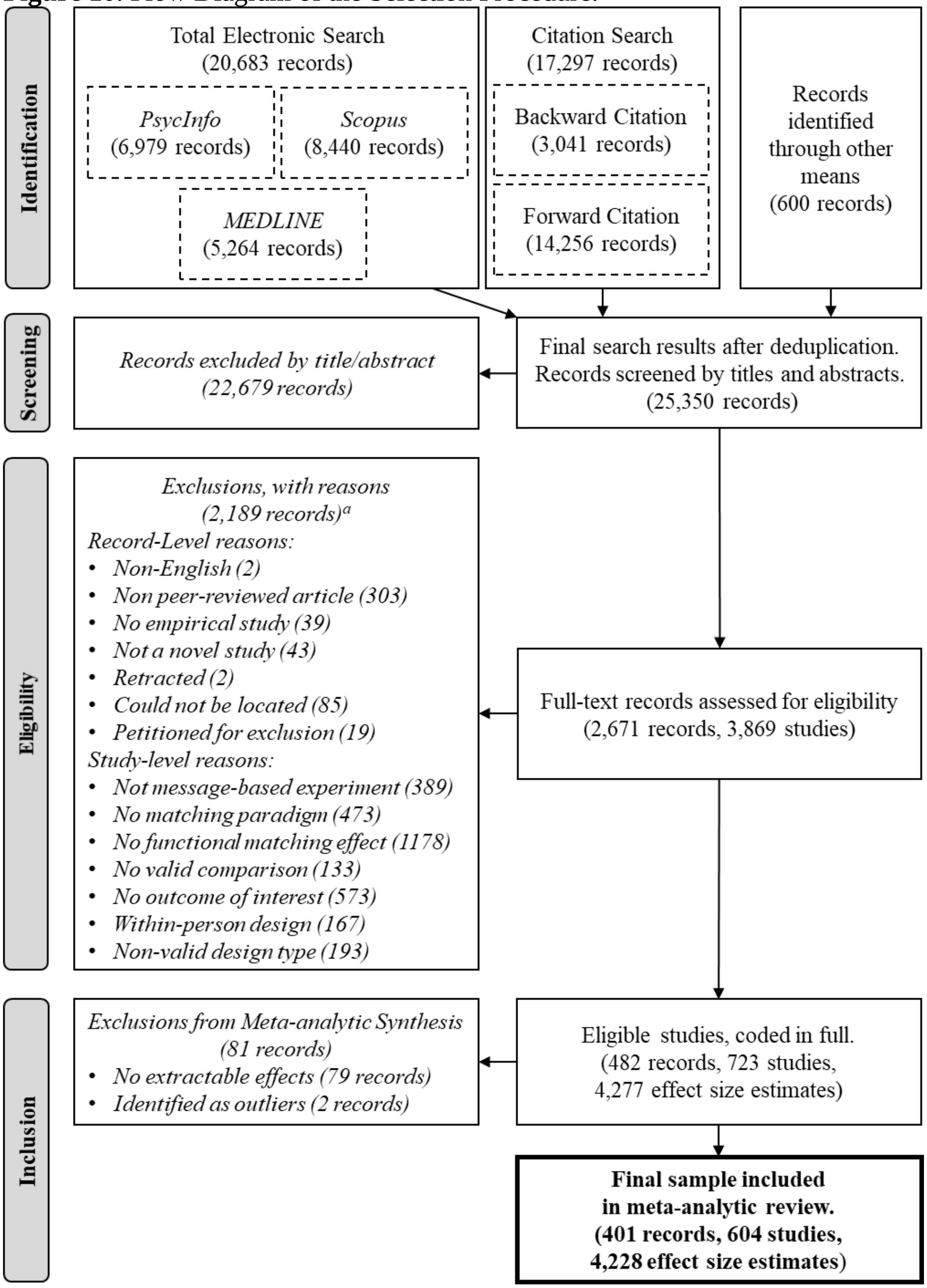
6.1. Study Selection, Interrater Reliability, and Outlier Identification

6.1.1. Study Selection Details. Figure 10 provides an overview of the record and study selection for the current synthesis. I conducted the entire search procedure between December 15th and December 19th, 2018. Overall, the search procedure returned 38,580 records.

Deduplication. The electronic search procedure across *PsycInfo*, *MEDLINE*, and *Scopus* originally returned 20,683 records, and 15,852 (77%) of these were retained as non-duplicates across the three databases. Next, deduplication was applied separately to the backward and forward citation searches. The backward citation search identified 3,041 records, and 1,917 (63%) were retained as non-duplicates. The forward citation procedure identified an additional 14,256 records, of which 9,396 (66%) were retained as non-duplicates. Deduplication was then applied to the set across the backward and forward citation searches, retaining 10,871 (96%) of records as non-duplicates. Finally, deduplication was applied across the retained records from the electronic search, forward/backward citation searches, and the records identified using other means (total of 27,323 records), leaving a total of 25,350 (93%) of records retained as non-duplicates.

The results of the deduplication procedure showed surprising non-overlap between the various search strategies employed. This finding reinforces the notion that the literature on message matching strategies is highly fragmented into several smaller sub-literatures, which each use unique terminologies and seldom cite one another.

Figure 10. Flow Diagram of the Selection Procedure.



Note. Flow diagram adapted from (Moher et al., 2009). The final dataset for the meta-analysis is indicated by the box with bold font/border. *Italics* indicate excluded records. [a]Coders could select more than one reason for excluding records/studies.

In particular, the non-overlap in the citation searches indicates that even syntheses (e.g., narrative reviews, systematic reviews, meta-analyses) show a large degree of non-overlap in the records they cite, and in the records that cite them.

Screening by Titles and Abstracts. In late December 2018, and in January, 2019, I screened the titles and abstracts of the 25,350 records retained from the last step. This screening procedure resulted in the identification of 2,671 relevant records that included language possibly related to message matching studies.

Screening and Coding of Full-Texts. The next step was to begin reading and coding the full texts of the 2,671 retained records. This step was accomplished by the full set of coders involved in the current project (Table I1 of Appendix I provides a breakdown of the relative contribution of each coder). This step of the coding was predominantly conducted between January 2019 and June 2020.[17]

During coding, 2,189 records contained no eligible studies for inclusion in the meta-analytic reviews. This left 482 records, containing 723 studies which met inclusion criteria (Section 5.2.2). A summary of the reasons noted for exclusions is provided in Figure 10. Of note, the majority of studies excluded at this stage were still message matching studies, and were excluded for more specific reasons (e.g., not being functional matching, having a Type III design, not having one of the 4 outcomes we required). The records screened at the full text level spanned over 600 distinct scientific journals, speaking to the wide breadth of interest that has been generated on message matching.

Final Data Selection for Inclusion into the Meta-Analysis. Of the 482 records

[17] A small set of records were screened and coded prior to this, during the development of the protocol and codebook.

with studies containing eligible studies, 79 records contained no studies for which an effect size estimate could be extracted. This left usable data from 403 records, covering 608 unique experimental studies, all of which reported at least one effect size (for a total of 4,277 extracted effect size estimates).

Because this project involves computing a large number of meta-analytic models (some of which may rely on smaller sets of studies), analyses were conducted beforehand to identify potential outliers that may skew the results of certain models. Two methods were used for this purpose. The first was an examination of sample sizes, which identified two records with samples sizes that were several magnitudes larger than other studies coded. These studies used large online sampling strategies to obtain over 1 million observations (Matz, Kosinski, Navem & Stillwell, 2017; Graham et al., 2012), whereas other studies had sample sizes typically below 10,000. These records were therefore excluded from analyses. The second method involved an examination of the effect sizes extracted. Twenty-eight effect sizes that were over 4.5 standard deviations from the mean were removed (this did not result in excluding any entire study/record).[18] Extensive details about these outlier analyses are reported in Appendix K.

The final dataset following these exclusions contained 4,228 effect size estimates from 604 studies (401 records).

6.1.2. Interrater Reliability. To evaluate the reliability of our coding procedure and team, a random subset of records was marked to be coded by a second person to

[18] Many of these effects approached r = 1.0 as the result of participants in one condition showing uniform responses on a dichotomous outcome measure in the context of a small sample size. Assuming a normal distribution, the presence of effects above 4.5 standard deviations from the mean is expected to occur at a rate of less than 0.001%. These 28 effects instead represented 0.65% of effects.

compute interrater reliability indices. This included a set of 30 records, covering 52 studies, for which it was possible to attempt to extract 395 effect size estimates. Using this set of records, we adopted an approach similar to the master coder approach described by Syed and Nelson (2015), whereby each article was independently coded by myself (the "master coder", who coded the majority of articles in the final dataset), and then by one of the three main coders for the project (AS, MM, JS).[19,20]

Reliability Metrics. Most coded variables were categorical in nature (e.g., when evaluating how characteristics were determined, coders picked an option from "directly measured", "indirectly inferred", "manipulated", or "unclear"), but several variables were also continuous in nature (e.g., effect size estimates, sample sizes). *Percentage agreement* between coders was used as the metric of interrater reliability for categorical variables. It was chosen for the intuitiveness of its interpretation, and for the fact that it is not unduly influenced by the degree to which response options are unevenly represented in a dataset (i.e., when one or more response options are disproportionately selected compared to others; which was the case for many variables). Kappa was considered but rejected for being too influenced by uneven response categories (Burton, 1981; Syed & Nelson, 2015). For the continuous variables, I calculated three indices of reliability: the percentage agreement between coders, the Pearson correlation coefficient (r), and the intraclass correlation (ICC, form 3,1; Shrout & Fleiss, 1979). The provision of these three

[19] The reliability indices derived for each coder pair is interpretable as a function of (i.e., capped by) the reliability of each coder within pairs. Consequently, the overall reliability across pairs is capped by the master coder's reliability.
[20] Once coding was completed by each person, differences in coding were later examined and reconciled by the master coder to create the final dataset, rather than relying only on the master coder's rating.

indices was chosen to provide maximal information regarding the most crucial element of coding; that is, the extraction of the effect size estimates themselves. Good reliability was established following norms in the field: a percent agreement on at least 80%; *r* of at least .80, and an ICC of at least .80 (Belur, Tompson, Thornton, & Simon, 2018; Neuendorf , 2002; Syed & Nelson, 2015).

Reliability Results. When considering the full set of variables assessed for reliability, 72 variables out of 73 showed an aggregate (across coder pairs) percent agreement of 80% or above.[21] The average percent agreement was 95.3% across the full set of variables. The *r*s and ICCs for the seven continuous variables evaluated for reliability were always above .80 (average $r = .98$, and ICC = .97). When it comes to the effect sizes estimates extracted by coders, the aggregate reliability was excellent (percent agreement = 87%;[22] $r = .96$; ICC = .96).

Appendix J provides in-depth information about the assessments conducted to establish the reliability of our coding. This involves a report of all the indices of reliability calculated, broken down by variable and specific coder pairs.

6.2. Descriptive Analyses

Before conducting meta-analytic models, descriptive statistics were examined to offer an understanding of the demographics being represented across message matching studies.

---

[21] The one variable below 80% had 67% agreement. This variable required coders to select all options that applied from a set of 19 choices, and agreement required all selections to match. This was likely too strict a test. Evaluating each of the 19 response options individually consistently led to an agreement above 80%.
[22] The percent agreement required deviations to be within r = .01 to be considered in agreement. Furthermore, several cases of disagreement reflected one coder overlooking information to extract an effect (i.e., not extracting an effect another coder extracted), rather than disagreement in the effect size itself.

6.2.1. Study Characteristics. The upper left quadrant of Figure 11 shows the number of studies using samples from different continents. Overall, samples were drawn from 36 countries, spanning five continents. Of the 604 studies, the majority recruited samples from North America (339 studies), but there was also a good number of samples drawn from Asia (131 studies) and Europe (91 studies). Fewer studies were recruited from Oceania, and only one from South America.

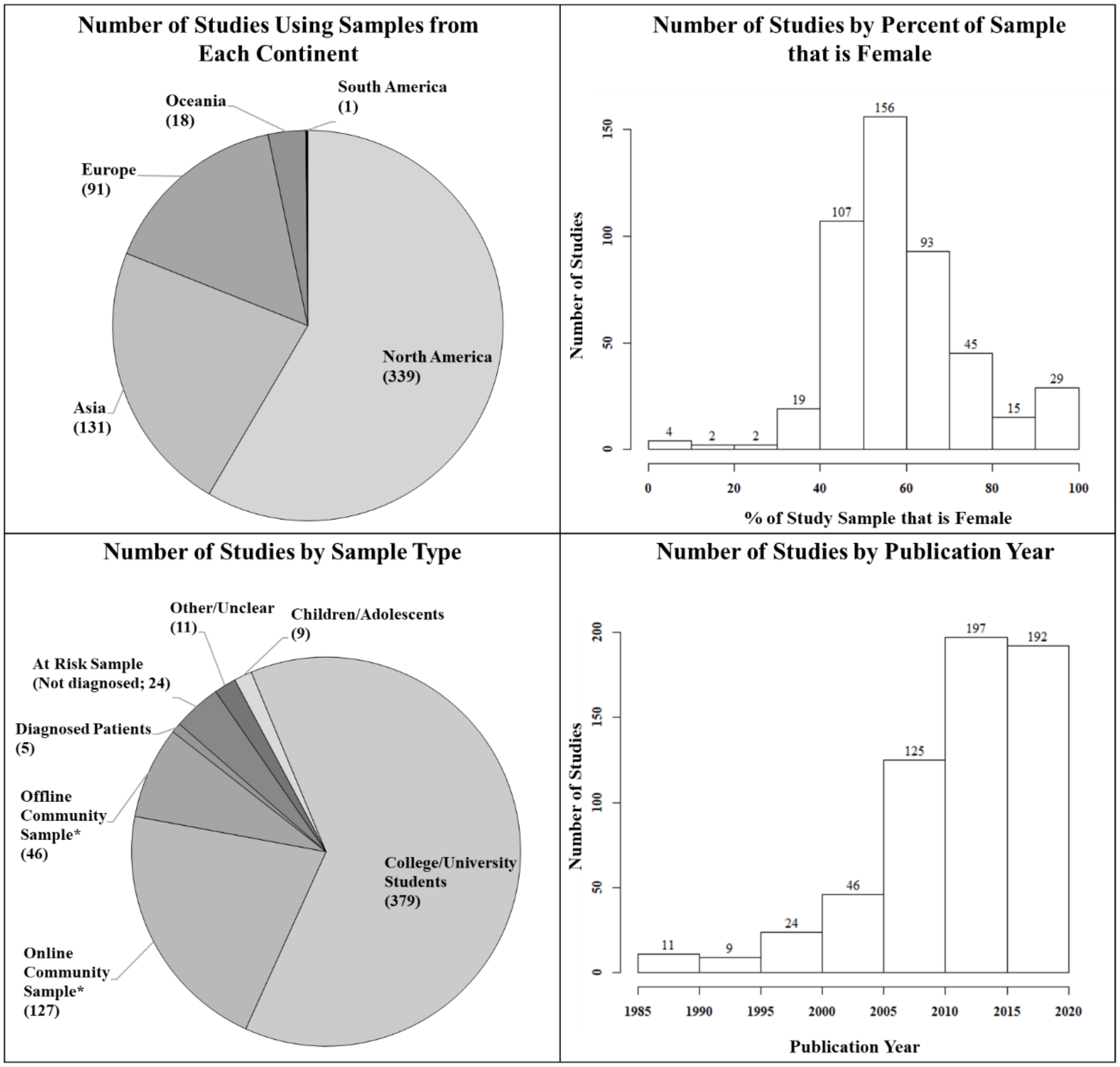
The upper right panel of Figure 11 shows the distribution of studies according to the percentage of their samples that was female. Overall, studies recruited a slightly larger proportion of female participants (on average, samples were 59% female).[23]

The lower left panel of Figure 11 provides information on the sampling frames used by studies. Overall, 379 studies (63%) used samples comprised of college and/or university students. When studies relied on non-student samples, the most common strategy was to recruit adult community members using online means (e.g., online panels).

Lastly, the lower right panel of Figure 11 shows the distribution of studies according to the year in which they were published. The distribution is similar to that from Figure 1. Figure 11 documents an initial interest in experiment message matching research starting in the mid-1980s, followed by a slow increase in interest until the mid-2000s, after which a notable surge of experimental studies began being published in this area.

[23] Only around 80% of studies reported gender distributions for participants. Additionally, very few studies reported gender categories beyond male and female.

Figure 11. Descriptive Information on Study Samples.



Notes. Figure excludes studies for which no information could be extracted on the country of the study, or regarding the gender breakdown of the sample.
*The two categories of "community sample" were defined as samples drawn from populations that did not meet criteria for inclusion into any other category.

6.2.2. Covariance Between Study Type, Type of Effect, and Type of Outcome.

When making inferences based on meta-analytic estimates, it is important to consider how certain features of studies covary with one another, and to consider the degree to which certain combinations of factors are well-represented. Given that meta-analytic results will be consistently broken down by *study type* (Type I vs. Type II studies), *type of effects* (e.g., main effects of messages given a level of the characteristic vs. interaction effects), and *type of outcome* (e.g., attitude vs. self-report behavior), I provide an exploration of how these factors covary with one another. Figure 12 plots the relationship between these three variables, and provides measures of strength of association between the categorical variables (Cramér's *V*, and Goodman and Kruskal's τ).

The upper left panel of Figure 12 shows the distribution of extracted effects according to study type and the type of effect being studied (e.g., the effect of a message given a characteristic level vs. the effect of a characteristic given a message level). As can be seen, there is a clear association between these two variables (e.g., V = .41) such that Type I studies only examine the effects of using different message interventions in ways that are conditional on people's characteristics. This is not surprising as this was built into the protocol of the synthesis when coding Type I studies. Specifically, Type I studies were defined as involving comparisons between two message-based experimental groups, and therefore could not treat characteristics being matched to as predictor variables. Consequently, Type I studies cannot examine how different levels of a characteristic influence responses to a given experimental message condition, and also cannot examine interaction effects (see Section 4.2.4. for more details on Type I studies).

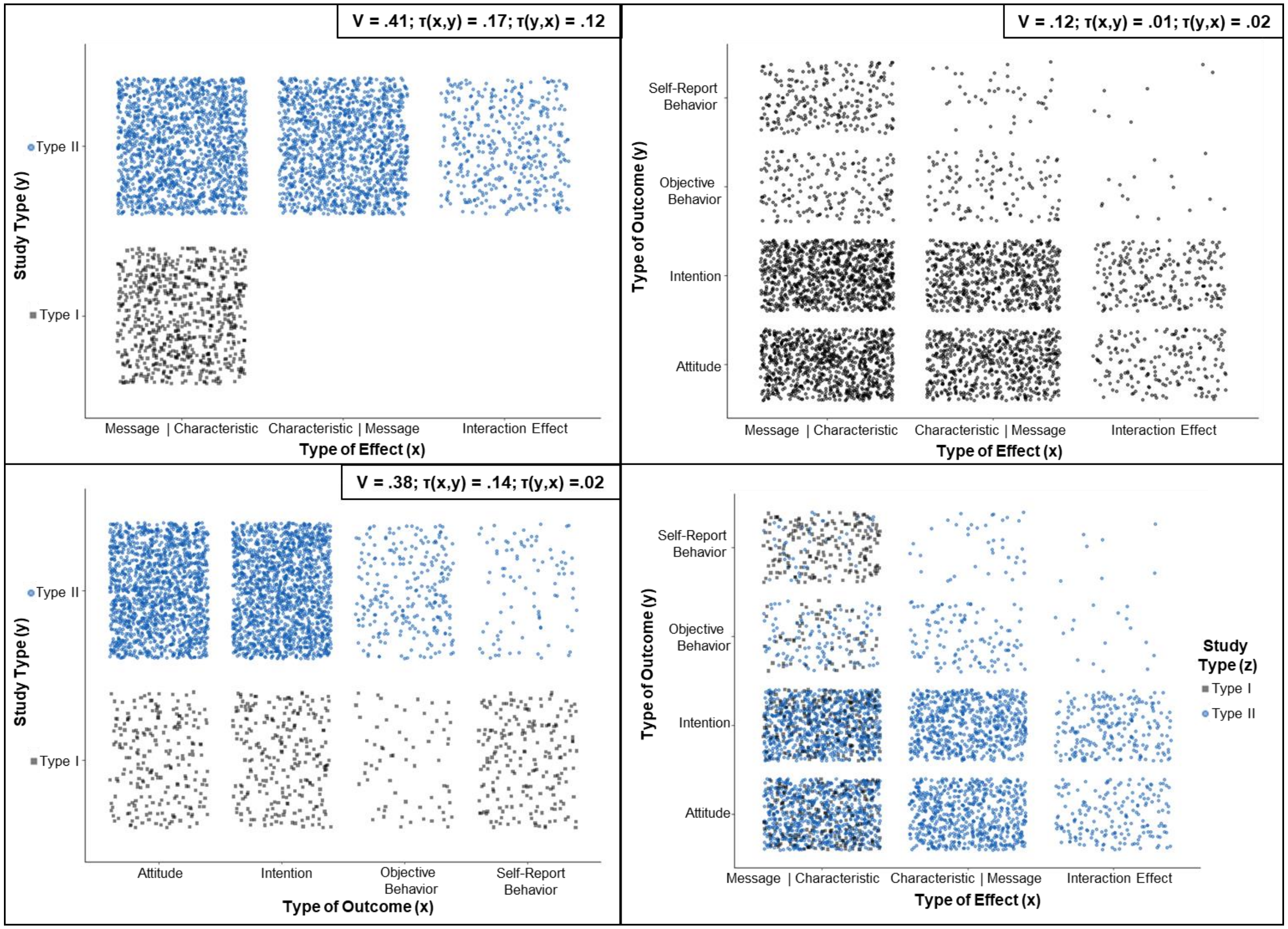
The upper right panel of Figure 12 shows the distribution of extracted effects according to type of effect and type of outcome. These two variables are not strongly associated (e.g., V = .12), but the concentration of effects across the cells is nevertheless informative. Specifically, we can see that extracted effects are very sparse for at least three cells in the plot; that is, for effects of characteristics conditional on message conditions on self-report behavior, and for the interaction effects on both self-report behavior and objective behavior. We can therefore expect that it will be more difficult to produce reliably narrow meta-analytic estimates for these cells, as there will be considerably fewer effects to aggregate.

The lower left panel of Figure 12 shows the association between study type and type of outcome. Here, the two variables are considerably associated ($V = .38$) such that effects on self-report behaviors are more likely to have been extracted from Type I than Type II studies. Given that Type I and Type II studies also tend to differ in other ways (e.g., Type I studies offer more flexibility in using different types of comparison messages), keeping analyses separate by Study Type will therefore allow me to make less confounded inferences when comparing message matching effects across types of outcomes.

Finally, the lower right panel of Figure 12 shows the relationship between the three variables considered simultaneously. The pattern here is largely a combination of the patterns from the upper left (i.e., Type I studies limited to one type of effect), upper right (i.e., lower representation of certain cells), and lower left panels (Type I studies report proportionately more effects on self-report behaviors than do Type II studies).

***Examining other confounded features*.** To help guide inferences throughout this meta-analysis, I created matrices of V and τ covering the bivariate associations between most of the variables coded in this meta-analytic synthesis. These matrices are found in Appendix L, along with some additional figures similar to the panels in Figure 12. These figures are referenced in text when they informed my inferences.

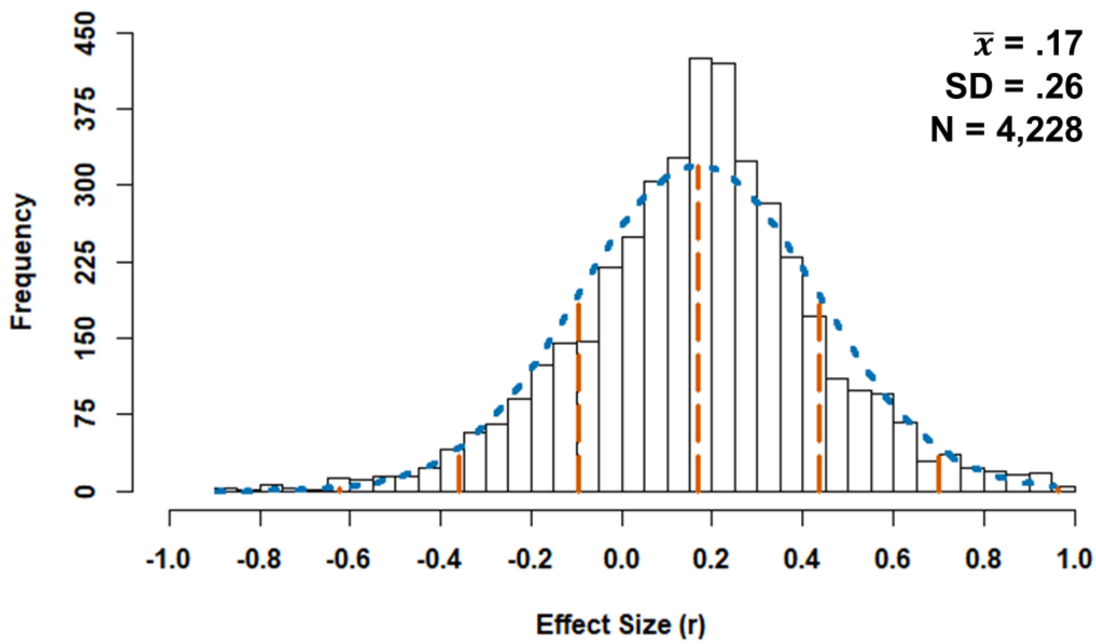
Figure 12. Example Plots of Covarying Features of Matching Effects, Focusing on Study Type, Effect Type, and Type of Outcome.



Notes. V = Cramér's V; τ(x,y) = Goodman and Kruskal's τ for variable x predicting variable y; τ(y,x) = Goodman and Kruskal's τ for variable y predicting variable x. The symbol "|" is used to indicate the effect of one factor (e.g., message) "given", or "conditional on", a level of another factor. V and τ are provided only for bivariate relations.

6.2.3. Univariate Distribution of Effect Sizes. Figure 13 presents a distribution of the 4,228 effect sizes included in the current synthesis. This analysis is provided solely for descriptive purposes, as it ignores nesting of estimates within studies and the relative sample sizes associated with each effect size estimate. Overall, effect sizes are distributed following a fairly normal distribution centered around a mean of r = .17 (median = .18), with a standard deviation of .26. There is a large spread of effects, such that it is relatively common to see effects that are substantially stronger than average (e.g., r > .50), as well as negative effects (i.e., r < .00).

Figure 13. Histogram of the Effect Sizes in this Synthesis.



Note. r = Pearson Correlation; $\bar{x}$ = mean effect size; SD = standard deviation; N = sample size (number of effect size estimates extracted). This histogram presents the frequency at which effect sizes were observed at different magnitudes. The blue dotted line presents the expected distribution of scores for a normal distribution with the observed mean and standard deviation. The orange dashed lines present represent the mean and scores falling at one standard deviation increments from it.

6.3. Primary Findings: Overall effects of Functional Message Matching.

From this point forward, when reporting results from the meta-analytic estimates, I use the expression *effect sizes* to refer to the individual effect sizes extracted from coded studies. In contrast, I will use the term *estimate* (or meta-analytic estimate) to refer to the effect size estimates produced by the three-level meta-analytic models that aggregate the effect sizes coded from individual studies. As a reminder, all reported meta-analytic estimates rely on aggregating effect sizes from a *minimum of four studies* to maximize the reliability of any inference made. In other words, when fewer than four studies were available to provide effect sizes for a given meta-analytic model, no meta-analytic estimate was generated.

6.3.1. Evaluating the Overall Impact of Functional Matching Studies. The meta-analytic estimates evaluating the overall impact of functional matching studies are presented in Table 1 and represented in Figure 14. Both Table 1 and Figure 14 present meta-analytic estimates (using r as a metric), broken down by type of outcome type (e.g., attitude vs. intention), study type (Type I vs. Type II), and effect type (e.g., effect of message given a level of a characteristic vs. an interaction effect).

Table 1 and Figure 14 also provide 95% confidence intervals around each estimate, and Table 1 further provides 95% prediction intervals as an indicator of the heterogeneity, or spread of effect sizes, that make up the distributions underlying each meta-analytic estimate. Whereas 95% confidence intervals are intended to capture the population *average* effect size 95% of the time (and give us an index of how reliable our meta-analytic estimate of that average effect size parameter may be), the purpose of 95% prediction intervals is to inform us about the likely range in which any given future effect size (e.g., from a new upcoming intervention) may be expected to fall.

In addition to confidence intervals and prediction intervals, Table 1 also provides the number of effect sizes being aggregated to derive each meta-analytic estimate, the number of separate studies effect sizes were extracted from, the average sample size of each aggregated study, and the significance level for each meta-analytic estimate.

The results of the analyses are very clear; there is a significant meta-analytic estimate for *every* combination of outcome type, study type, and effect type. These findings strongly support hypotheses H1, H2, H3, and H4. Estimates range in size from r = .06 to r = .24, and are typically around r = .20—with the exception of estimates for self-report behaviors, which tend to be (non-significantly) smaller and more varied. It is difficult to ascertain why the estimates for self-report behaviors are smaller (especially for Type I studies) when effects on objective behaviors were largely similar to other outcomes. One explanation may be that self-report behaviors were almost always assessed after some time had elapsed after intervention were delivered (allowing for decay in effect sizes), whereas other outcome types were generally assessed the same day the interventions were delivered (see Figure L1 of Appendix; see also moderation results for assessment time in Section 6.5.8).

Most confidence intervals around estimates are narrow for both attitude and intention outcomes, with the upper and lower bounds of the intervals within r = .05 of their respective estimates. This reflects that these estimates rely on very large sets of data, as even the least precise of these estimates was derived using 218 effect sizes (from 91 studies, with a combined sample of over twenty thousand participants). In contrast, many confidence intervals for self-report behavior and objective behavior are larger in size, although generally still having upper and lower bounds that within r = .10 of the estimates themselves. The larger intervals for these outcomes reflect the smaller number of studies that reported these outcomes (e.g., the widest interval aggregated 16 effects from 13 studies, with a total sample size slightly above one thousand participants). Despite the confidence intervals being larger for the two behavioral outcomes, no interval overlapped with r = .00.

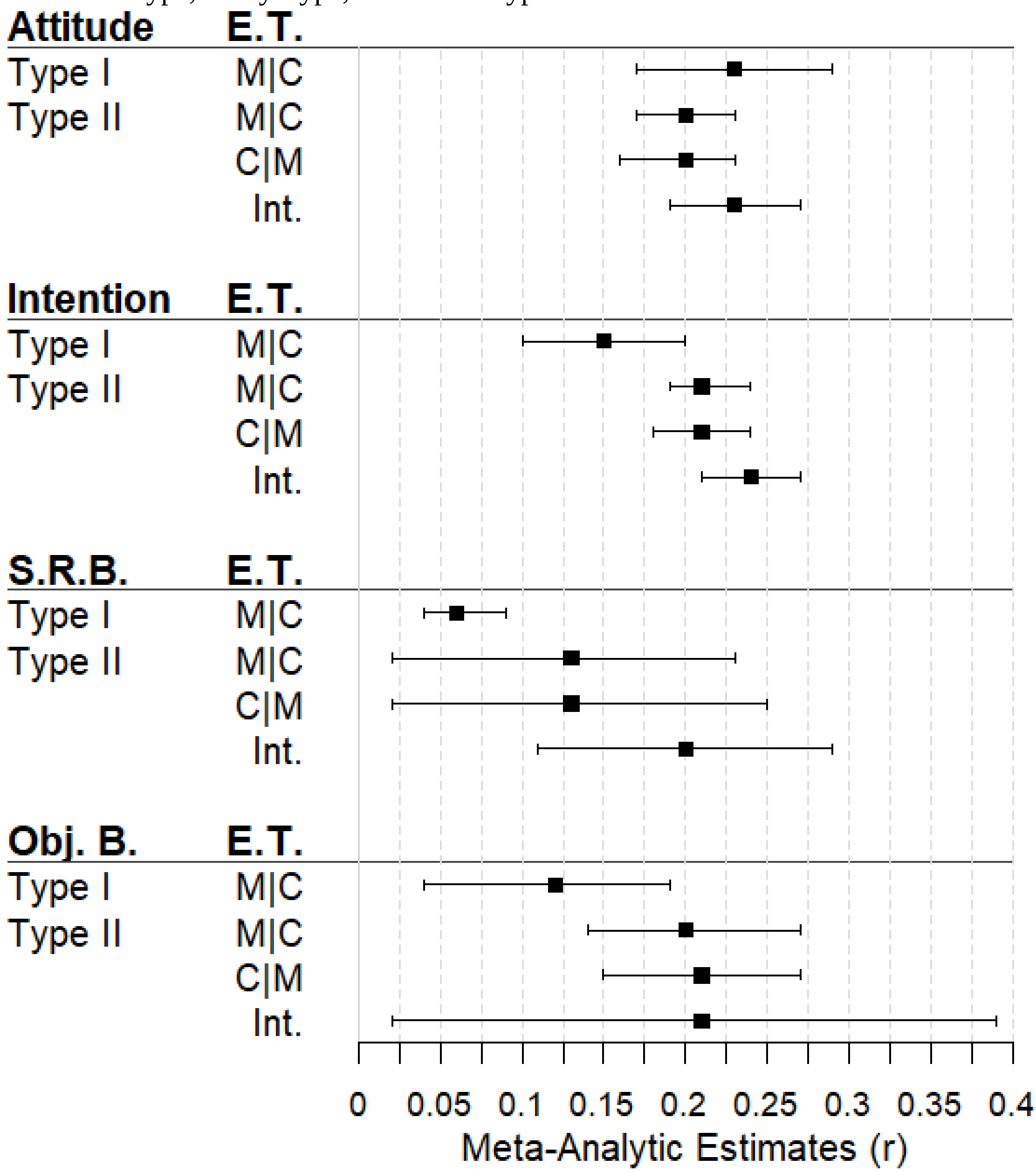
In order to fully interpret these effect, we can also consider the 95% prediction intervals in Table 1. These intervals consistently indicate that substantial heterogeneity exists in the distribution of effect sizes underlying each estimate. Specifically, most 95% prediction intervals extend into negative numbers, usually reaching at least r = -.20. This means that although there is strong evidence that matching effects are effective *on average*, there is a good chance that any given matching intervention will fail to achieve an advantage, and may even backfire. The converse possibly, however, is also true; there is a substantial chance that any given intervention will produce an effect that is substantially larger than average (e.g., most 95% prediction intervals had upper bounds extending beyond r = .50). Additional explorations of how effect sizes differ when conditional on other factors (i.e., levels of moderators) are therefore required.

Table 1. Primary Meta-Analytic Results for Function Matching Effects by Outcome Type, Study Type, and Effect Type.

Outcome, Study & Effect Type		r	95% CI Low	95% CI High	95% PI Low	95% PI High	Effect #	Study #	Mean Study N	Sig. (p)
Attitude										
Type I	M|C	.227	.168	.285	-.364	.688	218	91	244	<.001
Type II	M|C	.197	.167	.227	-.361	.652	710	216	218	<.001
	C|M	.197	.161	.231	-.465	.717	648	190	230	<.001
	Int.	.231	.194	.267	-.203	.589	181	149	186	<.001
Intention										
Type I	M|C	.149	.103	.196	-.300	.545	244	82	287	<.001
Type II	M|C	.214	.185	.242	-.313	.640	745	240	234	<.001
	C|M	.209	.181	.238	-.359	.665	654	206	248	<.001
	Int.	.239	.207	.271	-.185	.588	227	179	183	<.001
Self-Report Behavior										
Type I	M|C	.064	.040	.088	-.187	.308	199	42	1012	<.001
Type II	M|C	.126	.020	.230	-.398	.589	44	12	298	.021
	C|M	.134	.017	.248	-.433	.626	38	10	300	.030
	Int.	.201	.106	.293	.106	.293	7	5	107	.002
Objective Behavior										
Type I	M|C	.118	.044	.190	-.285	.485	64	27	365	<.001
Type II	M|C	.204	.138	.269	-.220	.564	117	36	774	<.001
	C|M	.209	.146	.270	-.164	.530	115	33	835	<.001
	Int.	.212	.025	.385	-.423	.707	16	13	94	<.001

Notes. r = meta-analytic estimate expressed as a correlation; 95 % CI = 95% confidence interval; 95% PI = 95 % prediction interval; Effect # = number of effect size estimates aggregated; Study # = number of studies used to derive meta-analytic estimate; Mean Study N = average sample size of each study used; Sig (p) = statistical significance level expressed as p-value; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect.

Figure 14. Forest Plot of Primary Meta-Analytic Results for Functional Matching Effects by Outcome Type, Study Type, and Effect Type.



Note. E.T. = Effect Type; S.R.B. = Self-Report Behavior; Obj. B. = Objective behavior; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect; r = meta-analytic estimate expressed as a correlation. The intervals around each estimate represent 95% confidence intervals.

6.3.2. Evaluation of Bias. To examine the presence of bias in the results of this synthesis, a series of analyses were conducted on the primary findings reported in Table 1 (and Figure 14). First, I report findings produced from sensitivity analyses. Second, I supplement these analyses with funnel plots and p-curve tests.

Sensitivity Analyses**.** Appendix M provides extensive details on the sensitivity analyses. Here, I provide a high-level summary of the findings.

Overall, 10 variables were used for examination in sensitivity analyses. These are listed in Table 2, along with a short description of what each variable stands for. For each of the 10 variables, I present the results of subgroup analyses that evaluated the moderation effect of each variable on the 16 meta-analytic estimates produced in Table 1. The right-most column of Table 2 summarizes the results of these evaluations.

Overall, there is little evidence of bias for most variables. The one variable that shows stronger evidence of influencing estimates is sample size—specifically, there is consistent evidence that larger samples sizes are associated with smaller estimates (i.e., 13 of 32 tests show significant effects in this direction). For each of the other variables, only one or two tests at a time (out of 11 to 15 evaluations per variable) show any significant evidence of moderation, for a total of 9 significant effects out of 104 tests (excluding the 32 tests associated with sample size). Of the 9 significant tests, four show evidence that higher bias is associated with larger effects, whereas the other five tests show that higher bias is associated with smaller effects.

Table 2. Summary of Results from Sensitivity Analyses Moderating the 16 Estimates in Table 1.

Variable	Description	Summary of Evidence for Each Variable[a]
1. Message fully available	Were the messages (intervention materials) made fully available by the authors?	**No Evidence**. No significant effects of this variable for 14 evaluations.
2. Covariates included	Were covariates included in the analyses to derive the effect size?	**Limited Evidence**: One of 13 evaluations shows significant moderation. Higher bias (i.e., the inclusion of a covariate) was associated with a smaller effect sizes.
3. Manipulation confounded	Do intervention conditions differ only in degree of matching (or is the manipulation confounded)?	**Limited Evidence**: One of 14 evaluations shows significant moderation. The moderate level of bias (when it is unclear whether the manipulation was confounded) is associated with smaller effect sizes than when manipulation was not confounded. There is no significant difference between high bias (confirmed presence of confounding) and either other levels of this variable.
4. Selection Bias	Is the randomization process explicitly described as truly random?	**Limited Evidence**: One of 8 evaluations shows significant moderation. The moderate level of bias (when it is unclear whether selection bias was present) is associated with larger effect sizes than when selection bias was low. There is no significant difference between high bias (randomization confirmed as not truly random) and either other levels of this variable.
5. Performance bias	Could a lack of blinding/masking lead to a bias on participants' actual outcomes?	**Limited Evidence**: Two of 15 evaluations show significant moderation. In both cases, higher bias is associated with larger effect sizes.
6. Attrition bias	Was the attrition rate between assessment time and randomization less or greater than 20%?	**Limited Evidence**: Two of 14 evaluations show significant moderation. In both cases, higher bias is associated with smaller effect sizes.
7. Reporting bias	Are there results reported for all matching effects of interest (including all subgroups? This is regardless of whether the way in which effect were reported could be used to extract effects.	**Limited Evidence**: One of 11 evaluations shows significant moderation. Higher bias (i.e., less complete reporting) is associated with smaller effect sizes.
8. Extractable effects	Percent of effects examined in a study that could be successfully extracted by coders	**Limited Evidence**: One of 15 evaluations shows significant moderation. Higher bias (i.e., less complete reporting) is associated with smaller effect sizes.
9. Sample size (effect-level)	Sample size associated with each effect size	**Consistent Evidence**: Seven of 16 evaluations show that larger sample sizes are associated with smaller effect sizes.
10. Sample size (study-level)	Sample size associated with the overall study an effect was extracted from.	**Consistent Evidence**: Six of 16 evaluations show that larger sample sizes are associated with smaller effect sizes.

[a]Could each include up to 16 tests, depending on whether there were at least four studies per level of the moderator for each of the 16 effects in Table 1.

Funnel plots and p-curve analyses. To complement the sensitivity analyses, I generated funnel plots and p-curve analyses for each estimate in Table 1. The full results of these analyses are found in Appendix N (Figures N1 to N32, and Tables N1 to N18).

Figure 15 presents a representative sample of the funnel plots. For each panel in Figure 15, two types of funnel plots are presented, each plotting effects by their size (on the x-axis), and their corresponding standard errors (on the y-axis). Standard errors are largely determined by sample size such that larger samples show smaller error and appear higher on the plot relative to smaller studies.

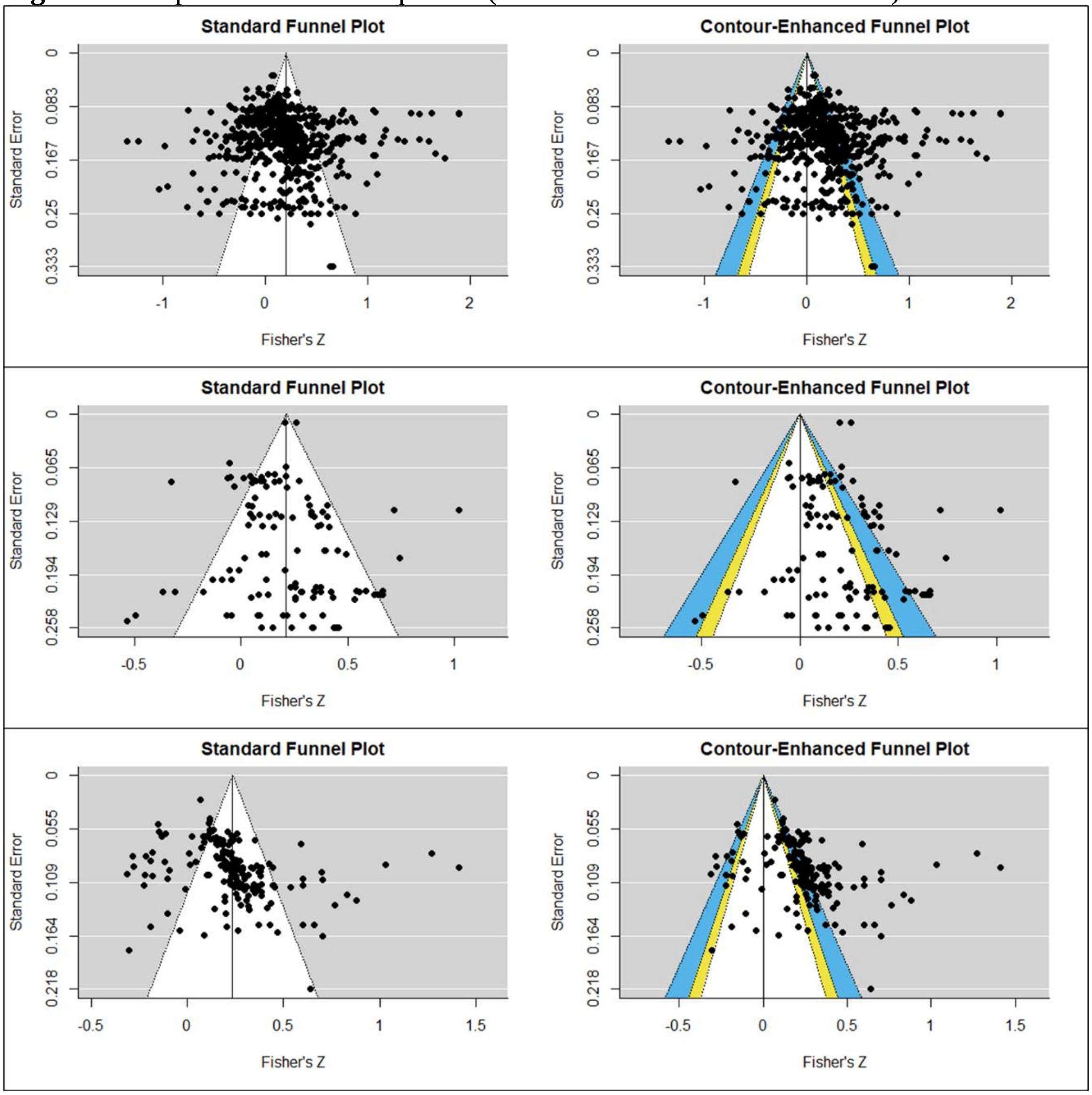
The first type of plot in Figure 15 consists of *standard funnel plots*. These plots are centered around meta-analytic estimates, and asymmetry in the distribution of effects sizes around the center is taken as possible evidence of publication-related bias. For example, if a larger proportion of effect sizes are found on the lower right side of the plot, relative to the lower left side, this shows that a disproportionately larger number of small studies with larger than typical effect sizes are present than would be expected from a normally (and symmetrically) distributed set of effects. This type of asymmetry can arise from publication/reporting biases favoring the publication of significant positive effects, but it should be noted that asymmetrical patterns can also arise from other (non-bias) sources as well (Terrin, Schmid, & Lau, 2005).

In addition, Figure 15 provides *contour-enhanced funnel plots*. These plots are centered around zero, and use colored regions to indicate the degree to which each effect size is statistically different from zero: effects in the white region are non-significantly different from zero; effects in the yellow region have significance values between $p = .10$ and .05; effects in the blue region are significantly different from zero at $p = .05$ and $p =$

.01, and; effects in the grey region captures significant effects at $p < .01$. The rationale behind these plots, is that biases favoring effects just below significance (e.g., questionable research practices; John, Loewenstein, & Prelec, 2012; Simmons, Nelson, & Simonsohn, 2011) should produce a disproportionate number of results that fall just below conventional levels of significance (i.e., the blue region of the plots).

The top two panels of Figure 15 are representative of the funnel plots for all the estimates captured in Table 1, except for the interaction effects, which typically follow a pattern similar to the lower panel of Figure 15. When looking at standard funnel plots, none of the plots show evidence for strong asymmetry in the effect sizes used to compute estimates; in particular, it does not appear that effects from small sample sizes are disproportionally more likely to produce larger effects. Most contour-enhanced plots also do not show obvious evidence of bias (and resemble the upper two panels of Figure 15), with the exception of plots for interaction effects. A large proportion of interaction effects sizes are located just below conventional significance levels (in the blue region of the plots), indicating possible bias. It is important to note that for Type II studies, authors primarily operationalize support for hypotheses through the significance level of interaction effects, rather than the significance level of pairwise comparisons (i.e., the other effect types extracted from Type II studies). This may lead to an asymmetry in bias, such that there is greater pressure for research to produce significant interaction effects than significant pairwise comparisons. Bias may also be more apparent for interaction effects as these were only extracted when authors reported formal statistical tests (e.g., ANOVAs), which often included covariates. In contrast, extracting pairwise comparisons relied mostly on unadjusted descriptive statistics (e.g., means and standard deviations).

Figure 15. Representative Examples of (Standard and Contour-Enhanced) Funnel Plots.



Notes. Standard funnel plots are centered on meta-analytic estimates, whereas contour-enhanced funnel plots are centered around an effect size of zero. For contour-enhanced funnel plots, effects in the white region are non-significantly different from zero. Effects in the yellow region correspond to significance values between p = .10 and .05. Effects in the blue region represent effects significantly different from zero at a level between p = .05 and p = .01. The grey region captures significant effects at p < .01.

The upper panel presents the funnel plots for Type II studies examining the effect of characteristics given messages on attitudes. The middle panel presents the funnel plots for Type II studies examining the effect of characteristics given messages on objective behavior. The lower panel presents the funnel plots for Type II studies examining interaction effects on attitudes. The full set of funnel plots for each of the 16 estimates from Table 1 are available in Appendix N.

Taken together, the funnel plots indicate little reason to anticipate bias for most estimates in this synthesis with the exception of interaction effects. Interaction effects may display some bias, which may explain why these are consistently very slightly larger than other effects in Table 1.

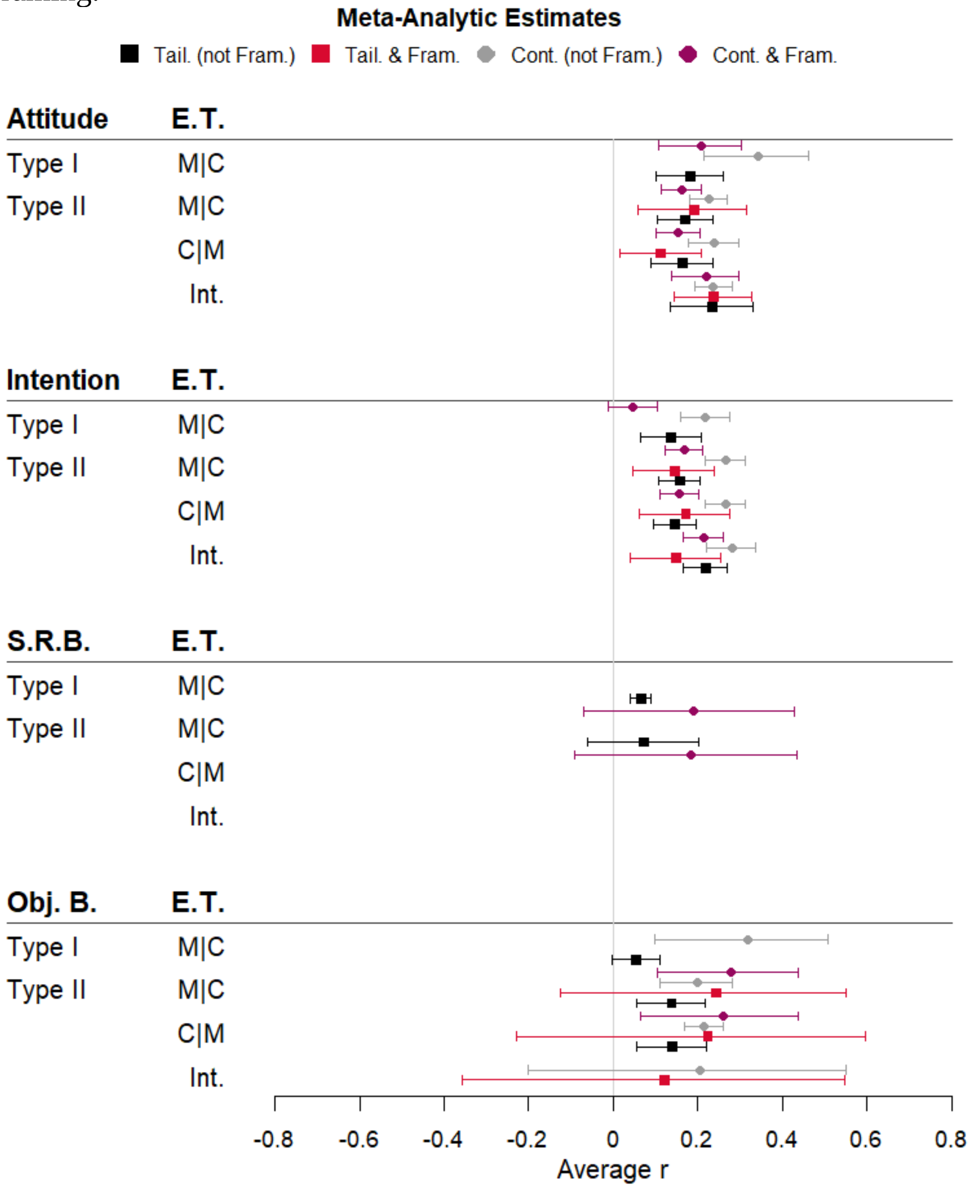
None of the p-curve analyses and tests provide evidence that the results reported in the current synthesis can be attributed to bias. All p-curves are right-skewed with p-values within the significant range (< .05) becoming increasingly less frequent as p-values approach .05. Only one of the sixteen sets of p-curves showed any deviation from this pattern. However, this p-curve was largely inconclusive owing to a small sample size (i.e., this was the interaction effect on self-reported behaviors in Table 1, which depended on only 7 effect size estimates). See Appendix O for more details.

***Overall evaluation of bias*.** Overall, there is relatively little consistent evidence of bias across the analyses. Eight of the ten variables used for sensitivity analyses do not show consistent moderation effects, and no evidence of bias is produced by the standard funnel plots, or by the p-curve analyses. That said, there is still some evidence of possible bias from other sources. Notably, sensitivity analyses using sample size do present consistent evidence that larger sample sizes are associated with smaller effect sizes. This could indicate that publication biases favor the publication of smaller samples with larger effects, but it is also possible that larger studies are correlated with study designs that are less effective. Given that the funnel plots do not show clear evidence for bias towards smaller studies with larger effects, the exact relationship between sample size and bias is somewhat inconclusive. The other consistent source of evidence for bias comes from contour-enhanced funnel plots, which show suspicious patterns for interaction effects (but not for any other effect type). Specifically, the plots show effect sizes that are suspiciously concentrated around a significance level between p =.05 and p = .01, which could indicate that the effect sizes extracted from interactions may be biased upwards. That said, this concentration was not pronounced enough for p-curve analyses to find significant evidence of bias. Consequently, the implications from the contour-enhanced funnel plots may also be somewhat inconclusive.

6.4. Matching Effects Broken Down by How Functional Matching Overlaps with Message Tailoring, Context Matching, and Message Framing.

Next, I examine whether significant effect sizes emerge for the four sub-literatures that make up functional message matching research, as delineated in Figure 2: (1) functional matching that overlaps with context matching but not message framing; (2) functional matching that overlaps both with context matching and message framing; (3) functional matching that overlaps with message tailoring but not message framing, and; (4) functional matching that overlaps with both message tailoring and message framing. The results of these analyses, including meta-analytic estimates and corresponding 95% confidence intervals, are presented in Figure 16. Tables similar to Table 1 are provided separately for each sub-literature in Appendix O, and contain information on the 95% prediction intervals, number of effect sizes being aggregated, number of studies effects are extracted from, and the average sample size of each study (See Tables O1 to O4 in Appendix O). Figure 16 summarizes the results.

Figure 16. Forest Plot of Meta-Analytic Results Broken Down by How Functional Matching Effects Overlap with Message Tailoring, Context Matching, and Message Framing.



Note. "Tail. (not Fram.)" = Functional effects that belong to the tailoring literature, but not the framing literature; "Tail. & Fram." = Functional effects that belong to the tailoring and framing literatures; "Cont. (not Fram.)" = Functional effects that belong to the context matching literature, but not the framing literature, and; "Cont. & Fram." = Functional effects that belong to the context matching and framing literatures.
E.T. = Effect Type; S.R.B. = Self-Report Behavior; Obj. B. = Objective behavior; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect; r = meta-analytic estimate expressed as a correlation. The intervals around each estimate represent 95% confidence intervals.

When looking at estimates for the outcomes of attitude and intention, estimates within all literatures tend to be significant, and generally cluster within the range of r = .15 to .25. This pattern is in line with my hypothesis that matching effects would be apparent in each sub-literature. The only sub-literature that stands out as possibly different from the others in terms of these two outcomes is the functional literature that is (1) context matching, but not message framing. Estimates for this type of matching effect tend to be slightly larger, and within the range of r = .22 to .34 (this encompasses eight estimates, all of which are significant). In contrast, here are the ranges for the other three sub-literatures:

2. Functional matching that is context matching and framing: r = .05 to .22. This encompasses eight estimates, seven of which are significant. The smallest estimate may be a relative outlier compared to the others, as the second smallest estimate is r = .15.
3. Functional matching that is tailoring but not framing: r = .14 to .23. This encompasses eight estimates, all of which are significant.
4. Functional matching that is tailoring and framing: r = .11 to .24. This encompasses six estimates, all of which are significant.

When it comes to estimated effects for self-report behaviors and objective behaviors, estimates are more varied and have considerably larger confidence intervals (but are still all positive in magnitude). The patterns by sub-literature are as follow:

1. Functional matching that is context matching but not framing: r = .20 to .32. This encompasses four estimates, three of which are significant.

2. Functional matching that is context matching and framing: r = .18 to .26. This encompasses four estimates, two of which are significant.
3. Functional matching that is tailoring but not framing: r = .05 to .14. This encompasses five estimates, three of which are significant.
4. Functional matching that is tailoring and framing: r = .12 to .24. This encompasses three estimates, none of which are significant.

Of note, there was considerable heterogeneity in effect sizes underlying nearly all estimates (as shown in prediction intervals provided in Appendix O). All estimates, save one, have 95% prediction intervals that extend into the negative range ($r < .00$), and most intervals also extend into large effect sizes as well ($r > .50$). This is similar to the heterogeneity found in producing the estimates for functional matching effects in general (i.e., the Table 1 results), and suggests that each of the four sub-literatures is also characterized by effect that vary substantially in their magnitude across interventions.

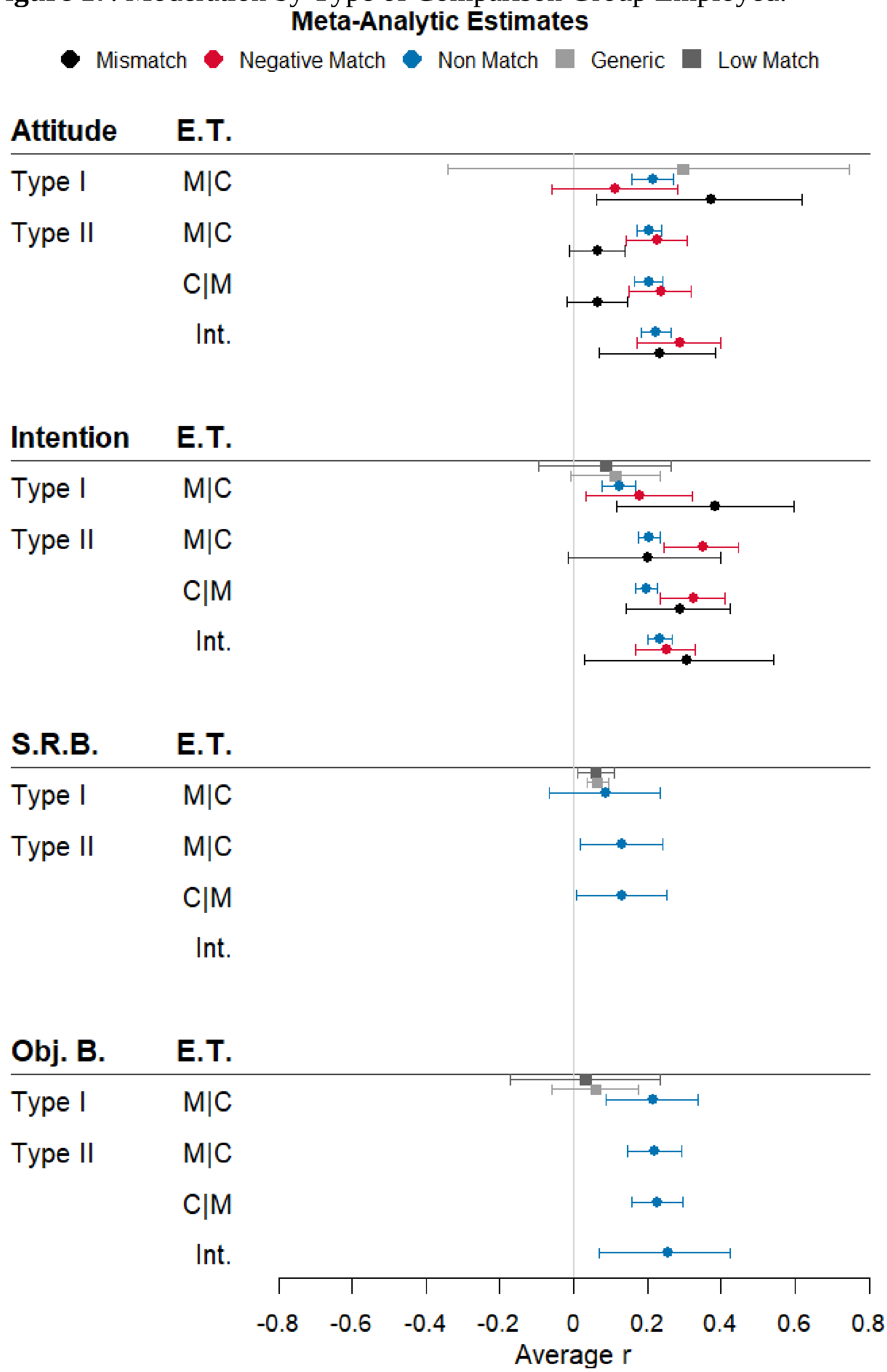
6.5. Moderation Analyses: Evaluating Principles for Message Matching.

The final set of analyses I conducted as part of this synthesis is a series of subgroup analyses to identify moderators of functional matching effects. For each moderator evaluate, I provide a summary of findings, interpret them in relation to my *a priori* hypotheses, and point out relevant confounding influences that may exist between moderators (i.e., as divulged by the analyses from Section 6.2.2.). For each moderator variable, a figure similar to Figure 15 is produced, providing meta-analytic estimates and 95% confidence intervals for each level of the moderator, whenever at least four studies were available to generate a meta-analytic estimate. These figures are then consistently supplemented by tables in the Appendix, modelled after Table 1—specifically, for each estimate produced in the figures, the tables in the Appendix provide 95% prediction intervals, numbers of effect sizes aggregated, numbers of studies the effects were extracted from, and the average sample sizes for studies used to derive each estimate. For simplicity, the text that follows does not describe the prediction intervals produced in subgroups analyses for each variable. However, the pattern is usually similar as before. Specifically, there is usually a large amount of heterogeneity in the effect sizes that make up the distributions that underlie each meta-analytic estimate (tables in the relevant appendices for each moderator variable provide more detail).

6.5.1. Type of Comparison Group Used. The first moderator I consider is the type of comparison message used to evaluate the effect of a positively matched message. Comparison messages could include: (a) non-matched messages, (b) negatively matched messages, (c) mismatched messages—which represent messages that could not be further classified as either non-matched or negatively matched; (d) generic messages; (e) low matched messages, and (f) mixed messages. Subgroup analyses on this factor are summarized in Figure 17 (see tables P1 to P5 of Appendix P for the full results). Overall, the effects for using each type of comparison are as follows:

a. Non-matched messages. Using a non-matched message as a comparison was by far the most common type of comparison group. Fifteen meta-analytic effects were generated for this comparison, ranging from $r = .09$ to $r = .26$. In total, 14 of the 15 generated effects are significant, providing consistent evidence that positively matched messages outperform this type of comparison (for attitude, intention, self-report behavior, and objective behavior).

Figure 17. Moderation by Type of Comparison Group Employed.



Note. E.T. = Effect Type; S.R.B. = Self-Report Behavior; Obj. B. = Objective behavior; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect; r = meta-analytic estimate expressed as a correlation. The intervals around each estimate represent 95% confidence intervals.

b. Negatively matched messages. Eight estimates were generated using negatively matched messages as a comparison. These range from r = .11 to r = .33, and seven of the estimates effects are significant. This provides good evidence that positively matched messages outperform this type of comparison for changing attitudes and intentions (no estimates were generated for the behavioral outcomes).

c. Mismatches (not further classified). Eight estimates were generated for comparison groups that were coded as mismatches that could not be further classified as non-matches or negative matches. The estimates for this category vary more widely in magnitude, ranging from r = .06 to r = .38. This may reflect the heterogeneous nature of this type of comparison, but the range is nevertheless consistent with this category being a mixture of non-matched and negatively matched messages. Overall, five of the eight estimates are significant. Given that even the non-significant estimates are of similar magnitude, this synthesis can be said to provide good evidence that positively matched messages outperform this type of comparison for changing attitudes and intentions (once again, no estimates were generated for behavior).

d. Generic messages. Four estimates (using Type I effects only) were generated for comparison groups that used generic messages. Only one of these estimates is significant, but the range in the magnitude of the estimates is similar to some of the other comparison message types (r = .06 to .30). Counterintuitively, the significant effect is a smaller one (r = .06) on self-report behavior (this is likely because this estimate makes use of a larger pool of effect sizes, leading to a narrower confidence interval). Overall, this finding provides some evidence that positively matched messages can outperform generic messages, but further data on this comparison type would be beneficial.

e. Low matched messages. Three estimates compare messages matching to a larger number of characteristics to messages that matched to a smaller number (i.e., low match conditions). These range in magnitude from r = .03 to r = .09, and only one estimate is significant. This provides some evidence that matching to a larger number of characteristics can be more beneficial than matching to a smaller number, but further data on this comparison type would again be beneficial to draw stronger conclusions.

f. Mixed messages. Lastly, a few studies used mixed messages as comparisons (i.e., messages that combined both matched and mismatched elements); however, too few effects were extracted from such studies to produce reliable meta-analytic estimates.

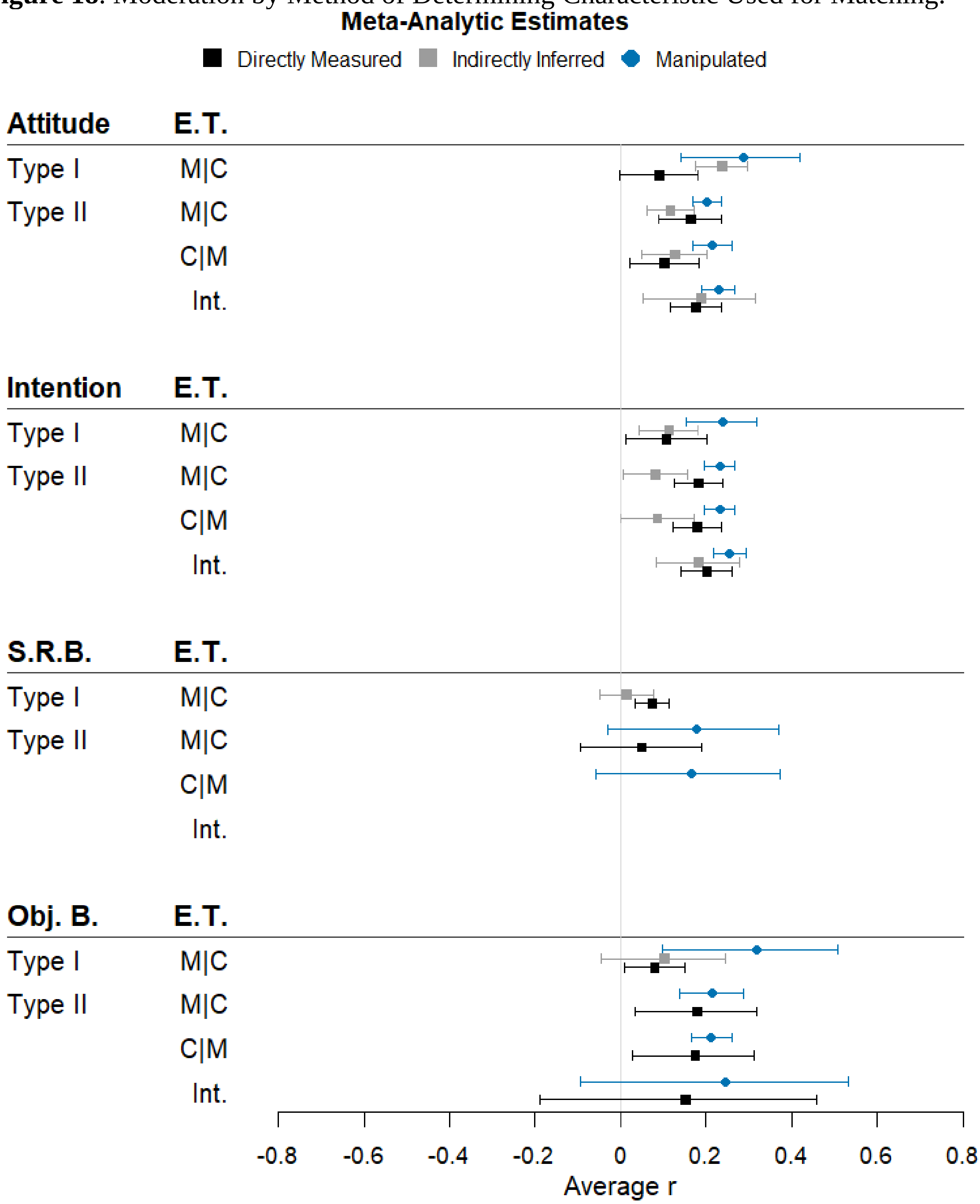
Hypotheses evaluated. Hypotheses H5 to H14 made predictions regarding the relative strength of effects making use of different types of comparison groups. Table 3 summarizes the hypotheses and the support each received from the data. Overall, although most comparisons of effect sizes are in the expected direction, it is generally difficult to draw clear inferences, as most types of comparison groups are not represented frequently enough in studies. An exception, however, exists for subgroup analyses comparing between negative matches and non-matched, and for subgroup analyses comparing between negative matches and mismatches. For these comparisons, the use of negative matches as comparisons does appear to lead to larger estimates, supporting the idea that matching effects exist on a continuum as exemplified in Figure 3.

Table 3. Summary of Support for Hypotheses H5 to H14.

Hypotheses	**Support Level**
H5: Negative matches > non-matches	**Supported.** Effects in correct direction in 7 of 8 comparable pairs; two comparisons were also significant
H6: Negative matches > mismatches	**Supported.** Effects in correct direction in 5 of 8 comparable pairs; two comparisons were also significant
H7: Negative matches > generic messages	**Inconclusive**. Two available comparisons, in conflicting directions, and neither significant.
H8: Negative matches > Low matches	**Inconclusive**. Only one comparison available; in expected direction, but not significant.
H9: Negative matches > mixed messages	**Inconclusive**. Not enough data to produce comparisons.
H10: non-matches > generic messages	**Inconclusive**. Three of four comparisons in hypothesizes direction, but no significant effect.
H11: non-matches > low matches	**Inconclusive**. Three of three comparisons in hypothesizes direction, but no significant effect.
H12: mismatches > generic messages	**Inconclusive**. Two effects of two in expected directed but neither significant.
H13: mismatches > low matches	**Inconclusive**. Only one comparison available. In expected direction, but not significant.
H14: generic messages > low matches	**Inconclusive**. Three comparisons available. All in expected direction, but nonsignificant, and effect sizes are always very close in magnitude.

6.5.2. Method of Determining Characteristic Used for Matching. Next, I examine how the method of determining the characteristic being matched to influences the magnitude of meta-analytic estimates. Specifically, I examine whether characteristics were determined by: (a) directly measuring their values; (b) indirectly inferring their values through a proxy variable, or; (c) manipulated. The results of subgroup analyses are summarized in Figure 18 (and see Tables Q1 to Q3 of Appendix Q for the full results). I also provide verbal summaries of the meta-analytic estimates derived according to the three levels of this moderator.

Figure 18. Moderation by Method of Determining Characteristic Used for Matching.



Note. E.T. = Effect Type; S.R.B. = Self-Report Behavior; Obj. B. = Objective behavior; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect; r = meta-analytic estimate expressed as a correlation. The intervals around each estimate represent 95% confidence intervals.

a. Directly measuring characteristic. Fourteen estimates were generated from studies that directly measured the characteristic they matched to. These range from r = .05 to r = .20, and 11 of the 14 effects are significant. Further, significant effects are observed for all four types of outcome (attitude, intention, self-report behavior, and objective behavior), providing good evidence that matching to directly measured characteristics is generally effective.

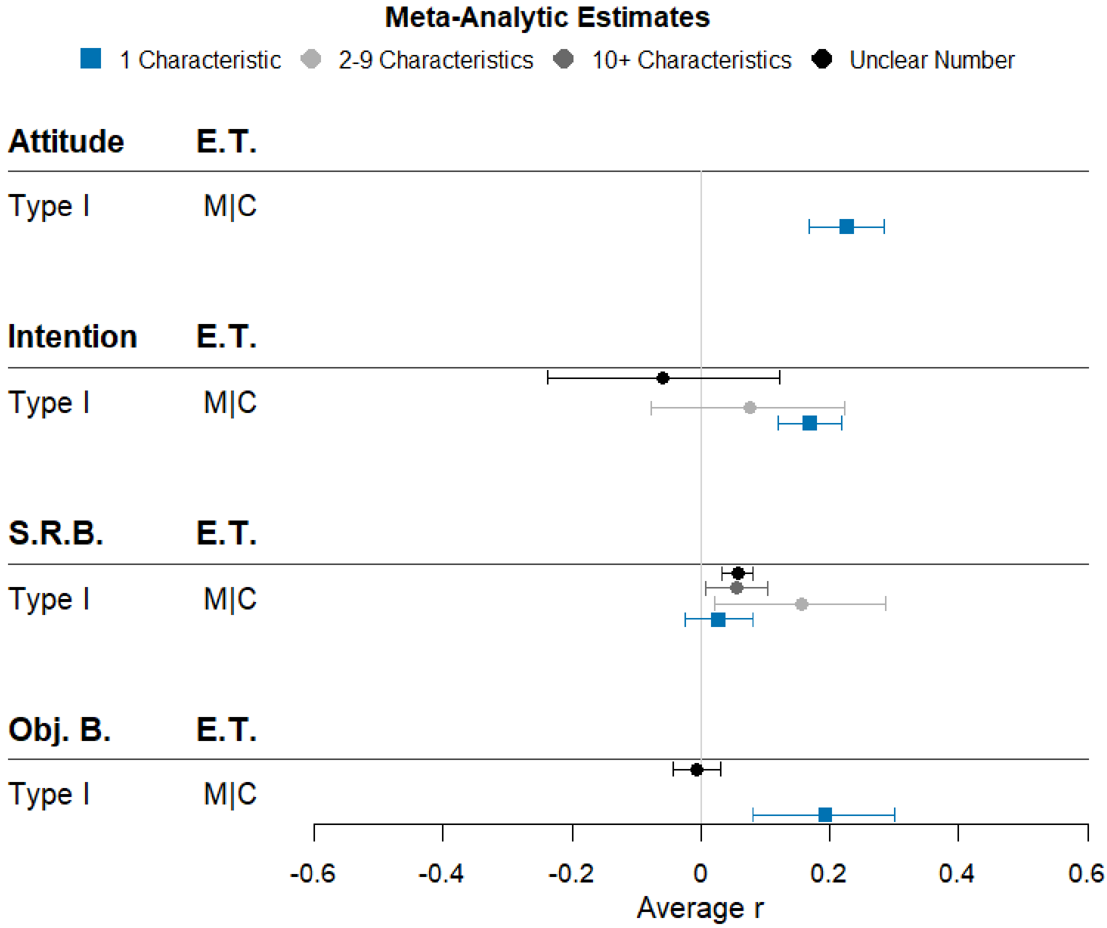
b. Indirectly inferring characteristic. Ten estimates were generated from studies that indirectly inferred the characteristics they matched to (e.g., using ethnicity to infer value-based differences). These estimates range from r = .02 to r = .24, and seven of the 10 estimates are significant. This provides good evidence that matching to indirectly inferred characteristics is effective, at least for influencing attitudes and intentions, as all seven significant estimates are for these two outcomes. In contrast, only two estimates were derived for behavior, and neither are significant.

c. Manipulating characteristic. Fourteen estimates were generated from studies that manipulated the characteristics they matched to (e.g., using primes to activate different values, and matching to those primes). These estimates range from r = .17 to r = .32, and 11 of the 14 estimates are significant. Further, there are significant estimates for the outcomes of attitude, intention and objective behavior. The estimates for self-report behavior are similar in magnitude but not significant. Overall, this provides good evidence that matching to manipulated characteristics is generally effective.

Comparing the three methods. Hypotheses posited that functional matching studies would produce larger effect sizes when directly measuring characteristics than when indirectly inferring them (H15), as well as when manipulating characteristics rather than indirectly inferring them (H16). Ten pairs of estimates can be used to evaluate the first of these predictions. Of these, five comparisons favor directly measuring over indirectly inferring, whereas five comparisons are in the opposite direction. Additionally, none of these differences are significant. Consequently, results are inconclusive for H15. Nine pairs of effects can be used to evaluate H16; of these, all comparisons are in the expected direction, and two are significant. This provides some support for H16. I did not make a prediction *a priori* about the relative effects of directly measuring versus manipulating characteristics, but 13 pairs of effects can be used to evaluate this comparison. Of these, all 13 comparisons favor using a manipulated characteristic, although none of the comparisons are significant. Taken together, the above results suggest that manipulating characteristics could possibly be a more successful strategy to elicit stronger matching effects than methods that rely on assessments.

6.5.3. Number of Characteristics Matched To. Next, I examine the influence of matching to differing numbers of characteristics. The results of these analyses are limited to Type I studies, whose designs allow more flexibility in evaluating the effects of matching to a larger number of characteristics. The results are summarized in Figure 19 (see tables R1 to R4 of Appendix R for the full results). Overall, interventions were classified into four categories based on the number of characteristics they targeted. These included: (a) matching to a single characteristic; (b) matching to between two and nine characteristics; (c) matching to ten or more characteristics, or; (d) matching to an unclear number of multiple characteristics. In most cases, this last category reflected interventions for which authors targeted fairly large number of characteristics, but only provided examples of characteristics targeted rather than an exhaustive list.

Figure 19. Moderation by Number of Characteristics Matched to.



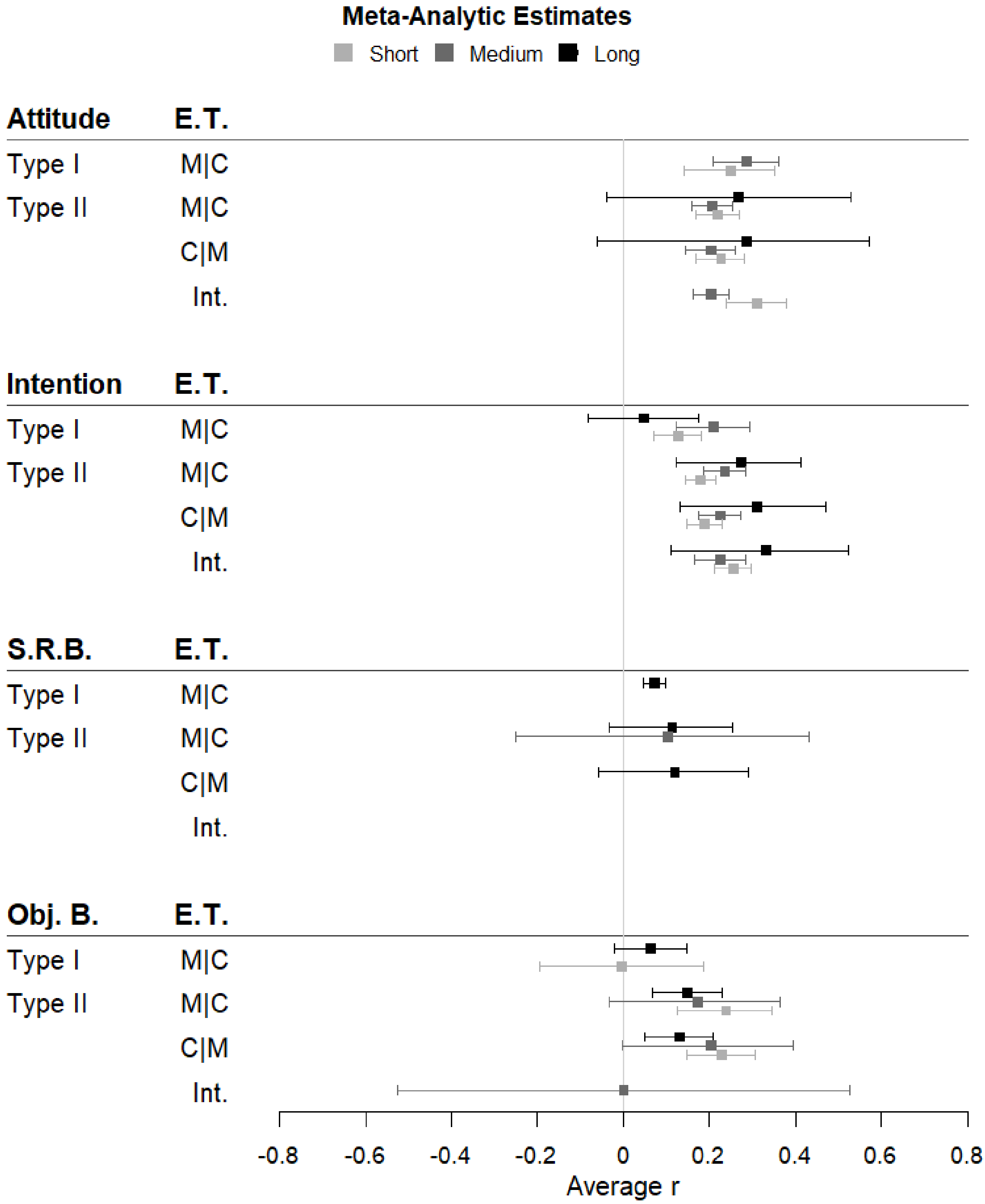
Note. E.T. = Effect Type; S.R.B. = Self-Report Behavior; Obj. B. = Objective behavior; M|C = effect of message given a characteristic being matched to; r = meta-analytic estimate expressed as a correlation. The intervals around each estimate represent 95% confidence intervals.

Overall, matching to one characteristic typically leads to significant positive effects (r = .03 to r = .23, three of four significant). Matching to 2-9 characteristics also produces two positive estimates (r = .08 and r = .16), but only one is significant. As for messages targeting larger numbers of characteristics (10+), only one estimate was produced (which was significant at r = .06). When authors matched to an unclear (but typically larger) number of characteristics, estimates are small and variable, extending as far into the negative range as the positive range (r = -.06 to r = .06). From this pattern, it is difficult to fully ascertain the effects of matching to a larger number of characteristics, but it is apparent that targeting larger numbers does not seem to generally increase the effectiveness of functional matching interventions.

6.5.4. Message Length. Next, I examine the influence of using messages of differing lengths for functional matching interventions. The results of these analyses are summarized in Figure 20 (see Tables S1 to S4 of Appendix S for the full results). Generally, message components that were varied to match/mismatch characteristics were classified into three different lengths: short (e.g., two sentences or less); medium (e.g., more than 2 sentences, but within 300 words), or; long (e.g., more than 300 words).

None of the subgroup analyses for the 16 effects from Table 1 produced any significant differences between messages of different lengths. Overall, ten of 11 estimates are significant for short messages (r = .00 to r = .31, covering all outcomes except self-report behaviors). Eight of 12 estimates are significant for medium messages (r= .00 to r= .29) but significant effects are limited to the outcomes of attitude and intentions. Lastly, six of 12 estimates are significant for long messages (r = .05 to r = .33; with significant effects across all outcomes except attitude). From these analyses, it can be inferred that message matching is generally effective across messages of different lengths and that message length itself may not be a major determinant of the effectiveness of functional matching interventions.

Figure 20. Moderation by Message Length.



Note. E.T. = Effect Type; S.R.B. = Self-Report Behavior; Obj. B. = Objective behavior; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect; r = meta-analytic estimate expressed as a correlation. The intervals around each estimate represent 95% confidence intervals.

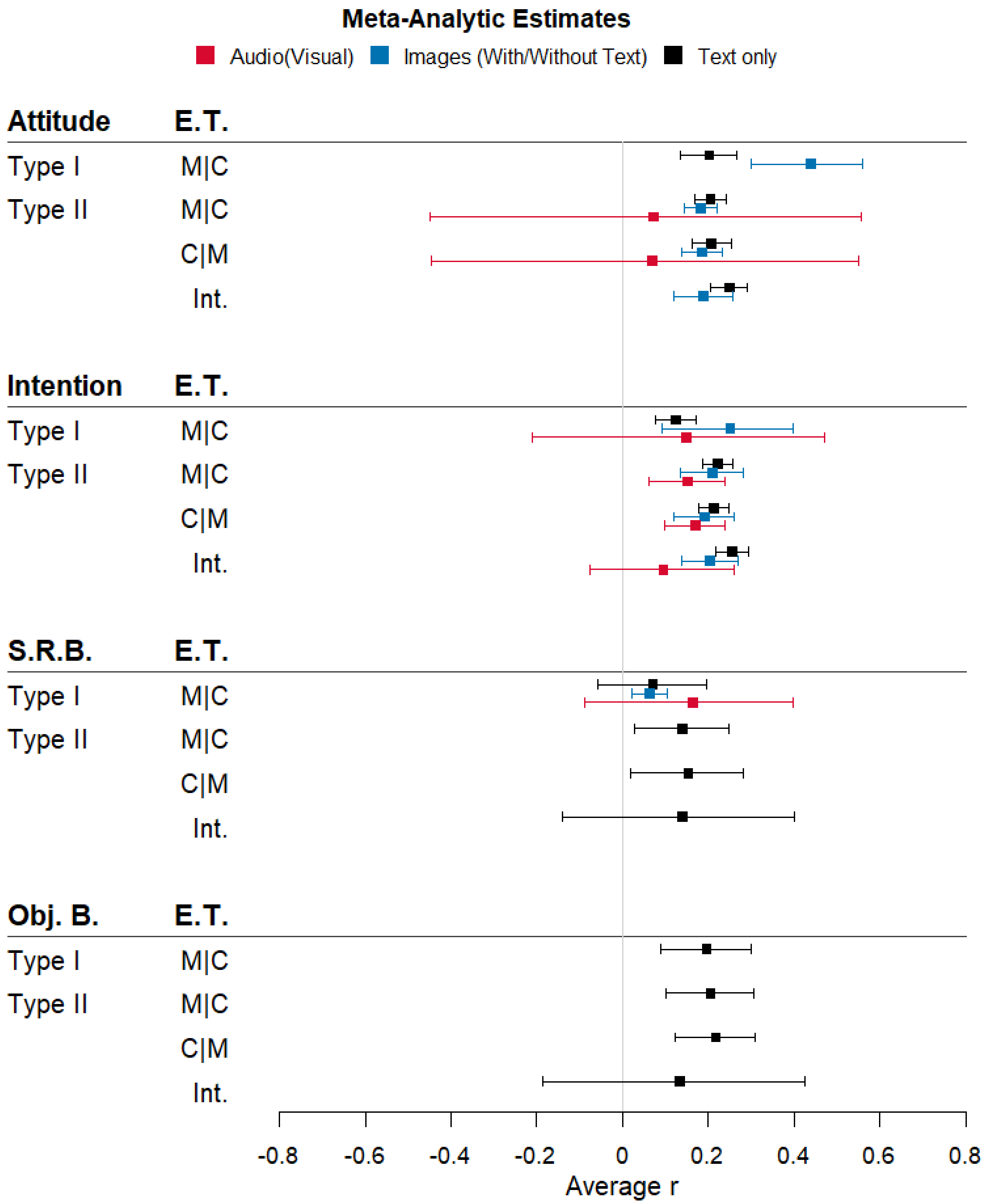
6.5.5. Message Modality. Next, I examine whether the modality used to manipulate message conditions moderates functional matching effects. Specifically, I compare matching interventions that manipulate message features using: (a) audio and or audiovisual means; (b) images, that are static in nature, with or without also manipulating text, or; (c) text-based means only. The results of these analyses are summarized in Figure 21 (and provided in full in Figures T1 to T3 of Appendix T).

a. Audio and/or audiovisual. Seven meta-analytic estimates were produced for interventions that manipulated messages through audio or audiovisual means. These estimates range from r = .07 to r = .16, but only two of the seven are significant (limited to the attitude outcome). The non-significant estimates relied on smaller sets of studies (8 or less), resulting in large confidence intervals. Consequently, more research in this area would be needed to draw inferences about the effectiveness of functional matching to enhance messages delivered through this modality.

b. Image with or without text. Nine meta-analytic estimates are available to evaluate message manipulations that used image-based means (with or without text being manipulated in addition). These estimates range from r = .06 to r = .44, and all nine estimates are significant. This provides good evidence that matching effects can enhance messages delivered through this modality (covering all outcome types except objective behavior, for which no estimate was produced).

c. Text only. Sixteen estimates evaluate message manipulations that only used text. These estimates range from r =.07 to r = .26, and 13 of the 16 estimates are significant. This provides good evidence that matching effects can enhance messages delivered through this modality, and this across all outcome types.

Figure 21. Moderation by Message Modality.



Note. E.T. = Effect Type; S.R.B. = Self-Report Behavior; Obj. B. = Objective behavior; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect; r = meta-analytic estimate expressed as a correlation. The intervals around each estimate represent 95% confidence intervals.

Comparing modalities. Estimates across modalities are generally within each other's confidence intervals, with the exception of one estimate for using images, which is much larger than the others. On average estimates for the audio/audiovisual modality were smaller than for other modalities. It is possible that matching confers a lesser advantage for this modality due to the modality increasing engagement/attention even in the comparison message condition, but this interpretation should be made with caution given that differences were never significant, and that message modality is correlated with many other features of interventions (e.g., type of comparison message used, message length, number of intervention contacts used; see Appendix L).

6.5.6. Number of Intervention Contacts. Next, I examine whether the effectiveness of message matching interventions varies by the number of times participants are exposed to the message before an outcome is assessed. The results of these analyses are summarized in Figure 22 (and provided in full in Figures U1 to U2 of Appendix U). Only two categories of effects were examined: (a) single intervention contexts versus (b) multiple contacts.[24]

a. Single contact interventions. Using a single contact point is frequently the default, and most frequent, option interventionists use in message matching research. Consequently, a full set of 16 meta-analytic estimates could be computed for interventions that made use of a single message exposure prior to assessing outcomes. These estimates range from r = .13 to r = .24, and 14 out of the 16 estimates are

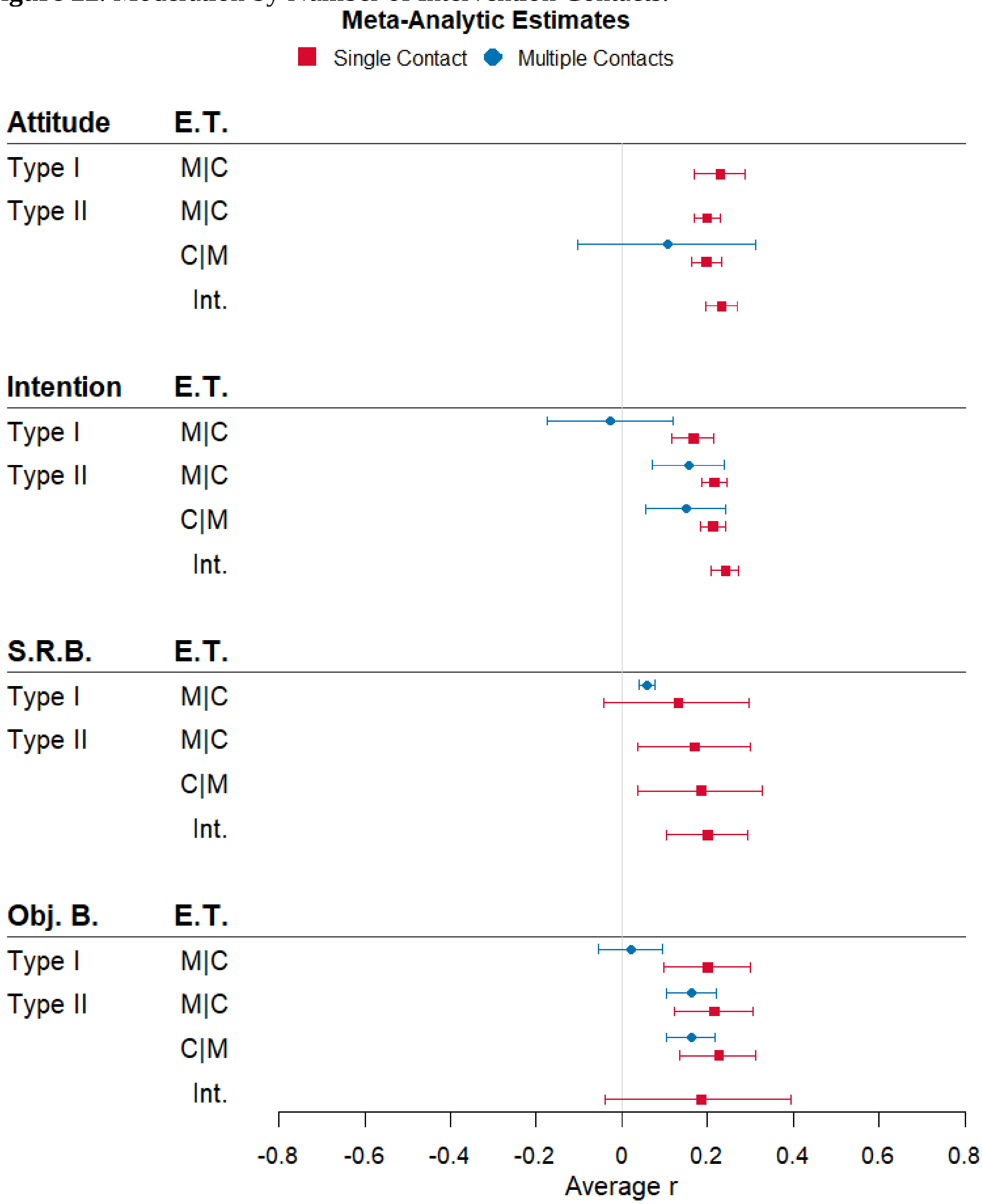
[24] In setting up Project 1, I delineated a difference between interventions that offered the possibility for multiple contacts vs. those that ensured participants viewed messages multiple time. These categories were combined, as too few studies existed within the two types to meaningfully treat them as separate.

significant. This provides good evidence that matching effects can enhance messages even after just one exposure to the message (for all outcome types assessed).

b. Multiple contact interventions. Although the use of multiple intervention contacts is less frequent, I was still able to compute eight meta-analytic estimates for interventions that made use of multiple message exposures prior to assessing outcomes. These estimates range from r = .02 to r = .16, and five out of the eight estimates are significant. This provides good evidence that matching effects can enhance message-based interventions that make use of multiple message exposures (for all outcome types assessed, except attitudes).

Comparing using single versus multiple exposures. Message matching estimates are consistently (although non-significantly) smaller in magnitude under multiple contact conditions compared to the use of single intervention contacts. This runs counter to hypothesis H17. It is possible that the relative advantage of matching diminishes with multiple contacts; however, another likely explanation is that this pattern was confounded with other study features. For example, interventions that make use of multiple contacts were considerably more likely to assess outcomes at a future time point, whereas interventions that made use of a single contact point were more likely to assess outcomes the same day as the intervention (see Figure L2 of Appendix L for the covariation between these study features). Consequently, this means that the effects used to assess the effectiveness of interventions with multiple contact points had greater potential to decay over time (see Section 6.5.8. for the moderation effect of assessment time). Additional confounds may likewise be at play (e.g., interventionists may be more likely to use multiple exposures when targeting behaviors that are generally harder to change).

Figure 22. Moderation by Number of Intervention Contacts.



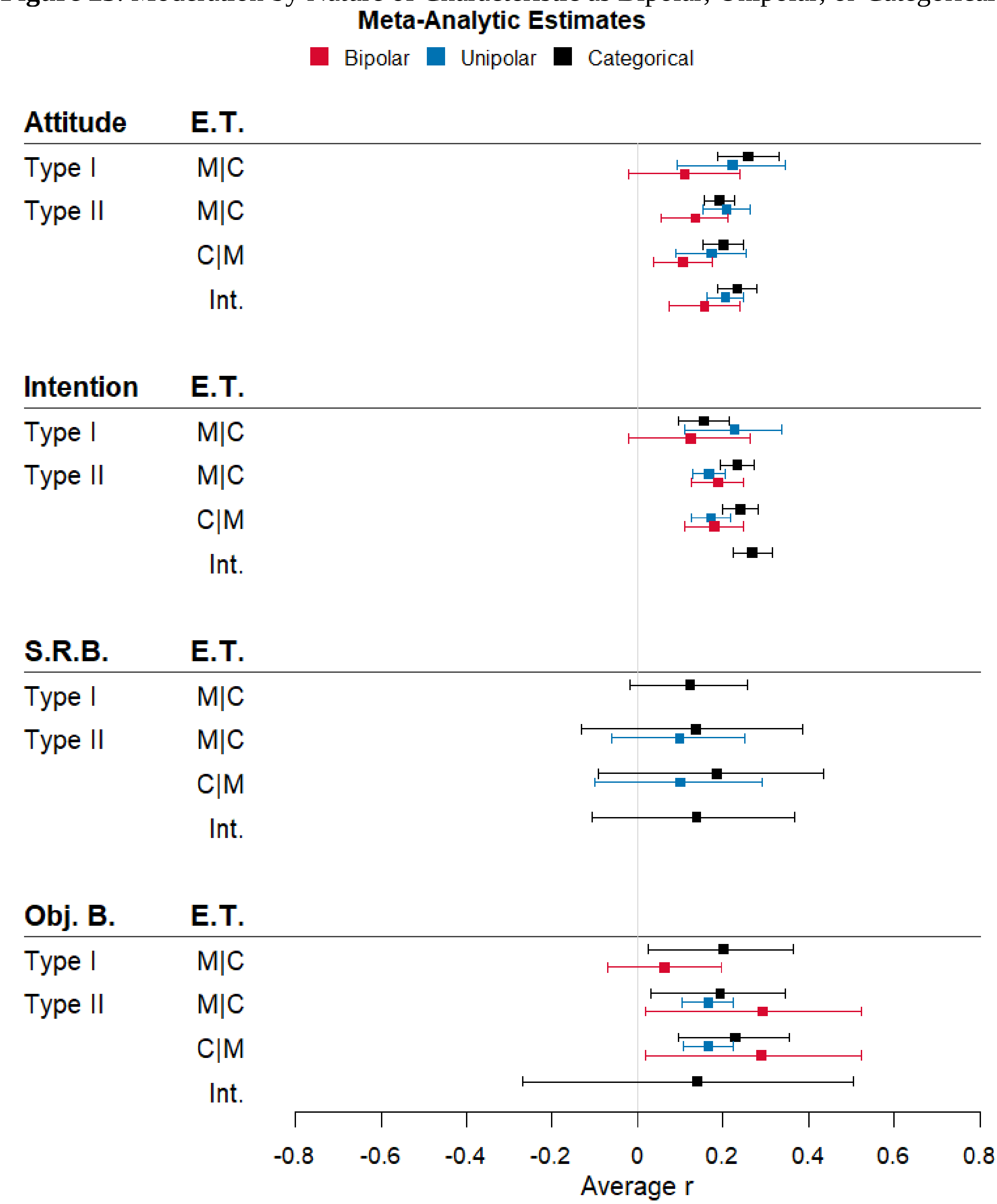
Note. E.T. = Effect Type; S.R.B. = Self-Report Behavior; Obj. B. = Objective behavior; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect; r = meta-analytic estimate expressed as a correlation. The intervals around each estimate represent 95% confidence intervals.

6.5.7. Nature of Characteristic as Bipolar, Unipolar, or Categorical. Next, I examine whether the effectiveness of message matching interventions varies by the nature of the characteristic used for matching. Specifically, I compare the effects of matching to: a bipolar characteristic (e.g., the cultural dimension of collectivism vs. individualism); a unipolar characteristic (e.g., having a high compared to low need for cognition), or; a categorical characteristic (e.g., matching to primes for prevention focus versus promotion focus). The results of these analyses are summarized in Figure 23 (and provided in full in Figures V1 to V3 of Appendix V).

a. Bipolar characteristic. Ten meta-analytic estimates were computed for interventions that matched to characteristics that are bipolar in nature. The estimates range from r = .06 to r = .29, and nine out of the ten estimates are significant. This provides good evidence that matching effects can be obtained when targeting bipolar characteristics, at least when outcomes of attitude, intention, and objective behavior (further data is needed to generate estimates for self-report behavior).

b. Unipolar characteristic. Eleven meta-analytic estimates were generated for interventions that matched to characteristics that are unipolar in nature. These range from r = .10 to r = .23, and nine of the 11 estimates are significant. This provides good evidence that matching effects can be obtained when targeting unipolar characteristics, at least when outcomes of attitude, intention, and objective behavior (further data is needed to generate estimates for self-report behavior).

Figure 23. Moderation by Nature of Characteristic as Bipolar, Unipolar, or Categorical.



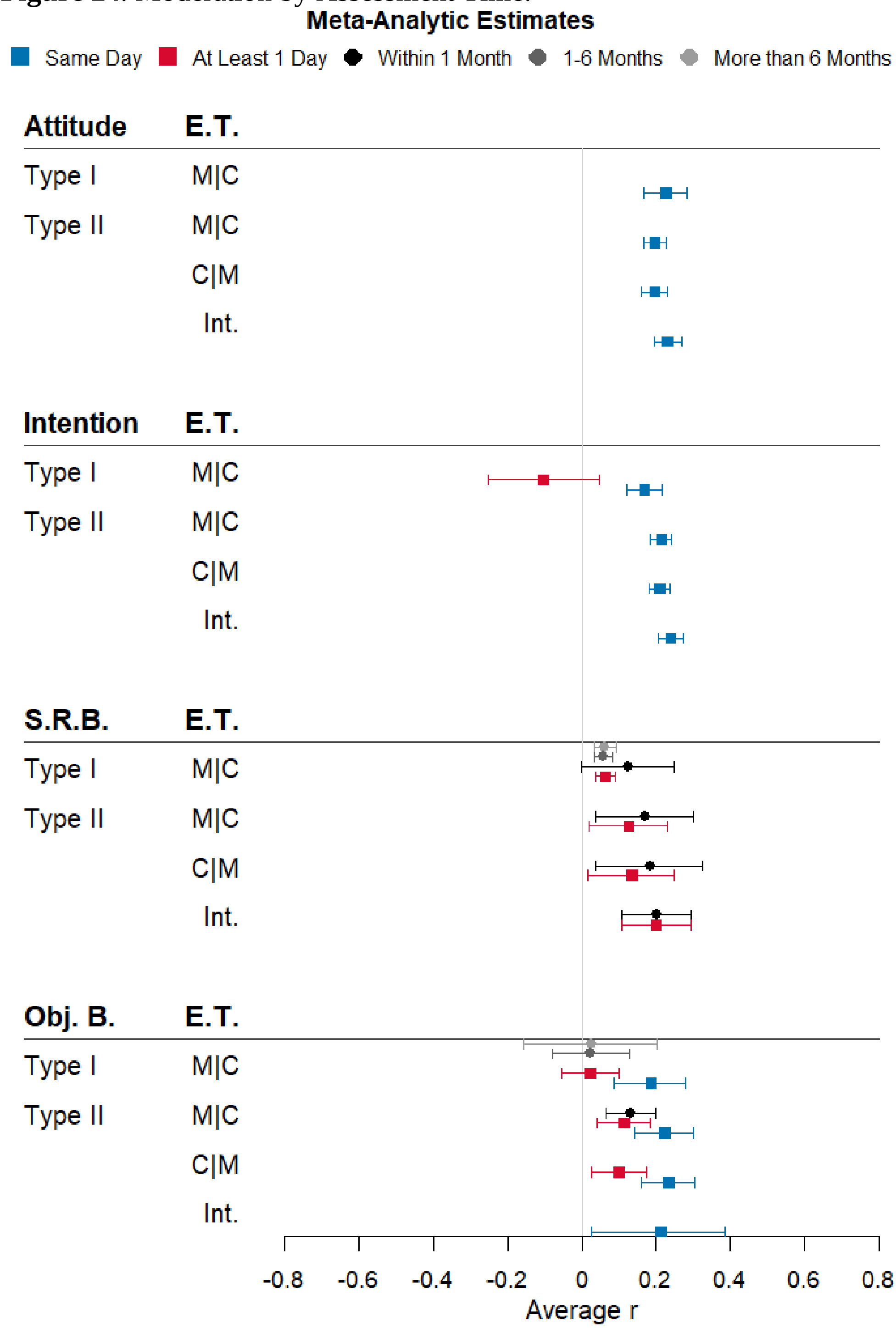
Note. E.T. = Effect Type; S.R.B. = Self-Report Behavior; Obj. B. = Objective behavior; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect; r = meta-analytic estimate expressed as a correlation. The intervals around each estimate represent 95% confidence intervals.

c. Categorical characteristic. Sixteen meta-analytic estimates were computed for interventions that matched to characteristics that are categorical in nature. These estimates range from r = .12 to r = .27, and 11 out of the 16 estimates are significant. This provides good evidence that matching effects can be obtained when targeting categorical characteristics, at least when outcomes of attitude, intention, and objective behavior (further data is needed to generate estimates for self-report behavior).

Comparing bipolar, unipolar, and categorical characteristics. Estimates across the three levels of this moderator consistently produced confidence intervals that overlapped with one another, making it difficult to establish whether effects are stronger for targeting one type of characteristic over the others. Results therefore fail to support hypothesis H18 that had predicted larger effects for bipolar than unipolar characteristics.

6.5.8. Assessment Time. Next, I examine whether the effectiveness of message matching interventions varies as a function of how much time has elapsed between when an outcome was assessed relative to when an intervention message was delivered. The results of these analyses are summarized in Figure 24 (and provided in full in Tables W1 to W5 of Appendix W). Subgroup analyses produced estimates for assessments made: (a) during the same day as the message matching intervention was delivered, compared to; (b) at least one day after receiving the intervention. The latter category was then broken down into three more specific categories, comprised of assessments made: (c) within one month of receiving the intervention (averaging 15 days); (d) between one and 6 months after receiving the intervention (averaging 118 days), and; (e) beyond six months post intervention (averaging 430 days). Because assessment times are highly dependent on the type of outcome considered, I organize my discussion around each type of outcome.

Figure 24. Moderation by Assessment Time.



Note. E.T. = Effect Type; S.R.B. = Self-Report Behavior; Obj. B. = Objective behavior; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect; r = meta-analytic estimate expressed as a correlation. The intervals around each estimate represent 95% confidence intervals.

a. Attitude. Meta-analytic estimates on attitudinal outcomes were only produced for interventions with assessments the day of the intervention. These estimates are virtually identical to those in Table 1, ranging from r = .20 to r = .23, and are all significant. It is clear that, on average, functional matching interventions produce immediate positive effects on attitudes, but research is lacking on how these effects maintain over time. This is a notable limitation given that attitude change has been the dominant interest of functional message matching, which initially emerged from theories of attitude change.

b. Intention. Meta-analytic estimates on intentions are consistently positive and in the range of r = .17 to r = .24 for when assessments were made the day of the intervention. Only one estimate was produced by aggregating effects assessed at one or more days from the intervention, and this effect estimate is nonsignificant at r = -.11. As with the attitude outcomes, there is a need for future research to document longitudinal effects on intentions.

c. Self-report behavior. The outcome of self-report behavior shows the opposite limitation compared to both the attitude and intention outcomes. Specifically, no estimates were produced for self-report behavior effects the day of the intervention, making it impossible to ascertain the average immediate effect of functional matching interventions on this outcome. In contrast, this outcome provides the most estimates for follow up assessments. When it comes to assessments at *any* time beyond the intervention day, four estimates were produced and range from r = .06 to r = .20. All these effects are significant, demonstrating the potential for functional interventions to impact this outcome beyond immediate assessments. When assessments were made within 1 month of the intervention, effect sizes are between r = .13 and r = .20 (with three of four estimates being significant). Only one estimate is available for assessments between one and six months. This estimate is significant at r = .06. Lastly, one estimate is available beyond 6 months, and is also significant at r = .06. This pattern provides good evidence that matching effects are maintained over considerable time for self-report behaviors. These effects appear to deteriorate over time, but possibly stabilize after some time has passed.

d. Objective behavior. In contrast to self-report behavior, objective behaviors were most frequently assessed the day of intervention delivery (e.g., assessing a behavioral choice made immediately following an intervention delivered in a lab setting). Consequently, four estimates are available for when assessments were made the day of the intervention. Estimates range from r = .19 to r = .23, and are all significant. Three estimates could also be computed for assessments aggregated at any time point beyond the day of the intervention. These estimates range from r = .02 and r = .11, and two are significant. One estimate is available for assessments at within 1 month; this estimate is equal to r = .13 and is significant. Finally, one estimate was available for assessments between one and six months, and one estimate was available for assessments made beyond 6 months. Both these estimates were nonsignificant and equal to r = .02 (but dependent on small numbers of studies). Overall, these effects suggest that functional matching interventions produce immediate effects on objective behavior, that these effects are maintained for some time, but may eventually decay substantially.

Overall Evaluation. Hypotheses H19-H20 predicted that estimates would be significant for both immediate and non-immediate assessments. Overall, these predictions found support in the current analyses, as significant effects were obtained for all assessment time categories. Hypothesis H21 further predicted that effects sizes would decay in size over time, and this is also supported by the findings of the current synthesis. In general, the magnitude of the generated estimates is also similar to some previous meta-analyses (e.g., Krebs et al., 2010 also found effects on behavior around r = .06 at 13 or more months). That said, caution is still warranted when interpreting the exact nature and magnitude of how effects decay over time, as assessments times were highly correlated with other study design features, and in particular with the type of outcome variable evaluated. Continued efforts to delineate effects of assessment time are therefore required. In particular, efforts should be made to assess attitude, intention, and objective behavior outcomes beyond the day of an intervention, and to assess self-report behavior within the day an intervention is delivered. This sort of information can aid interventionists predict the long-term effectiveness of their interventions based on early data they collect.

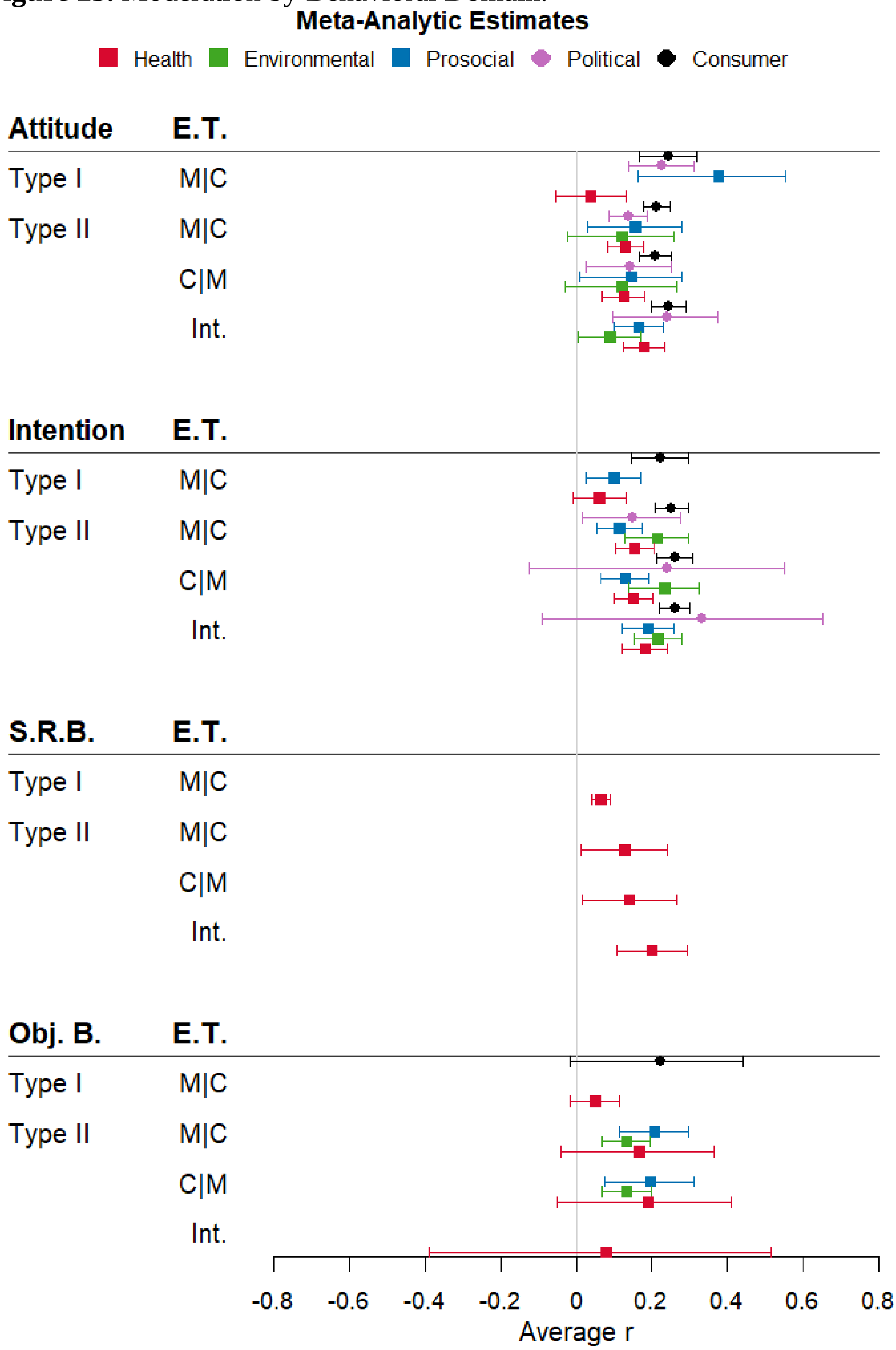
6.5.9. Behavioral domain. Next, I examine whether the effectiveness of message matching interventions varies as a function of the behavioral domain in which an intervention was delivered. Coders for the meta-analysis classified behaviors targeted by message matching studies into over 40 categories, which were then be grouped into larger domains. Larger domains (with examples of specific categories) included: health behaviors (e.g., smoking, physical activity, dietary behaviors), environmental behaviors (e.g., recycling, energy conservation, sustainable consumption efforts), prosocial behaviors (e.g., volunteerism, charity), political behaviors (e.g., endorsing or voting for a candidate or policy), and consumer behaviors (e.g., tourism, buying electronic devices, purchasing specific food brands). Meta-analytic estimates were produced for each of these five domains and are summarized in Figure 25 (and provided in full in Tables X1 to X5 of Appendix X).

a. Health behaviors. Sixteen meta-analytic estimates were generated for interventions that attempted to change health-related outcomes. The estimates range from r = .04 to r = .20, and 10 of the 16 estimates are significant. Estimates are generally significant across all outcome types, except for objective behavior measures—for objective behavior, estimates are in a similar range to others, but are reliant on smaller numbers of samples and have wider confidence intervals that overlap with r = .00. Overall, these findings provide good evidence that functional matching effects can influence outcomes in the health domain.

b. Environmental behaviors. Eight meta-analytic estimates were computed for interventions that attempted to change environmental outcomes. The estimates range from r = .09 to r = .23, and six out of the eight estimates are significant, covering the outcomes of attitude, intention, and objective behaviors (no meta-analytic estimate was produced for self-report behavior). Overall, these findings provide good evidence that functional matching effects can influence outcomes in the environmental domain.

c. Prosocial behaviors. Ten meta-analytic estimates were computed for interventions that attempted to change prosocial outcomes. The estimates range from r = .10 to r = .38, and ten out of ten are significant, covering the outcomes of attitude, intention, and objective behaviors (no meta-analytic estimate was produced for self-report behavior). Overall, these findings provide good evidence that functional matching effects can influence outcomes in the prosocial domain.

Figure 25. Moderation by Behavioral Domain.



Note. E.T. = Effect Type; S.R.B. = Self-Report Behavior; Obj. B. = Objective behavior; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect; r = meta-analytic estimate expressed as a correlation. The intervals around each estimate represent 95% confidence intervals.

d. Political behaviors. Seven meta-analytic estimates were computed for interventions that attempted to change political outcomes. The estimates range from r = .14 to r = .24, and five out of the seven estimates are significant. Significant effects are limited to the outcomes of attitude (the focus of most studies in this domain) and to a lesser extent on intentions (for which only one of the 3 estimates is significant). No meta-analytic estimates were produced for the outcomes of self-report behavior and objective behavior. Overall, these findings provide good evidence that functional matching effects can influence attitudes (and probably intentions) in the political domain, but further work is required to examine if these effects translate to behavior.

e. ***Consumer behaviors***. Nine meta-analytic estimates were computed for interventions that attempted to change consumer outcomes. The estimates range from r = .21 to r = .26, and eight out of the nine estimates are significant. Significant effects are limited to the outcomes of attitude and intentions (where effects are consistently significant), as no estimates were generated for self-report behavior, and only one non-significant effect was produced for objective behavior (this estimate relies on only 6 studies, but the magnitude of the estimate is consistent with estimates for other outcomes). Overall, these findings provide good evidence that functional matching effects can influence attitudes and intentions in the consumer behavior domain, but further work is required to examine if these effects translate to behavior.

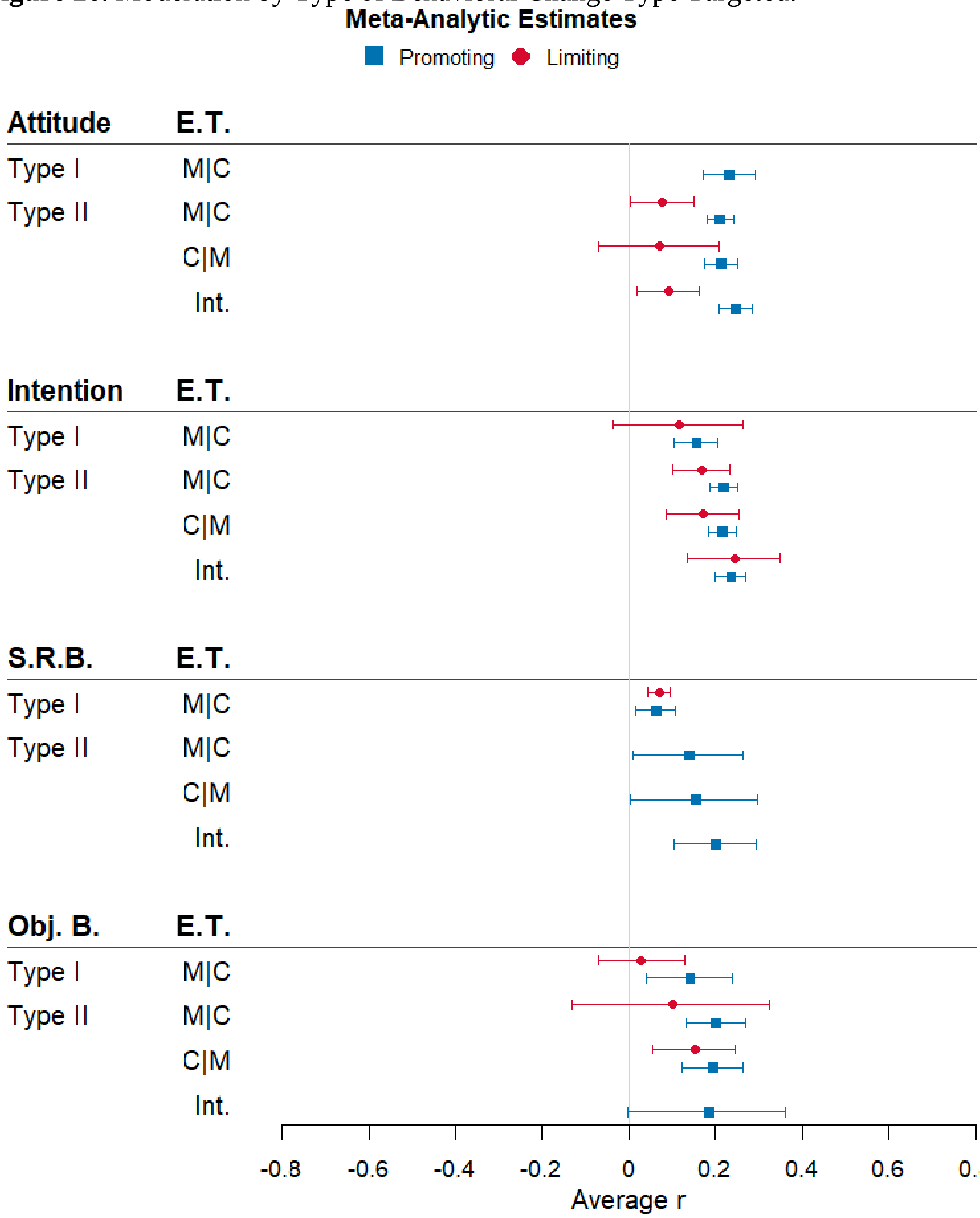
Relative effect sizes across domains. Generally, there is substantial overlap in the magnitude of the estimates that were produced across the five behavioral domains (and in their confidence intervals). The only domain that stands out relative to the others is the consumer behavior domain, for which meta-analytic estimates are tightly constrained to the upper range of observed effect sizes across domains.

6.5.10. Behavioral change type targeted. The final moderator I examine in Project 1 is whether interventions tried to *promote* a behavior (e.g., increase fruit and vegetable consumption, promote buying a particular product) or whether interventions tried to *limit* a behavior (e.g., smoking cessation, discouraging unnecessary consumption). Meta-analytic estimates were produced for both types of goals an intervention could have, and the results are summarized in Figure 26 (and provided in full in Tables Y1 to Y2 of Appendix Y).

a. Promoting Behaviors. Sixteen meta-analytic estimates were computed for interventions that attempted to promote a behavior. The estimates range from r = .06 to r = .25, and 15 of the 16 estimates are significant (with the 16^{th} having a p-value of .054). Estimates are significant across all outcome types, providing strong evidence that functional matching interventions are generally successful when it comes to promoting behaviors.

a. Limiting Behaviors. A substantially smaller set of message interventions were designed with the intent of limiting a behavior, but it was nevertheless possible to compute 11 meta-analytic estimates. The magnitude of the estimates ranges from r = .03 to r = .25, and seven of the 11 estimates are significant. Significant estimates are distributed across all outcome types, providing evidence that functional matching effects can help interventions change attitudes and intentions tied to limiting behaviors, and can further produce reductions in those behaviors. That said, evidence is stronger for influencing attitudinal/intentional outcomes, as only two estimates (out of four) are significant across the self-report behavior and objective behavior outcomes.

Figure 26. Moderation by Type of Behavioral Change Type Targeted.



Note. E.T. = Effect Type; S.R.B. = Self-Report Behavior; Obj. B. = Objective behavior; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect; r = meta-analytic estimate expressed as a correlation. The intervals around each estimate represent 95% confidence intervals.

Comparing promoting to limiting effects. When it comes to changing attitudes, it appears that functional matching effects are typically significantly larger for interventions that have the goal of promoting rather than limiting a behavior. When it comes to intentions and objective behaviors, the estimates for promoting a behavior are again generally larger, but never significant. Finally, for predicting self-report behaviors, there is too little data from studies to draw a meaningful comparison between the two change types. Taken as a whole, however, the findings of these subgroup analyses suggest that functional matching effects may generally be more effective when interventions are trying to promote rather than limit a behavior.

7. Project 1: Discussion

7.1. Primary Findings.

7.1.1. Functional Matching Reliably Improves Persuasion Outcomes. This meta-analysis reviewed and integrated 4,228 effect sizes from 604 studies on functional matching. The primary findings provide clear and consistent evidence that functional matching can increase the effectiveness of interventions on diverse outcomes (i.e., attitudes, intentions, self-report-behaviors, and objective behavior) by a magnitude of around r = .20. This is roughly equivalent to a Cohen's d of .41, or to an odds ratio of 2.10 or .48, depending on direction (DeCoster, 2012). From the subgroup analyses, we find the average positive effects of functional matching to be highly robust, in the sense that significant positive estimates can reliably be achieved for a wide variety of behaviors (e.g., covering domains such as health, environmental, and prosocial behaviors, and both for promoting and limiting behaviors), and under a wide variety of intervention conditions. For example, functional matching effects are obtained when matching to measured individual differences as well as when manipulating characteristics (e.g., matching to primes). Functional matching effects can also be reliably obtained when using messages of different lengths or when matching is achieved through different modalities (e.g., text vs. images). Benefits of functional matching are even maintained over time (despite some decay in magnitude). These findings are particularly promising when we consider that the effects refer to increases in persuasion achieved by positively matched messages, compared to comparison messages which, although they are not positive matches, have generally been designed to be persuasive in their own right.

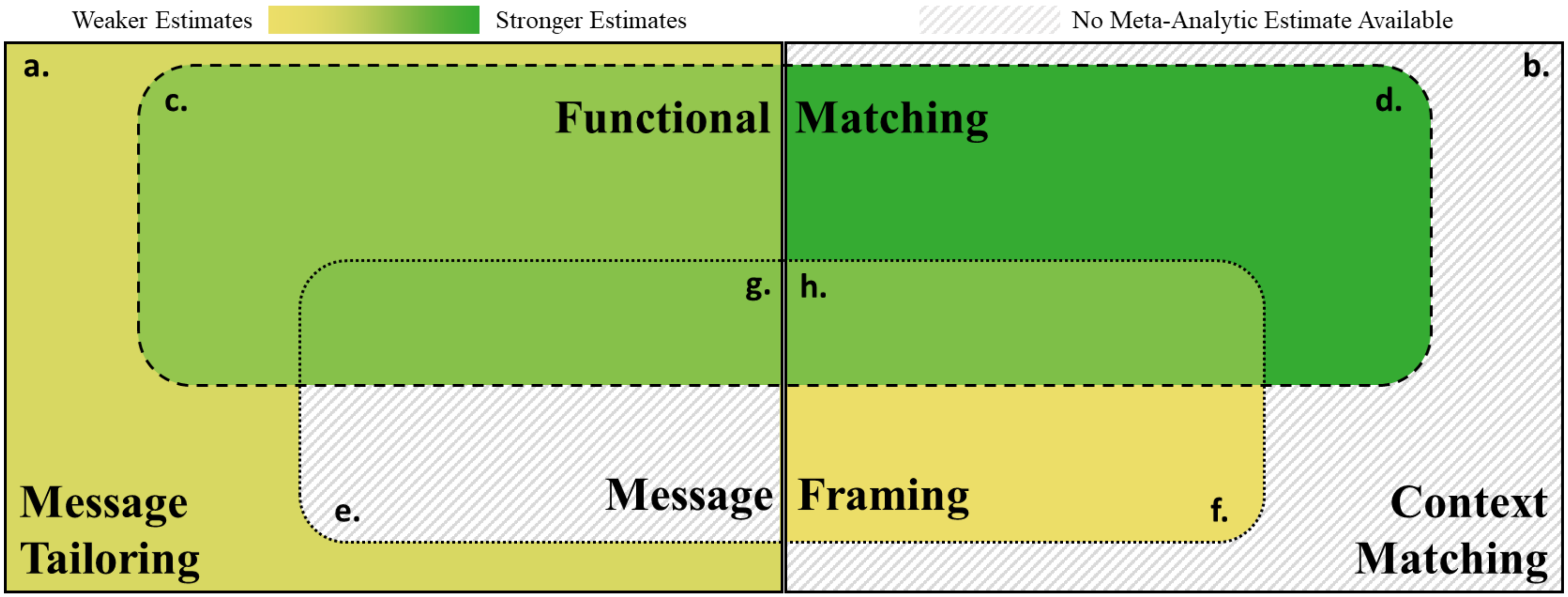
There is an important caveat, however, to consider when interpreting the meta-analytic estimates produced in Project 1. Specifically, for nearly every estimate produced, there was substantial heterogeneity indicated by prediction intervals. For instance, in Table 1, 15 of the 16 meta-analytic estimates have lower bounds for their 95% prediction intervals that extend to r = -.16 or below (and similarly, 14 estimates have upper bounds for the 95% prediction intervals extending to r = .49 or above). This indicates that although, on average, we can expect functional matching interventions to increase the effectiveness of an intervention by around r = .20, any given functional matching intervention implemented has a nontrivial chance of backfiring (lead to reduced effectiveness of a message) or, conversely, to have a substantially larger than average benefit (i.e, lead to a large improvement in persuasion). Given this large spread in the distribution of effect sizes, it is likely desirable to limit any inference drawn from singular studies, or even small sets of studies, when seeking to understand how functional matching effects operate on average. Continued reliance on syntheses is recommended.

7.2. Comparing Across Message Matching Literatures.

The overall estimates provided in the current synthesis reflect the best current effect size estimates available for the functional message matching literature. Inferences from the current synthesis can be compared to the typical estimates reported in previous meta-analyses of message matching to understand how effect sizes vary as a function of where studies are situated between the literatures of functional matching, message framing, message tailoring, and context matching. Figure 27 summarizes these comparisons by updating the map of the different message matching literatures from Figure 2 to take the results of the current and pre-existing meta-analyses into account.

Generally, previous meta-analyses that focus on research at the intersection of message framing and context matching (but which are not functional matching; i.e., belong to area f of Figure 27) have produced the smallest meta-analytic effect size estimates. This research typically uses the risk perception framework—matching to health prevention versus health detection behaviors, assuming that this contextual factor translates to differences in perceptions tied to risk—and have reported estimates typically in a range between r = .03 and .08, with mixed levels of statistical significance (e.g., Gallagher & Updegraff, 2012; O'Keefe & Jensen, 2006). Next, there have been numerous meta-analyses focusing on message tailoring research. This work sometimes includes research that intersects with the other literatures, but for the most part, syntheses of message tailoring have focused heavily on matching (non-framed) messages to characteristics that are not functional in nature (i.e., do not refer to qualitative differences in motivations); for instance, message tailoring works instead focus on as variables such as those from the Reasoned Action Approach (Ajzen, 1991; Ajzen & Fishbein, 1980), the Health Belief Model (Rosenstock, 1974), or the Transtheoretical Model (Prochaska et al., 1993), along with matching to simple demographic differences. Consequently, most meta-analyses of message tailoring can be said to inform our understanding of the typical effect size obtained in research that is tailoring, but neither functional matching, nor message framing (i.e., that corresponds to area a of Figure 27). Meta-analytic estimates in this area are typically significant and between r = .06 and r = .10 (e.g., Krebs et al., 2010; Lustria et al., 2013; Noar et al., 2007; Sohl & Moyer, 2007), placing these just above estimates from message framing meta-analyses. Estimates of message tailoring are also generally limited to the health behavior domain and may not represent other contexts.

Figure 27. Updated Map of Message Matching Literatures, Comparing Size of Meta-Analytic Estimates.



(a) Only Message Tailoring: Past meta-analyses commonly find meta-analytic estimates between r = .06 and r = .10. Syntheses generally limited to health behavior research;

(c) Functional & Tailoring: Current synthesis finds meta-analytic estimates ranging between r = .05 and r = .23, but more concentrated between r = .14 and r = .18;

(e) Framing & Tailoring: Meta-analytic estimates not currently available;

(g) Functional, Tailoring, & Framing: Current synthesis finds meta-analytic estimates ranging between r = .11 and .24;

(b) Only Context Matching: Meta-analytic estimates not currently available;

(d) Functional & Context: Current synthesis finds meta-analytic estimates ranging between r = .20 and .34;

(f) Framing & Context: Past meta-analyses commonly find meta-analytic estimates of between r = .03 and r = .08. Syntheses generally limited to the risk perception approach in health behavior research;

(h) Functional, Context, & Framing: Current synthesis finds meta-analytic estimates ranging between r = .05 and .26, but more concentrated between r = .15 and r = .22

Taken together, past meta-analyses have produced good estimates for two of the eight areas shown in Figure 27. Through the current synthesis, I provide estimates for an additional four areas. First, I find that functional matching effects in the following three areas of Figure 27 are largely similar in magnitude: functional matching that is message tailoring but not message framing (area c of Figure 27; e.g., matching social adjustive vs. value expressive appeals to self-monitoring differences); functional matching that is message tailoring as well as message framing (area g of Figure 27; e.g., matching gain/loss frames to measured differences in regulatory focus), and; functional matching that is context matching as well as message framing (area g of Figure 27; e.g., matching gain/loss frames to promotion/prevention focus primes). Each area produced meta-analytic estimates with effect sizes generally in the range of r = .11 to .24, which is above the typical range of meta-analytic estimates produced in message tailoring and message framing research that is not functional. In addition, I find the largest effect sizes within the area of functional matching that is also context matching but not message framing (area h of Figure 27; e.g., matching hedonic vs. utilitarian appeals to hedonic vs. utilitarian products). Meta-analytic estimates for this area range between r = .20 and r =.34, which is considerably higher than the range of meta-analytic effects produced by any other area of message matching.

These findings have important implications for research and practice. Specifically, it appears that interventionists could incorporate functional matching effects into their interventions to achieve larger benefits on persuasion than would be otherwise possible by matching to characteristics that are non-functional in nature. In doing so, interventionists can explore the benefits of using context-matching paradigms that use message features other than message frames. One of the major drawbacks of most message tailoring interventions has been the resources required to assess individual differences, and to allocate messages to those differences. Most context matching studies in the current review relied on either priming a functional orientation prior to assigning messages, or on incorporating primes into the messages themselves (e.g., using language that primes a certain temporal orientation, and then having additional message components use language that varies in concreteness/abstractness to match the primed orientation). These designs by-pass the need to assess individual differences and could therefore be much more cost-effective options than the strategy of message tailoring.

That said, there are certain limitations to consider for the above comparative inferences. In particular, the effect sizes associated with each of these combinations of literatures may be confounded with various other aspects of the studies the meta-analytic estimates were computed from. For example, I mentioned that past reviews of message tailoring/framing have predominantly focused on health behavior change, whereas the current review was not limited to a particular behavioral domain. Although most subliteratures (specifically, areas c, g, and h of Figure 27) of functional matching show a decent representation of the health behavior domain, the functional message matching literature that is context matching, but not message framing (i.e., area d of Figure 27), represents a lower concentration of effects focused on health behaviors, and a higher concentration of effects focused on consumer behaviors.[25] Future efforts should therefore

[25] See Figures L3 and L4 of Appendix L for a depiction of how represented health- and consumer-related behaviors are for literatures that intersect the areas of functional matching, message tailoring, context matching and message framing.

be made to examine such confounds. This can, for example, be accomplished by (a) examining how each specific subliterature reviewed in the current synthesis operate in the domain of health behavior to obtain comparable findings to past syntheses of message tailoring/framing, and (b) extending reviews of message tailoring/framing research that is not functional nor message framing to include non-health domains. On a related note, there continues to be a lack of research syntheses available for both message tailoring works that are not functional matching but use message framing (area e of Figure 27), and for context matching works that are neither functional matching nor context matching (area b of Figure 27). Thankfully, all these limitations can be addressed in future extensions of the current work as the coding protocol for Project 1 notes the behavioral domain in which studies operate, and the registration for Project 1 (Joyal-Desmarais et al., 2018; 2019) already contains plans to extend the synthesis to the full scope of the message matching literatures contained in Figure 27.

7.3. Moderation: Evaluating Principles of Message Matching.

Another major goal of Project 1 was to begin exploring factors that predict when message matching effects are expected to be larger versus smaller. In particular, I focused on analyzing variables tied to the ideas that I outlined in the theoretical review at the beginning of this dissertation. The ideas centered around three key themes. First, that matching effects exist from a continuum from positive to negative matching, and that the size of effects attributed to achieving a positive matching effect should be largely dependent on the nature of the comparison message being used to study it. Second, I posited that the *degree* to which messages achieve matches would impact their effectiveness, but that this effect would not be linear, such that increasing the degree to which messages match a person's characteristics only increases persuasion up to a point. Lastly, I posited that matching is differentially effective depending on the type of characteristics matched to during message-based interventions.

7.3.1. Does Matching Exist as a Continuum from Positive to Negative Matching? In my theoretical review, I argued that messages matching interventions should produce larger effects when positively matched messages (i.e., message congruent with a person's motives) are compared to negative matches (i.e., messages that oppose a person's motives), rather than other types of comparison messages; most notably, when compared to non-matched messages (i.e., messages that are neither congruent with, nor in opposition to, a person's motives). I further argued that the relative success of positive matches again any given type of comparison (i.e., negative matches, non-matches, mismatches, generic matches, low matches, and mixed messages) would depend on where those comparison groups are situated, on average for a given sample, on the continuum ranging from positive matching to negative matching. For example, if a generic message is constructed to appeal to the most normative motivations in a sample, then it should be more effective, on average, than a message that is systematically delivered to be mismatched with people's motives. Therefore, when a positively matched message is compared to a generic message, it should typically show a smaller advantage than when compared to a mismatched message.

Overall, findings were supportive of the existence of a continuum underlying the relative effectiveness of different types of messages. Specifically, positively matched messages were relatively more effective when compared to negatively matched messages than to either non-matches, or messages classified as mismatches. Unfortunately, when it came to the relative performance of positive matches across other pairs of comparison messages (e.g., comparing using mismatches vs. generic messages as comparisons), there was too little data available to make reliable inferences. This is therefore an area that would benefit from further empirical evidence. Specifically, I suggest that: (1) researchers should explicitly make use of the typology of comparison groups I have outlined in this dissertation, and (2) diversify their use of different types of comparison messages. If primary research can also make use of multiple types of comparisons simultaneously in their designs (e.g., make use of both non-matched and negatively matched comparisons within a singular experimental study), this would also allow us to begin building a base of study-generated experimental evidence, rather than relying on synthesis-generated evidence (i.e., evidence that relies on comparisons only between studies). Project 2 will model what such a study can look like.

7.3.2. How Does Increasing the Degree to Which Messages Implement Matching Influence Persuasion? The second major idea presented in my theoretical review was that the effectiveness of message matching interventions should depend on the degree to which messages achieve matches for the individuals to whom they are delivered. Several dimensions of degree were defined.

a. Specificity of matching. First, I argued that the effectiveness of message matching should depend on the *specificity* with which interventionists determine the specific elements of a message that should be matched to. This could be done either by using more individualized methods (i.e., directly measuring a person's actual values, or manipulating it) over more general assessments (e.g., indirectly inferring a person's values based on group membership), or by seeking to match messages to a larger number of characteristics at a time. Both methods of increasing the specificity to which messages are matched were represented in this meta-analysis.

I evaluated the degree to which message matching effects would be larger when the characteristic was either directly measured or manipulated over indirectly inferred. Overall, the meta-analytic findings suggested that manipulating characteristics consistently led to the largest effects, whereas the relative effectiveness of directly measuring compared to indirectly inferring characteristics was largely inconclusive. The lack of a significant difference between directly measuring and indirectly inferring characteristics is surprising given that the principle is rooted in the simple notion that assessment error should lead to less well defined matches (i.e., inferring characteristics should be more prone to errors). Given that the few works that provide within-study data on this question tend to find an advantage of direct over indirect assessment (e.g., Chang, 2006; Neale, Robbie, & Martin, 2016), it is quite possible that the lack of conclusive findings is largely due to correlated features across studies that confound inferences. Consequently, more experimental work should examine this question directly in order for the relative effects of these two strategies to be compared. Even if direct assessments can reliably lead to larger effects, it is of paramount importance to quantify the size of this advantage before making recommendations given that direct assessments are a considerably more costly strategy to implement. As for the effects of matching to manipulated characteristics being the largest, this is in line with the idea I presented in my theoretical review that matching to a person's psychological *state* (e.g., as induced by a prime) could lead to a higher degree of correspondence between a manipulated message and the characteristic than would matching to a long-standing *chronic*, or “trait-level”, disposition (see Figure 8). Specifically, many chronic disposition (e.g., extroversion) reflect a person’s average tendencies over time, and those tendencies can fluctuate in strength from context to context (e.g., a person may feel more extroverted on some days than others). The further away deviates from their chronic disposition at the specific time they receive a message matched to their chronic disposition, the lower the actual degree of match achieved at that time. Therefore, it makes sense that assessing or controlling (via a manipulation) a state-level characteristic would lead to higher performing message matching intervention. Future work should attempt to directly tease apart the influence of matching to states compared to chronic dispositions.

The second component of increasing specificity that I introduced in my theoretical review concerns matching messages to a larger number of characteristics. In this dissertation, and in other work (Joyal-Desmarais et al., 2020a; Rothman et al., 2020), I have argued that matching messages to more than one characteristics has potential to increase the effectiveness of matching interventions, but that such increases are unlikely to follow a linear trend, especially as we target very large numbers of characteristics. The current synthesis provides two types of evidence evaluating matching to a larger number of characteristics. The first type of evidence, relies on study-generated information, by examining the effects of studies that compare messages matched to larger numbers of characteristics to messages matched to smaller numbers; that is, by looking at studies that use low match comparison groups. In the current review, I produced three meta-analytic estimates for such comparisons. The effects were small ($r = .03$ to $r = .06$), and only one was significant. This provides some limited evidence that targeting more than one characteristic can have an advantage, and this average advantage appears modest at best. The second type of evidence unpacks this effect a little by examining how the relative importance of this factor may depend on the exact number of characteristics targeted (e.g., matching to 1, 2-9, or 10 or more characteristics). From these comparisons, there was not a clear advantage from targeting a larger number of characteristics, over targeting a smaller number, or just one. This is similar to other meta-analytic work that has failed to produce a clear pattern for the effect of matching to multiple characteristics (e.g., Noar et al., 2007). Currently, this second type of evidence is dependent on synthesis-generated information and is confounded with various study-level features (e.g., studies targeting large numbers of characteristics are more likely to assess self-report behaviors at later time points).[26] Although several studies exist that directly evaluate the relative effects of matching to different numbers of characteristics, they are currently too heterogeneous in their designs to derive study-generated meta-analytic estimates. Furthermore, they also tend to use designs that confound matching to multiple factors to other variables within the studies themselves (see Joyal-Desmarais et al., 2020a for a discussion). Consequently, there remains a need for primary experimental research to examine this factor more carefully.

b. Dosage of message matching. In my theoretical review, I defined message dosage as the strength with which message features are manipulated, and outlined four different dimensions of dosage: dosage frequency, dosage intensity, dosage ratio, and dosage exposures.

[26] See Appendix L and Figure L5 for a depiction of this confounding.

Dosage frequency was defined as the number of times a message feature is altered to match a characteristic (e.g., how often framed statements are used in a message). Although this factor could not be examined directly, I posited that message length could act as a proxy measure, but no reliable differences was observed between messages of different lengths. *Dosage intensity* was defined as the extent to which message features are manipulated to arouse stronger experiences (e.g., using messages that arouse higher versus lower levels of fear). This factor could also not be examined directly, but message modality was used as a proxy (e.g., considering messages with audio or visual components higher in intensity potential than text-based messages). Once again, no reliable differences were observed between modalities. *Dosage ratio* was defined as the proportion of message elements manipulated to match (or mismatch) a targeted characteristic. Dosage ratio could only be operationalized in terms of coding certain comparison messages as mixed (i.e., contain elements that target several levels of a characteristic at a time) rather than purely matched (i.e., all message element target a specific level of a characteristic), but not enough instances of mixed messages were extracted from the literature to compute reliable meta-analytic estimates. Finally, *dosage exposure* refers to the number of times a person is exposed to a message matching intervention. In this synthesis, I found that interventions using more than one message exposure were associated with smaller effect size estimates than interventions that only provided one exposure to messages. This runs counter to intuition and adds to the mixed findings for using multiple exposures found in past meta-analyses (e.g., Lustria et al., 2013; Noar et al., 2007).

A general limitation for interpreting the different dosage effects is that, in addition to using proxy measures for most of these dimensions, the factors were generally confounded with each other, as well as with other features of studies. For instance, interventions that made use of multiple intervention contact points were more likely to use longer messages, and less likely to rely on image-based manipulations. Messages that used multiple contact points, along with longer messages, were also more likely to be used in studies that assessed outcomes at further (e.g., after 6 months) than earlier (e.g., same day) assessment times.[27] Consequently, interpretations of the meta-analytic effects associated with these different types of dosage factors should be made with caution. Future research should also begin to examine these factors directly through experiments to produce study-generated evidence that avoids these confounds.

7.3.3. How Do Matching Effects Vary When Targeting Different Types of Characteristics? The last principle I outlined in my theoretical review was that the size of message matching effects would be dependent on the type of characteristic being targeted by an intervention. One prediction I made was that targeting more psychologically relevant characteristics (e.g., functional differences in values) would lead to larger effect sizes than targeting less psychologically-focused characteristics (e.g., demographic variables). The current meta-analysis did not generally focus on addressing this prediction, as the meta-analysis was focused solely on synthesizing functional matching research. However, the fact that I observed larger effects for functional matching than is typical in other areas of message matching (e.g., message tailoring that is non-functional) supports my general prediction. Registered extensions of the current

[27] See Appendix L and Figures L6, L7, L8, and L9 for examples of these confounding influences.

meta-analysis that will seek to incorporate the broader message matching literature (i.e., covering all areas in Figures 2 and 27) will be better suited to making more direct comparisons between types of characteristics. Furthermore, coders in Project 1 were required to note the specific characteristic being targeted in each study (e.g., whether it might be regulatory focus differences, or primes for different self-construal). Future extensions of the current work will be able to make use of this extracted information to answer questions such how the size of matching effects varies as a function of the specific type of characteristic used.

In setting up hypotheses for Project 1, I did, however, derive one more specific prediction based on the type of characteristic targeted. Specifically, I argued that characteristics that are bipolar in nature (i.e., consist of two poles that are different in quality, such as liberal vs. conservative values) are more likely to elicit negative matches than are characteristics that are unipolar in nature (e.g., promotion focus, which varies in terms of being high vs. low), and should therefore lead to stronger effect. This hypothesis was not supported by the data, as meta-analytic estimates for the two types of characteristics typically overlapped. However, it should be noted that many characteristics coded as bipolar, were artificially so. Specifically, it is common in message matching works to create a bipolar dimension by matching messages to a difference score between two independent unipolar dimensions; for instance, many researchers will match messages to a difference score between promotion and prevention foci (e.g., Chang, 2009; Han, Park, & Khang, 2018). Unlike truly bipolar characteristics, those that are created using a difference score between two unipolar characteristics may not be as likely to elicit negative matching effects. For instance, having a strong promotion focus relative to a prevention focus (e.g., a high score if the latter is subtracted from the former) does not imply having an opposing disposition to that of people with a stronger prevention focus than promotion focus (e.g., a low score). Instead, having a strong relative promotion focus simply relates to the relative absence of (or a weak) prevention focus. This would therefore lead a prevention-focused message to conceptually be closer to a non-match than a negative match. Given this limitation, future research should therefore take care to disentangle effects that arise from matching to truly bipolar variables from those that arise from matching to artificially bipolar characteristics.

7.4. Strengths and Limitations of the Current Synthesis.

The current synthesis represents by far the largest meta-analytic project in the field of message matching to date. It is also the first attempt to provide a comprehensive synthesis of research on functional message matching. In doing so, it has generated the current best estimates of the average effect sizes associated with functional matching. That said, no synthesis is without limitations, and the literature itself has limitations that cannot be overcome through a synthesis alone. I discuss some of these limitations here.

First, the study of message matching continues to be predominantly conducted using samples from wealthier nations. Although the current meta-analysis incorporated samples from five continents, only one sample was drawn from South America, and no samples were drawn from Africa. For each represented continent, samples from specific countries were largely overrepresented (i.e., the United States in North America, from which over half of all studies for the meta-analysis were drawn; The Netherlands and the

United Kingdom in Europe; Taiwan, China, and South Korea, in Asia, and; Australia in Oceania). Samples were also drawn more frequently from college/university student populations than from any other sampling frame, making it unlikely that samples are representative of the diverse demographics that exist within any country. Efforts to diversify sampling frames therefore remain required.

Second, the literature on message matching is not, of course, impervious to various research-related biases that have emerged in other areas of the behavioral sciences. In the current synthesis, I conducted a large number of analyses to gain further understanding of how biases might operate in the functional matching literature. Sensitivity analyses were largely inconclusive for most variables, finding few significant moderation effects, and largely in mixed directions. However, they did reveal a relatively consistent association between effect sizes and sample sizes, such that larger sample sizes tend to be associated with smaller effects. This pattern may have arisen because of inflated effect sizes from smaller studies are more likely to get published (i.e., publication bias), but it is also possible that the effect could be attributed to study design differences between larger and smaller studies. A likely possibility is that both publication bias and true design differences contribute to this effect; consequently, future effort could attempt to further qualify the relationship between sample size and the effect size obtained in functional matching study. In addition to the sensitivity analyses, I also conducted p-curve analyses, which indicated that the effects observed were unlikely to be the effect of research biases alone (i.e., there likely are true effects), and funnel plots which found some evidence of bias concentrated in the reporting of interaction effects in Type II studies (i.e., factorial experiments studying message matching). Future works should further investigate the presence and influence of research biases on message matching research. Of particular importance for future syntheses will be the inclusion of grey literature (e.g., data from posters, dissertations) to examine how patterns differ between published and unpublished literature. Although Project 1 did not review grey literature, the larger registered systematic review of message matching research that Project 1 is part of will ultimately seek to incorporate such literature in order to gain more insights on the operation of publication biases. Additionally, very few studies to date in message matching research are registered beforehand, and very few engage in other open science practices such as the sharing of data and/or analysis scripts. The adoption of these practices is highly recommended for the field in order to examine and limit the influence of various research biases on our inferences.

Third, the current review was unable to fully evaluate the influence of numerous levels of moderator variables as they apply to several of the outcome variables examined. This may partially be owing to the search strategy I employed being incomplete (i.e., despite the large size of this review, there are still many studies our search protocol likely failed to identify), but the reality is that there are many empirical gaps remaining in the literature itself. For example, consider the effects of assessment time depicted in Figure 24. Meta-analytic estimates on attitudes and intentions were almost entirely limited to assessments made on the very same day as when message interventions were delivered. Further consider that of the 4,228 effect sizes extracted from the literature, only one effect was extracted that evaluated effects on intentions beyond 6 months, only one effect evaluated intervention impacts on attitudes within one month (but beyond the day of message intervention itself), and not even a single effect evaluated the impact of interventions on attitude beyond six months. In contrast, when it comes to effects on outcomes assessed the very same day as interventions, 1,742 effect sizes were extracted for attitude outcomes, and 1,826 effects were extracted for intention outcomes (Figure L1 of Appendix L provides a breakdown of the covariance between assessment time and types of outcomes). Future studies can therefore use the results of the current synthesis to determine which study designs they should generate to maximally advance the field. For instance, conducting just a few new studies on the long term effects of functional matching on attitudes and intentions will aid move the field forward in generating better meta-analytic estimates. In contrast, producing even 100 new estimates on the effects of functional matching on attitudes or intentions measured the day of interventions is unlikely to meaningfully alter the corresponding meta-analytic estimates. Additionally, future studies will also want to begin providing experimental evidence that directly evaluates the various moderators outlined in this meta-analysis, as the meta-analytic tests were heavily dependent on correlational evidence generated from differences that exist across studies (i.e., tests of moderation depended on synthesis-generated evidence rather than study-generated evidence).

In terms of strengths of the current synthesis, I have already mentioned the large scope and extensiveness of the current meta-analysis compared to previous meta-analyses of message matching. This benefit was likely the result of the extensive development efforts that went towards building the electronic search strategy for Project 1—efforts that are documented in detail in this dissertation and corresponding appendix files. The full electronic search queries used for each electronic database searched are also provided in full in Appendix D to make the electronic search fully reproducible.

Of importance when considering scope of Project 1, is that inclusion criteria for studies were much more stringent than for most pre-existing meta-analyses. For instance, studies were only included if they made use of experimental designs, whereas many previous meta-analyses have incorporated designs such as quasi-experiments, or have not specified any similar design-based criterion (e.g., Lustria et al., 2013; O'Keefe & Jensen, 2006). This criterion allows each meta-analytic estimate produced in Project 1 (including each estimate conditional on specific levels of moderator variables) to achieve high causal validity.

Effect sizes also had to correspond to well-defined types of outcomes: attitude, intention, self-report behavior, and objective behaviors. This is in contrast to several meta-analyses that evaluated effects on an singular "persuasiveness" outcome that mixes the four outcome types in Project 1 together with other varied outcomes, such as evaluations of the messages themselves (e.g., Carpenter, 2012; O'Keefe & Jensen, 2006). This allowed the estimates produced in Project 1 to benefit from greater clarity in their theoretical meaning. This clarity was further improved by the fact that Project 1 maintained clear distinctions between different types of effects (e.g., the effect of messages conditional on levels of characteristics, as opposed to the effect of characteristics conditional on levels of message manipulations), and the fact that Project 1 required comparison groups to be receiving active interventions targeting the same outcome as the positively matched treatment condition—for instance, we excluded comparison conditions that received no intervention, and also excluded comparison groups that received active treatments, but targeting different outcomes than the positive match condition (e.g., having a control group read a message promoting flossing, when the intervention is evaluating a positively matched message's ability to promote physical activity). This contrasts with many other meta-analyses that have opted for more inclusive inclusion criteria for determining valid comparison groups (e.g., Huang & Shen, 2016; Krebs et al., 2010; Lustria et al., 2013; Noar et al., 2007).

Other strengths of the current meta-analysis include that the protocol and hypotheses were fully registered beforehand (with a protocol that met PRISMA-P guidelines; Moher et al., 2015; Shamseer et al., 2015), and that the current report further adheres to PRISMA guidelines (see Appendix B for an annotated checklist; Liberati et al., 2009; Moher et al., 2009). Further, the coding consistently demonstrated high interrater reliability across coded variables (see Section 6.1.2.). Finally, I made use of state-of-the art multi-level meta-analytic techniques to better account for dependencies between effect size estimates in the literature, and ultimately improve the reliability and accuracy of the generated meta-analytic estimates (Van den Noortgate et al., 2013; 2015).

8. Project 2: Overview—Exploring Negative Matching, and the Bipolar Nature of the Message Matching Phenomenon

One of the limitations of systematic reviews and meta-analyses, is that moderator effects are usually evaluated using *synthesis-generated evidence* rather than *study-generated evidence* (Cooper, 2009). Because synthesis-generated evidence relies on comparing attributes *between* studies, findings are mostly limited to correlational rather than causal inferences. Causally-oriented primary research (e.g., experimental research) therefore remains needed to confirm the moderation patterns obtained in Project 1, and to examine moderation not fully captured in existing studies to date.

Project 2 begins this process by providing experimental evidence on the degree to which matching effects vary along a continuum from positive matching to negative matching (e.g., Figure 3). I focus on this idea for three reasons.

First, compared to other themes introduced in Section 3, this idea represents a more fundamental change in how research has theoretically construed message matching effects. Traditionally, research on message matching has conceptualized matching processes as operating to increase persuasion; relying on the premise that more highly matched messages should be more salient and processed more deeply than mismatched messages, and that these processes increase persuasion (e.g., e.g., Huang & Shen, 2016; Lustria et al., 2013; Motyka et al., 2014; Carpenter, 2013). However, I propose this may only be the case when positively matched messages are compared to non-matched messages, and that negatively matched messages could also entail increased salience, and deeper processing than non-matched messages, but activating these processes in ways that instead decrease persuasion.

Second, Project 1 provided some evidence for the continuum I have proposed (Sections 6.5.2.). This evidence, however, was limited by its dependence on indirect tests of synthesis-generated data. Project 1 operationalized evidence of negative matching as an increased effect size when comparing positively matched messages to negatively matched messages, compared to using non-matched messages as the comparison group. Direct evidence of a matching continuum would emerge from demonstrating both that positively matched messages offer an advantage over non-matches, *and* that negatively matched messages are disadvantageous compared to non-matches (and to positive matches by extension). Project 2 will address this limitation by providing direct evidence for the continuum under a tightly-controlled experimental setting.

Third, in addition to the meta-analytic evidence above, an experimental study I previously conducted also found empirical evidence for the operation of negative matching (Joyal-Desmarais & Snyder, 2016). Specifically, when messages conveyed a negative aspect of engaging in a volunteer experience, there was a greater decline in persuasion when messages targeted characteristics that were rated as more central by participants compared to when messages targeted characteristics rated as less central (see Figure 3). This past project theoretically compared negatively matched messages to non-matched messages. In Project 2, I take this idea a step further by demonstrating that negatively matched messages *and* positively matched messages differ significantly in their effects from that of a non-matched message; I also aim to demonstrate that messages that are positive matches for some people can simultaneously act as negative matches for other people, and to quantify the relative contribution of positive and negative matching effects.

The general framework for Project 2 is shown in Figure 28. In this study, I focus on demonstrating the differential effects of positive and negative matching using a characteristic that is generally agreed upon to be bipolar in nature—political orientation. Political orientation consists of whether a person identifies with liberal or conservative values. The values at both ends of the political spectrum are inherently opposed to one another such that promoting liberal outcomes will generally conflict with conservative values and promoting conservative outcomes will generally conflict with liberal values. In countries such as the U.S., where there is increasing perceived polarization between the political left and right (e.g., Westfall, Van Boven, Chambers, & Judd, 2015), this pattern may be especially pronounced. Consequently, if we develop three types of messages arguing for a particular cause, and alter the messages to either contain liberal, conservative, or politically neutral arguments, this should create the necessary conditions to observe the three types of message matching effects I have discussed. A neutral message (message 3 in Figure 28) would convey themes that are relatively inert for people across the range of the political spectrum, and the persuasiveness of such a message should not interact with a person's political orientation.[28] A message designed to convey conservative arguments and themes should have a relative dissuasive effect on politically liberal individuals, as operationalized by the conservative message exerting a negative influence on persuasion success relative to a theoretically inert politically neutral message (see the bottom left area in Figure 28, shaded in dark pink). However, if

[28] The average persuasiveness of a neutral message should be determined by the quality of the message itself, whereas the slope should theoretically be determined by the main effect of a person's political orientation. Therefore, the slope may not be flat as shown in Figure 28. The slope should simply be located somewhere between the slopes of the other 2 messages.

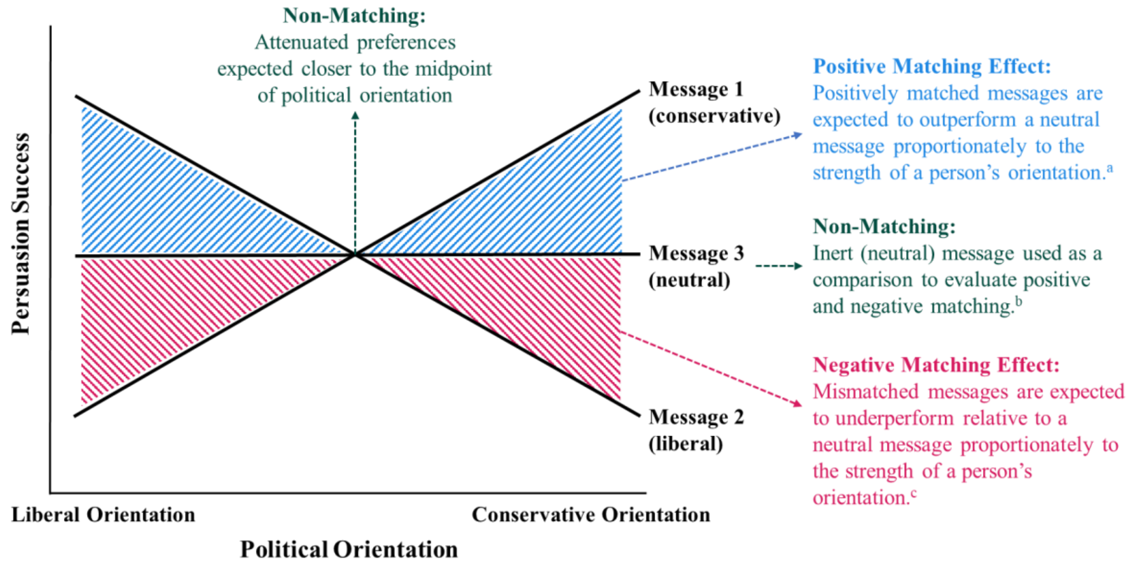
the conservative message is given to individuals with a more conservative political orientation, the message should have a positive influence on persuasion relative to a politically neutral message (see the upper right area in Figure 28, shaded in blue). If we consider the impact of a message designed to convey liberal arguments and themes, the pattern of effects should be the reverse such that liberals would display higher persuasion (relative to a neutral message; see upper left area of Figure 28, shaded in blue), whereas conservatives would display decreased persuasion (relative to a neutral message; see lower right area of Figure 28, shaded in dark pink). Project 2 explicitly examines the degree to which this pattern of effects holds for messages that promoting non-profit organization.

Given the framework exemplified by Figure 28—holding that higher scores on a measure of political orientation indicates a more conservative orientation—we can make the following hypotheses to evaluate the presence of negative and positive matching effects:

> **H1**: The effect of political orientation on persuasion should be *more positive* when receiving a politically *conservative* message than a politically *neutral* message.
>
> **H2**: The effect of political orientation on persuasion should be *more negative* when receiving a politically *liberal* message than a politically *neutral* message.

These hypotheses, as well as the full design and analysis plan for Project 2, were registered on the OSF website (Joyal-Desmarais, Rothman, & Snyder, 2020b).

Figure 28. Hypothetical Framework Guiding Project 2.



Note. Message matching on political orientation. Figure depicts processes of positive matching (space/text in blue; when a message conveys themes in agreement with a person's political orientation), negative matching (space/text in dark pink; when a message conveys themes in conflict with a person's political orientation), and non-matching (text in dark cyan; when a message conveys themes neither in agreement nor in conflict with a person's political orientation).

[a]A liberal message increasingly becomes a positive match to the extent that a person is more strongly liberal, whereas a conservative message increasingly becomes a positive match to the extent that a person is more strongly conservative.

[b]A neutral message's slope should be predominantly determined by the main effect of a person's political orientation, rather than how political orientation interacts with the message (it need not be flat as portrayed here). At the two ends of the political spectrum, the neutral message should perform somewhere in between the liberal and conservative messages. Additionally, to the extent that someone is politically moderate, they should show less pronounced differences across message conditions.

[c]A liberal message increasingly becomes a negative match to the extent that a person is more strongly conservative, whereas a conservative message increasingly becomes a negative match to the extent that a person is more strongly liberal.

9. Project 2: Methods and Design.

9.1. Pilot Study

Prior to conducting Project 2, a pilot study was conducted to: (1) construct and evaluate an inventory to measure political orientation, and (2) to select message components that could be clearly identified as politically liberal, conservative, or neutral. A more detailed summary of the pilot is described in Appendix Z, and I provide an overview here.

Overall, 250 participants were recruited using an online survey. Participants first completed a series of 25 items assessing their political orientation. Items took a variety of formats and were pulled from, and inspired by, past research in the area of matching messages to political orientation (e.g., Arpan, Xu, Raney, Chen, & Wang, 2018; Day, Fiske, Downing, & Trail, 2014; Dixon, Hmielowski, & Ma, 2017; Feinberg & Willer, 2015; Hartman & Weber, 2009; Kaikati et al., 2017; Kidwell et al., 2013; Kim et al., 2018a; Malka & Lelkes, 2010; Nelson & Garst, 2005; Wolsko et al., 2016).

Responses to these items were subjected to a series of psychometric evaluations. First, an examination of correlation matrices, along with exploratory factor analyses, filtered out items that did not relate in an expected manner with other items in the set. Then, item-response theory analyses were conducted to select items so that the resulting scale would be maximally informative, be able to maximally discriminate between different levels of political orientations, and demonstrate high reliability across the full range of scores. This work resulted in the selection of six items to make up a measure of political orientation with strong psychometric properties (the items are presented in Table 5 below, and discussed in Section 9.3.1).

In addition to completing political orientation questions, pilot participants also rated nine statements describing possible goals a non-profit organization could pursue, and four images that an organization may use in its advertising. Participants indicated the extent to which they associated each goal statement and image to politically liberal vs. conservative positions. Each goal statement and image had three alternative versions: one was designed to appeal to liberals, one to conservatives, and the other to be more neutral in its appeal. Each person was randomized to one of the three versions, for each of the statements and images. Ratings were used to identify the top two sets of goal statements that contained a clearly liberal version, a clearly conservative version, and one version that was clearly neither liberal nor conservative. Additionally, three images were selected based on being most consistently identified as being associated with liberal, conservative, or politically moderate positions. The final set of goals and images are presented in Section 9.3.2.

9.2. Sample & Procedure.

9.2.1. Power Analysis to Determine Necessary Sample Size. Project 2 was completed before Project 1 could provide an estimate of the average functional matching effect. However, since Project 2 targets a motivationally-relevant characteristic, I expected the effect sizes to be larger than the average effect reported in the message tailoring and message framing literatures (which are typically around or less than $r = .10$; see Sections 2.2.4 and 2.3.2 for past meta-analyses; see Section 3.3.1 for rationale to expect larger effects for motivationally-relevant characteristic). Consequently, Project 2 was designed to have power to detect an effect size within the range of $r = .15$ to $r = .20$.

Power was calculated assuming a linear regression of the following form (in line with Figure 28):

$$Y = a + b_1(X_1) + b_2(X_2) + b_3(X_3) + b_4(X_1*X_3) + b_5(X_2*X_3) + e \quad (1)$$

Where: Y is the outcome of interest; b_1 is the main effect of the liberal message compared to a neutral message (variable X_1, where the neutral message is the control group); b_2 is the main effect of the conservative message compared to a neutral message (variable X_2, where the neutral message is the control group); b_3 is the main effect of political orientation (X_3); b_4 is the interaction effect between X_1 and X_3 (i.e., the differential effect between the liberal and neutral message according to participants' political orientation); b_5 is the interaction effect between X_2 and X_3 (i.e., the differential effect between the conservative and neutral message according to participants' political orientation), and; e is an error term assumed to follow a normal distribution. In this model, hypotheses H1 and H2 are operationalized through the interaction terms b_4 and b_5.

Table 4 provides power analyses calculated using *G*Power 3.1* (Faul, Erdfelder, Buchner, & Lang, 2009) to detect the two interaction terms. Analyses assumed b_4 and b_5 contribute equally to an effect size of either r = .15 (R^2 = .02) or r = .20 (R^2 = .04). Sample sizes (N) were altered between 600, 800, 1000, and 1200. The power column labelled "detect each" refers to the probability of detecting either effect (b_4 or b_5) considered independently of one another, and the power column "detect both" refers to the joint probability of detecting *both* b_4 and b_5. According to these analyses, I aimed to recruit 1000 participants.

Table 4. Power Analyses to Detect Effect Sizes of Size r = .15 and r = .20.

N	Effect Size		Power	
	r	R^2	Detect Each	Detect Both
600	0.15	0.02	0.75	0.56
600	0.20	0.04	0.94	0.89
800	0.15	0.02	0.86	0.74
800	0.20	0.04	0.98	0.97
1000	0.15	0.02	0.92	0.85
1000	0.20	0.04	1.00	0.99
1200	0.15	0.02	0.96	0.92
1200	0.20	0.04	1.00	1.00

N = sample size; r = correlation size; R^2 = coefficient of determination

9.1.2. Sample Recruitment & Survey Procedure. Participants for Project 2 were recruited using *Amazon Mechanical Turk* (Buhrmester, Kwang, & Gosling, 2011), managed through *CloudResearch.com* (Litman & Robinson, 2020; Litman, Robinson, & Abbercock, 2017). Recruitment occurred in March 2020. Participants were required to be U.S. residents and 18 years old or older. They were also required to meet several criteria to ensure data quality (e.g., not having participated in the pilot, passing a reCAPTCHA test, not having a duplicate IP address with another participant). The full set of requirements participants had to meet is listed in Appendix AA.

Before completing the full survey, participants were asked to complete a short screener question, which included our six-item measure of political orientation (described in Section 9.3.1). To ensure Project 2 relied on a diverse sampling of political orientations, a quota was employed at recruitment, such that we would recruit a relatively equal number of participants who identified as liberal (operationalized for the quota as scores lower than 3), conservative (scores higher than 5), or politically moderate (scores between, and inclusive of, 3 to 5). Quota enforcement was automated within *Qualtrics* and resulted in the recruitment of 367 participants within the liberal range of scores, 363 participants within the conservative range of scores, and 371 participants within the politically moderate range of scores (for a total of N =1,101).

When participants met all inclusion criteria, they were invited to participate in the full study. After providing informed consent, participants reported their birth year and level of education, followed by answers to the Ten Item Personality Inventory (Gosling, Rentfrow, & Swann, 2003). Then, participants were randomized to one of three messages promoting a hypothetical nonprofit organization (see Section 9.3.2 below), and were asked to report on their attitudes towards the organization, their attitudes towards making a contribution to the organization, and their intentions towards making a contribution towards the organization. Finally, participants completed a few additional demographics questions before being debriefed and thanked for their participation. The entire survey generally took less than 10 minutes to complete. Participants did not interact with any research staff, and were blind to experimental conditions and hypotheses until debriefing.

9.3. Measures & Manipulations.

9.3.1. Political Orientation. Political orientation scores were assessed using the mean of participant responses on the six-item measure developed in the pilot study for Project 2. The specific items and their response options are reported in Table 5. This table also presents the results of a confirmatory factor analysis (CFA) evaluating the unidimensional nature of the scale in this sample. Each factor loading was positive, significant, and equal or above .70. The measure also showed high reliability with a standardized reliability alpha (α_s) equal to .95.

Table 5. Political Orientation Items & CFA Results.

	Items	Example Anchors[a,b]	CFA FL
1.	How would you describe your political party preference?[c]	(1) Strong Democrat; (4) Neither Democrat nor Republican; (7) Strong Republican	.90
2.	How would you describe your political views in general?	(1) Strongly liberal; (4) Moderate/Middle of the road; (7) Strongly conservative	.98
3.	In terms of your social/cultural views, where would you place yourself on the following scale?	(1) Strongly liberal; (4) Moderate/Middle of the road; (7) Strongly conservative	.92
4.	In terms of your economic views, where would you place yourself on the following scale?	(1) Strongly liberal; (4) Moderate/Middle of the road; (7) Strongly conservative	.89
5.	Please indicate your opinion towards the following two groups… Democrats[c]	(1) Extremely negative; (4) Neither negative nor positive; (7) Extremely positive	.70
6.	Please indicate your opinion towards the following two groups… Republicans[c,d]	(1) Extremely negative; (4) Neither negative nor positive; (7) Extremely positive	.78

Note. CFA FL = Confirmatory factor analysis factor loadings.
[a]The full set of anchors for this measure is provided in Appendix AA.
[b]Items 1-4 also had 8th and 9th anchors participants could choose: "I do not know" & "Does not apply to me". These response options were treated as missing data when taking a mean across responses and when calculating psychometrics.
[c]Items 1, 5 and 6 ask participants about their inclinations towards particular political parties in the United States. This differs from the other three items that ask about a person's political views (i.e., values). Excluding these items from the measure leads to a political orientation score that correlates at .97 with the measure that includes these items. Furthermore, the inclusion/exclusion of these items does not influence any of the findings reported in this dissertation (e.g., regression model estimates remain nearly identical).
[d]Item 6 was reverse coded prior to scoring the political orientation measure, and prior to calculating any psychometrics.

9.3.2. Persuasive Messages. Participants were randomized—using *Qualtrics'* built-in randomization algorithm—to receive one of three persuasive appeals promoting a hypothetical non-profit organization called JFA. One appeal contained liberal goals/imagery, one appeal contained conservative goals/imagery, and the final appeal contained politically neutral goals/imagery. The specific elements manipulated across each appeal were those participants in the pilot study had most strongly identified as liberal, conservative, or neither liberal nor conservative. For example, here are three goal statements, each on the topic of crime reduction, but emphasizing different solutions:

- *Liberal*: "Reducing crime rates by establishing training programs and services to aid people with criminal records to begin new lives"
- *Conservative*: "Reducing crime rates by creating neighborhood watch groups to monitor unlawful behavior, and establishing programs to build law abiding communities"
- *Neutral*: "Reducing crime rates by meeting with community leaders, and identifying strategies that are tailored to the types of crimes in the area"

Manipulating goals and solutions for dealing with a politically relevant issue is a common technique in message matching works targeting political orientation (e.g., Arpan et al., 2018; Day et al., 2014; Dixon et al., 2017; Nelson & Garst, 2005). Additionally, in line with several others works in matching to political orientation (Hartman & Weber, 2009; Malka & Lelkes, 2010; Nelson & Garst, 2005; Slothuus & de Vreese, 2010), the liberal and conservative appeal conditions explicitly labelled their goals as in line with liberal and conservative ideals, respectively (whereas the neutral condition did not apply such a label). Figures 29 reproduces each of the three message conditions. In total, 369 participants viewed the liberal appeal (Figure 29, left panel), 370 participants viewed the conservative appeal (Figure 29, middle panel), and 362 participants viewed the politically neutral appeal (Figure 29, right panel).

9.3.3. Outcome Measures. To evaluate the effects of matching messages to people's political orientation, we used four outcome measures. The full measures (including all response options) are available in the registration file for Project 2 (Joyal-Desmarais et al., 2020b).

Attitude towards the organization. First, participants were asked to rate the non-profit organization featured in the appeal (i.e., JFA) along six dimensions. Specifically, they answered the prompt "I would rate the organization as…" followed by three positive and three negative adjectives (listed in Table 6). For each adjective, they were asked to indicate their agreement on a 6-point scale (1 = "strongly disagree"; 6 = "strongly agree"). Table 6 also presents CFA results on this measure. Each factor loading was positive, significant, and equal or above .70. The measure also showed high reliability (α_s = .94).

Table 6. Attitude Towards the Organization: Items & CFA Results.

Items	CFA FL
1. Valuable	.92
2. Beneficial	.91
3. Harmful[a]	.70
4. Effective	.85
5. Infective[a]	.83
6. Wasteful[a]	.86

Note. CFA FL = Confirmatory factor analysis factor loadings.
[a]Item was reverse coded prior to scoring the measure and evaluating psychometrics.

Figure 29. Message Conditions Used in Project 2.

Note. Left panel = liberal appeal condition; middle panel = conservative appeal condition; right panel = neutral appeal condition.

Attitude towards contributing. Second, participants completed six semantic differential items using six-point Likert type response options. These items asked participants to indicate (1) their attitudes towards making a financial contribution towards the organization, and (2) their attitudes towards volunteering their time to aid the organization. See Table 7 for the item prompts and the sets of opposite adjective words participants used to indicate their attitudes. Table 7 also presents CFA results on this measure. Each factor loading was positive, significant, and equal or above .80. The measure also showed high reliability (α_s = .95).

Table 7. Attitude Towards Contributing: Items & CFA Results.

Prompt & Semantic Differential Adjectives[a]	**CFA FL**
I would find the idea of making a *financial contribution* to this organization…	
1. Bad vs. Good	.88
2. Harmful vs. Beneficial	.84
3. Wasteful vs. Valuable	.87
I would find the idea of *volunteering* for this organization…	
4. Bad vs. Good	.91
5. Wasteful vs. Valuable	.93
6. Unpleasant vs. Pleasant	.85

Note. CFA FL = Confirmatory factor analysis factor loadings.
[a]For each adjective "X", anchors were: extremely "X", moderately "X", or slightly "X" (e.g., ranging from "extremely good" to "extremely bad")

Positive behavioral intentions. Third, participants completed six items assessing their behavioral intentions to make a contribution towards the organization. Each item was completed using a five-point Likert type format (1= "not at all"; 5 = "strongly"). Table 8 provides the prompts participants responded to, along with CFA results using this scale. Each factor loading was positive, significant, and equal or above .80. The measure also showed high reliability (α_s = .94).

Negative behavioral intentions. Finally, participants completed six items assessing their behavioral intentions to actively *avoid* contributing towards the organization (and to discourage others from doing so). This alternate conceptualization of behavioral intentions was used to measure reactance against the persuasive messages, whereby certain people (e.g., receiving a negatively matched message) may become motivated to take action against the organization, rather than passively avoiding to contribute (i.e., showing low scores on positive behavioral intentions). These items were framed similarly to their positive counterparts, and used the same five-point Likert type format (1= "not at all"; 5 = "strongly"). Table 8 provides the prompts participants responded to, along with CFA results for this scale. Each factor loading was positive, significant, and equal or above .60. The measure also showed good reliability (α_S = .84). An alternative CFA examined whether this scale could be combined with the positive behavioral intentions items, but that resulted in significantly poorer fit (e.g., negative items would show low factor loadings). Consequently, the positive and negative items were scored separately.

Table 8. Behavioral Intentions: Items & CFA Results.

Positive Intentions		Negative Intentions	
Prompt/Items	**CFA FL**	**Prompt/Items**	**CFA FL**
Imagine you were provided with a link to make a financial contribution to this organization…		Imagine you accidentally clicked on a link and made a small donation to this organization…	
1. How willing would you be to contribute financially?	.87	1. How unwilling would you be to let them keep the funds?	.69
2. Would you intend to contribute financially?	.87	2. Would you intend to contact them to withdraw the donation?	.79
Imagine a friend of yours was considering donating to this organization…		Imagine a friend of yours was considering donating to this organization…	
3. Would you encourage your friend?	.85	3. Would you discourage your friend?	.72
Imagine you were provided with a link to volunteer for this organization…		Imagine you accidentally clicked a link and your contact information had been added to the organization's volunteer mailing list…	
4. How willing would you be to join their volunteer mailing list?	.85	4. How unwilling would you be to have them contact you?	.67
5. Would you intend to volunteer with them?	.84	5. Would you intend to contact the organization to have your contact information removed?	.63
Imagine a friend of yours were planning to volunteer for this organization…		Imagine a friend of yours were planning to volunteer for this organization…	
6. Would you encourage your friend?	.81	6. Would you discourage your friend?	.65

Note. CFA FL = Confirmatory factor analysis factor loadings.

10. Project 2: Results.

All analyses Project 2 were conducted using *R* (R Core Team, 2020).

10.1. Descriptive Findings

10.1.1. Sample Description. In total, 1,101 participants completed this study. Participants had an average age of 39.6 years, and were predominantly female (59.6%), white (80.8%), working full-time (59.3%), and educated (e.g., 55.1% had at least a bachelor's degree). Table 9 provides a breakdown of the demographic composition.

Table 9. Sample Demographics for Project 2 (N = 1,101).

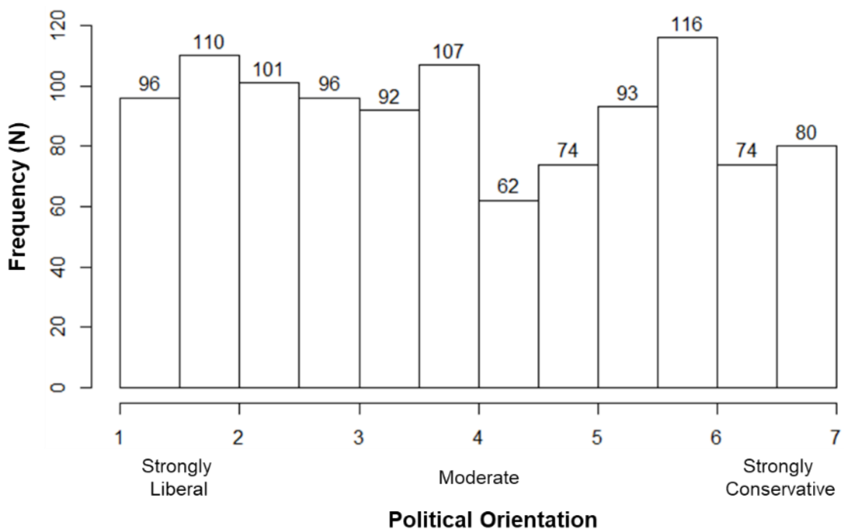
Variable	**Mean**	***SD***
Age	39.6	12.5
Year of Birth	1979.6	12.5
Variable	**N**	**%**
Gender		
Male	437	39.7
Female	656	59.6
Other	8	.7
Race/Ethnicity[a]		
White/Caucasian	890	80.8
Black/African American/African	78	7.1
Asian/Asian American	102	9.3
Latino/Hispanic	70	6.4
Other	20	1.8
Highest Education Level		
High school or less	212	19.3
Vocational/College	279	25.3
Bachelor's	418	38.0
Master's/Doctoral/Professional	189	17.2
Other/No answer	3	.3
Employment Status		
Full-Time	653	59.3
Part-Time	203	18.4
Not working	101	9.2
Retired	59	5.4
Other/No answer	85	7.7
Family Income		
Less than 30,000	224	20.3
30,000-59,999	323	29.3

60,000-89,999	258	23.4
90,000 and above	268	24.3
No answer	28	2.5

[a]Participants could select more than one option

Further, an examination of participant political orientation scores revealed a fairly uniform distribution, showing that our quota-based sampling procedure was successful. This is depicted in Figure 30.

Figure 30. Histogram of Political Orientation Scores (N = 1,101).



10.1.2. Descriptive Statistics. Table 10 provides a correlation matrix, along with descriptive statistics for the primary measures used in our analyses. To ease future meta-analytic efforts, similar tables are provided in Appendix AB, broken down by each of the three message conditions.

Table 10. Correlation Matrix and Descriptive Statistics for Key Variables (N = 1,101).

Variable	**1**	**2**	**3**	**4**	**5**	**Mean**	***SD***
1. Political orientation	-	.07*	.04	.01	-.06	3.96	1.75
2. Attitude towards the organization		-	.86***	.63***	-.65***	4.63	1.03
3. Attitude towards contributing			-	.73***	-.66***	4.40	1.19
4. Positive behavioral intention				-	-.43***	2.48	1.10
5. Negative behavioral intention					-	1.92	.97

Note. SD = Standard Deviation. Correlations were computed using standardized scores for each variable, whereas the means and SDs were calculated using raw variable scores. *p < .05; **p < .01; ***p < .001

10.2. Primary Findings

The effects of matching messages to individual's political orientation on each of four outcome variables was examined using linear regressions taking the form described in Equation 1 (Section 9.2.1). Furthermore, matching thresholds (MTs) were computed in an exploratory manner using the nonparametric bootstrapping procedure (with 10,000 bootstrap samples) outlined by Joyal-Desmarais et al., 2020 to further qualify findings. In this study, MTs refer to the specific scores along the political orientation dimension at which people change in their relative predisposition from one message to another (e.g., the political orientation score above which people respond more favorably to conservative appeals, but below which people respond more favorably to liberal appeals).

10.2.1. Overview of Regression Results. Table 11 presents the results of the regression analyses, broken down for each of the four outcome that were assessed. Figure 31 represents the results of the regression analyses graphically. For each outcome measure, Table 11 begins by providing the full set of regression parameters obtained. Here, I provide an example of how to interpret each piece of information contained in Table 11 as it pertains to the outcome of attitudes towards the non-profit organization (the upper left quadrant of Table 11, which corresponds to the upper left panel of Figure 31).

The first pieces of information reported in Table 11 are the regression parameters for the models (always coding the politically neutral appeal as the comparison group using dummy coding). The first parameter is the *intercept* of the model, which represents the average score on the outcome when participants view the neutral message condition, and have a standardized political orientation score of zero (i.e., a politically moderate score, as this value is only .02 standard deviations from the midpoint of the raw political orientation scale). For the first model, the parameter is β = .26 (95% CI [.16, .35]), signifying that participants with a standardized political orientation score of 0 are predicted to show a standardized score of .26 on attitude towards the organization when exposed to a neutral message. Given that this score is significant, this indicates that such participants are expected to score significantly higher on this attitude measure than the overall sample mean attitude score (equal to 0).

The second parameter is the effect of receiving the *conservative appeal* (relative to the neutral appeal), conditional on a political orientation score of 0. The value is β = -.50 [95% CI [-.63, -.36]) for the outcome of attitude towards the organization. Consequently, participants with a political orientation score of zero (i.e., political moderates) are expected to show a score of around -.24 (i.e., the intercept of .26 modified by -.50) on the outcome measure. This can be confirmed visually by looking at Figure 31. Because this value is significant, we can say that participants scoring around the mean of political orientation (i.e., political moderates) score significantly lower on this attitude outcome when viewing the conservative appeal relative to the neutral appeal.

The third parameter is the effect of receiving the *liberal appeal* (relative to the neutral appeal), conditional on a political orientation score of 0. The value is β = -.26 [95% CI [-.39, -.13]) for the outcome of attitude towards the organization. Consequently, participants with a political orientation score of zero (i.e., political moderates) are expected to show a score of around .00 (i.e., the intercept of .26 modified by -.26) on the outcome measure. This can again be confirmed visually by looking at Figure 31. Because this value is significant, we can say that participants scoring around the mean of the political orientation score significantly lower on this outcome when viewing the liberal appeal relative to the neutral appeal. Taken together with the last parameter, we can then conclude that politically moderate participants respond significantly more positively to the politically neutral appeal than to either the liberal or conservative appeals.

The fourth parameter in the model is the effect (i.e., the slope) of *political orientation*, given reception of the politically neutral appeal. For the attitude towards the organization outcome, this value is nonsignificant at β = -.01 (95% CI [-.10, .09]), signifying that political orientation does not significantly moderate participants' responses to the politically neutral message. Indeed, examining the slope of the neutral appeal in Figure 31. shows a flat line. This result is in line with the idea that neutral messages act as a non-match for participants generally, as noted in Figure 28.

The fifth parameter is the *interaction between political orientation and the conservative appeal*. The value of the parameter is significant at β = .49 (95% CI [.36, .62]), signifying that the slope for the conservative appeal condition is around β = .48

(i.e., the slope in the neutral condition modified by the interaction, so -.01 plus .49), and is significantly more positive than the slope for the neutral appeal condition. This confirms hypothesis H1. That is, participants become significantly more (less) receptive towards the conservative appeal the more (less) conservative their political orientation.

The sixth parameter is the *interaction between political orientation and the liberal appeal*. The value of the parameter is significant at β = -.29 (95% CI [-.43, .16]), signifying that the slope for the liberal appeal condition is around β = -.30 (i.e., the slope in the neutral condition modified by the interaction, so -.01 minus .29), and is significantly more negative than the slope for the neutral appeal condition. This confirms hypothesis H2. That is, participants become significantly more (less) receptive towards the liberal appeal the more (less) liberal their political orientation scores.

The rows under the section labelled "Slopes of PO Given" in Table 11 provide the slopes of political orientation for the conservative and liberal appeal conditions (the betas are the same as derived in the above paragraphs). Both slopes are significant at $p < .001$, signifying that message matching effects are operating significantly within both conditions (rather than being driven by one condition over the other). This stands in contrast to the non-significant slope under the neutral appeal condition.

The pattern of the regression analyses is nearly identical across all outcome measures. The final outcome (negative intentions) is reverse-coded relative to the others, and each regression parameter is Table 11 (and Figure 31) is correspondingly reversed in direction.

Table 11. Regression Results Broken Down by Outcome.

Outcome = Attitude Towards Organization

Regression Parameters	***β***	**95% CI**	***SE***	***p***
Intercept	.255	[.160, .350]	.049	<.001
Conservative appeal	-.498	[-.632, -.364]	.068	<.001
Liberal appeal	-.259	[-.394, -.125]	.068	<.001
Political Orientation (PO)	-.009	[-.104, .087]	.049	.859
PO*Conservative appeal	.491	[.357, .624]	.068	<.001
PO*Liberal appeal	-.291	[-.426, -.156]	.069	<.001
Slopes of PO Given	***β***	**95% CI**	***SE***	***p***
Conservative appeal	.482	[.389, .575]	.047	<.001
Liberal appeal	-.299	[-.395, -.204]	.049	<.001
Matching Thresholds	**Est.**	**95% CI**		
Neutral vs. Conservative	1.010	[.720, 1.458]		
Neutral vs. Liberal	-.892	[-1.726, -.466]		
Conservative vs. Liberal	.304	[.118, .509]		
Multiple R^2 = .151; Adjusted R^2 = .147				

Outcome = Attitude Towards Contributing

Regression Parameters	***β***	**95% CI**	***SE***	***p***
Intercept	.213	[.117, .308]	.049	<.001
Conservative appeal	-.466	[-.600, -.331]	.068	<.001
Liberal appeal	-.165	[-.300, -.031]	.069	.016
Political Orientation (PO)	-.014	[-.110, .082]	.049	.781
PO*Conservative appeal	.467	[.333, .600]	.068	<.001
PO*Liberal appeal	-.325	[-.460, -.189]	.069	<.001
Slopes of PO Given	***β***	**95% CI**	***SE***	***p***
Conservative appeal	.453	[.360, .546]	.047	<.001
Liberal appeal	-.338	[-.434, .242]	.049	<.001
Matching Thresholds	**Est.**	**95% CI**		
Neutral vs. Conservative	.998	[.683, 1.486]		
Neutral vs. Liberal	-.509	[-1.040, -.133]		
Conservative vs. Liberal	.380	[.198, .592]		
Multiple R^2 = .146; Adjusted R^2 = .142				

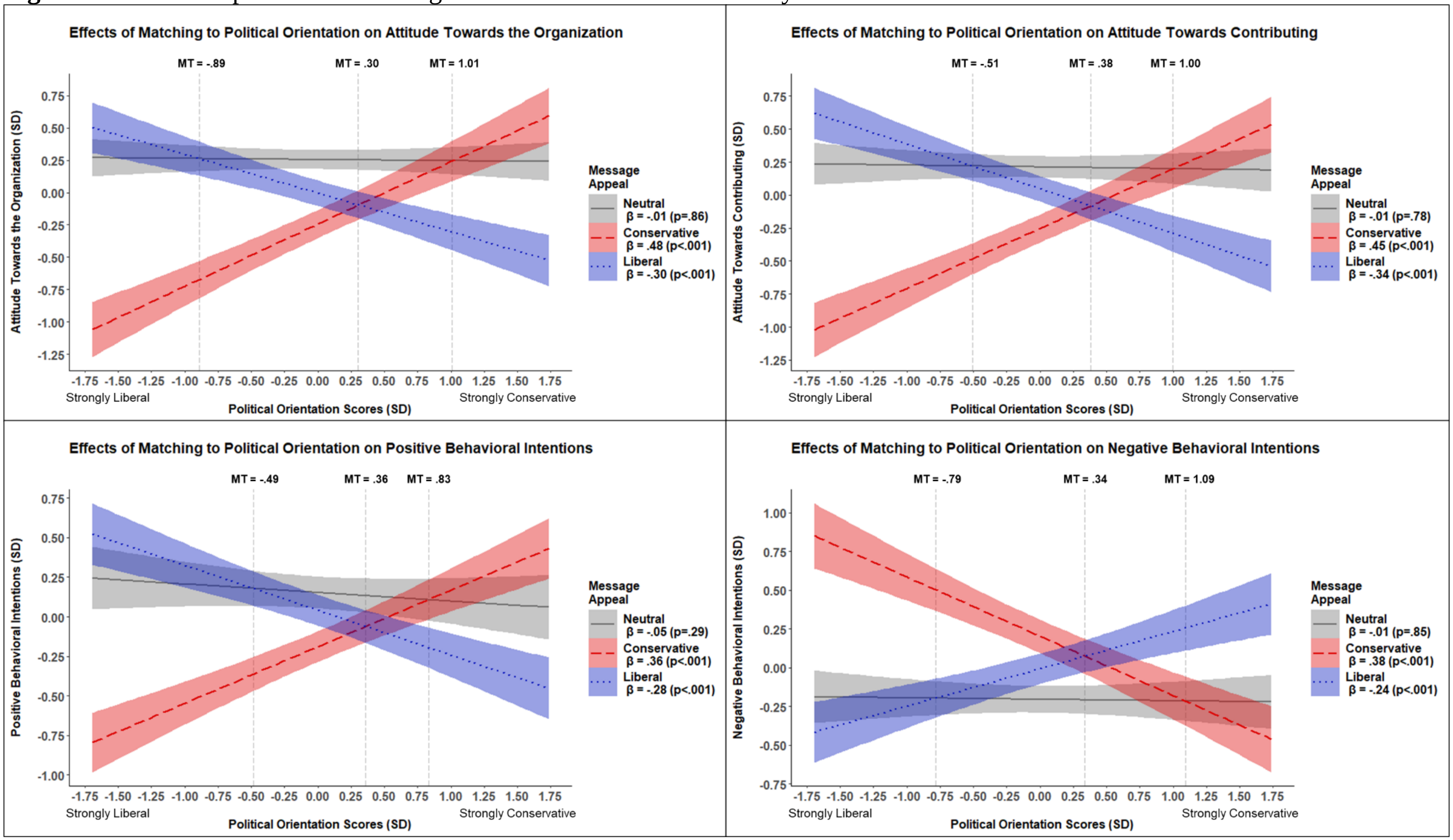
Outcome = Positive Behavioral Intentions

Regression Parameters	***β***	**95% CI**	***SE***	***p***
Intercept	.153	[.055, .252]	.050	.002
Conservative appeal	-.342	[-.480, -.203]	.071	<.001
Liberal appeal	-.112	[-.251, .027]	.071	.113
Political Orientation (PO)	-.054	[-.153, .045]	.050	.287
PO*Conservative appeal	.411	[.273, .549]	.070	<.001
PO*Liberal appeal	-.230	[-.370, -.090]	.071	.001
Slopes of PO Given	***β***	**95% CI**	***SE***	***p***
Conservative appeal	.357	[.261, .453]	.049	<.001
Liberal appeal	-.284	[-.383, -.185]	.050	<.001
Matching Thresholds	**Est.**	**95% CI**		
Neutral vs. Conservative	.832	[.451, 1.445]		
Neutral vs. Liberal	-.486	[-1.640, .138]		
Conservative vs. Liberal	.359	[.138, .616]		
Multiple R^2 = .092; Adjusted R^2 = .088				

Outcome = Negative Behavioral Intentions

Regression Parameters	***β***	**95% CI**	***SE***	***p***
Intercept	-.204	[-.302, -.105]	.050	<.001
Conservative appeal	.407	[.269, .546]	.070	<.001
Liberal appeal	.197	[.059, .335]	.070	.005
Political Orientation (PO)	-.009	[-.108, .089]	.050	.851
PO*Conservative appeal	-.373	[-.510, -.236]	.070	<.001
PO*Liberal appeal	.251	[.111, .390]	.071	<.001
Slopes of PO Given	***β***	**95% CI**	***SE***	***p***
Conservative appeal	-.383	[-.478, -.287]	.049	<.001
Liberal appeal	.241	[.143, .340]	.050	<.001
Matching Thresholds	**Est.**	**95% CI**		
Neutral vs. Conservative	1.092	[.675, 1.842]		
Neutral vs. Liberal	-.785	[-1.954, -.266]		
Conservative vs. Liberal	.338	[.103, .610]		
Multiple R^2 = .097; Adjusted R^2 = .093				

Figure 31. Visual Representation of Regression Results Broken Down by Outcome.



Note. MT = Matching Threshold; β = Standardized Regression Slope; SD = Standard Deviation.

Matching threshold (MT) analyses. The final pieces of information provided in Table 11. are the results of the MT analyses. For each outcome, three MTs are provided. The first threshold identifies the point at which participants change their relative receptivity between the neutral and the conservative message. The value of this MT for the outcome of attitude towards the organization is 1.01, signifying that participants below a political orientation score of 1.01 tend to show more positive attitudes when receiving the neutral appeal over the conservative appeal, but that participants with scores above 1.01 instead show more positive attitudes after receiving the conservative appeal. The 95% CI for this MT ranged from .72 to 1.46. This signifies that participants with political orientation scores within this range did not respond significantly differently to either appeal (i.e., there is an absence of a significant matching effect within this region). In contrast, participants with political orientation scores below .72 responded with significantly more positive attitudes when viewing the neutral appeal (i.e., receiving the conservative message led to significantly more negative attitudes, signifying a negative match effect), whereas participants with political orientation scores above 1.46 responded with significantly more positive attitudes to the conservative appeal (i.e., signifying region where there is a significant positive match effect for the conservative appeal).

The second MT corresponds to participants' relative preference for the neutral appeal compared to the liberal appeal. The value of this MT was -.89 with a 95% CI of -1.73 to -.47. The interpretation is similar than before, in that the value of -.89 represents the point when participants shift in which message they respond most positively to. For values below this MT, participants responded more positively to the liberal appeal (a difference than was significant for scores below -1.73), whereas for values above this

MT, participants responded more favorably to the neutral appeal (a difference that was significant for scores above -.47).

The third MT corresponds to participants' relative preference for the conservative vs. liberal messages. The value of this MT was .30 with a 95% CI of .12 to .51. The interpretation is again similar to above in that the value of -.30 represents the point when participants shift in which message they respond most positively to. For values below this MT, participants responded more positively to the liberal appeal (a difference than was significant for scores below .12), whereas for values above this MT, participants responded more favorably to the conservative appeal (a difference that was significant for scores above .51).

Interpreting raw scores corresponding to the matching thresholds (MTs). To aid interpretations and inferences, Figure 32 presents a visual representation of participants' relative responses to each message appeal given their *raw scores* on the political orientation scale. The results in Figure 32 are derived from the MT estimates and the CIs around them (i.e., the estimates from Table 11, back-transformed into raw scores on political orientation for ease of interpretation).

The *upper panel* presents the appeal type that participants at each range of political orientation scores were predicted to respond most positively to, regardless of significance level.

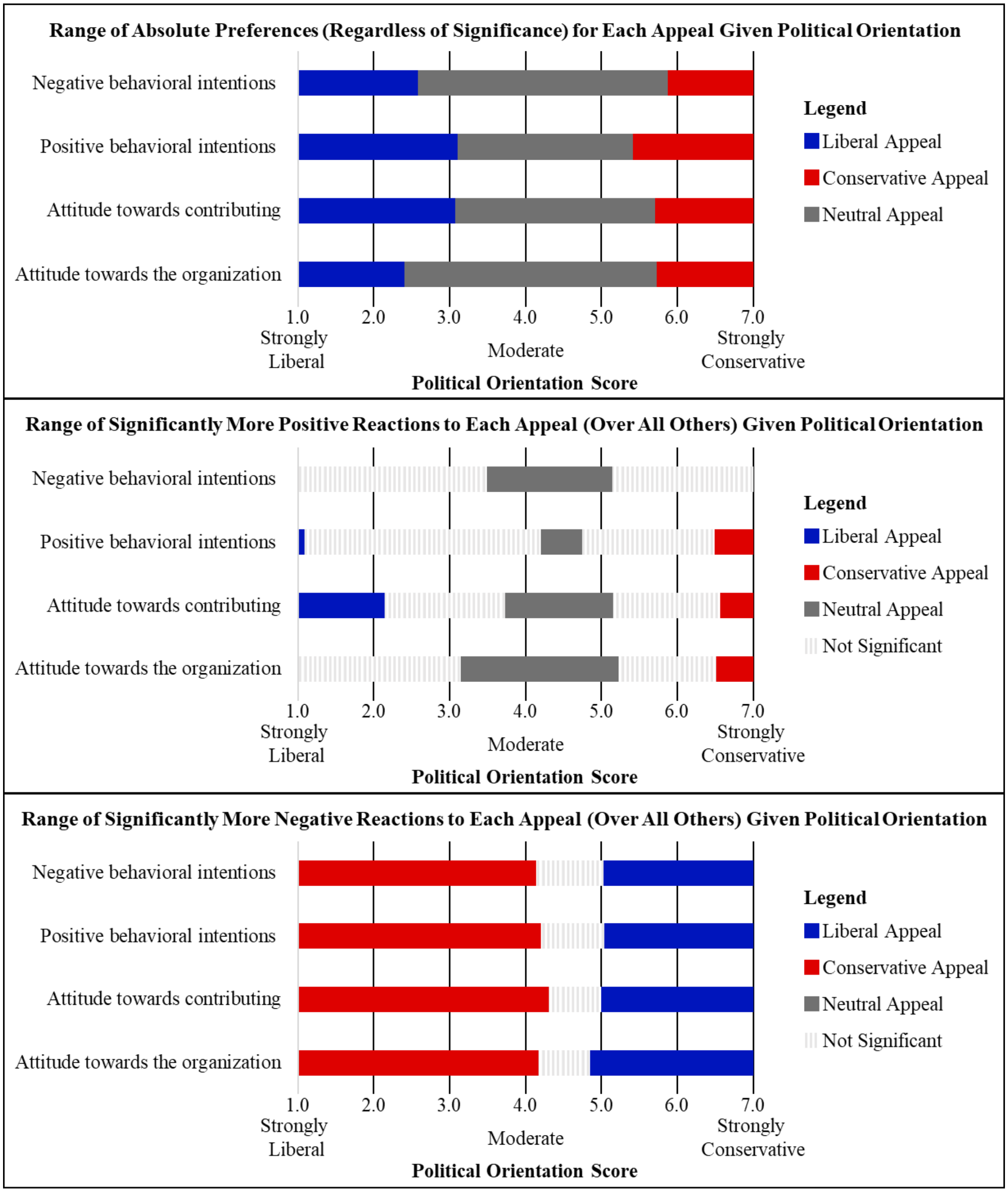
The *middle panel* presents the ranges at which participants respond significantly (at 95%) more positively to each of the three appeals, compared to *all* other appeals. For example, consider the pattern for attitudes towards contributing [to the nonprofit]. Responses to the liberal appeal were significantly more positive than responses to either the neutral or conservative appeals when participants scored below 2.14 on the raw political orientation measure.[29] In contrast, participants with scores between 3.73 and 5.16 responded significantly more positively to the neutral message than to either of the two politically charged appeals.[30] Additionally, participants scoring above 6.56 responded significantly more positively to the conservative appeal than to any other appeal.[31] Finally, participants scoring between 2.14 and 3.73 showed no significant difference between receiving the liberal or neutral appeal, whereas participants with scores between 5.16 and 6.56 showed no significant differences when responding to the neutral or conservative appeals.

The *lower panel* presents the range of values at which participants respond significantly (at 95%) more negatively to each of the three appeals, compared to *all* other appeals. For example, again consider the pattern for attitudes towards contributing [to the nonprofit]. For scores below 4.31, participants responded significantly more negatively to the conservative appeal than to any other message appeal condition.[32] For scores above 5.00, participants responded significantly more negatively to the liberal message than to any other message appeal condition.[33]

---

[29] This cutoff corresponds to the lower end of the CI for the MT comparing neutral vs. liberal appeals (standardized value of -1.040 in Table 11).
[30] These cutoffs correspond to the upper end of the MT comparing neutral vs. liberal appeals (standardized value of -.133 in Table 11), and the lower end of the MT comparing neutral vs. conservative appeals (standardized value of .683 in Table 11).
[31] This cutoff corresponds to the upper end of the CI for the MT comparing neutral vs. conservative appeals (standardized value of 1.486 in Table 11).
[32] This cutoff corresponds to the lower end of the MT comparing liberal vs. conservative appeals (standardized value of .198 in Table 11).
[33] This cutoff corresponds to the upper end of the MT comparing liberal vs. conservative appeals (standardized value of .592 in Table 11).

Figure 32. Summary of Patterns from Comparing Matching Thresholds Using Raw Political Orientation Scores.



Note. Statistical significance was evaluated at the 95% level.

11. Project 2: Discussion

Overall, the matching effects outlined by H1 and H2 were consistently and significantly supported (at $p < .001$) for all four outcome measures (Table 11). The pattern of these effects also consistently corresponded to the framework outlined in Figure 28, such that more conservative participants responded more positively to a conservative appeal and more negatively to a liberal appeal, whereas more liberal participants showed the opposite pattern. In contrast, participants across the political spectrum responded similarly to the neutral appeal, and although moderate participants showed a preference for neutral messages, differences between appeals were smaller nearer the middle of the political spectrum compared to the extremities. In terms of effect sizes, the slope of political orientation within the liberal appeal condition ranged from a magnitude of $\beta = .24$ to $\beta = .34$, placing it in the upper range of average matching effects that compare positive matches to negative matches (relative to our results in Project 1; see Section 6.5.1). The effect of political orientation within the conservative appeal condition was even larger, ranging from $\beta = .36$ to $\beta = .48$. Overall, this gives credence to the idea that matching messages to political orientation can lead to large differences in the messages participants respond most positively to, strongly justifying the application of applying matching principles in this domain.

How much of the above pattern, however, is attributable to the *relative* influence of positive versus negative matching? A careful inspection of the results reveals that for a positive match to be significantly more effective than a neutral message, participants had to score either very high or very low on the political orientation scale (this pattern is most visible in the middle panel of Figure 32). In contrast, significant negative matching effects could be discerned across almost the entire range of political orientation scores (see the lower panel of Figure 32). Additionally, the biggest discrepancies in preferences (i.e., largest differences between any message appeals) consistently emerged under conditions of negative matching rather than positive matching. Specifically, for conservative participants, the negative matching effect of receiving a liberal appeal was considerably larger than the positive effect of receiving a conservative appeal (both compared to receiving a neutral appeal). Likewise, for liberal participants, the negative matching effect of receiving a conservative appeal was considerably larger than the positive effect of receiving a liberal appeal (again, both compared to receiving a neutral appeal). In fact, this pattern was particularly pronounced for more liberal participants, who responded considerably more negatively to the conservative appeal.

Taken together, the above pattern indicates that negative matching may be exerting a considerably stronger influence on participants' responses than positive matching. That is, considerably large increases in persuasion are gained by avoiding negative matches for liberal and conservative participants (i.e., by using a neutral appeal), whereas little additional benefits are then accrued by achieving a positive match (over the neutral appeal). The implication is that implementing an intervention using a generic politically neutral (systematically non-matched) appeal could fare almost as well as implementing a matching intervention to achieve positive matches, but without incurring any of the extra costs associated with assessing people's political orientations beforehand. This is an important implication, but would not have been possible to determine under the design of most matching studies, which only compare the effect of a positive match to that of a mismatch, without delineating the nature of the latter as a negative or a non-match message. Consequently, future research should pay attention to this distinction to inform when interventionists are better served by the use of matching paradigms relative to using generic non-matched messages.

As I mentioned in the theoretical review potion of this dissertation, the distinction between non-matches and negative matches may also be particularly relevant when messages must deliver information that is possibly distressing (e.g., encouraging a behavior in response to a poor health diagnosis). In such cases, researchers have argued that mismatched messages would be superior to positively matched messages by virtue of eliciting weaker emotional reactions than positive matches elicit (e.g., Fridman et al., 2016). However, I argued that this is likely only true of non-matches and not of negative matches. Although the current study does not assess emotional responses, the pattern of findings is consistent with this interpretation. Specifically, although the non-match message (the neutral appeal) elicited a standard response from participants regardless of their political orientation (consistent with it being relatively inert), the negative matching effects produced the most extreme responses both in terms of reducing positive attitudes and intentions, and also in increasing people's intentions to take *active* response against the organization promoted in messages (e.g., taking action to withdraw a contribution, or directly discouraging another person from contributing). If negative matching produces the strongest reactions, then using a negative match may backfire when delivering distressing information, even relative to a positively matched message. Future research should therefore evaluate the relative effects of positive versus negative matching effects, as they compare to non-matches, in the context of distressing information.

When interpreting the current study, I acknowledge that participants, on average, held very positive attitudes towards the non-profit organization, as well as towards making contributions to it (i.e., showing attitude scores that were, on average, close to 4.5 on both 1-6 point attitude measures). It is therefore possible that the positive matching effect was attenuated because of a ceiling effect in changing attitudes, and that in domains where the opposite is true (i.e., when attitudes are mostly negative to begin with), that negative matching effects would become more attenuated relative to positive matching effects. It will therefore be important to explore the relative impact of negative and positive matches when encouraging unpopular behaviors. That said, concerns for a ceiling effects are less obvious for the intention measures I used; for example, the average score on positive intentions was only 2.5 out of a 1-5 point measure. Despite this average being below the midpoint of the scale, negative matching effects in our regression were predicted to reach scores beyond -.75 standard deviations from the mean (i.e., see response of strongly liberal participants to conservative appeal in Figure 31), whereas the positive matching effects were predicted to reach scores just above .50 standard deviations from the mean (i.e., for strongly liberal participants receiving a liberal appeal). Nevertheless, a floor effect should still be capable of limiting negative matching when attitudes/intentions are very negative (and cannot go much lower), whereas ceiling effects should typically place a greater limit on positive matching. That said, the reverse is less clear. Specifically, do unpopular/unpleasant behaviors allow positive matches to exert a greater influence, or do they generally constrain their influence? Similarly, might the context of popular and highly prevalent behaviors be more amenable for negative matches to exert a greater influence, or might they instead provide protection against such forces? These are questions future studies could address to determine the boundary conditions that guide the effectiveness of negative and positive matching effects.

Constraints on Generality. The current experiment benefitted from the use of a strong measurement protocol, and a large sample size. Further, the recruitment procedure allowed the sample to represent a full range of scores along the political spectrum measure. These design features help the study achieve stronger reliability and validity, and can give us confidence that the results have a higher chance to reproduce in a direct replication attempt. That said, in interpreting the findings, it is important to remember that the context of the study was highly specific: matching to political orientation with a sample drawn from the United States, where political attitudes are more polarized along the dimension of liberal to conservative than in several other countries. As a result, it is likely that findings would differ if the study was conducted in a different national context, when using a sample with a narrower (or skewed) distribution of political orientation scores, or when matching messages to a characteristic other than political orientation. After all, in my theoretical review, I maintained that the pattern of effects a message matching intervention would produce should be the joint effect of the characteristic targeted, the way a message is manipulated to target that characteristic, and the distribution of the targeted characteristic within the target sample. Consequently, variation in any of these factors should alter the results obtained, but ideally in predictable ways according to the principles I outlined in my theoretical review.

12. Conclusion

Message matching is no doubt one of the most popular techniques of persuasion in the behavioral sciences, with research on the topic having been published across hundreds of scientific journals. However, despite this popularity, the success of message matching interventions has varied widely, and little consensus exists as to when and how to best use the technique. This paucity of guiding principles is further compounded by the fractured nature of the literature on message matching. The goals of the current dissertation were therefore to unite and map out the literature on message matching, provide a set of theoretical principles to guide our understanding of the technique, and offer meta-analytic and experimental evidence in support of the principles. The dissertation was divided into three main parts: a theoretical review, a meta-analysis (Project 1), and an experimental study (Project 2).

The first part of this dissertation was a *theoretical review* that sought to unify and explain the relations between four large literatures on message matching: functional matching, message framing, message tailoring, and message framing. This review then sought to provide a set of three core principles to guide research on understanding when and how to use message matching.

The first principle was that messages vary to the extent to which they match people's characteristics along a continuum that from positive matches (i.e., messages congruent with people's dispositions), to non-matches (i.e., messages that are neither congruent nor in opposition to people's dispositions), to negative matches (i.e., messages that are in opposition to people's dispositions). As a consequence of this underlying continuum, the effectiveness of a given message matching intervention becomes dependent on: (a) the degree to which achieving a positive match confers benefits to persuasion; (b) the extent to which avoiding a negative match allows us to avoid detrimental effects to persuasion, and (c) the relative position of two messages (e.g., a positive match versus a generic message) along the continuum from positive matching to negative matching. The stronger the relative effects of positive versus negative matching, and the further away two message types are along the continuum, the greater the effects of a matching intervention.

The second principle is that the effectiveness of matching interventions ought to be affected by the degree to which messages achieve matches—a property that can be broken down into the ideas of specificity and dosage. Specificity refers to how well message features match the unique characteristics of their audience and can be increased either by improving our assessments of characteristics (e.g., using individualized assessments over indirectly inferring characteristics by proxy), or by matching to a larger set of characteristics at a time. Dosage instead refers to the strength with which message features are made to match characteristics, and can be further divided into four subtypes: dosage frequency (the number of message components manipulated to be a match); dosage intensity (the extent to which message components are manipulated to elicit stronger reactions); dosage ratio (the proportion of all elements contained in the message manipulated to be matches), and; dosage exposures (the number of times people are exposed to a matched message). For each method of increasing the degree of matching achieved by an intervention, I argued that there likely exists an optimal amount such that too little fails to provide benefits, whereas too much can potentially make matched messages either overwhelming or intrusive, thereby also reducing their effectiveness.

Lastly, the third principle was that the effectiveness of message matching should depend on the type of characteristic targeted, with psychological characteristics more centrally tied to a person's motivations being able to elicit stronger matching effects than would more psychologically surface-level characteristics (e.g., demographic variables such as a person's age group, or a person's subjective norms towards a target behavior).

In the second part of this dissertation (i.e., Project 1), I presented a large-scale registered meta-analysis of 4,228 effects from 604 experimental studies of functional message matching. This meta-analysis provided overall meta-analytic estimates for functional matching on four distinct outcome variables. These included measures of attitude, intention, self-report behavior, and objective behavior. Through this meta-analysis, I found strong and consistent evidence that functional matching can increase the persuasiveness of message-based interventions by a factor averaging around $r = .20$, and this across the four outcome types examined. I then explored the degree to which effects vary as a function of how functional matching effects intersect with those from message tailoring, context matching, and message framing. I then performed a series of subgroup analyses to explore moderator variables tied to each of the three principles outlined in my theoretical review. These analyses provided some evidence for the first principle that matching effects may indeed exist on a continuum from positive matching to negative matching, and also supported the third principle that matching messages to deeper psychological variables (operationalized through the literature on functional message matching which targets variables that are directly motivational in nature) would lead to stronger effects than matching messages to less psychologically central variables (as typically explored in many past meta-analyses). Evidence relevant to the second principle—examining how the degree of matching achieved in interventions impacts their effectiveness—was considerably more mixed and inconclusive.

A challenge with the subgroup analyses for this meta-analysis, was that analyses of moderation depended largely on indirect tests of many of the principles, and almost entirely on synthesis-generated evidence—that is, moderation was evaluated based on features that vary correlationally across studies rather than experimentally within studies. The problem with synthesis-generated evidence is that many study features covary substantially with one another, making it difficult to draw strong causal conclusions about the principles I outlined in my theoretical review. Consequently, although the moderation results of the meta-analysis are informative, they will ultimately need to be supplemented by a new wave of primary studies that seek to directly, and experimentally, examine the three principles I outlined. The accumulation of such studies will eventually provide study-generated evidence for use in future meta-analytic work.

Given the limitations of the meta-analysis to confirm the principles, the third and final part of this dissertation (Project 2) was an experiment that sought to provide study-generated data for the first principle I outlined. Specifically, I designed and conducted a study to show that negative matching effects could be differentiated from positive matching effects, that messages which are positive matches for some people could be either non-matches or negative matches for others, and attempted to quantify the relative contributions of positive and negative matching effects. I accomplished these goals in the context of matching politically liberal, conservative, or neutral messages—which each promoted a non-profit organization—to people's political orientation scores. Through this study, I found evidence that individuals showed increased receptivity to messages that were positively matched to their own beliefs (i.e., liberal appeals for liberal participants, and conservative appeals for conservative participants), but these effects tended to be small. In contrast, participants showed large and consistently decreased receptivity to messages that negatively matched their beliefs (i.e., conservative appeals for liberal participants, and liberal appeals for conservative participants). In fact, not only did participants show reduced receptivity, they also showed increased intentions to take action against the non-profit organization featured in the messages, such as by withdrawing contributions or discouraging others from making contributions.

This study—taken together with previous work that I have done to show that negatively matched messages lead to worse persuasion than non-matched messages (Joyal-Desmarais & Snyder, 2016), and with the meta-analytic finding from Project 1 that positively matched messages show larger effects when compared to negatively matched than non-matched messages—provides a strong and consistent triangulation of evidence for the first principle of my theoretical review. In other words, thinking of messages as varying along a continuum from positively matched to negatively matched messages can be a useful tool at interventionists' and researchers' disposal when it comes to understanding and predicting the effects of message matching interventions. Future research should therefore explore this idea as it pertains to other contexts than matching messages to people's political orientations to promote non-profit organizations. It may even be particularly interesting to apply these ideas to contexts in which groups of individuals have been particularly resistant to interventions (e.g., in the domain of anti-vaccination), by exploring if high levels of resistance could be in part attributed to common persuasion attempts creating negative matching effects that further entrench individuals in their views. It will also be important for research to begin directly, and simultaneously, comparing positively matched, negatively matched, and non-matched messages to the other common types of messages frequently seen in interventions (e.g., generic messages, mixed messages).

In terms of the other principles outlined in this dissertation, work should especially begin examining the ways I have outlined to increase the degree to which messages achieve matching. In a previous study, I outlined and demonstrated a procedure for systematically studying the effects of matching messages to increasingly larger numbers of characteristics (Joyal-Desmarais et al., 2020a), and plan to continue similar efforts when it comes to studying the effects of the ideas I have outlined around specificity and dosage. In terms of studying the effects of targeting different types of characteristics, future extensions to the meta-analysis from Project 1 will begin outlining such differences. These extensions will also seek to eventually map out the full scope of the message matching literature, such that meta-analytic estimates will be available not only for each of the four main message literatures (i.e., functional matching, message framing, message tailoring, and context matching), but also for each sub-literature that intersects across these areas (as depicted by Figures 2 and 27).

Looking to the future, I end with a call to readers to take this dissertation as suggestive of new avenues for exploration, rather than as an attempt to provide strong and final answers on principles of message matching. Given the wide range of applications for message matching, and the incredible diversity that exists in term of characteristics to target and message features to manipulate, it will be necessary for a major mobilization within the field to occur before we can have a full grasp of the impact of the principles I have discussed. My theoretical review, meta-analysis (Project 1), and experimental works (e.g., Project 2; Joyal-Desmarais et al., 2020a) provide initial explorations and discussions of these ideas, and can hopefully act as a springboard for inspiration towards new avenues of empirical works.

13. Bibliography

References marked with an asterisk (*) indicate records that were included in the meta-analysis for Project 1.

*Aaker, J. L. (2000). Accessibility or diagnosticity? Disentangling the influence of culture on persuasion processes and attitudes. *Journal of Consumer Research, 26*(4), 340-357.

*Aaker, J. L., & Lee, A. Y. (2001). “I” seek pleasures and “we” avoid pains: The role of self-regulatory goals in information processing and persuasion. *Journal of Consumer Research, 28*(1), 33-49.

*Aaker, J. L., & Williams, P. (1998). Empathy versus pride: The influence of emotional appeals across cultures. *Journal of Consumer Research, 25*(3), 241-261.

*Aaker, J., & Schmitt, B. (2001). Culture-dependent assimilation and differentiation of the self - preferences for consumption symbols in the United States and China. *Journal of Cross-Cultural Psychology, 32*(5), 561-576.

Abrams, D. B., Mills, S., & Bulger, D. (1999). Challenges and future directions for tailored communication research. *Annals of Behavioral Medicine, 21*(4), 299-306.

Abroms, L. C., & Maibach, E. W. (2008). The effectiveness of mass communication to change public behavior. *Annu Rev Public Health, 29*, 219-234. doi:10.1146/annurev.publhealth.29.020907.090824

Abhyankar, P., O'Connor, D. B., & Lawton, R. (2008). The role of message framing in promoting MMR vaccination: Evidence of a loss-frame advantage. *Psychology, Health and Medicine, 13*(1), 1-16.

*Adams, L., & Geuens, M. (2007). Healthy or unhealthy slogans: That's the question. *Journal of Health Communication*, *12*(2), 173-185.

*Aerts, G., Smits, T., & Verlegh, P. W. J. (2017). How online consumer reviews are influenced by the language and valence of prior reviews: A construal level perspective. *Computers in Human Behavior, 75*, 855-864.

*Agrawal, N., & Duhachek, A. (2010). Emotional compatibility and the effectiveness of antidrinking messages: A defensive processing perspective on shame and guilt. *Journal of Marketing Research, 47*(2), 263-273.

*Agrawal, N., & Maheswaran, D. (2005). The effects of self-construal and commitment on persuasion. *Journal of Consumer Research, 31*(4), 841-849.

*Ahn, H. Y., Paek, H. J., & Tinkham, S. (2018). The role of source characteristics and message appeals in public service advertising (PSA) messages: An application of fishbein's expectancy-value model and the match-up hypothesis for anti-binge-drinking campaigns targeting college students. J*ournal of Current Issues and Research in Advertising, NA.*

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*(2), 179-211. dx.doi.org/10.1016/0749-5978(91)90020-T

Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*: Prentice-Hall.

Ajzen, I., & Timko, C. (1986). Correspondence between health attitudes and behavior. *Basic and Applied Social Psychology, 7*(4), 259-276.

Alden, D. L., Friend, J., Schapira, M., & Stiggelbout, A. (2014). Cultural targeting and tailoring of shared decision making technology: a theoretical framework for improving the effectiveness of patient decision aids in culturally diverse groups. *Social Science & Medicine*, *105*, 1-8.

*Alexander, G. L., McClure, J. B., Calvi, J. H., Divine, G. W., Stopponi, M. A., Rolnick, S. J., ... & Strecher, V. J. (2010). A randomized clinical trial evaluating online interventions to improve fruit and vegetable consumption. *American journal of Public Health, 100*(2), 319-326.

*Allard, T., & Griffin, D. (2017). Comparative price and the design of effective product communications. *Journal of Marketing, 81*(5), 16-29.

Allen, M. (1991). Meta-analysis comparing the persuasiveness of one-sided and two-sided messages. *Western Journal of Speech Communication, 55*(4), 390-404.

Amodio, D. M., Master, S. L., Yee, C. M., & Taylor, S. E. (2008). Neurocognitive components of the behavioral inhibition and activation systems: Implications for theories of self-regulation. *Psychophysiology, 45*(1), 11-19.

Anderson, L. R. (2011). *Refining what works in tailoring: Comprehensive meta-analysis of computer-tailored interventions*. Dissertations and Master's Theses (Campus Access). Paper AAI3465908. Retrieved from https://digitalcommons.uri.edu/dissertations/AAI3465908

*Anghelcev, G., & Sar, S. (2014). In the mood for [the right kind of] social marketing communication: How congruity between consumer mood and message framing influences intentions to recycle. *Journal of Social Marketing, 4*(1), 38-57.

Apanovitch, A. M., McCarthy, D., & Salovey, P. (2003). Using message framing to motivate HIV testing among low-income, ethnic minority women. *Health Psychology, 22*(1), 60.

Arpan, L. M., Xu, X., Raney, A. A., Chen, C. F., & Wang, Z. (2018). Politics, values, and morals: Assessing consumer responses to the framing of residential renewable energy in the United States. *Energy Research and Social Science, 46*, 321-331.

*Ashraf, A. R., & Thongpapanl, N. (2015). Connecting with and converting shoppers into customers: Investigating the role of regulatory fit in the online customer's decision-making process. *Journal of Interactive Marketing, 32*, 13-25.

*Ashraf, A. R., Razzaque, M. A., & Thongpapanl, N. (2016). The role of customer regulatory orientation and fit in online shopping across cultural contexts. *Journal of Business Research, 69*(12), 6040-6047.

Austin, J. T., & Vancouver, J. B. (1996). Goal constructs in psychology: Structure, process, and content. *Psychol Bull, 120*(3), 338.

*Avnet, T., Laufer, D., & Higgins, E. T. (2013). Are all experiences of fit created equal? Two paths to persuasion. *Journal of Consumer Psychology, 23*(3), 301-316.

*Baek, T. H., & Yoon, S. (2017). Guilt and shame: Environmental message framing effects. *Journal of Advertising, 46*(3), 440-453.

*Baek, T. H., Shen, L., & Reid, L. N. (2013). Effects of message framing in anti-binge drinking psas: The moderating role of counterfactual thinking. *Journal of Health Communication, 18*(4), 442-458.

*Balbo, L., & Jeannot, F. (2015). The fit between message framing and temporal distance: An efficient way to promote an innovative product. *Recherche Et Applications En Marketing (English Edition), 30*(1), 28-49.

*Baldwin, M., & Lammers, J. (2016). Past-focused environmental comparisons promote proenvironmental outcomes for conservatives. *Proceedings of the National*

Academy of Sciences of the United States of America, 113(52), 14953-14957.

Bandura, A. (1986). *Social foundation of thought and action: A social-cognitive view*. Englewood Cliffs.

Banks, S. M., Salovey, P., Greener, S., Rothman, A. J., Moyer, A., Beauvais, J., & Epel, E. (1995). The effects of message framing on mammography utilization. *Health Psychology*, *14*(2), 178.

Bartels, R. D., Kelly, K. M., & Rothman, A. J. (2010). Moving beyond the function of the health behaviour: the effect of message frame on behavioural decision-making. *Psychol Health*, *25*(7), 821-838. doi:10.1080/08870440902893708

*Bashir, N. Y., Lockwood, P., Dolderman, D., Sarkissian, T., & Quick, L. K. (2011). Emphasizing jobs and trees: Increasing the impact of proenvironmental messages on migrants. *Basic and Applied Social Psychology, 33*(3), 255-265.

*Batavia, C., Bruskotter, J. T., Jones, J. A., Vucetich, J. A., Gosnell, H., & Nelson, M. P. (2018). Nature for whom? How type of beneficiary influences the effectiveness of conservation outreach messages. *Biological Conservation, 228*, 158-166.

Bazzini, D. G., & Shaffer, D. R. (1995). Investigating the social-adjustive and value-expressive functions of well-grounded attitudes: Implications for change and for subsequent behavior. *Motivation and Emotion*, *19*(4), 279-305.

Becker, B. J., & Wu, M. J. (2007). The synthesis of regression slopes in meta-analysis. *Statistical Science*, *22*(3), 414-429.

Begg, C. B., & Mazumdar, M. (1994). Operating characteristics of a rank correlation test for publication bias. *Biometrics,* 1088-1101.

Belur, J., Tompson, L., Thornton, A., & Simon, M. (2018). Interrater reliability in systematic review methodology: exploring variation in coder decision-making. *Sociological Methods & Research*, 0049124118799372.

*Berezowska, A., Fischer, A. R. H., & Van Trijp, H. C. M. (2018). The interplay between regulatory focus and temporal distance in the health context. *British Journal of Health Psychology, 23*(1), 22-37.

Berlyne, D. E. (1970). Novelty, complexity, and hedonic value. *Perception & Psychophysics, 8*(5), 279-286. doi:10.3758/BF03212593

*Bertolotti, M., & Catellani, P. (2015). Agreement with climate change policies: Framing the future and national versus supranational identity. *European Journal of Social Psychology, 45*(7), 847-857.

*Binning, K. R., Brick, C., Cohen, G. L., & Sherman, D. K. (2015). Going along versus getting it right: The role of self-integrity in political conformity. *Journal of Experimental Social Psychology, 56,* 73-88.

*Blankenship, K. L., & Wegener, D. T. (2008). Opening the mind to close it: Considering a message in light of important values increases message processing and later resistance to change. *Journal of Personality and Social Psychology, 94*(2), 196-213.

Bohner, G., & Dickel, N. (2011). Attitudes and attitude change. *Annu Rev Psychol, 62,* 391-417. doi:10.1146/annurev.psych.121208.131609

Borenstein, M., Hedges, L. V., Higgins, J. P. T., & Rothstein, H. R. (2009). *Introduction to meta-analysis*. New York, US: John Wiley & Sons, Ltd

Borenstein, M., Hedges, L. V., Higgins, J. P., & Rothstein, H. R. (2010). A basic introduction to fixed-effect and random-effects models for meta-analysis.

Research synthesis methods, 1(2), 97-111.

*Borges, A., & Gomez, P. (2015). How products induce regulatory fit: Evidence from the health domain. Journal of Consumer Marketing, 32(6), 441-449.

*Bosmans, A., & Baumgartner, H. (2005). Goal-relevant emotional information: When extraneous affect leads to persuasion and when it does not. *Journal of Consumer Research, 32*(3), 424-434.

*Bosone, L., Martinez, F., & Kalampalikis, N. (2015). When the model fits the frame: The impact of regulatory fit on efficacy appraisal and persuasion in health communication. *Personality and Social Psychology Bulletin, 41*(4), 526-539.

*Bower, A. B., & Landreth, S. (2001). Is beauty best? Highly versus normally attractive models in advertising. *Journal of Advertising, 30*(1), 43842.

*Brannon, L. A., & Mccabe, A. E. (2002). Schema-derived persuasion and perception of aids risk. *Health Marketing Wuarterly, 20*(2), 31-48.

*Braun, K. L., Fong, M., Kaanoi, M. E., Kamaka, M. L., & Gotay, C. C. (2005). Testing a culturally appropriate, theory-based intervention to improve colorectal cancer screening among native hawaiians. *Preventive Medicine, 40*(6), 619-627.

Brehm, J. W. (1966). *A theory of psychological reactance*. Oxford, England: Academic Press.

Brehm, S. S., & Brehm, J. W. (1981). *Psychological reactance: A theory of freedom and control* (Vol. 26). New York: Academic Press.

Brehm, J. W., & Cohen, A. R. (1962). *Explorations in cognitive dissonance*. Hoboken, NJ, US: John Wiley & Sons Inc.

*Bresnahan, M. J., Zhuang, J., & Sun, S. (2013). Influence of smoking norms and gain/loss antismoking messages on young chinese adults. *Nicotine & Tobacco Research, 15*(9), 1564-1571.

*Brick, C., Mccully, S. N., Updegraff, J. A., Ehret, P. J., Areguin, M. A., & Sherman, D. K. (2016). Impact of cultural exposure and message framing on oral health behavior: Exploring the role of message memory. *Medical Decision Making, 36*(7), 834-843.

Bridle, C., Riemsma, R. P., Pattenden, J., Sowden, A. J., Mather, L., Watt, I. S., & Walker, A. (2005). Systematic review of the effectiveness of health behavior interventions based on the transtheoretical model. *Psychology & Health, 20*(3), 283-301.

*Brinberg, D., & Axelson, M. L. (1990). Increasing the consumption of dietary fiber: A decision theory analysis. *Health Education Research, 5*(4), 409-420.

Brinberg, D., Axelson, M. L., & Price, S. (2000). Changing food knowledge, food choice, and dietary fiber consumption by using tailored messages. *Appetite, 35*(1), 35-43.

*Brough, A. R., Wilkie, J. E. B., Ma, J., Isaac, M. S., & Gal, D. (2016). Is eco-friendly unmanly? The green-feminine stereotype and its effect on sustainable consumption. *Journal of Consumer Research, 43*(4), 567-582.

Brug, J., Campbell, M., & van Assema, P. (1999). The application and impact of computer-generated personalized nutrition education: a review of the literature. *Patient education and counseling, 36*(2), 145-156.

Brug, J., Oenema, A., & Campbell, M. (2003). Past, present, and future of computer-tailored nutrition education. *The American journal of clinical nutrition, 77*(4), 1028S-1034S.

*Bull, F. C., Kreuter, M. W., & Scharff, D. P. (1999). Effects of tailored, personalized and general health messages on physical activity. *Patient Educ Couns, 36*(2), 181-192.

*Bullard, O., & Penner, S. (2017). A regulatory-focused perspective on philanthropy: Promotion focus motivates giving to prevention-framed causes. *Journal of Business Research, 79*, 173-180.

Buhrmester, M., Kwang, T., & Gosling, S. D. (2011). Amazon's Mechanical Turk: A New Source of Inexpensive, Yet High-Quality, Data?. *Perspectives on Psychological Science, 6*(1), 3-5.

*Burman, B., Albinsson, P. A., Hyatt, E., & Robles, B. (2017). The impact of price level and appeal type in hotel advertising: A pilot study. *Services Marketing Quarterly, 38*(1), 46-56.

Burton, N. W. (1981). Estimating scorer agreement for nominal categorization systems. *Educational and Psychological Measurement, 41*(4), 953-962.

*Byun, J., & Jang, S. (2015). Effective destination advertising: Matching effect between advertising language and destination type. *Tourism Management, 50*(), 31-40.

*Campbell, M. K., Bernhardt, J. M., Waldmiller, M., Jackson, B., Potenziani, D., Weathers, B., & Demissie, S. (1999). Varying the message source in computer-tailored nutrition education. *Patient Education and Counseling, 36*(2), 157-169.

Campbell, M. K., DeVellis, B. M., Strecher, V. J., Ammerman, A. S., DeVellis, R. F., & Sandler, R. S. (1994). Improving dietary behavior: the effectiveness of tailored messages in primary care settings. *American Journal of Public Health, 84*(5), 783-787.

*Campbell, T. H., & Kay, A. C. (2014). Solution aversion: On the relation between ideology and motivated disbelief. *J Pers Soc Psychol, 107*(5), 809.

Carpenter, C. J. (2012). A meta-analysis of the functional matching effect based on functional attitude theory. *Southern Communication Journal, 77*(5), 438-451.

Carpenter, C., Boster, F. J., & Andrews, K. R. (2013). Functional attitude theory. *The Sage handbook of persuasion: Developments in theory and practice*, 104-119.

Carver, C. S., & White, T. L. (1994). Behavioral inhibition, behavioral activation, and affective responses to impending reward and punishment: the BIS/BAS scales. *J Pers Soc Psychol, 67*(2), 319.

Caseras, X., Avila, C., & Torrubia, R. (2003). The measurement of individual differences in behavioural inhibition and behavioural activation systems: a comparison of personality scales. *Personality and Individual Differences, 34*(6), 999-1013.

*Cesario, J., Corker, K. S., & Jelinek, S. (2013). A self-regulatory framework for message framing. *Journal of Experimental Social Psychology, 49*(2), 238-249.

*Cesario, J., Grant, H., & Higgins, E. T. (2004). Regulatory fit and persuasion: Transfer from "feeling right". *Journal of Personality and Social Psychology, 86*(3), 388-404.

*Champion, V. L., Springston, J. K., Zollinger, T. W., Saywell, R. A., Jr., Monahan, P. O., Zhao, Q., & Russell, K. A. (2006). Comparison of three interventions to increase mammography screening in low income african american women. *Cancer Detection and Prevention, 30*(6), 535-544.

*Chandran, S., & Menon, G. (2004). When a day means more than a year: Effects of temporal framing on judgments of health risk. *Journal of Consumer Research,* *31*(2), 375-389.

*Chang, C. C. (2002). Self-congruency as a cue in different advertising-processing contexts. *Communication Research*, *29*(5), 503-536.

*Chang, C. (2005). The moderating influence of ad framing for ad–self?congruency effects. *Psychology & Marketing*, *22*(12), 955-968.

Chang, C. (2006). Seeing the small picture: Ad-self versus ad-culture congruency in international advertising. *Journal of Business and Psychology*, *20*(3), 445-465.

*Chang, C.-T. (2007). Interactive effects of message framing, product perceived risk, and mood - the case of travel healthcare product advertising. *Journal of Advertising Research*, *47*(1), 51-65.

*Chang, C. (2008). Ad framing effects for consumption products: An affect priming process. *Psychology and Marketing*, *25*(1), 24-45.

*Chang, C. (2009). Enhancing the effectiveness of antismoking messages via self-congruent appeals. *Health Communication*, *24*(1), 33–40.

*Chang, C. (2010). Making unique choices or being like others: How priming self-concepts influences advertising effectiveness. *Psychology & Marketing*, *27*(4), 399-415.

*Chang, C. (2010). Message framing and interpersonal orientation at cultural and individual levels involvement as a moderator. *International Journal of Advertising*, *29*(5), 765-794.

*Chang, S. S., Chang, C. C., Chien, Y. L., & Chang, J. H. (2014). Having champagne without celebration?: The impact of self-regulatory focus on moderate incongruity effect. *European Journal of Marketing*, *48*(44147), 1939-1961.

*Chang, C.-C., & Chou, Y.-J. (2008). Goal orientation and comparative valence in persuasion. *Journal of Advertising, 37*(1), 73-87.

*Chang, C. T., & Lee, Y. K. (2011). The 'I'of the beholder: How gender differences and self-referencing influence charity advertising. *International Journal of Advertising, 30*(3), 447-478.

*Chang, C., & Li, H. (2010). Why are childlike portrayals appealing in east asia? A cross-cultural comparison between taiwan and the us. *International Journal of Advertising, 29*(3), 451-472.

*Chang, J. C., Wall, G., & Lai, C. Y. (2005). The advertising effectiveness of aboriginal endorsers: An example from taiwan. *Tourism Analysis, 10*(3), 247-256.

*Chang, C. T., & Yen, C. T. (2013). Missing ingredients in metaphor advertising: The right formula of metaphor type, product type, and need for cognition. *Journal of Advertising, 42*(1), 80-94.

*Chang, H., Zhang, L., & Xie, G. X. (2015). Message framing in green advertising: The effect of construal level and consumer environmental concern. *International Journal of Advertising, 34*(1), 158-176.

*Chen, M.-Y. (2016). Consumer response to health product communication: The role of perceived product efficacy. *Journal of Business Research, 69*(9), 3251-3260.

*Chen, Y.-F., & Chang, S.-H. (2016). The online framing effect: The moderating role of warning, brand familiarity, and product type. *Electronic Commerce Research, 16*(3), 355-374.

*Cheong, Y., & Kim, K. (2011). The interplay between advertising claims and product categories in food advertising: A schema congruity perspective. *Journal of*

Applied Communication Research, 39(1), 55-74.

*Cheung, M. C., Chan, A. S., Han, Y. M., Sze, S. L., & Fan, N. H. (2013). Differential effects of chinese women's sexual self-schema on responses to sex appeal in advertising. *Journal of Promotion Management, 19*(3), 373-391.

Chiauzzi, E., Green, T. C., Lord, S., Thum, C., & Goldstein, M. (2005). My student body: a high-risk drinking prevention web site for college students. *Journal of American College Health, 53*(6), 263-274.

*Childs, M. L., & Jin, B. (2016). Do status symbols in marketing increase product evaluations? An experimental analysis of group differences on product evaluations for scarce and brand-presence products. *Journal of International Consumer Marketing, 28*(3), 154-168.

*Choi, H., & Springston, J. K. (2014). How to use health and nutrition-related claims correctly on food advertising: Comparison of benefit-seeking, risk-avoidance, and taste appeals on different food categories. *Journal of Health Communication, 19*(9), 1047-1063.

*Choi, H., Paek, H.-J., & King, K. W. (2012). Are nutrient-content claims always effective? Match-up effects between product type and claim type in food advertising. *International Journal of Advertising: The Quarterly Review of Marketing Communications, 31*(2), 421-443.

*Choi, J., Lee, K., & Ji, Y.-Y. (2012). What type of framing message is more appropriate with nine-ending pricing?. *Marketing Letters, 23*(3), 603-614.

*Choi, N. H., Jung, J. M., Oyunbileg, T., & Yang, P. (2016). The impact of emotional arousal levels and valence on product evaluations: From regulatory goal perspective. *European Journal of Marketing, 50*(43832), 78-99.

*Choi, Y. K., Seo, Y., Wagner, U., & Yoon, S. (2018). Matching luxury brand appeals with attitude functions on social media across cultures. *Journal of Business Research, NA.*

*Chowdhury, T. G., & Khare, A. (2011). Matching a cause with self-schema: The moderating effect on brand preferences. *Psychology & Marketing, 28*(8), 825-842.

*Christopher, M. S., Skillman, G. D., Kirkhart, M. W., & D'souza, J. B. (2006). The effect of normative and behavioral persuasion on help seeking in thai and american college students. *Journal of Multicultural Counseling and Development, 34*(2), 80-93.

*Chung, H., & Ahn, E. (2013). The effects of fear appeal: A moderating role of culture and message type. *Journal of Promotion Management, 19*(4), 452-469.

Cialdini, R. B., & Goldstein, N. J. (2004). Social influence: compliance and conformity. *Annu Rev Psychol, 55*, 591-621. doi:10.1146/annurev.psych.55.090902.142015

*Cialdini, R. B., Wosinska, W., Barrett, D. W., Butner, J., & Gornik-Durose, M. (1999). Compliance with a request in two cultures: The differential influence of social proof and commitment/consistency on collectivists and individualists. *Personality and Social Psychology Bulletin, 25*(10), 1242-1253.

*Clarkson, J. J., Tormala, Z. L., & Rucker, D. D. (2011). Cognitive and affective matching effects in persuasion: An amplification perspective. *Personality and Social Psychology Bulletin, 37*(11), 1415-1427.

Clary, E. G., & Snyder, M. (1999). The Motivations to Volunteer: Theoretical and

Practical Considerations. *Current Directions in Psychological Science, 8*(5), 156-159. doi:10.1111/1467-8721.00037

Clary, E. G., Snyder, M., Copeland, J. T., & French, S. A. (1994a). Promoting volunteerism: An empirical examination of the appeal of persuasive messages. *Nonprofit and Voluntary Sector Quarterly, 23*(3), 265-280.

*Clary, E. G., Snyder, M., Ridge, R. D., Miene, P. K., & Haugen, J. A. (1994b). Matching Messages to Motives in Persuasion: A Functional Approach to Promoting Volunteerism. *Journal of Applied Social Psychology, 24*(13), 1129-1146. doi:10.1111/j.1559-1816.1994.tb01548.x

Clary, E. G., Snyder, M., Ridge, R. D., Copeland, J., Stukas, A. A., Haugen, J., & Miene, P. (1998). Understanding and Assessing the Motivations of Volunteers: A Functional Approach. *J Pers Soc Psychol, 74*(6), 1516-1530.

*Cohen, A., Perozich, A., Rajan, R., Persky, S., Parisi, J., Bowie, J., Fahle, J., Cho, J., Krishnan, A., Cohen, Z., Ezike, A., Schulte, C., Taylor, J., Storey, D., Ahmed, R. S., & Cheskin, L. J. (2017). Framed, interactive theory-driven texting: Effects of message framing on health behavior change for weight loss. *Family and Community Health, 40*(1), 43-51.

Conner, M., McEachan, R., Lawton, R., & Gardner, P. (2017). Applying the reasoned action approach to understanding health protection and health risk behaviors. *Social Science & Medicine*, *195*, 140-148.

*Connors, S., Anderson-Macdonald, S., & Thomson, M. (2017). Overcoming the 'window dressing' effect: Mitigating the negative effects of inherent skepticism towards corporate social responsibility. *Journal of Business Ethics, 145*(3), 599-

621.

Conway, N., Webster, C., Smith, B., & Wake, D. (2017). eHealth and the use of individually tailored information: a systematic review. *Health informatics journal*, *23*(3), 218-233.

Cooper, H. (2009). Hypotheses and problems in research synthesis. In H. Cooper, L. V. Hedges & J. C. Valentine (Eds.), *The handbook of research synthesis and meta-analysis*, p. 19-35. Russell Sage Foundation.

Cooper, H., Hedges, L. V., & Valentine, J. C. (Eds.). (2009). *The handbook of research synthesis and meta-analysis*. Russell Sage Foundation.

*Cooper, J. A., Worthy, D. A., & Maddox, W. T. (2015). Chronic motivational state interacts with task reward structure in dynamic decision-making. *Cognitive Psychology*, *83*, 40-53.

*Cornelis, E., Adams, L., & Cauberghe, V. (2012). The effectiveness of regulatory (in)congruent ads the moderating role of an ad's rational versus emotional tone. *International Journal of Advertising*, *31*(2), 397-420.

*Cornelis, E., Cauberghe, V., & De Pelsmacker, P. (2014). Being healthy or looking good? The effectiveness of health versus appearance-focused arguments in two-sided messages. *Journal of Health Psychology*, *19*(9), 1132-1142.

Corr, P. J. (2004). Reinforcement sensitivity theory and personality. *Neuroscience & Biobehavioral Reviews*, *28*(3), 317-332.

Covey, J. (2014). The role of dispositional factors in moderating message framing effects. *Health Psychology*, *33*(1), 52.

*Craciun, G. (2018). Choice defaults and social consensus effects on online information sharing: The moderating role of regulatory focus. *Computers in Human Behavior, 88*, 89-102.

Cramér, H. (1946). Chapter 21: The two-dimensional case. *Mathematical Methods of Statistics*. Princeton University Press: Princeton, NJ, USA.

*Cui, G., & Yang, X. (2009). Responses of chinese consumers to sex appeals in international advertising: A test of congruency theory. J*ournal of Global Marketing, 22*(3), 229-245.

*Curry, S. J., Mcbride, C., Grothaus, L. C., Louie, D., & Wagner, E. H. (1995). A randomized trial of self-help materials, personalized feedback, and telephone counseling with nonvolunteer smokers. J*ournal of Consulting and Clinical Psychology, 63*(6), 1005-1014.

*Czeizler, A., & Garbarino, E. (2017). Give blood today or save lives tomorrow: Matching decision and message construal level to maximize blood donation intentions. *Health marketing quarterly*, *34*(3), 175-186.

*Da Costa Hernandez, J. M., Wright, S. A., & Ferminiano Rodrigues, F. (2015). Attributes versus benefits: The role of construal levels and appeal type on the persuasiveness of marketing messages. *Journal of Advertising, 44*(3), 243-253.

*Daffu-O'Reilly, A. K., O'connor, D. B., & Lawton, R. J. (2017). Testing message framing to increase physical activity among british south asians. *Health Psychology and Behavioral Medicine*, *5*(1), 372-389.

*Damen, F., Van Knippenberg, B., & Van Knippenberg, D. (2008). Affective match in leadership: Leader emotional displays, follower positive affect, and follower performance. *Journal of Applied Social Psychology, 38*(4), 868-902.

*Daryanto, A., De Ruyter, K., Wetzels, M., & Patterson, P. G. (2010). Service firms and customer loyalty programs: A regulatory fit perspective of reward preferences in a health club setting. *Journal of the Academy of Marketing Science, 38*(5), 604-616.

*Das, G., Mukherjee, A., & Smith, R. J. (2018). The perfect fit: The moderating role of selling cues on hedonic and utilitarian product types. *Journal of Retailing, 94*(2), 203-216.

*Davis, J. J. (1995). The effects of message framing on response to environmental communications. *Journalism & Mass Communication Quarterly, 72*(2), 285-299.

Day, M. V., Fiske, S. T., Downing, E. L., & Trail, T. E. (2014). Shifting Liberal and Conservative Attitudes Using Moral Foundations Theory. *Personality and Social Psychology Bulletin, 40*(12), 1559-1573.

*DeBono, K. G. (1987). Investigating the social-adjustive and value-expressive functions of attitudes: Implications for persuasion processes. *J Pers Soc Psychol, 52*(2), 279.

DeBono, K. G. (2000). Attitude functions and consumer psychology: Understanding perceptions of product quality. In G. R. Maio & J. M. Olson (Eds.), *Why we evaluate: Functions of attitudes* (1 ed., pp. 195-221). New York: Psychology Press.

*Debono, K. G., & Harnish, R. J. (1988). Source expertise, source attractiveness, and the processing of persuasive information - a functional-approach. *Journal of Personality and Social Psychology, 55*(4), 541-546.

*Debono, K. G., & Packer, M. (1991). The effects of advertising appeal on perceptions of product quality. *Personality and Social Psychology Bulletin, 17*(2), 194-200.

*De Bruijn, G.-J. (2018). To frame or not to frame? Effects of message framing and risk priming on mouth rinse use and intention in an adult population-based sample. *Journal of Behavioral Medicine, NA*, 43845.

*De Bruijn, G.-J., & Budding, J. (2016). Temporal consequences, message framing, and consideration of future consequences: Persuasion effects on adult fruit intake intention and resolve. *Journal of Health Communication*, *21*(8), 944-953.

DeCoster, J. (2012). *Converting effect sizes 2012-06-19.xls*. [Excel Calculator]. Retrieved from: http://www.stat-help.com/spreadsheets.html

*Desteno, D., Wegener, D. T., Petty, R. E., Rucker, D. D., & Braverman, J. (2004). Discrete emotions and persuasion: The role of emotion-induced expectancies. *Journal of Personality and Social Psychology, 86*(1), 43-56.

Detweiler, J. B., Bedell, B. T., Salovey, P., Pronin, E., & Rothman, A. J. (1999). Message framing and sunscreen use: gain-framed messages motivate beach-goers. *Health Psychology, 18*(2), 189.

de Vet, E., de Nooijer, J., de Vries, N. K., & Brug, J. (2007). Testing the transtheoretical model for fruit intake: comparing web-based tailored stage-matched and stage-mismatched feedback. *Health Educ Res, 23*(2), 218-227.

Dijkstra, A. (2008). The psychology of tailoring-ingredients in computer-tailored persuasion. *Social and Personality Psychology Compass, 2*(2), 765-784.

*Dimmock, J. A., Jackson, B., Clear, S. E., & Law, K. H. (2013). Matching temporal frame to recipients' time orientation in exercise messaging: Does argument quality matter?. *Psychology of Sport and Exercise, 14*(6), 804-812.

Dixon, G., Hmielowski, J., & Ma, Y. (2017). Improving climate change acceptance among US conservatives through value-based message targeting. *Science Communication, 39*(4), 520-534.

*Dubé, L., & Cantin, I. (2000). Promoting health or promoting pleasure? A contingency approach to the effect of informational and emotional appeals on food liking and consumption. *Appetite, 35*(3), 251-262.

*Dubois, D., Rucker, D. D., & Galinsky, A. D. (2016). Dynamics of communicator and audience power: The persuasiveness of competence versus warmth. *Journal of Consumer Research, 43*(1), 68-85.

*Duhachek, A., Agrawal, N., & Han, D. (2012). Guilt versus shame: Coping, fluency, and framing in the effectiveness of responsible drinking messages. *Journal of Marketing Research, 49*(6), 928-941.

*Duncan, L. R., Latimer, A. E., Pomery, E., Rivers, S. E., Berotoli, M. C., & Salovey, P. (2013). Testing messages to encourage discussion of clinical trials among cancer survivors and their physicians: Examining monitoring style and message detail. *Journal of Cancer Education, 28*(1), 119-126.

*Durkin, K., Hendry, A., & Stritzke, W. G. K. (2013). Mixed selection. Effects of body images, dietary restraint, and persuasive messages on females' orientations towards chocolate. *Appetite, 60*, 95-102.

Dutta-Bergman, M. J. (2003). The linear interaction model of personality effects in health communication. *Health Commun, 15*(1), 101-116.

Eagly, A. H., & Chaiken, S. (1993). *The psychology of attitudes*: Harcourt Brace Jovanovich College Publishers.

Egger, M., Davey Smith, G., Schneider, M., & Minder, C. (1997). Bias in meta-analysis detected by a simple, graphical test. *BMJ, 315*(7109), 629-634.

*Elbert, S. P., Dijkstra, A., & Rozema, A. D. (2017). Effects of tailoring ingredients in auditory persuasive health messages on fruit and vegetable intake. *Psychology & Health, 32*(7), 781-797.

Enwald, H. P. K., & Huotari, M. L. A. (2010). Preventing the obesity epidemic by second generation tailored health communication: an interdisciplinary review. *Journal of medical Internet research, 12*(2).

*Erickson, J., Mackenzie, C. S., Menec, V. H., & Bailis, D. S. (2017). The effect of time perspectives on mental health information processing and help-seeking attitudes and intentions in younger versus older adults. *Aging & Mental Health, 21*(3), 259-271.

*Erlandsson, A., Västfjäll, D., Sundfelt, O., & Slovic, P. (2016). Argument-inconsistency in charity appeals: Statistical information about the scope of the problem decrease helping toward a single identified victim but not helping toward many non-identified victims in a refugee crisis context. *Journal of Economic Psychology, 56*, 126-140.

Evans, L. M., & Petty, R. E. (2003). Self-guide framing and persuasion: Responsibly increasing message processing to ideal levels. *Personality and Social Psychology Bulletin, 29*(3), 313-324.

*Evers, E. R. K., Inbar, Y., Blanken, I., & Oosterwijk, L. D. (2017). When do people prefer carrots to sticks? A robust "matching effect" in policy evaluation. *Management Science, 63*(12), 4261-4276.

*Eyal, T., Sagristano, M. D., Trope, Y., Liberman, N., & Chaiken, S. (2009). When values matter: Expressing values in behavioral intentions for the near vs. Distant future. *Journal of Experimental Social Psychology, 45*(1), 35-43.

Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using GPower 3.1: Tests for correlation and regression analyses. *Behavior Research Methods, 41*, 1149-1160.

Feinberg, M., & Willer, R. (2015). From Gulf to Bridge: When do moral arguments facilitate political influence? *Personality and Social Psychology Bulletin, 41*(12), 1665-1681.

*Fennis, B. M., & Stel, M. (2011). The pantomime of persuasion: Fit between nonverbal communication and influence strategies. *Journal of Experimental Social Psychology, 47*(4), 806-810.

*Fennis, B. M., Das, E. H. H. J., & Pruyn, A. T. H. (2004). If you can't dazzle them with brilliance, baffle them with nonsense: Extending the impact of the disrupt-then-reframe technique of social influence. *Journal of Consumer Psychology, 14*(3), 280-290.

Fernández-Castilla, B., Declercq, L., Jamshidi, L., Beretvas, S. N., Onghena, P., & Van den Noortgate, W. (2019). Detecting selection bias in meta-analyses with multiple outcomes: A simulation study. *The Journal of Experimental Education*, 1-20.

Finitsis, D. J., Pellowski, J. A., & Johnson, B. T. (2014). Text message intervention designs to promote adherence to antiretroviral therapy (ART): a meta-analysis of randomized controlled trials. *PloS one, 9*(2), e88166.

Finney, L. J., & Iannotti, R. J. (2002). Message framing and mammography screening: A theory-driven intervention. *Behavioral Medicine, 28*(1), 5-14.

*Fjeldsoe, B. S., Miller, Y. D., Graves, N., Barnett, A. G., & Marshall, A. L. (2015). Randomized controlled trial of an improved version of mobilemums, an intervention for increasing physical activity in women with young children. *Annals of Behavioral Medicine*, *49*(4), 487-499.

*Florack, A., Ineichen, S., & Bieri, R. (2009). The impact of regulatory focus on the effects of two-sided advertising. *Social Cognition*, *27*(1), 37-56.

Fowles, D. C. (1987). Application of a behavioral theory of motivation to the concepts of anxiety and impulsivity. *Journal of Research in Personality, 21*(4), 417-435.

*Fransen, M. L., Fennis, B. M., Pruyn, A. T. H., & Vohs, K. D. (2011). When fit fosters favoring: The role of private self-focus. *Journal of Experimental Social Psychology*, *47*(1), 202-207.

*Fransen, M. L., Reinders, M. J., Bartels, J., & Maassen, R. L. (2010). The influence of regulatory fit on evaluation and intentions to buy genetically modified foods: The mediating role of social identification. *Journal of Marketing Communications, 16*(43832), 43971.

*Fridman, I., Scherr, K. A., Glare, P. A., & Higgins, E. T. (2016). Using a Non-Fit Message Helps to De-Intensify Negative Reactions to Tough Advice. *Personality and Social Psychology Bulletin*, 0146167216649931.

Fu, R., Gartlehner, G., Grant, M., Shamliyan, T., Sedrakyan, A., Wilt, T. J., ... & Santaguida, P. (2011). Conducting quantitative synthesis when comparing medical interventions: AHRQ and the Effective Health Care Program. *Journal of Clinical Epidemiology, 64*(11), 1187-1197.

*Fujita, K., Eyal, T., Chaiken, S., Trope, Y., & Liberman, N. (2008). Influencing attitudes toward near and distant objects. *Journal of Experimental Social Psychology, 44*(3), 562-572.

Gainforth, H. L., Cao, W., & Latimer-Cheung, A. E. (2012). Message framing and parents' intentions to have their children vaccinated against HPV. *Public Health Nurs, 29*(6), 542-552. doi:10.1111/j.1525-1446.2012.01038.x

Gallagher, K. M., & Updegraff, J. A. (2011). When 'fit'leads to fit, and when 'fit'leads to fat: How message framing and intrinsic vs. extrinsic exercise outcomes interact in promoting physical activity. *Psychol Health, 26*(7), 819-834.

Gallagher, K. M., & Updegraff, J. A. (2012). Health message framing effects on attitudes, intentions, and behavior: a meta-analytic review. *Ann Behav Med, 43*(1), 101-116. doi:10.1007/s12160-011-9308-7

Gallagher, K. M., Updegraff, J. A., Rothman, A. J., & Sims, L. (2011). Perceived susceptibility to breast cancer moderates the effect of gain-and loss-framed messages on use of screening mammography. *Health Psychology, 30*(2), 145.

*Gans, K. M., Risica, P. M., Dulin-Keita, A., Mello, J., Dawood, M., Strolla, L. O., & Harel, O. (2015). Innovative video tailoring for dietary change: final results of the Good for you! cluster randomized trial. *International Journal of Behavioral Nutrition and Physical Activity, 12*(1), 130.

Ganzach, Y., & Karsahi, N. (1995). Message framing and buying behavior: A field experiment. *Journal of Business Research, 32*(1), 11-17.

*Gardner, M. P., & Wilhelm, F. O., Jr. (1987). Consumer responses to ads with positive vs. Negative appeals: Some mediating effects of context-induced mood and congruency between context and ad. *Current Issues and Research in Advertising,* *10*(43832), 81-98.

Gardner, W. L., Gabriel, S., & Lee, A. Y. (1999). “I” value freedom, but “we” value relationships: Self-construal priming mirrors cultural differences in judgment. *Psychol Sci*, *10*(4), 321-326.

*Gellert, P., Ziegelmann, J. P., Krupka, S., Knoll, N., & Schwarzer, R. (2014). An age-tailored intervention sustains physical activity changes in older adults: A randomized controlled trial. *International Journal of Behavioral Medicine, 21*(3), 519-528.

*Gerend, M. A., & Maner, J. K. (2011). Fear, anger, fruits, and veggies: Interactive effects of emotion and message framing on health behavior. *Health Psychology, 30*(4), 420-423.

Gerend, M. A., & Shepherd, J. E. (2007). Using message framing to promote acceptance of the human papillomavirus vaccine. *Health Psychology, 26*(6), 745.

Gerend, M. A., Shepherd, M. A., & Lustria, M. L. (2013). Increasing human papillomavirus vaccine acceptability by tailoring messages to young adult women's perceived barriers. *Sex Transm Dis, 40*(5), 401-405. doi:10.1097/OLQ.0b013e318283c8a8

*Gerend, M. A., & Sias, T. (2009). Message framing and color priming: How subtle threat cues affect persuasion. *Journal of Experimental Social Psychology, 45*(4), 999-1002.

*Gevorgyan, G., & Manucharova, N. (2015). The effects of cultural appeal, product involvement, and ethnic identity on attitudes and recall in online advertising. *Chinese Journal of Communication, 8*(2), 196-220.

*Gilbert, H., Nazareth, I., & Sutton, S. (2007). Assessing the feasibility of proactive recruitment of smokers to an intervention in general practice for smoking cessation using computer-tailored feedback reports. *Family Practice, 24*(4), 395-400.

*Glowacki, E. M., Bernhardt, J. M., & McGlone, M. S. (2019). Tailored texts: An application of regulatory fit to text messages designed to reduce high-risk drinking. *Health Informatics Journal, 1460458219889279*.

*Goldsmith, K., Newman, G. E., & Dhar, R. (2016). Mental representation changes the evaluation of green product benefits. *Nature Climate Change, 6*(9), 847-851.

*Gomez, P., & Torelli, C. J. (2015). It's not just numbers: Cultural identities influence how nutrition information influences the valuation of foods. *Journal of Consumer Psychology, 25*(3), 404-415.

Gosling, S. D., Rentfrow, P. J., & Swann Jr, W. B. (2003). A very brief measure of the Big-Five personality domains. *Journal of Research in personality, 37*(6), 504-528.

Goodman, L. A., & Kruskal, W. H. (1963). Measures of association for cross classifications III: Approximate sampling theory. *Journal of the American Statistical Association, 58*(302), 310-364.

Gotay, C. C., Banner, R. O., Matsunaga, D. S., Hedlund, N., Enos, R., Issell, B. F., & DeCambra, H. O. (2000). Impact of a culturally appropriate intervention on breast and cervical screening among native Hawaiian women. *Preventive Medicine, 31*(5), 529-537.

Gould, G. S., McEwen, A., Watters, T., Clough, A. R., & van der Zwan, R. (2013).

Should anti-tobacco media messages be culturally targeted for Indigenous populations? A systematic review and narrative synthesis. *Tobacco Control, 22*(4), e7-e7.

Graham, A. L., Fang, Y., Moreno, J. L., Streiff, S. L., Villegas, J., Muñoz, R. F., Tercyak, K. P., Mandelblatt, J. S., & Vallone, D. M. (2012). Online advertising to reach and recruit latino smokers to an internet cessation program: Impact and costs. *Journal of Medical Internet Research, 14*(4)

Gray, J. A. (1970). The psychophysiological basis of introversion-extraversion. *Behav Res Ther, 8*(3), 249-266.

Gray, J. A. (1990). Brain systems that mediate both emotion and cognition. *Cogn Emot, 4*(3), 269-288.

*Grazzini, L., Rodrigo, P., Aiello, G., & Viglia, G. (2018). Loss or gain? The role of message framing in hotel guests' recycling behaviour. *Journal of Sustainable Tourism, 26*(11), 1944-1966.

*Green, T., & Peloza, J. (2014). Finding the right shade of green: The effect of advertising appeal type on environmentally friendly consumption. *Journal of Advertising, 43*(2), 128-141.

*Gregory, G. D., & Munch, J. M. (1997). Cultural values in international advertising: An examination of familial norms and roles in mexico. P*sychology & Marketing, 14*(2), 99-119.

Grewal, D., Motyka, S., Puccinelli, N. M., Roggeveen, A. L., Daryanto, A., de Ruyter, K., & Wetzels, M. (2011). Understanding how to achieve competitive advantage through regulatory fit: a meta-analysis. *Marketing Science Institute Research*

Report, 10-117.

Guo, Y. (2017). *The Effect of Gain-Loss Message Framing and Dimensions of Perceived Risk on Consumer Purchase Evaluation: Evidence from Discount Carriers* (Master's Thesis). Purdue University, ProQuest Dissertations Publishing, 2017. 10601489.

*Guo, W., & Main, K. (2017). The effectiveness of matching sales influence tactics to consumers' avoidance versus approach shopping motivations. *European Journal of Marketing*, *51*(44084), 1577-1596.

*Haddock, G., Maio, G. R., Arnold, K., & Huskinson, T. (2008). Should persuasion be affective or cognitive? The moderating effects of need for affect and need for cognition. *Personality and Social Psychology Bulletin*, *34*(6), 769-778.

*Han, D., Duhachek, A., & Agrawal, N. (2016). Coping and construal level matching drives health message effectiveness via response efficacy or self-efficacy enhancement. *Journal of Consumer Research*, *43*(3), 429-447.

*Han, K.-H., & Jo, S. (2012). Does culture matter?: A cross-national investigation of women's responses to cancer prevention campaigns. *Health Care for Women International*, *33*(1), 75-94.

*Han, J., Ling, J., & Lim, A. (2018). Emotional appeal in recruiting advertisement and applicant attraction: Unpacking national cultural differences. *Journal of Organizational Behavior*, *37*(8), 1202-1223.

Han, S.-P., & Shavitt, S. (1994). Persuasion and culture: Advertising appeals in individualistic and collectivistic societies. *Journal of Experimental Social Psychology*, *30*(4), 326-350.

*Han, J. K., Sohn, Y. S., & Yoo, K. W. (2015). The korean language and the effects of its honorifics system in advertising: Deferential vs. Informal speech as regulatory prime on persuasive impact. *Marketing Letters, 26*(3), 321-333.

*Han, E. K., Park, C., & Khang, H. (2018). Exploring linkage of message frames with personality traits for political advertising effectiveness. *Asian Journal of Communication, 28*(3), 247–263.

*Harnish, R. J., & Bridges, K. R. (2016). Mall haul videos: Self-presentational motives and the role of self-monitoring. *Psychology & Marketing, 33*(2), 113-124.

Harrer, M., Cuijpers, P., Furukawa, T., & Ebert, D. D. (2019). *dmetar: companion R package for the guide "doing meta-analysis in R"*. R package version 0.0. 9000.

Hartman, T. K., & Weber, C. R. (2009). Who said what? The effects of source cues in issue frames. *Political Behavior, 31*(4), 537-558.

Hartmann-Boyce, J., Lancaster, T., & Stead, L. F. (2014). Print-based self-help interventions for smoking cessation. *Cochrane Database of Systematic Reviews,* (6).

Hawkins, R. P., Kreuter, M., Resnicow, K., Fishbein, M., & Dijkstra, A. (2008). Understanding tailoring in communicating about health. *Health Educ Res, 23*(3), 454-466.

Head, K. J., Noar, S. M., Iannarino, N. T., & Harrington, N. G. (2013). Efficacy of text messaging-based interventions for health promotion: a meta-analysis. *Social Science & Medicine, 97,* 41-48.

Hébert, E. T., Stevens, E. M., Frank, S. G., Kendzor, D. E., Wetter, D. W., Zvolensky, M. J., . . . Businelle, M. S. (2017). An ecological momentary intervention for smoking cessation: The associations of just-in-time, tailored messages with lapse risk factors. *Addictive Behaviors*, *78*, 30-35.

*Henley, W. H., Ranganathan, S. K., & Gurtu, A. (2018). Improving effectiveness of public service advertisements to prevent texting and driving of american youth. *International Journal of Nonprofit and Voluntary Sector Marketing, 23*(4).

Heo, H. H., & Braun, K. L. (2014). Culturally tailored interventions of chronic disease targeting Korean Americans: a systematic review. *Ethnicity & health, 19*(1), 64-85.

Hedges, L. V., & Vevea, J. L. (1998). Fixed-and random-effects models in meta-analysis. *Psychological methods, 3*(4), 486.

*Heredia-Colaco, V., & Do Vale, R. C. (2018). Seize the day or save the world? The importance of ethical claims and product nature congruity. *Journal of Business Ethics*, *152*(3), 783-801.

Herek, G. (1985). Beyond "homophobia": A social psychological perspective on attitudes toward lesbians and gay men. DeCecco (ed.), Homophobia in American Society: New York, Harrington Park Press.

Herek, G. M. (1986). The Instrumentality of Attitudes: Toward a Neofunctional Theory. *Journal of Social Issues, 42*(2), 99-114.

Herek, G. M. (1987). Can functions be measured? A new perspective on the functional approach to attitudes. *Social Psychology Quarterly*, 285-303.

Herek, G. M. (2000). The social construction of attitudes: Functional consensus and divergence in the US public's reactions to AIDS. In G. R. Maio & J. M. Olson (Eds.), *Why we evaluate: Functions of attitudes* (pp. 325-364). New York:

Psychology Press.

Hernán, M. A., Hernández-Díaz, S., Werler, M. M., & Mitchell, A. A. (2002). Causal knowledge as a prerequisite for confounding evaluation: an application to birth defects epidemiology. *American Journal of Epidemiology, 155*(2), 176-184.

*Herz, M. F., & Diamantopoulos, A. (2013). Activation of country stereotypes: Automaticity, consonance, and impact. Jou*rnal of the Academy of Marketing Science, 41*(4), 400-417.

*Hevey, D., & Dolan, M. (2014). Approach/avoidance motivation, message framing and skin cancer prevention: A test of the congruency hypothesis. *Journal of Health Psychology, 19*(8), 1003-1012.

Higgins, E. T. (1996). The" self digest": self-knowledge serving self-regulatory functions. *J Pers Soc Psychol, 71*(6), 1062.

Higgins, E. T. (1997). Beyond pleasure and pain. *American Psychologist, 52*(12), 1280.

Higgins, E. T. (1998). Promotion and prevention: Regulatory focus as a motivational principle. *Advances in experimental social psychology, 30*, 1-46.

Higgins, E. T., Friedman, R. S., Harlow, R. E., Idson, L. C., Ayduk, O. N., & Taylor, A. (2001). Achievement orientations from subjective histories of success: Promotion pride versus prevention pride. *European Journal of Social Psychology, 31*(1), 3-23.

Higgins, E. T., Shah, J., & Friedman, R. (1997). Emotional responses to goal attainment: strength of regulatory focus as moderator. *J Pers Soc Psychol, 72*(3), 515.

Higgins, J. P. T., & Green, S. (Eds.). (2011). *Cochrane handbook for systematic reviews of interventions* (Version 5.1.0). Retrieved from http://www.cochrane-handbook.org

Hirsh, J. B., Kang, S. K., & Bodenhausen, G. V. (2012). Personalized persuasion tailoring persuasive appeals to recipients' personality traits. *Psychol Sci, 23*(6), 578-581.

*Hoeken, H., Starren, M., Nickerson, C., Crijns, R., & Van Den Brandt, C. (2007). Is it necessary to adapt advertising appeals for national audiences in Western Europe?. *Journal of Marketing Communications, 13*(1), 19-38.

*Hoeken, H., Van Den Brandt, C., Crijns, R., Domínguez, N., Hendriks, B., Planken, B., & Starren, M. (2003). International advertising in western europe: Should differences in uncertainty avoidance be considered when advertising in belgium, france, the netherlands and spain?. *The Journal of Business Communication, 40*(3), 195-216.

Hofstede, G. (2011). Dimensionalizing cultures: The Hofstede model in context. *Online readings in psychology and culture, 2*(1), 8.

Hogg, M. A. (2000). Subjective uncertainty reduction through self-categorization: A motivational theory of social identity processes. *European Review of Social Psychology, 11*(1), 223-255.

Hogg, M. A. (2003). Social Identity. In M. R. Leary & T. J. P. (Eds.), *Handbook of Self and Identity* (pp. 462-479). New York: Guilford.

*Holler, M., Hoelzl, E., Kirchler, E., Leder, S., & Mannetti, L. (2008). Framing of information on the use of public finances, regulatory fit of recipients and tax compliance. *Journal of Economic Psychology, 29*(4), 597-611.

*Hong, T. (2014). Examining the role of exposure to incongruent messages on the effect of message framing in an internet health search. *Communication Research, 41*(2), 159-179.

Hornikx, J. M. A., & O'Keefe, D. J. (2009a). Adapting consumer advertising appeals to cultural values: A meta-analytic review of effects on persuasiveness and ad liking. In C. S. Beck (Ed.), *Communication Yearbook 33* (pp. 38-71). New York: Lawrence Erlbaum.

Hornikx, J., & O'Keefe, D. J. (2009b). Adapting consumer advertising appeals to cultural values a meta-analytic review of effects on persuasiveness and ad liking. *Annals of the International Communication Association, 33*(1), 39-71.

*Hornikx, J., Hendriks, B., & Thijzen, D. (2010). The effects of cultural adaptation in fundraising letters: The case of help-self and help-others appeals in a feminine culture. *Communications-European Journal of Communication Research, 35*(1), 93-110.

Hovland, C. I., Janis, I. L., & Kelley, H. H. (1953). *Communication and persuasion; psychological studies of opinion change*. New Haven, CT, US: Yale University Press.

*Hsu, C. L., & Chen, M. C. (2014). Explaining consumer attitudes and purchase intentions toward organic food: Contributions from regulatory fit and consumer characteristics. *Food Quality and Preference, 35*, 43995.

Huang, Y., & Shen, F. (2016). Effects of Cultural Tailoring on Persuasion in Cancer Communication: A Meta-Analysis. *Journal of Communication, 66*(4), 694-715.

Hühn, A. E., Khan, V. J., Ketelaar, P., van't Riet, J., Konig, R., Rozendaal, E., ... & Markopoulos, P. (2017). Does location congruence matter? A field study on the effects of location-based advertising on perceived ad intrusiveness, relevance & value. *Computers in Human Behavior, 73*, 659-668.

*Hull, S. J., & Hong, Y. (2016). Sensation seeking as a moderator of gain- and loss-framed hiv-test promotion message effects. *Journal of Health Communication, 21*(1), 46-55.

Hullett, C., & Boster, F. (2001). Matching messages to the values underlying value-expressive and social-adjustive attitudes: Reconciling an old theory with a contemporary measurement approach. *Communication Monographs, 68*(2), 133-153.

Hunter, J. E., & Schmidt, F. L. (2000). Fixed effects vs. random effects meta-analysis models: Implications for cumulative research knowledge. *International Journal of Selection and Assessment, 8*(4), 275-292.

Hutchison, A. J., Breckon, J. D., & Johnston, L. H. (2009). Physical activity behavior change interventions based on the transtheoretical model: a systematic review. *Health Education & Behavior, 36*(5), 829-845

*Idson, L. C., Liberman, N., & Higgins, E. T. (2004). Imagining how you'd feel: The role of motivational experiences from regulatory fit. *Personality and Social Psychology Bulletin, 30*(7), 926-937.

IntHout, J., Ioannidis, J. P., Rovers, M. M., & Goeman, J. J. (2016). Plea for routinely presenting prediction intervals in meta-analysis. *BMJ Open, 6*(7).

*Jain, S. P., Lindsey, C., Agrawal, N., & Maheswaran, D. (2007). For better or for worse? Valenced comparative frames and regulatory focus. *Journal of Consumer Research, 34*(1), 57-65.

Janis, I. L., & Feshbach, S. (1954). Personality differences associated with responsiveness to fear-arousing communications. *J Pers, 23*(2), 154-166.

Jibaja-Weiss, M. L., Volk, R. J., Kingery, P., Smith, Q. W., & Holcomb, J. D. (2003). Tailored messages for breast and cervical cancer screening of low-income and minority women using medical records data. *Patient Education and Counseling, 50*(2), 123-132.

*Jin, L., & He, Y. (2013). Designing service guarantees with construal fit: Effects of temporal distance on consumer responses to service guarantees. *Journal of Service Research, 16*(2), 202-215.

*Jin, L., Hu, B., & He, Y. (2014). The recent versus the out-dated: An experimental examination of the time-variant effects of online consumer reviews. *Journal of Retailing, 90*(4), 552-566.

*Jin, S.-a. A. (2011). It feels right. Therefore, i feel present and enjoy: The effects of regulatory fit and the mediating roles of social presence and self-presence in avatar-based 3d virtual environments. *Presence-Teleoperators and Virtual Environments, 20*(2), 105-116.

Johar, J. S., & Sirgy, M. J. (1991). Value-expressive versus utilitarian advertising appeals: When and why to use which appeal. *Journal of advertising, 20*(3), 23-33.

John, L. K., Loewenstein, G., & Prelec, D. (2012). Measuring the prevalence of questionable research practices with incentives for truth telling. *Psychological Science, 23*(5), 524-532.

*Johnson, C. D., Bauer, B. C., Ascencio, C. A., & Kuang, Y. (2018). Priming from the pulpit: Extending regulatory focus theory to church services. *Nonprofit*

Management and Leadership, 0(0), 43841.

*Johnson, Z. S., Tian, Y., & Lee, S. (2016). Country-of-origin fit: When does a discrepancy between brand origin and country of manufacture reduce consumers' product evaluations?. *Journal of Brand Management, 23*(4), 403-418.

*Johnston, A. C., Warkentin, M., Dennis, A. R., & Siponen, M. (2018). Speak their language: Designing effective messages to improve employees' information security decision making. *Decision Sciences, 50*(2), 245-284.

*Jonas, E., Graupmann, V., Kayser, D. N., Zanna, M., Traut-Mattausch, E., & Frey, D. (2009). Culture, self, and the emergence of reactance: Is there a "universal" freedom?. *Journal of Experimental Social Psychology, 45*(5), 1068-1080.

*Joo, Y. K., & Lee, J.-E. R. (2014). Can "the voices in the car" persuade drivers to go green?: Effects of benefit appeals from in-vehicle voice agents and the role of drivers' affective states on eco-driving. *Cyberpsychology Behavior and Social Networking, 17*(4), 255-261.

Joyal-Desmarais, K., Rothman, A., & Snyder, M. (2018, December 1). *Message Matching: A Review* [registration, protocol]. Retrieved from osf.io/rpjdg.

Joyal-Desmarais, K., Rothman, A., & Snyder, M. (2019, January 4). *Message matching: a systematic review and meta-analysis of experimental effects of functional matching, message framing, and message tailoring on attitudes, intentions, and behaviors.* PROSPERO 2019 CRD42019116688 [registration, protocol]. Retrieved from https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42019116688.

Joyal-Desmarais, K., Rothman, A. J., Snyder, M. (2020a). How do we optimize message matching interventions? Identifying matching thresholds, and simultaneously matching to multiple characteristics. E*uropean Journal of Social Psychology, 50*(3), 701-720. doi: 10.1002/ejsp.2645

Joyal-Desmarais, K., Rothman, A., & Snyder, M. (2020b, March 15). *Negative Matching Project* [registration, protocol]. Retrieved from osf.io/ex72c

Joyal-Desmarais, K., & Snyder, M. (2016, January 28, 2016). *Functional Resistance: The Power of Diverse Motives to Elicit Psychological Reactance Towards Volunteering*. Poster presented at the 17th Annual Convention of the Society for Personality and Social Psychology (SPSP), San Diego, California, USA.

*Julka, D. L., & Marsh, K. L. (2005). An Attitude Functions Approach to Increasing Organ-Donation Participation. *Journal of Applied Social Psychology, 35*(4), 821-849.

*Jung, J. M., Polyorat, K., & Kellaris, J. J. (2009). A cultural paradox in authority-based advertising. *International Marketing Review, 26*(6), 601-632.

Kaikati, A. M., Torelli, C. J., Winterich, K. P., & Rodas, M. A. (2017). Conforming conservatives: How salient social identities can increase donations. *Journal of Consumer Psychology, 27*(4), 422-434.

*Kalichman, S. C., Kelly, J. A., Hunter, T. L., Murphy, D. A., & Tyler, R. (1993). Culturally tailored hiv-aids risk-reduction messages targeted to african-american urban women: Impact on risk sensitization and risk reduction. *Journal of Consulting and Clinical Psychology, 61*(2), 291-295.

*Kamins, M. A. (1990). An investigation into the “match-up” hypothesis in celebrity advertising: When beauty may be only skin deep. *Journal of Advertising, 19*(1),

43934.

Kang, E., & Lakshmanan, A. (2018). Narcissism and Self- Versus Recipient-Oriented Imagery in Charitable Giving. *Personality and Social Psychology Bulletin, 0*(0), 0146167218764658. doi:10.1177/0146167218764658

*Kao, D. T. (2011). Message sidedness in advertising: The moderating roles of need for cognition and time pressure in persuasion. *Scandinavian Journal of Psychology, 52*(4), 329-340.

*Kao, D. T. (2016). The moderating roles of ad claim type and rhetorical style in the ads of competitor brands for diluting the consumers' brand commitment to the existing brands. *Asia Pacific Management Review, 21*(1), 44091.

*Kareklas, I., Carlson, J. R., & Muehling, D. D. (2012). The role of regulatory focus and self-view in "green" advertising message framing. *Journal of Advertising, 41*(4), 25-39.

Katz, D. (1960). The functional approach to the study of attitudes. *Public Opinion Quarterly, 24*(2), 163-204. doi:10.1086/266945

Katz, D., McClintock, C., & Sarnoff, I. (1957). The measurement of ego defense as related to attitude change. *J Pers, 25*(4), 465-474.

*Keeling, D. I., Daryanto, A., De Ruyter, K., & Wetzels, M. (2013). Take it or leave it: Using regulatory fit theory to understand reward redemption in channel reward programs. *Industrial Marketing Management, 42*(8), 1345-1356.

*Kees, J. (2010). Temporal framing in health advertising: The role of risk and future orientation. *Journal of Current Issues and Research in Advertising, 32*(1), 33-46.

*Kees, J. (2011). Advertising framing effects and consideration of future consequences.

Journal of Consumer Affairs, 45(1), 11871.

*Keller, P. A. (2006). Regulatory focus and efficacy of health messages. *Journal of Consumer Research, 33*(1), 109-114.

Keller, P. A., & Lehmann, D. R. (2008). Designing effective health communications: a meta-analysis. *Journal of Public Policy & Marketing*, *27*(2), 117-130.

Kelman, H. C. (1958). Compliance, identification, and internalization three processes of attitude change. *Journal of Conflict Resolution*, *2*(1), 51-60.

*Keng, C. J., & Liu, C. C. (2013). Can avatar and self-referencing really increase the effects of online 2-d and 3-d advertising?. *Computers in Human Behavior, 29*(3), 791-802.

Kidwell, B., Farmer, A., & Hardesty, D. M. (2013). Getting liberals and conservatives to go green: Political ideology and congruent appeals. *Journal of Consumer Research, 40*(2), 350-367.

Kiesler, C. A., Collins, B. E., & Miller, N. (1969). *Attitude change; a critical analysis of theoretical approaches*. New York: Wiley.

*Kim, Y. J. (2006). The role of regulatory focus in message framing in antismoking advertisements for adolescents. *Journal of Advertising*, *35*(1), 143-151.

*Kim, K., Cheong, Y., & Zheng, L. (2009a). The current practices in food advertising: the usage and effectiveness of different advertising claims. *International Journal of Advertising, 28*(3), 527-553.

Kim, C. H., Han, D., Duhachek, A., & Tormala, Z. L. (2018a). Political identity, preference, and persuasion. *Social Influence, 13*(4), 177-191.

Kim, H., & John, D. R. (2008). Consumer response to brand extensions: Construal level as a moderator of the importance of perceived fit. *Journal of Consumer Psychology, 18*(2), 116-126.

*Kim, S., & Kim, Y.-K. (2018). The Interplay of Regulatory Focus and Temporal Distance on Consumer Evaluation of Online Reviews. *Clothing and Textiles Research Journal, 36*(3), 135-150. doi:10.1177/0887302x18772740

*Kim, J., Kim, P. B., Kim, J.-E., & Magnini, V. P. (2016a). Application of construal-level theory to promotional strategies in the hotel industry. *Journal of Travel Research, 55*(3), 340-352.

*Kim, S., & Labroo, A. A. (2011). From inherent value to incentive value: When and why pointless effort enhances consumer preference. *Journal of Consumer Research, 38*(4), 712-742.

*Kim, H. K., & Lee, T. K. (2018). Combining two outcome frames to promote support for obesity-related policies. *Journal of Health Communication, 23*(8), 751-760.

*Kim, K., Lee, S., & Choi, Y. K. (2017). Image proximity in advertising appeals: Spatial distance and product types. *Journal of Business Research, 99*, 490-497.

*Kim, K., & Park, J. S. (2010). Message framing and the effectiveness of dtc advertising: The moderating role of subjective product knowledge. *Journal of Medical Marketing, 10*(2), 165-176.

*Kim, J., & Nan, X. (2016). Temporal framing effects differ for narrative versus non-narrative messages the case of promoting hpv vaccination. *Communication Research, 43*(3), 401-417.

*Kim, D. H., & Sung, Y. (2013). Gucci versus old navy: Interplay of brand personality and regulatory focus in advertising persuasion. *Psychology & Marketing, 30*(12),

1076-1087.

*Kim, D. H., Sung, Y. H., Lee, S. Y., Choi, D., & Sung, Y. (2016b). Are you on timeline or news feed? The roles of facebook pages and construal level in increasing ad effectiveness. *Computers in Human Behavior, 57*, 312-320.

*Kim, D. H., Sung, Y., & Drumwright, M. (2018b). Where i come from' determines, how i construe my future': The fit effect of culture, temporal distance, and construal level. International *Journal of Advertising, 37*(2), 270-288.

*Kim, H., Rao, A. R., & Lee, A. Y. (2009b). It's time to vote: The effect of matching message orientation and temporal frame on political persuasion. *Journal of Consumer Research, 35*(6), 877-889.

Kingsbury, J. H., Gibbons, F. X., & Gerrard, M. (2015). The effects of social and health consequence framing on heavy drinking intentions among college students. *Br J Health Psychol*, *20*(1), 212-220.

*Klein, K., & Melnyk, V. (2016). Speaking to the mind or the heart: Effects of matching hedonic versus utilitarian arguments and products. *Marketing Letters, 27*(1), 131-142.

*Knapp, L. G. (1991). Effects of type of value appealed to and valence of appeal on children's dental health behavior. *Journal of Pediatric Psychology, 16*(6), 675-686.

Knapp, G., & Hartung, J. (2003). Improved tests for a random effects meta-regression with a single covariate. *Statistics in Medicine, 22*(17), 2693-2710.

Ko, L. K., Campbell, M. K., Lewis, M. A., Earp, J., & DeVellis, B. (2010). Mediators of fruit and vegetable consumption among colorectal cancer survivors. *Journal of*

Cancer Survivorship, 4(2), 149-158.

*Ko, D. M., & Kim, H. S. (2010). Message framing and defensive processing: A cultural examination. *Health Commun, 25*(1), 61-68.

Konstantopoulos, S. (2011). Fixed effects and variance components estimation in three-level meta-analysis. *Research Synthesis Methods, 2*(1), 61-76.

*Kramer, T., Spolter-Weisfeld, S., & Thakkar, M. (2007). The effect of cultural orientation on consumer responses to personalization. *Marketing Science, 26*(2), 246-258.

*Kramish Campbell, M., James, A., Hudson, M. A., Carr, C., Jackson, E., Oakes, V., Demissie, S., Farrell, D., & Tessaro, I. (2004). Improving multiple behaviors for colorectal cancer prevention among african american church members. *Health Psychology, 23*(5), 492-502.

Krebs, P., Prochaska, J. O., & Rossi, J. S. (2010). A meta-analysis of computer-tailored interventions for health behavior change. *Prev Med, 51*(3-4), 214-221.

*Kreuter, M. W., Bull, F. C., Clark, E. M., & Oswald, D. L. (1999). Understanding how people process health information: A comparison of tailored and nontailored weight-loss materials. *Health Psychology, 18*(5), 487-494.

Kreuter, M. W., & Skinner, C. S. (2000). Tailoring: what's in a name? *Health Educ Res, 14*(1), 1-4. doi:https://doi.org/10.1093/her/15.1.1

*Kreuter, M. W., Skinner, C. S., Steger-May, K., Holt, C. L., Bucholtz, D. C., Clark, E. M., & Haire-Joshu, D. (2004). Responses to behaviorally vs culturally tailored cancer communication among african american women. *American Journal of Health Behavior, 28*(3), 195-207.

Kreuter, M. W., Strecher, V. J., & Glassman, B. (1999). One size does not fit all: the case for tailoring print materials. *Annals of Behavioral Medicine, 21*(4), 276-283.

*Kreuter, M. W., Sugg-Skinner, C., Holt, C. L., Clark, E. M., Haire-Joshu, D., Fu, Q. A., Booker, A. C., Steger-May, K., & Bucholtz, D. (2005). Cultural tailoring for mammography and fruit and vegetable intake among low-income african-american women in urban public health centers. *Preventive Medicine, 41*(1), 53-62.

*Krishen, A. S., & Bui, M. (2015). Fear advertisements: Influencing consumers to make better health decisions. *International Journal of Advertising: The Review of Marketing Communications, 34*(3), 533-548.

Kroeze, W., Werkman, A., & Brug, J. (2006). A systematic review of randomized trials on the effectiveness of computer-tailored education on physical activity and dietary behaviors. *Annals of Behavioral Medicine, 31*, 205–223. doi: 10.1207/s15324796abm3103_2

*Ku, H.-H., Kuo, C.-C., & Kuo, T.-W. (2012). The effect of scarcity on the purchase intentions of prevention and promotion motivated consumers. *Psychology & Marketing, 29*(8), 541-548.

*Ku, H.-H., Kuo, C.-C., Wu, C.-L., & Wu, C.-Y. (2012). Communicating green marketing appeals effectively the role of consumers' motivational orientation to promotion versus prevention. *Journal of Advertising, 41*(4), 41-50.

*Ku, H.-H., Kuo, C.-C., Yang, Y.-T., & Chung, T.-S. (2013). Decision-contextual and individual influences on scarcity effects. *European Journal of Marketing, 47*(8), 1314-1332.

*Kulkarni, A. A., & Yuan, H. (2015). Effect of ad-irrelevant distance cues on persuasiveness of message framing. *Journal of Advertising, 44*(3), 254-263.

*Kulow, K., & Kramer, T. (2016). In pursuit of good karma: When charitable appeals to do right go wrong. *Journal of Consumer Research, 43*(2), 334-353.

*Kusumasondjaja, S. (2018). Comparing the effectiveness of information framing strategy on utilitarian and hedonic food product packaging. *Jurnal Manajemen & Agribisnis, 15*(1), 44.

*Kwon, J., Seo, Y., & Ko, D. (2016). Effective luxury-brand advertising: The ES–IF matching (Entity–Symbolic versus Incremental–Functional) model. *Journal of Advertising, 45*(4), 459-471.

*La Barbera, P. A., Weingard, P., & Yorkston, E. A. (1998). Matching the message to the mind: Advertising imagery and consumer processing styles. *Journal of Advertising Research, 38*(5), 29-42.

*Labroo, A. A., & Lee, A. Y. (2006). Between two brands: A goal fluency account of brand evaluation. *Journal of Marketing Research, 43*(3), 374-385.

Lagisetty, P. A., Priyadarshini, S., Terrell, S., Hamati, M., Landgraf, J., Chopra, V., & Heisler, M. (2017). Culturally targeted strategies for diabetes prevention in minority population: a systematic review and framework. *The Diabetes Educator, 43*(1), 54-77.

Lakens, D. (2013). Calculating and reporting effect sizes to facilitate cumulative science: A practical primer for t-tests and ANOVAs. *Frontiers in Psychology, 4,* 863.

Lalwani, A. K., & Shavitt, S. (2009). The “me” I claim to be: Cultural self-construal elicits self-presentational goal pursuit. *J Pers Soc Psychol, 97*(1), 88.

Lancaster, T., & Stead, L. F. (2005). Self-help interventions for smoking cessation. *Cochrane Database Syst Rev, 3*(3).

Latimer, A. E., Brawley, L. R., & Bassett, R. L. (2010). A systematic review of three approaches for constructing physical activity messages: what messages work and what improvements are needed?. *International Journal of Behavioral Nutrition and Physical Activity, 7*(1), 36.

Latimer, A. E., Katulak, N. A., Mowad, L., & Salovey, P. (2005). Motivating cancer prevention and early detection behaviors using psychologically tailored messages. *J Health Commun, 10*(S1), 137-155.

*Laufer, D., Silvera, D. H., Mcbride, J. B., & Schertzer, S. M. B. (2010). Communicating charity successes across cultures highlighting individual or collective achievement?. *European Journal of Marketing, 44*(44084), 1322-1333.

*Lavine, H., & Snyder, M. (1996). Cognitive processing and the functional matching effect in persuasion: The mediating role of subjective perceptions of message quality. *Journal of Experimental Social Psychology, 32*(6), 580-604.

Lavine, H., & Snyder, M. (2000). Cognitive processes and the functional matching effect in persuasion: Studies of personality and political behavior. In G. R. Maio & J. M. Olson (Eds.), *Why we evaluate: Functions of attitudes* (pp. 97-131). Mahwah. New Jersey: Lawrence erlbaum Associates.

*Leboeuf, R. A., & Simmons, J. P. (2010). Branding alters attitude functions and reduces the advantage of function-matching persuasive appeals. *Journal of Marketing Research, 47*(2), 348-360.

*Leder, S., Mannetti, L., Holzl, E., & Kirchler, E. (2010). Regulatory fit effects on perceived fiscal exchange and tax compliance. *The Journal of Socio-Economics, 39*(2), 271-277.

*Lee, S. (2017). Impacts of Altruistic Disposition and Framing on Persuasion to Help Distant Others in Need. *한국콘텐츠학회논문지*, *17*(7), 332-343.

*Lee, A. Y., & Aaker, J. L. (2004). Bringing the frame into focus: the influence of regulatory fit on processing fluency and persuasion. *Journal of Personality and Social Psychology, 86*(2), 205.

*Lee, S., & Cho, J. (2017). Interactive effects of dispositional empathic concern and message framing on international relief campaigns. *Social Behavior and Personality, 45*(8), 1281-1292.

*Lee, S., & Heo, J. (2016). The moderating role of cultural orientation in explaining temporal orientation of self-referencing. *Asian Journal of Communication, 26*(4), 333-349.

*Lee, S., Lee, A. Y., & Kern, M. C. (2011). Viewing time through the lens of the self: The fit effect of self-construal and temporal distance on task perception. *European Journal of Social Psychology, 41*(2), 191-200.

*Lee, Y. H., & Lim, E. a. C. (2010). When good cheer goes unrequited: How emotional receptivity affects evaluation of expressed emotion. *Journal of Marketing Research, 47*(6), 1151-1161.

*Lee, H. C., Liu, S. F., & Cheng, Y. C. (2018). Positive or Negative? The Influence of Message Framing, Regulatory Focus, and Product Type. *International Journal of Communication, 12*, 18.

*Lee, Y. J., Liu, Y. I., & Lee, T. (2013). Effects of ethnic identity on perceived advertisers' motives in values advocacy advertising. *Journal of Promotion Management, 19*(5), 583-604.

*Lee, M. J., & Kang, H. (2018). Designing skin cancer prevention messages: Should we emphasize gains or losses? Message framing, risk type, and prior experience. *American Journal of Health Promotion, 32*(4), 939-948.

Lee, S., Kim, K. J., & Sundar, S. S. (2015). Customization in location-based advertising: Effects of tailoring source, locational congruity, and product involvement on ad attitudes. *Computers in Human Behavior, 51*, 336-343.

*Lee, K., & Shavitt, S. (2006). The use of cues depends on goals: Store reputation affects product judgments when social identity goals are salient. *Journal of Consumer Psychology, 16*(3), 260-271.

Lehnert, K., Till, B. D., & Carlson, B. D. (2013). Advertising creativity and repetition: Recall, wearout and wearin effects. *International Journal of Advertising, 32*(2), 211-231.

*Leikas, S., Lindeman, M., Roininen, K., & Lahteenmaki, L. (2009). Boundaries of regulatory fit: Is it the thought that counts?. *Basic and Applied Social Psychology, 31*(4), 289-294.

Levin, I. P., Schneider, S. L., & Gaeth, G. J. (1998). All frames are not created equal: A typology and critical analysis of framing effects. *Organizational behavior and human decision processes, 76*(2), 149-188.

*Levinson, A. H., Glasgow, R. E., Gaglio, B., Smith, T. L., Cahoon, J., & Marcus, A. C. (2008). Tailored behavioral support for smoking reduction: Development and pilot results of an innovative intervention. *Health Education Research*, *23*(2), 335-346.

Liberati, A., Altman, D. G., Tetzlaff, J., Mulrow, C., Gøtzsche, P. C., Ioannidis, J. P. A., . . . Moher, D. (2009). The PRISMA Statement for Reporting Systematic Reviews and Meta-Analyses of Studies That Evaluate Health Care Interventions: Explanation and Elaboration. *PLoS medicine*, *6*(7), e1000100. doi:10.1371/journal.pmed.1000100

*Lien, N. H., Chou, H. Y., & Chang, C. H. (2012). Advertising effectiveness and the match-up hypothesis: Examining spokesperson sex, attractiveness type, and product image. *Journal of Current Issues and Research in Advertising, 33*(2), 282-300.

Lienemann, B. A. (2015). *Influencing Help-Seeking for Depression with Public Service Announcements: An Examination of Message Sidedness and Functional Matching* (Doctoral Dissertation). The Claremont Graduate University, ProQuest Dissertations Publishing, 2015. 3734391.

*Lin, Y.-C., Chang, C.-C. A., & Lin, Y.-F. (2012). Self-construal and regulatory focus influences on persuasion: The moderating role of perceived risk. Journal of Business Research, 65(8), 1152-1159.

*Lin, C.-H., & Huang, Y. (2018). How self-construals affect responses to anthropomorphic brands, with a focus on the three-factor relationship between the brand, the gift-giver and the recipient. *Frontiers in Psychology, 9*.

*Lin, H.-F., & Shen, F. (2012). Regulatory focus and attribute framing evidence of compatibility effects in advertising. *International Journal of Advertising, 31*(1),

169-188.

*Lin, C. Y., & Yeh, W. J. (2017). How does health-related advertising with a regulatory focus and goal framing affect attitudes toward ads and healthy behavior intentions?. Int*ernational Journal of Environmental Research and Public Health, 14*(12).

Litman, L., Robinson, J. (2020). *Conducting Online Research on Amazon Mechanical Turk and Beyond*. April, 2020. Sage Publications.

Litman, L., Robinson, J., & Abberbock, T. (2017). TurkPrime.com: A versatile crowdsourcing data acquisition platform for the behavioral sciences. *Behavior Research Methods, 49*(2), 433-442.

*Liu, S. Q., & Mattila, A. S. (2016). Effective communication strategies for store remodeling. *Cornell Hospitality Quarterly, 57*(4), 411-420.

*Liu, X. K., Wright, A. M., & Wu, Y.-J. (2015). Managers' unethical fraudulent financial reporting: The effect of control strength and control framing. *Journal of Business Ethics, 129*(2), 295-310.

Locander, W. B., & Spivey, W. A. (1978). A functional approach to attitude measurement. *Journal of Marketing Research*, 576-587.

*Lu, A. S. (2013). An experimental test of the persuasive effect of source similarity in narrative and nonnarrative health blogs. Jour*nal of Medical Internet Research, 15*(7), 264-278.

*Lu, H. (2016). The effects of emotional appeals and gain versus loss framing in communicating sea star wasting disease. *Science Communication, 38*(2), 143-169.

*Lu, A. C. C., Chi, C. G. Q., & Lu, C. Y. R. (2017). Sensation seeking, message sensation value, and destinations: A cross-cultural comparison. *Journal of Hospitality and Tourism Research, 41*(3), 357-383.

*Lu, H., Siemer, W. F., Baumer, M. S., & Decker, D. J. (2018). Exploring the role of gain versus loss framing and point of reference in messages to reduce human–bear conflicts. *Social Science Journal, 55*(2), 182-192.

*Lu, H., Siemer, W. F., Baumer, M. S., Decker, D. J., & Gulde, A. (2016). Effects of Message Framing and Past Experience on Intentions to Prevent Human–Coyote Conflicts. *Human Dimensions of Wildlife, 21*(6), 506-521.

*Lucas, T., Hayman, L. W., Jr., Blessman, J. E., Asabigi, K., & Novak, J. M. (2016). Gain versus loss-framed messaging and colorectal cancer screening among african americans: A preliminary examination of perceived racism and culturally targeted dual messaging. *British Journal of Health Psychology, 21*(2), 249-267.

Ludolph, R., & Schulz, P. J. (2015). Does regulatory fit lead to more effective health communication? A systematic review. *Soc Sci Med, 128*, 142-150.

Lueck, J. A. (2017). Matching Message Design and Depressed Cognition: An Exploration of Attention Patterns for Gain- and Loss-Framed Depression Help-Seeking Messages. *J Health Commun, 22*(7), 593-603. doi:10.1080/10810730.2017.1324538

*Lueck, J. A. (2018). Respecting the ‘Stages’ of Depression: Considering Depression Severity and Readiness to Seek Help. *Patient Educ Couns*.

Lustria, M. L., Cortese, J., Noar, S. M., & Glueckauf, R. L. (2009). Computer-tailored health interventions delivered over the Web: review and analysis of key components. *Patient Educ Couns, 74*(2), 156-173. doi:10.1016/j.pec.2008.08.023

Lustria, M. L. A., Noar, S. M., Cortese, J., Van Stee, S. K., Glueckauf, R. L., & Lee, J. (2013). A meta-analysis of web-delivered tailored health behavior change interventions. *J Health Commun, 18*(9), 1039-1069.

*Ma, Z., & Nan, X. (2018). Friends don't let friends smoke: How storytelling and social distance influence nonsmokers' responses to antismoking messages. *Health Communication, 33*(7), 887-895.

Maio, G. R., & Olson, J. M. (1994). Value—attitude-behaviour relations: The moderating role of attitude functions. *British Journal of Social Psychology, 33*(3), 301-312.

Maio, G. R., & Olson, J. M. (1995). Relations between values, attitudes, and behavioral intentions: The moderating role of attitude function. *Journal of Experimental Social Psychology, 31*(3), 266-285.

Maio, G. R., & Olson, J. M. (2000). *Why we evaluate: Functions of attitudes*: Psychology Press.

Maki, A., Vitriol, J. A., Dwyer, P. C., Kim, J. S., & Snyder, M. (2017). The Helping Orientations Inventory: Measuring Propensities to Provide Autonomy and Dependency Help. *European Journal of Social Psychology, 47*(6), 677-693.

*Malaviya, P., & Miguel Brendl, C. (2014). Do hedonic motives moderate regulatory focus motives? Evidence from the framing of persuasive messages. *Journal of Personality and Social Psychology, 106*(1), 43849.

Malka, A., & Lelkes, Y. (2010). More than Ideology: Conservative–Liberal Identity and Receptivity to Political Cues. *Social Justice Research, 23*(2), 156-188. doi:10.1007/s11211-010-0114-3

Mann, T., Sherman, D., & Updegraff, J. (2004). Dispositional motivations and message framing: a test of the congruency hypothesis in college students. *Health Psychology, 23*(3), 330.

*Mannetti, L., Brizi, A., Giacomantonio, M., & Higgins, E. T. (2013). Framing political messages to fit the audience's regulatory orientation: How to improve the efficacy of the same message content. *Plos One, 8*(10), .

*Mannetti, L., Giacomantonio, M., Higgins, E. T., Pierro, A., & Kruglanski, A. W. (2010). Tailoring visual images to fit: Value creation in persuasive messages. *European Journal of Social Psychology, 40*(2), 206-215.

*Mantovani, D., & Tazima, D. I. (2016). Visual art and regulatory fit messages on consumer evaluations. *Revista De Administracao De Empresas, 56*(2), 152-165.

*Manuel, E., Youn, S., & Yoon, D. (2014). Functional matching effect in crm: Moderating roles of perceived message quality and skepticism. *Journal of Marketing Communications, 20*(6), 397-418.

Marcus, B. H., Lewis, B. A., Williams, D. M., Dunsiger, S., Jakicic, J. M., Whiteley, J. A., … Parisi, A. F. (2007). A comparison of Internet and print-based physical activity interventions. *Archives of Internal Medicine, 167*, 944–949. doi: 10.1001/archinte. 167.9.944

Markus, H. R., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. *Psychol Rev, 98*(2), 224-253. doi:10.1037/0033-295X.98.2.224

Marshall, S. J., & Biddle, S. J. (2001). The transtheoretical model of behavior change: a meta-analysis of applications to physical activity and exercise. *Annals of Behavioral Medicine, 23*(4), 229-246.

*Martin, I. M., & Kamins, M. A. (2010). An application of terror management theory in the design of social and health-related anti-smoking appeals. *Journal of Consumer Behaviour, 9*(3), 172-190.

*Martin, B., & Lawson, R. (1998). Mood and framing effects in advertising. *Australasian Marketing Journal, 6*, 35-50.

*Martin, B. a. S., Lee, C. K.-C., Weeks, C., & Kaya, M. (2013). How to stop binge drinking and speeding motorists: Effects of relational-interdependent self-construal and self-referencing on attitudes toward social marketing. *Journal of Consumer Behaviour, 12*(1), 81-90.

*Martin, B. a. S., Sherrard, M. J., & Wentzel, D. (2005). The role of sensation seeking and need for cognition on web-site evaluations: A resource matching perspective. *Psychology & Marketing, 22*(2), 109-126.

*Martin, B. a. S., & Xavier, R. (2010). How do consumers react to physically larger models? Effects of model body size, weight control beliefs and product type on evaluations and body perceptions. *Journal of Strategic Marketing, 18*(6), 489-501.

*Mason, D., Gilbert, H., & Sutton, S. (2012). Effectiveness of web-based tailored smoking cessation advice reports (iquit): A randomized trial. *Addiction, 107*(12), 2183-2190.

Matz, S. C., Kosinski, M., Nave, G., & Stillwell, D. J. (2017). Psychological targeting as an effective approach to digital mass persuasion. *Proceedings of the National Academy of Sciences of the United States of America, 114*(48), 12714-12719.

*Mavandadi, S., Wright, E., Klaus, J., & Oslin, D. (2018). Message framing and engagement in specialty mental health care. *Psychiatric Services, 69*(3), 308-314.

*Mayer, N. D., & Tormala, Z. L. (2010). Think versus "feel" framing effects in persuasion. *Personality and Social Psychology Bulletin, 36*(4), 443-454.

*McAuley, J. D., Henry, M. J., & Tuft, S. (2011). Musician advantages in music perception: an issue of motivation, not just ability. *Music Perception: An Interdisciplinary Journal, 28*(5), 505-518.

McGowan, J., Sampson, M., Salzwedel, D. M., Cogo, E., Foerster, V., & Lefebvre, C. (2016). PRESS Peer Review of Electronic Search Strategies: 2015 Guideline Statement. *Journal of Clinical Epidemiology, 75*, 40-46. doi:https://doi.org/10.1016/j.jclinepi.2016.01.021

*Mckay-Nesbitt, J., Bhatnagar, N., & Smith, M. C. (2013). Regulatory fit effects of gender and marketing message content. *Journal of Business Research, 66*(11), 2245-2251.

*Melbye, E. L., Hansen, H., & Onozaka, Y. (2015). Advertising functional foods: The effects of physical body size and appeal type on ad credibility and purchase intentions. *Journal of International Food and Agribusiness Marketing, 27*(2), 142-154.

Meldrum, P., Turnbull, D., Dobson, H. M., Colquhoun, C., Gilmour, W. H., & McIlwaine, G. M. (1994). Tailored Written Invitations for Second round Breast Cancer Screening: A Randomised Controlled Trial. *Journal of Medical Screening, 1*(4), 245-248. doi:10.1177/096914139400100412

Methley, A. M., Campbell, S., Chew-Graham, C., McNally, R., & Cheraghi-Sohi, S. (2014). PICO, PICOS and SPIDER: a comparison study of specificity and sensitivity in three search tools for qualitative systematic reviews. *BMC Health Services Research, 14*(1), 579. doi:10.1186/s12913-014-0579-0

Meyer, D. E., & Schvaneveldt, R. W. (1971). Facilitation in recognizing pairs of words: evidence of a dependence between retrieval operations. *Journal of Experimental Psychology, 90*(2), 227.

Meyerowitz, B. E., & Chaiken, S. (1987). The effect of message framing on breast self-examination attitudes, intentions, and behavior. *J Pers Soc Psychol, 52*(3), 500.

*Migneault, J. P., Dedier, J. J., Wright, J. A., Heeren, T., Campbell, M. K., Morisky, D. E., Rudd, P., & Friedman, R. H. (2012). A culturally adapted telecommunication system to improve physical activity, diet quality, and medication adherence among hypertensive african-americans: A randomized controlled trial. *Annals of Behavioral Medicine, 43*(1), 62-73.

*Millar, M. G., & Houska, J. A. (2007). Masculinity and intentions to perform health behaviors: The effectiveness of fear control arguments. *Journal of Behavioral Medicine, 30*(5), 403-409.

*Millar, M. G., & Millar, K. U. (1990). Attitude-change as a function of attitude type and argument type. *Journal of Personality and Social Psychology, 59*(2), 217-228.

*Millar, M. G., & Millar, K. U. (1993). Changing breast self-examination attitudes: Influences of repression-sensitization and attitude-message match. *Journal of Research in Personality, 27*(4), 301-314.

*Miller, M. M., & Brannon, L. A. (2015). Influencing college student drinking intentions with social norms and self-schema matched messages: Differences between low and high self-monitors. *Health Marketing Quarterly, 32*(4), 297-312.

Miller, S. A., & Forrest, J. L. (2001). Enhancing your practice through evidence-based decision making: PICO, learning how to ask good questions. *Journal of Evidence Based Dental Practice, 1*(2), 136-141.

*Mir, H. M., Behrang, K., Isaai, M. T., & Nejat, P. (2016). The impact of outcome framing and psychological distance of air pollution consequences on transportation mode choice. *Transportation Research Part D, 46,* 328-338.

Miron, A. M., & Brehm, J. W. (2006). Reactance theory-40 years later. *Zeitschrift für Sozialpsychologie, 37*(1), 9-18.

*Mitchell, M. M. (2001). Risk, threat, and information seeking about genital herpes: The effects of mood and message framing. *Communication Studies, 52*(2), 141-152.

Moeyaert, M., Ugille, M., Natasha Beretvas, S., Ferron, J., Bunuan, R., & Van den Noortgate, W. (2017). Methods for dealing with multiple outcomes in meta-analysis: a comparison between averaging effect sizes, robust variance estimation and multilevel meta-analysis. *International Journal of Social Research Methodology, 20*(6), 559-572.

*Mogilner, C., Aaker, J. L., & Pennington, G. L. (2008). Time will tell: The distant appeal of promotion and imminent appeal of prevention. *Journal of Consumer Research, 34*(5), 670-681.

Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & The PRISMA Group. (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLOS Medicine, 6*(7), e1000097.

Moher, D., Shamseer, L., Clarke, M., Ghersi, D., Liberati, A., Petticrew, M., . . . Stewart, L. A. (2015). Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Systematic reviews, 4*(1), 1. doi:10.1186/2046-4053-4-1

*Mollen, S., Engelen, S., Kessels, L. T. E., & Van Den Putte, B. (2017). Short and sweet: The persuasive effects of message framing and temporal context in antismoking warning labels. *Journal of Health Communication, 22*(1), 20-28.

*Monga, A. B., & John, D. R. (2010). What makes brands elastic? The influence of brand concept and styles of thinking on brand extension evaluation. *Journal of Marketing, 74*(3), 80-92.

Moss, A.J., & Litman, L. (2018, Sept. 18). *After the bot scare: Understanding what's been happening with data collection on MTurk and how to stop it* [blog post]. Retrieved from: https://www.cloudresearch.com/resources/blog/after-the-bot-scare-understanding-whats-been-happening-with-data-collection-on-mturk-and-how-to-stop-it/

Motyka, S., Grewal, D., Puccinelli, N. M., Roggeveen, A. L., Avnet, T., Daryanto, A., . . . Wetzels, M. (2014). Regulatory fit: A meta-analytic synthesis. *Journal of Consumer Psychology, 24*(3), 394-410.

Müller, A. M., Blandford, A., & Yardley, L. (2017). The conceptualization of a Just-In-Time Adaptive Intervention (JITAI) for the reduction of sedentary behavior in older adults. *Mhealth, 3*.

*Muralidharan, S., La Ferle, C., & Sung, Y. (2017). Are we a product of our environment? Assessing culturally congruent green advertising appeals, novelty, and environmental concern in india and the USA. *Asian Journal of Communication, 27*(4), 396-414.

*Muralidharan, S., & Sheehan, K. (2017). “Tax” and “fee” frames in green advertisements: The influence of self-transcendence in reusable bag usage. *Journal of Promotion Management, 23*(6), 851-871.

*Nan, X. (2007). Social distance, framing, and judgment: A construal level perspective. *Human Communication Research, 33*(4), 489-514.

Nansel, T. R., Weaver, N., Donlin, M., Jacobsen, H., Kreuter, M. W., & Simons-Morton, B. (2002). Baby, Be Safe: the effect of tailored communications for pediatric injury prevention provided in a primary care setting. *Patient Education and Counseling, 46*(3), 175-190.

*Naughton, F., Cooper, S., Foster, K., Emery, J., Leonardi-Bee, J., Sutton, S., Jones, M., Ussher, M., Whitemore, R., Leighton, M., Montgomery, A., Parrott, S., & Coleman, T. (2017). Large multi-centre pilot randomized controlled trial testing a low-cost, tailored, self-help smoking cessation text message intervention for pregnant smokers (miquit). *Addiction, 112*(7), 1238-1249.

*Naughton, F., Jamison, J., Boase, S., Sloan, M., Gilbert, H., Prevost, A. T., Mason, D., Smith, S., Brimicombe, J., Evans, R., & Sutton, S. (2014). Randomized controlled trial to assess the short-term effectiveness of tailored web- and text-based facilitation of smoking cessation in primary care (iquit in practice). *Addiction, 109*(7), 1184-1193.

*Naughton, F., Prevost, A. T., Gilbert, H., & Sutton, S. (2012). Randomized controlled trial evaluation of a tailored leaflet and sms text message self-help intervention for pregnant smokers (miquit). *Nicotine & Tobacco Research, 14*(5), 569-577.

Neale, L., Robbie, R., & Martin, B. (2016). Gender identity and brand incongruence:

When in doubt, pursue masculinity. *Journal of Strategic Marketing, 24*(5), 347-359.

*Nelson, T. E., & Garst, J. (2005). Values-based political messages and persuasion: Relationships among speaker, recipient, and evoked values. *Political Psychology, 26*(4), 489-515.

*Nenkov, G. Y. (2012). It's all in the mindset: Effects of varying psychological distance in persuasive messages. *Marketing Letters, 23*(3), 615-628.

Neuendorf, K. A. (2002). *The Content Analysis Guidebook*. Thousand Oaks, CA: Sage.

Neville, L. M., Milat, A. J., & O'Hara, B. (2009). Computer-tailored weight reduction interventions targeting adults: A narrative systematic review. *Health Promotion Journal of Australia, 20*, 48–57.

Neville, L. M., O'Hara, B., & Milat, A. J. (2009). Computer-tailored dietary behaviour change interventions: A systematic review. *Health Education Research, 24*, 699–720. doi: 10.1093/her/cyp006

Neville, L. M., O'Hara, B., & Milat, A. J. (2009). Computer-tailored physical activity behavior change interventions targeting adults: A systematic review. *International Journal of Behavioral Nutrition and Physical Activity, 6*, e30. doi: 10.1186/1479-5868-6-30

Noar, S. M., Benac, C. N., & Harris, M. S. (2007). Does tailoring matter? Meta-analytic review of tailored print health behavior change interventions. *Psychol Bull, 133*(4), 673-693. doi:10.1037/0033-2909.133.4.673

Noar, S. M., Black, H. G., & Pierce, L. B. (2009). Efficacy of computer technology-based HIV prevention interventions: a meta-analysis. *Aids, 23*(1), 107-115.

Noar, S. M., & Harrington, N. G. (2016). Tailored Communications for Health-Related Decision-Making and Behavior Change. In M. A. Diefenbach, S. Miller-Halegoua, & D. J. Bowen (Eds.), *Handbook of Health Decision Science* (pp. 251-263). New York, NY: Springer.

Noar, S. M., Harrington, N. G., & Aldrich, R. S. (2009). The role of message tailoring in the development of persuasive health communication messages. *Annals of the International Communication Association, 33*(1), 73-133.

Noar, S. M., Harrington, N. G., Van Stee, S. K., & Aldrich, R. S. (2011). Tailored health communication to change lifestyle behaviors. *American Journal of Lifestyle Medicine, 5*(2), 112-122.

Noar, S. M., Pierce, L. B., & Black, H. G. (2010). Can computer-mediated interventions change theoretical mediators of safer sex? A meta-analysis. *Human Communication Research, 36*(3), 261-297.

*Noble, G., Pomering, A., & Johnson, L. W. (2014). Gender and message appeal: Their influence in a pro-environmental social advertising context. *Journal of Social Marketing, 4*(1), 43942.

*Nollen, N., Ahluwalia, J. S., Mayo, M. S., Richter, K., Choi, W. S., Okuyemi, K. S., & Resnicow, K. (2007). A randomized trial of targeted educational materials for smoking cessation in african americans using transdermal nicotine. *Health Education & Behavior, 34*(6), 911-927.

*Notthoff, N., & Carstensen, L. L. (2014). Positive messaging promotes walking in older adults. *Psychology and Aging, 29*(2), 329-341.

O'Connor, D. B., Ferguson, E., & O'Connor, R. C. (2005). Intentions to use hormonal male contraception: The role of message framing, attitudes and stress appraisals. *Br J Psychol, 96*(3), 351-369.

*O'Connor, D. B., Warttig, S., Conner, M., & Lawton, R. (2009). Raising awareness of hypertension risk through a web-based framing intervention: Does consideration of future consequences make a difference?. *Psychology Health & Medicine, 14*(2), 213-219.

O'Keefe, D. J., & Jensen, J. D. (2006). The advantages of compliance or the disadvantages of noncompliance? A meta-analytic review of the relative persuasive effectiveness of gain-framed and loss-framed messages. Annals of the International Communication Association, 30(1), 1-43.

O'Keefe, D. J., & Jensen, J. D. (2007). The relative persuasiveness of gain-framed and loss-framed messages for encouraging disease prevention behaviors: a meta-analytic review. *J Health Commun, 12*(7), 623-644. doi:10.1080/10810730701615198

O'Keefe, D. J., & Jensen, J. D. (2008). Do loss-framed persuasive messages engender greater message processing than do gain-framed messages? A meta-analytic review. Communication Studies, 59(1), 51-67.

O'Keefe, D. J., & Jensen, J. D. (2009). The relative persuasiveness of gain-framed and loss-framed messages for encouraging disease detection behaviors: A meta-analytic review. *Journal of Communication, 59*(2), 296-316.

O'Keefe, D. J., & Jensen, J. D. (2011). The relative effectiveness of gain-framed and loss-framed persuasive appeals concerning obesity-related behaviors: Meta-analytic evidence and implications. In R. Batra, P. A. Keller, & V. J. Strecher (Eds.), *Leveraging consumer psychology for effective health communications: The obesity challenge* (pp. 171-185). New York: ME Sharpe.

O'Keefe, D. J., & Nan, X. (2012). The relative persuasiveness of gain-and loss-framed messages for promoting vaccination: A meta-analytic review. *Health communication, 27*(8), 776-783.

O’Keefe, D. J., & Wu, D. (2012). Gain-framed messages do not motivate sun protection: A meta-analytic review of randomized trials comparing gain-framed and loss-framed appeals for promoting skin cancer prevention. *International journal of environmental research and public health, 9*(6), 2121-2133.

*Orazi, D. C., Lei, J., & Bove, L. L. (2015). The nature and framing of gambling consequences in advertising. *Journal of Business Research, 68*(10), 2049-2056.

*Orbell, S., & Hagger, M. (2006). Temporal framing and the decision to take part in type 2 diabetes screening: Effects of individual differences in consideration of future consequences on persuasion. *Health Psychology, 25*(4), 537-548.

*Orbell, S., & Kyriakaki, M. (2008). Temporal framing and persuasion to adopt preventive health behavior: Moderating effects of individual differences in consideration of future consequences on sunscreen use. *Health Psychology, 27*(6), 770.

*Orbell, S., Perugini, M., & Rakow, T. (2004). Individual differences in sensitivity to health communications: Consideration of future consequences. *Health Psychology, 23*(4), 388-396.

*Ordabayeva, N., & Fernandes, D. (2018). Better or different? How political ideology shapes preferences for differentiation in the social hierarchy. *Journal of*

Consumer Research, 45(2), 227-250.

*Orleans, C. T., Boyd, N. R., Bingler, R., Sutton, C., Fairclough, D., Heller, D., ... & Baum, S. (1998). A self-help intervention for African American smokers: tailoring cancer information service counseling for a special population. *Preventive medicine, 27*(5), S61-S70.

*Paek, H. J., Choi, H., & Nelson, M. R. (2010). Product, personality or prose? Testing functional matching effects in advertising persuasion. *Journal of Current Issues and Research in Advertising, 32*(2), 44161.

Palmer, T. M., Sutton, A. J., Peters, J. L., & Moreno, S. G. (2008). Contour-enhanced funnel plots for meta-analysis. *The STATA Journal, 8(*2), 242-254.

Pandis, N. (2011). The evidence pyramid and introduction to randomized controlled trials. *American Journal of Orthodontics and Dentofacial Orthopedics, 140*(3), 446-447.

*Park, G., & Park, H. S. (2016). Corporate social responsibility in korea: How to communicate global issues to local stakeholders. *Corporate Social Responsibility and Environmental Management, 23*(2), 77-87.

*Park, K., & Lee, S. S. (2015). The role of beneficiaries' group identity in determining successful appeal strategies for charitable giving. *Psychology & Marketing, 32*(12), 1117-1132.

*Park, S.-Y., & Morton, C. R. (2015). The role of regulatory focus, social distance, and involvement in anti-high-risk drinking advertising: A construal-level theory perspective. *Journal of Advertising, 44*(4), 338-348.

Pelletier, L. G., & Sharp, E. (2008). Persuasive Communication and Proenvironmental

Behaviours: How Message Tailoring and Message Framing Can Improve the Integration of Behaviours Through Self-Determined Motivation. *Canadian Psychology*, *49*(3), 210-217.

Penţa, M. A., & Băban, A. (2018). Message Framing in Vaccine Communication: A Systematic Review of Published Literature. *Health communication, 33*(3), 299-314.

Peters, J. L., Sutton, A. J., Jones, D. R., Abrams, K. R., & Rushton, L. (2008). Contour-enhanced meta-analysis funnel plots help distinguish publication bias from other causes of asymmetry. *Journal of Clinical Epidemiology, 61*(10), 991-996.

Petty, R. E., & Cacioppo, J. T. (1996). *Attitudes and persuasion: Classic and contemporary approaches*: Westview Press.

Petty, R. E., & Wegener, D. T. (1998). Matching versus mismatching attitude functions: Implications for scrutiny of persuasive messages. *Personality and Social Psychology Bulletin, 24*(3), 227-240.

Petty, R. E., Wheeler, S. C., & Bizer, G. Y. (2000). Attitude functions and persuasion: An elaboration likelihood approach to matched versus mismatched messages. In G. R. Maio & J. M. Olson (Eds.), *Why we evaluate: Functions of attitudes* (pp. 133-162). New York: Psychology Press.

Pfeffer, I. (2013). Regulatory fit messages and physical activity motivation. *Journal of Sport and Exercise Psychology*, *35*(2), 119-131.

*Pierro, A., Giacomantonio, M., Pica, G., Giannini, A. M., Kruglanski, A. W., & Higgins, E. T. (2013a). Persuading drivers to refrain from speeding: Effects of message sidedness and regulatory fit. *Accident Analysis and Prevention, 50*, 917-

925.

*Pierro, A., Giacomantonio, M., Pica, G., Mannetti, L., Kruglanski, A. W., & Higgins, E. T. (2013b). When comparative ads are more effective: Fit with audience's regulatory mode. *Journal of Economic Psychology, 38*, 90-103.

Polanin, J. R., Snilstveit, B. (2016). *Campbell Methods Policy Note on Converting Between Effect Sizes* (Version 1.1, updated December 2016). Oslo: The Campbell Collaboration. DOI: 10.4073/cmpn.2016.3

*Polyorat, K., & Alden, D. L. (2005). Self-construal and need-for-cognition effects on brand attitudes and purchase intentions in response to comparative advertising in thailand and the united states. *Journal of Advertising, 34*(1), 37-48.

Pope, J. P., Pelletier, L., & Guertin, C. (2018). Starting Off on the Best Foot: A Review of Message Framing and Message Tailoring, and Recommendations for the Comprehensive Messaging Strategy for Sustained Behavior Change. *Health communication, 33*(9), 1068-1077.

*Pornpitakpan, C., & Green, R. T. (2007). The effect of message appeals countering unrealistic optimism on purchase intentions. *Asia Pacific Journal of Marketing and Logistics, 19*(3), 207-226.

Portnoy, D. B., Scott-Sheldon, L. A., Johnson, B. T., & Carey, M. P. (2008). Computer-delivered interventions for health promotion and behavioral risk reduction: a meta-analysis of 75 randomized controlled trials, 1988–2007. *Preventive Medicine, 47*(1), 3-16.

*Pounders, K. R., Lee, S., & Mackert, M. (2015). Matching temporal frame, self-view, and message frame valence: Improving persuasiveness in health communications.

Journal of Advertising, 44(4), 388-402.

*Pounders, K., Lee, S., & Royne, M. (2018). The effectiveness of guilt and shame ad appeals in social marketing: The role of regulatory focus. *Journal of Current Issues and Research in Advertising, 39*(1), 37-51.

Prochaska, J. O., DiClemente, C. C., & Norcross, J. C. (1993). In Search of How People Change: Applications to Addictive Behaviors. *Journal of Addictions Nursing, 5*(1), 2-16. doi:doi:10.3109/10884609309149692

Prochaska, J. O., DiClemente, C. C., Velicer, W. F., & Rossi, J. S. (1993). Standardized, individualized, interactive, and personalized self-help programs for smoking cessation. *Health Psychology, 12*(5), 399.

Prochaska, J. O., Norcross, J. C., & DiClemente, C. C. (2013). Applying the stages of change. *Psychotherapy in Australia, 19*(2), 10.

*Putrevu, S. (2014). The influence of mood and attribute framing on consumer response toward persuasive appeals. *Journal of Current Issues and Research in Advertising, 35*(2), 107-125.

*Quintiliani, L. M., & Carbone, E. T. (2005). Impact of diet-related cancer prevention messages written with cognitive and affective arguments on message characteristics, stage of change, and self-efficacy. *Journal of Nutrition Education and Behavior, 37*(1), 44184.

R Core Team. (2020). *A language and environment for statistical computing [computer program]*. Vienna, Austria: R Foundation for Statistical Computing.

Raffle, H. (2006). *Assessment and reporting of intercoder reliability in published meta-analyses related to preschool through Grade 12 education* (Doctoral dissertation, Ohio University).

Rakowski, W. (1999). The potential variances of tailoring in health behavior interventions. *Annals of Behavioral Medicine, 21*(4), 284.

*Ramirez, E., Jiménez, F. R., & Gau, R. (2015). Concrete and abstract goals associated with the consumption of environmentally sustainable products. *European Journal of Marketing*, *49*(44084), 1645-1665.

*Ranjit, Y. S., Snyder, L. B., Hamilton, M. A., & Rimal, R. N. (2017). Self-determination theory and risk behavior in a collectivistic society: Preventing reckless driving in urban nepal. *Journal of Health Communication*, *22*(8), 672-681.

Ratajczyk, E., Brady, U., Baggio, J., Barnett, A., Perez-Ibarra, I., Rollins, N., ... & Anderies, J. (2016). Challenges and opportunities in coding the commons: problems, procedures, and potential solutions in large-N comparative case studies. *International Journal of the Commons, 10*(2).

Ratcliff, C. L., Kaphingst, K. A., & Jensen, J. D. (2018). When Personal Feels Invasive: Foreseeing Challenges in Precision Medicine Communication. *Journal of health communication*, *23*(2), 144-152.

*Redding, C. A., Prochaska, J. O., Armstrong, K., Rossi, J. S., Hoeppner, B. B., Sun, X., Kobayashi, H., Yin, H. Q., Coviello, D., Evers, K., & Velicer, W. F. (2015). Randomized trial outcomes of a ttm-tailored condom use and smoking intervention in urban adolescent females. *Health Education Research*, *30*(1), 162-178.

*Resnicow, K., Davis, R. E., Zhang, G., Konkel, J., Strecher, V. J., Shaikh, A. R., Tolsma, D., Calvi, J., Alexander, G., Anderson, J. P., & Wiese, C. (2008).

Tailoring a fruit and vegetable intervention on novel motivational constructs: Results of a randomized study. *Annals of Behavioral Medicine, 35*(2), 159-169.

*Resnicow, K., Davis, R., Zhang, N., Strecher, V., Tolsma, D., Calvi, J., Alexander, G., Anderson, J. P., Wiese, C., & Cross Jr, W. E. (2009). Tailoring a fruit and vegetable intervention on ethnic identity: Results of a randomized study. *Health Psychology*, *28*(4), 394-403.

*Resnicow, K., Zhou, Y., Hawley, S., Jimbo, M., Ruffin, M. T., Davis, R. E., Shires, D., & Lafata, J. E. (2014). Communication preference moderates the effect of a tailored intervention to increase colorectal cancer screening among african americans. *Patient Education and Counseling, 97*(3), 370-375.

Revere, D., & Dunbar, P. J. (2001). Review of computer-generated outpatient health behavior interventions: Clinical encounters "in absentia." *Journal of the American Medical Informatics Association, 8,* 62–79. doi: 10.1136/jamia.2001.0080062

*Rhodes, R. E., & Courneya, K. S. (2000). Effects of a health-based versus appearance-based persuasive message on attitudes towards exercise: Testing the moderating role of self-monitoring. *Journal of Social Behavior and Personality, 15*(3), 321-330.

Richards, K. C., Enderlin, C. A., Beck, C., McSweeney, J. C., Jones, T. C., & Roberson, P. K. (2007). Tailored biobehavioral interventions: a literature review and synthesis. *Research and theory for nursing practice*, *21*(4), 271.

Richardson, W. S., Wilson, M. C., Nishikawa, J., & Hayward, R. S. (1995). The well-built clinical question: a key to evidence-based decisions. *ACP journal club, 123*(3), A12-A12.

Richetin, J., Conner, M., & Perugini, M. (2011). Not doing is not the opposite of doing: Implications for attitudinal models of behavioral prediction. *Personality and Social Psychology Bulletin, 37*(1),40–54.

Rimer, B. K., & Glassman, B. (1998). Tailoring communications for primary care settings. *Methods of Information in Medicine, 37*, 171–177.

Rimer, B. K., & Kreuter, M. W. (2006). Advancing tailored health communication: A persuasion and message effects perspective. *Journal of Communication, 56*(s1).

*Robberson, M. R., & Rogers, R. W. (1988). Beyond fear appeals: Negative and positive persuasive appeals to health and self-esteem. *Journal of Applied Social Psychology, 18*(3, Pt 1), 277-287.

Rodgers, M. A., & Pustejovsky, J. E. (2019, December 3). *Evaluating Meta-Analytic Methods to Detect Selective Reporting in the Presence of Dependent Effect Sizes*. Pre-print available at: https://doi.org/10.31222/osf.io/vqp8u

Rohrer, J. M. (2018). Thinking clearly about correlations and causation: Graphical causal models for observational data. *Advances in Methods and Practices in Psychological Science, 1*(1), 27-42.

Rosenstock, I. M. (1974). Historical Origins of the Health Belief Model. *Health Education & Behavior, 2*(4), 328-335. doi:10.1177/109019817400200403

Roth, P. L., Le, H., Oh, I. S., Van Iddekinge, C. H., & Bobko, P. (2018). Using beta coefficients to impute missing correlations in meta-analysis research: Reasons for caution. *Journal of Applied Psychology, 103*(6), 644.

Rothman, A., & Baldwin, A. (2012). A person x intervention strategy approach to understanding health behavior. In K. Deaux & M. Snyder (Eds.*), Handbook of* *personality and social psychology* (pp. 729-752).

Rothman, A. J., Bartels, R. D., Wlaschin, J., & Salovey, P. (2006). The Strategic Use of Gain- and Loss-Framed Messages to Promote Healthy Behavior: How Theory Can Inform Practice. *Journal of Communication, 56*(s1), S202-S220. doi:10.1111/j.1460-2466.2006.00290.x

Rothman, A. J., Joyal-Desmarais, K., Lenne, R. L. (2020). Moving from research on message framing to principles for message matching. In Andrew Elliott (Ed.), *Advances in Motivation Science*. Academic Press: Elsevier. doi: 10.1016/bs.adms.2019.03.001

Rothman, A. J., Martino, S. C., Bedell, B. T., Detweiler, J. B., & Salovey, P. (1999). The systematic influence of gain-and loss-framed messages on interest in and use of different types of health behavior. *Personality and Social Psychology Bulletin, 25*(11), 1355-1369.

Rothman, A. J., & Salovey, P. (1997). Shaping Perceptions to Motivate Healthy Behavior: The Role of Message Framing. *Psychol Bull, 121*(1), 3-19.

Rothman, A. J., Salovey, P., Antone, C., Keough, K., & Martin, C. D. (1993). The Influences of Message Framing on Intentions to Perform Health Behaviors. *Journal of Experimental Social Psychology, 29*(5), 408-433. doi:10.1006/jesp.1993.1019

Rothman, A. J., & Updegraff, J. A. (2010). Specifying When and How Gain- and Loss-Framed Messages Motivate Healthy Behavior: An Integrated Approach. In G. Keren (Ed.), *Perspectives on Framing*. London: Psychology Press / Taylor & Francis.

*Roy, D. P. (2010). The impact of congruence in cause marketing campaigns for service firms. *Journal of Services Marketing, 24*(3), 255-263.

*Roy, R. (2017). The effects of regulatory focus and mixed valence imagery and analytical attributes on product decisions. *Marketing Intelligence & Planning, 35*(3), 397-407.

*Roy, R., & Naidoo, V. (2017). The impact of regulatory focus and word of mouth valence on search and experience attribute evaluation. *European Journal of Marketing, 51*(44020), 1353-1373.

*Roy, R., & Ng, S. (2012). Regulatory focus and preference reversal between hedonic and utilitarian consumption. *Journal of Consumer Behaviour, 11*(1), 81-88.

*Roy, R., & Phau, I. (2014). Examining regulatory focus in the information processing of imagery and analytical advertisements. *Journal of Advertising, 43*(4), 371-381.

*Rozenkrants, B., Wheeler, S. C., & Shiv, B. (2017). Self-expression cues in product rating distributions: When people prefer polarizing products. *Journal of Consumer Research, 44*(4), 759-777.

*Rucker, D. D., & Galinsky, A. D. (2009). Conspicuous consumption versus utilitarian ideals: How different levels of power shape consumer behavior. *Journal of Experimental Social Psychology, 45*(3), 549-555.

Ruiter, R. A., Kessels, L. T., Peters, G. J. Y., & Kok, G. (2014). Sixty years of fear appeal research: Current state of the evidence. *International journal of psychology, 49*(2), 63-70.

*Rutchick, A. M., & Eccleston, C. P. (2010). Ironic effects of invoking common ingroup identity. *Basic and Applied Social Psychology, 32*(2), 109-117.

*Ryffel, F. A., & Wirth, W. (2016). Heart versus mind how affective and cognitive message frames change attitudes. *Social Psychology*, *47*(1), 52-62.

*Ryoo, Y., Hyun, N. K., & Sung, Y. (2017). The effect of descriptive norms and construal level on consumers' sustainable behaviors. *Journal of Advertising, 46*(4), 536-549.

*Samuelsen, B. M., Olsen, L. E., & Keller, K. L. (2015). The multiple roles of fit between brand alliance partners in alliance attitude formation. *Marketing Letters, 26*(4), 619-629.

*Santelli, A. G., Struthers, C. W., & Eaton, J. (2009). Fit to forgive: Exploring the interaction between regulatory focus, repentance, and forgiveness. *Journal of Personality and Social Psychology, 96*(2), 381-394.

*Schlosser, A. E. (1998). Applying the functional theory of attitudes to understanding the influence of store atmosphere on store inferences. *Journal of Consumer Psychology, 7*(4), 345-369.

Schmid, K. L., Rivers, S. E., Latimer, A. E., & Salovey, P. (2008). Targeting or tailoring? Maximizing resources to create effective health communications. *Marketing Health Services, 28*(1), 32.

Schmidt, F. L., & Hunter, J. E. (2014). *Methods of meta-analysis: Correcting error and bias in research findings*. Sage publications.

Schlosser, A. E. (1998). Applying the functional theory of attitudes to understanding the influence of store atmosphere on store inferences. *Journal of Consumer Psychology*, *7*(4), 345-369.

*Segev, S., Fernandes, J., & Wang, W. (2015). The effects of gain versus loss message framing and point of reference on consumer responses to green advertising. *Journal of Current Issues and Research in Advertising*, *36*(1), 35-51.

*Sela, A., Wheeler, S. C., & Sarial-Abi, G. (2012). We are not the same as you and i: Causal effects of minor language variations on consumers' attitudes toward brands. *Journal of Consumer Research, 39*(3), 644-661.

*Septianto, F., Sung, B., Seo, Y., & Tugiman, N. (2018). Proud volunteers: The role of self- and vicarious-pride in promoting volunteering. *Marketing Letters, 29*(4), 501-519.

Shamseer, L., Moher, D., Clarke, M., Ghersi, D., Liberati, A., Petticrew, M., . . . Stewart, L. A. (2015). Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015: elaboration and explanation. *BMJ, 349*, g7647.

*Shang, J., Reed, A., Ii, & Croson, R. (2008). Identity congruency effects on donations. *Journal of Marketing Research, 45*(3), 351-361.

*Shao, W. (2012). Framing and efficacy: The effect of regulatory fit on skin cancer prevention and detection. Jo*urnal of Nonprofit and Public Sector Marketing, 24*(3), 161-180.

*Shao, W., Grace, D., & Ross, M. (2015). Self-regulatory focus and advertising effectiveness. *Marketing Intelligence & Planning*, *33*(4), 612-632.

*Sharma, N. (2018). Decoding the effects of a product's cast shadow in brand advertising. *Journal of Product and Brand Management*, *27*(2), 103-114.

Shavitt, S. (1989). A functional approach to attitudes and persuasion. In A. R. Pratkanis, S. J. Breckler, & A. G. Greenwald (Eds.), *Attitude structure and function* (pp. 31 1-337). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

Shavitt, S. (1990). The role of attitude objects in attitude functions. *Journal of Experimental Social Psychology, 26*(2), 124-148.

Shavitt, S., & Fazio, R. H. (1991). Effects of attribute salience on the consistency between attitudes and behavior predictions. *Personality and Social Psychology Bulletin, 17*(5), 507-516.

Shavitt, S., & Nelson, M. R. (2002). The role of attitude functions in persuasion and social judgment. *The persuasion handbook: Developments in theory and practice*, 137-153.

*Shen, G. C.-C. (2015). Users' adoption of mobile applications: Product type and message framing's moderating effect. *Journal of Business Research, 68*(11), 2317-2321.

Shen, L., & Dillard, J. P. (2007). The influence of behavioral inhibition/approach systems and message framing on the processing of persuasive health messages. *Communication Research, 34*(4), 433-467.

*Sherman, D. K., Mann, T., & Updegraff, J. A. (2006). Approach/avoidance motivation, message framing, and health behavior: Understanding the congruency effect. *Motivation and Emotion, 30*(2), 165-169.

Shi, J., & Smith, S. W. (2016). The effects of fear appeal message repetition on perceived threat, perceived efficacy, and behavioral intention in the extended parallel process model. *Health Commun, 31*(3), 275-286.

*Shiffman, S., Paty, J. A., Rohay, J. M., Di Marino, M. E., & Gitchell, J. (2000). The efficacy of computer-tailored smoking cessation material as a supplement to nicotine polacrilex gum therapy. *Archives of Internal Medicine, 160*(11), 1675-

1681.

Short, C. E., James, E. L., Plotnikoff, R. C., & Girgis, A. (2011). Efficacy of tailored-print interventions to promote physical activity: a systematic review of randomised trials. *International Journal of Behavioral Nutrition and Physical Activity, 8*(1), 113.

Shrout, P. E., & Fleiss, J. L. (1979). Intraclass correlations: uses in assessing rater reliability. *Psychological Bulletin, 86*(2), 420.

*Shu, T.-M., & Lam, S.-F. (2011). Are success and failure experiences equally motivational? An investigation of regulatory focus and feedback. *Learning and Individual Differences, 21*(6), 724-727.

Simmons, J. P., Nelson, L. D., & Simonsohn, U. (2011). False-positive psychology: Undisclosed flexibility in data collection and analysis allows presenting anything as significant. *Psychological Science, 22*(11), 1359-1366.

*Simpson, B., White, K., & Laran, J. (2018). When public recognition for charitable giving backfires: The role of independent self-construal. *Journal of Consumer Research, 44*(6), 1257-1273.

*Simpson, P. M., Horton, S., & Brown, G. (1996). Male nudity in advertisements: A modified replication and extension of gender and product effects. *Journal of the Academy of Marketing Science, 24*(3), 257-262.

Simonsohn, U., Nelson, L. D., & Simmons, J. P. (2014a). p-curve and effect size: Correcting for publication bias using only significant results. *Perspectives on Psychological Science, 9*(6), 666-681.

Simonsohn, U., Nelson, L. D., & Simmons, J. P. (2014b). P-curve: a key to the filedrawer. *Journal of Experimental Psychology: General, 143*(2), 534.

Simonsohn, U., Simmons, J. P., & Nelson, L. D. (2015). Better P-Curves: Making P-Curve Analysis More Robust to Errors, Fraud, and Ambitious P-Hacking, A Reply to Ulrich and Miller. *Simonsohn, Uri, Joseph P. Simmons, and Leif D. Nelson (2015),"Better P-Curves: Making P-Curve Analysis More Robust To Errors, Fraud, and Ambitious P-Hacking, A Reply To Ulrich and Miller (2015)," Journal of Experimental Psychology: General, 144*, 1146-1152.

Skinner, C. S., Campbell, M. K., Rimer, B. K., Curry, S., & Prochaska, J. O. (1999). How effective is tailored print communication? *Annals of Behavioral Medicine, 21*(4), 290-298

*Skinner, C. S., Schildkraut, J. M., Berry, D., Calingaert, B., Marcom, P. K., Sugarman, J., Winer, E. P., Iglehart, J. D., Futreal, P. A., & Rimer, B. K. (2002). Pre-counseling education materials for brca testing: Does tailoring make a difference?. *Genetic Testing, 6*(2), 93-105.

Skinner, C. S., Strecher, V. J., & Hospers, H. (1994). Physicians' recommendations for mammography: do tailored messages make a difference? *American Journal of Public Health, 84*(1), 43-49.

Slothuus, R., & de Vreese, C. H. (2010). Political parties, motivated reasoning, and issue framing effects. *The Journal of Politics, 72*(3), 630-645.

Smith, M. B., Bruner, J. S., & White, R. W. (1956). *Opinions and personality*. Oxford, England: John Wiley & Sons.

Smith, W. R. (1956). Product differentiation and market segmentation as alternative marketing strategies. *Journal of marketing, 21*(1), 3-8.

*Smith, S. S., Rouse, L. M., Caskey, M., Fossum, J., Strickland, R., Culhane, J. K., & Waukau, J. (2014). Culturally tailored smoking cessation for adult american indian smokers: A clinical trial. *The Counseling Psychologist, 42*(6), 852-886.

*Snyder, M., & DeBono, K. G. (1985). Appeals to image and claims about quality: Understanding the psychology of advertising. *J Pers Soc Psychol, 49*(3), 586.

Snyder, M., Omoto, A. M., & Smith, D. M. (2009). The role of persuasion strategies in motivating individual and collective action. In E. Borgia, C. M. Federico, & J. L. Sullivan (Eds.), *The political psychology of democratic citizenship* (pp. 125-150): Oxford University Press.

Sohl, S. J., & Moyer, A. (2007). Tailored interventions to promote mammography screening: a meta-analytic review. *Prev Med, 45*(4), 252-261.

*Spassova, G., & Lee, A. Y. (2013). Looking into the future: A match between self-view and temporal distance. *Journal of Consumer Research, 40*(1), 159-171.

Spencer, L., Adams, T. B., Malone, S., Roy, L., & Yost, E. (2006). Applying the transtheoretical model to exercise: a systematic and comprehensive review of the literature. *Health Promot Pract, 7*(4), 428-443.

*Spiegel, S., Grant-Pillow, H., & Higgins, E. T. (2004). How regulatory fit enhances motivational strength during goal pursuit. *European Journal of Social Psychology, 34*(1), 39-54.

Spivey, A. W., Munson, M. J., & Locander, W. B. (1983). Improving the effectiveness of persuasive communications: Matching message with functional profile. *Journal of Business Research, 11*(2), 257-269. doi:https://doi.org/10.1016/0148-2963(83)90032-2

Spittaels, H., De Bourdeaudhuij, I., Brug, J., & Vandelanotte, C. (2006). Effectiveness of an online computer-tailored physical activity intervention in a real-life setting. *Health Education Research, 22*(3), 385-396.

*Srivastava, J., Oza, S. S., & Koukova, N. T. (2017). To contribute or not: A goals-based perspective on the effect of industry sales trend and solicitation messages on voluntary contributions to a generic advertising campaign. *Journal of Experimental Psychology-Applied, 23*(4), 484-499.

Stafford, M. R., Stafford, T. F., & Day, E. (2002). A contingency approach: The effects of spokesperson type and service type on service advertising perceptions. *Journal of Advertising, 31*(2), 17-35.

*Stanton, C. A., Papandonatos, G. D., Shuter, J., Bicki, A., Lloyd-Richardson, E. E., De Dios, M. A., Morrow, K. M., Makgoeng, S. B., Tashima, K. T., & Niaura, R. S. (2015). Outcomes of a tailored intervention for cigarette smoking cessation among latinos living with hiv/aids. *Nicotine & Tobacco Research, 17*(8), 975-982.

*Steinhart, Y., Kamins, M., Mazursky, D., & Noy, A. (2014). Effects of product type and contextual cues on eliciting naive theories of popularity and exclusivity. *Journal of Consumer Psychology, 24*(4), 472-483.

*Strathman, A., Gleicher, F., Boninger, D. S., & Edwards, C. S. (1994). The consideration of future consequences: weighing immediate and distant outcomes of behavior. *J Pers Soc Psychol, 66*(4), 742.

*Strecher, V. J., Marcus, A., Bishop, K., Fleisher, L., Stengle, W., Levinson, A., Fairclough, D. L., Wolfe, P., Morra, M., Davis, S., Warnecke, R., Heimendinger, J., & Nowak, M. (2005). A randomized controlled trial of multiple tailored messages for smoking cessation among callers to the cancer information service. *Journal of Health Communication*, *10*, 105-118.

*Strecher, V. J., McClure, J. B., Alexander, G. L., Chakraborty, B., Nair, V. N., Konkel, J. M., . . . Wiese, C. J. (2008). Web-based smoking-cessation programs: results of a randomized trial. *Am J Prev Med, 34*(5), 373-381.

*Strecher, V. J., Shiffman, S., & West, R. (2005). Randomized controlled trial of a web-based computer-tailored smoking cessation program as a supplement to nicotine patch therapy. *Addiction, 100*(5), 682-688.

*Sue-Chan, C., Wood, R. E., & Latham, G. P. (2012). Effect of a coach's regulatory focus and an individual's implicit person theory on individual performance. *Journal of Management, 38*(3), 809-835.

*Sunaga, T. (2018). How the sound frequency of background music influences consumers' perceptions and decision making. *Psychology and Marketing, 35*(4), 253-267.

*Sung, Y., & Choi, S. M. (2011). Increasing power and preventing pain the moderating role of self-construal in advertising message framing. *Journal of Advertising, 40*(1), 71-85.

Sutton, A. J., Duval, S. J., Tweedie, R. L., Abrams, K. R., & Jones, D. R. (2000). Empirical assessment of effect of publication bias on meta-analyses. *British Medical Journal*, *320*(7249), 1574–1577.

*Sutton, S., & Gilbert, H. (2007). Effectiveness of individually tailored smoking cessation advice letters as an adjunct to telephone counselling and generic self-help materials: Randomized controlled trial. *Addiction, 102*(6), 994-1000.

Syed, M., & Nelson, S. C. (2015). Guidelines for establishing reliability when coding narrative data. *Emerging Adulthood, 3*(6), 375-387.

Tajfel, H. (1974). Social identity and intergroup behaviour. *Information (International Social Science Council), 13*(2), 65-93.

*Tangari, A. H., & Smith, R. J. (2012). How the temporal framing of energy savings influences consumer product evaluations and choice. *Psychology and Marketing, 29*(4), 198-208.

Terrin, N., Schmid, C. H., & Lau, J. (2005). In an empirical evaluation of the funnel plot, researchers could not visually identify publication bias. *Journal of Clinical Epidemiology, 58*(9), 894-901.

*Thomas, K., Hevey, D., Pertl, M., Ni Chuinneagain, S., Craig, A., & Maher, L. (2011). Appearance matters: The frame and focus of health messages influences beliefs about skin cancer. *British Journal of Health Psychology, 16*, 418-429.

*Tih, S., Chan, K. T., Ansary, A., & Ahmed, A. (2016). Green advertising appeal and consumer purchase intention. *Jurnal Pengurusan, 47*, 157-168.

Tipton, E., Pustejovsky, J. E., & Ahmadi, H. (2019a). A history of meta-regression: Technical, conceptual, and practical developments between 1974 and 2018. *Research Synthesis Methods*, *10*(2), 161-179.

Tipton, E., Pustejovsky, J. E., & Ahmadi, H. (2019b). Current practices in meta-regression in psychology, education, and medicine. *Research Synthesis Methods, 10*(2), 180-194.

Tu, S. P., Taylor, V., Yasui, Y., Chun, A., Yip, M. P., Acorda, E., ... & Bastani, R. (2006). Promoting culturally appropriate colorectal cancer screening through a health educator. *Cancer, 107*(5), 959-966.

*Tugrul, T. O., & Lee, E. M. (2018). Promoting charitable donation campaigns on social media. *Service Industries Journal, 38*(43894), 149-163.

Tversky, A., & Kahneman, D. (1991). Loss aversion in riskless choice: A reference-dependent model. *The Quarterly Journal of Economics, 106*(4), 1039-1061.

*Tykocinski, O., Higgins, E. T., & Chaiken, S. (1994). Message framing, self-discrepancies, and yielding to persuasive messages: The motivational significance of psychological situations. *Personality and Social Psychology Bulletin*, *20*(1), 107-115.

Updegraff, J. A., Brick, C., Emanuel, A. S., Mintzer, R. E., & Sherman, D. K. (2015). Message framing for health: Moderation by perceived susceptibility and motivational orientation in a diverse sample of Americans. *Health Psychology, 34*(1), 20-29. doi:10.1037/hea0000101

Updegraff, J. A., & Rothman, A. J. (2013). Health Message Framing: Moderators, Mediators, and Mysteries. *Social and Personality Psychology Compass, 7*(9), 668-679. doi:10.1111/spc3.12056

*Uskul, A. K., & Oyserman, D. (2010). When message-frame fits salient cultural-frame, messages feel more persuasive. *Psychology and Health, 25*(3), 321-337.

Uskul, A. K., Sherman, D. K., & Fitzgibbon, J. (2009). The cultural congruency effect: Culture, regulatory focus, and the effectiveness of gain-vs. loss-framed health messages. *Journal of Experimental Social Psychology, 45*(3), 535-541.

van den Broek, K., Bolderdijk, J. W., & Steg, L. (2017). Individual differences in values determine the relative persuasiveness of biospheric, economic and combined appeals. *Journal of Environmental Psychology*.

Van den Noortgate, W., López-López, J. A., Marín-Martínez, F., & Sánchez-Meca, J. (2013). Three-level meta-analysis of dependent effect sizes. *Behavior Research Methods, 45*(2), 576-594.

Van den Noortgate, W., López-López, J. A., Marín-Martínez, F., & Sánchez-Meca, J. (2015). Meta-analysis of multiple outcomes: a multilevel approach. *Behavior Research Methods, 47*(4), 1274-1294.

Van Den Noortgate, W., & Onghena, P. (2003). Multilevel meta-analysis: A comparison with traditional meta-analytical procedures. *Educational and Psychological Measurement, 63*(5), 765-790.

*Van-Dijk, D., & Kluger, A. N. (2004). Feedback sign effect on motivation: Is it moderated by regulatory focus?. *Applied Psychology-an International Review-Psychologie Appliquee-Revue Internationale, 53*(1), 113-135.

van Doorn, J., & Hoekstra, J. C. (2013). Customization of online advertising: The role of intrusiveness. *Marketing Letters, 24*(4), 339-351.

Van’t Riet, J., Cox, A. D., Cox, D., Zimet, G. D., De Bruijn, G.-J., Van den Putte, B., . . . Ruiter, R. A. (2016). Does perceived risk influence the effects of message framing? Revisiting the link between prospect theory and message framing. *Health Psychol Rev*, *10*(4), 447-459.

Van't Riet, J., Ruiter, R. A., Werrij, M. Q., Candel, M. J., & de Vries, H. (2010). Distinct pathways to persuasion: The role of affect in message-framing effects. *European Journal of Social Psychology, 40*(7), 1261-1276.

Velicer, W. F., Velicer, W. F., Prochaska, J. O., Velicer, W. F., Prochaska, J. O., Redding, C. A., ... & Redding, C. A. (2006). Tailored communications for smoking cessation: Past successes and future directions. *Drug and Alcohol Review, 25*(1), 49-57.

Viechtbauer, W. (2010). Conducting meta-analyses in R with the metafor package. *Journal of Statistical Software, 36*(3), 1-48.

Viechtbauer, W (2020). *Metafor: meta-analysis package for R*. R package version 2.4-0.

Villar, J., Mackey, M. E., Carroli, G., & Donner, A. (2001). Meta-analyses in systematic reviews of randomized controlled trials in perinatal medicine: comparison of fixed and random effects models. *Statistics in Medicine, 20*(23), 3635-3647.

*Voelkel, J. G., & Feinberg, M. (2017). Morally reframed arguments can affect support for political candidates. *Social Psychological and Personality Science, 0*(0), 1948550617729408. doi:10.1177/1948550617729408

*Von Borgstede, C., Andersson, M., & Hansla, A. (2014). Value-congruent information processing: The role of issue involvement and argument strength. *Basic and Applied Social Psychology, 36*(6), 461-477.

*Voss Jr, R. P., Corser, R., Mccormick, M., & Jasper, J. D. (2018). Influencing health decision-making: A study of colour and message framing. *Psychology and Health, 33*(7), 941-954.

*Wan, X., Wang, T., & Wu, J. (2018). I'll follow the minority: The effects of sales level on purchase intention of self-expressive products. Frontiers in Psychology, 9(), .

*Wang, C. L., Bristol, T., Mowen, J. C., & Chakraborty, G. (2000). Alternative modes of self-construal: Dimensions of connectedness-separateness and advertising appeals to the cultural and gender-specific self. *Journal of Consumer Psychology, 9*(2),

107-115.

*Wang, L., Wang, S., Keller, L. R., & Li, J. (2016). Thinking styles affect reactions to brand crisis apologies. *European Journal of Marketing, 50*(44020), 1263-1289.

*Wang, Y., Kandampully, J., & Jia, H. (2013). Tailoring customization services effects of customization mode and consumer regulatory focus. *Journal of Service Management*, *24*(1), 82-104.

*Wangberg, S. C., Nilsen, O., Antypas, K., & Gram, I. T. (2011). Effect of tailoring in an internet-based intervention for smoking cessation: Randomized controlled trial. *Journal of Medical Internet Research*, *13*(4).

Wanyonyi, K. L., Themessl-Huber, M., Humphris, G., & Freeman, R. (2011). A systematic review and meta-analysis of face-to-face communication of tailored health messages: implications for practice. *Patient Educ Couns, 85*(3), 348-355.

*Webb, M. S. (2008). Does one size fit all african american smokers? The moderating role of acculturation in culturally specific interventions. *Psychology of Addictive Behaviors*, *22*(4), 592-596.

*Webb, M. S., Baker, E. A., & De Ybarra, D. R. (2010). Effects of culturally specific cessation messages on theoretical antecedents of behavior among low-income african american smokers. *Psychology of Addictive Behaviors*, *24*(2), 333-341.

*Weinberg, D. S., Keenan, E., Ruth, K., Devarajan, K., Rodoletz, M., & Bieber, E. J. (2013). A randomized comparison of print and web communication on colorectal cancer screening. *Jama Internal Medicine*, *173*(2), 122-129.

Weinstein, N. D., Lyon, J. E., Sandman, P. M., & Cuite, C. L. (1998). Experimental Evidence for Stages of Health Behavior Change: The Precaution Adoption

Process Model Applied to Home Radon Testing. *Health Psychology, 17*(5), 445-453.

Weinstein, N. D., Rothman, A. J., & Sutton, S. R. (1998). Stage Theories of Health Behavior: Conceptual and Methodological Issues. *Health Psychology, 17*(3), 290-299.

Weinstein, N., & Sandman, P. M. (1992). A Model of the Precaution Adoption Process: Evidence From Home Radon Testing. *Health Psychology, 11*(2), 170-180.

*Wen, J. T., & Wu, L. (2018). Communicating als to the public: The message effectiveness of social-media-based health campaign. *Health Marketing Quarterly, 35*(1), 47-64.

*Wen, J. T., Sar, S., & Anghelcev, G. (2017). The interaction effects of mood and ad appeals on type of elaboration and advertising effectiveness. *Journal of Current Issues and Research in Advertising, 38*(1), 31-43.

*Wen, N., & Shen, F. (2016). Communicating to young chinese about human papillomavirus vaccination: Examining the impact of message framing and temporal distance. *Asian Journal of Communication, 26*(4), 387-404.

*Werth, L., & Foerster, J. (2007). How regulatory focus influences consumer behavior. *European Journal of Social Psychology, 37*(1), 33-51.

Westfall, J., Van Boven, L., Chambers, J. R., & Judd, C. M. (2015). Perceiving political polarization in the United States: Party identity strength and attitude extremity exacerbate the perceived partisan divide. *Perspectives on Psychological Science, 10*(2), 145-158.

*Westmaas, J. L., Bontemps-Jones, J., Hendricks, P. S., Kim, J., & Abroms, L. C. (2017).

Randomised controlled trial of stand-alone tailored emails for smoking cessation. *Tobacco Control, 27*, 136-146.

*Wheeler, S. C., Petty, R. E., & Bizer, G. Y. (2005). Self-schema matching and attitude change: Situational and dispositional determinants of message elaboration. *Journal of Consumer Research, 31*(4), 787-797.

*White, K., Macdonnell, R., & Dahl, D. W. (2011). It's the mind-set that matters: The role of construal level and message framing in influencing consumer efficacy and conservation behaviors. *Journal of Marketing Research, 48*(3), 472-485.

*White, K., & Peloza, J. (2009). Self-benefit versus other-benefit marketing appeals: Their effectiveness in generating charitable support. *Journal of Marketing, 73*(4), 109-124.

*White, K., & Simpson, B. (2013). When do (and don't) normative appeals influence sustainable consumer behaviors?. *Journal of Marketing*, *77*(2), 78-95.

White, T. B., Zahay, D. L., Thorbjørnsen, H., & Shavitt, S. (2008). Getting too personal: Reactance to highly personalized email solicitations. *Marketing Letters, 19*(1), 39-50.

*Williams-Piehota, P., Pizarro, J., Silvera, S. a. N., Mowad, L., & Salovey, P. (2006). Need for cognition and message complexity in motivating fruit and vegetable intake among callers to the cancer information service. *Health Communication, 19*(1), 75-84.

Wilson, G. D., Gray, J. A., & Barrett, P. T. (1990). A factor analysis of the Gray-Wilson personality questionnaire. *Personality and Individual Differences, 11*(10), 1037-1044. doi:http://dx.doi.org/10.1016/0191-8869(90)90131-A

Wilson, D. K., Purdon, S. E., & Wallston, K. A. (1988). Compliance to health recommendations: A theoretical overview of message framing. *Health Educ Res, 3*(2), 161-171.

Witte, K., & Allen, M. (2000). A meta-analysis of fear appeals: Implications for effective public health campaigns. *Health Education & Behavior, 27*(5), 591-615.

Wolsko, C., Ariceaga, H., & Seiden, J. (2016). Red, white, and blue enough to be green: Effects of moral framing on climate change attitudes and conservation behaviors. *Journal of Experimental Social Psychology, 65*, 7-19.

*Wong, N. C. H., Harvell, L. A., & Harrison, K. J. (2013). The unintended target: Assessing nonsmokers' reactions to gain-and loss-framed antismoking public service announcements. *Journal of Health Communication, 18*(12), 1402-1421.

*Woo, S., & Lee, S. (2016). Role of message appeal and regulatory focus in the effects of visual perspective on reactions toward advertisements. *Indian Journal of Science and Technology, 9*(40), .

*Wood, W., Pool, G. J., Leck, K., & Purvis, D. (1996). Self-definition, defensive processing, and influence: The normative impact of majority and minority groups. *Journal of Personality and Social Psychology, 71*(6), 1181-1193.

*Wright, S. A. (2016). Reinvestigating the endorser by product matchup hypothesis in advertising. *Journal of Advertising, 45*(1), 26-32.

*Wurdak, M., Wolstein, J., & Kuntsche, E. (2016). Effectiveness of a drinking-motive-tailored emergency-room intervention among adolescents admitted to hospital due to acute alcohol intoxication - a randomized controlled trial. *Preventive Medicine Reports, 3*, 83-89.

*Xue, F. (2015). Message Framing and Collectivistic Appeal in Green Advertising—A Study of Chinese Consumers. *Journal of International Consumer Marketing, 27*(2), 152-166.

*Yan, C., Dillard, J. P., & Shen, F. (2010). The effects of mood, message framing, and behavioral advocacy on persuasion. *Journal of Communication, 60*(2), 344-363.

*Yan, C., Dillard, J. P., & Shen, F. (2012). Emotion, motivation, and the persuasive effects of message framing. *Journal of Communication, 62*(4), 682-700.

*Yang, B., Liu, J., & Popova, L. (2018). Targeted versus nontargeted communication about electronic nicotine delivery systems in three smoker groups. *International Journal of Environmental Research and Public Health, 15*(10).

*Yang, B., Nan, X., & Zhao, X. (2017). Persuasiveness of anti-smoking messages: Self-construal and message focus. *Health Education, 117*(4), 398-413.

*Yang, D., Lu, Y., Zhu, W., & Su, C. (2015a). Going green: How different advertising appeals impact green consumption behavior. *Journal of Business Research, 68*(12), 2663-2675.

*Yang, H., Stamatogiannakis, A., & Chattopadhyay, A. (2015b). Pursuing attainment versus maintenance goals: The interplay of self-construal and goal type on consumer motivation. *Journal of Consumer Research, 42*(1), 93-108.

*Yang, P., & Zhang, Q. (2018). How pride influences product evaluation through construal level. *European Journal of Marketing, 52*(44020), 1750-1775.

*Yao, Q., & Chen, R. (2014). Gift cards and gifted cash: The impact of fit between gift type and message construal. *Journal of Retailing, 90*(4), 481-492.

*Yeo, J., & Park, J. (2006). Effects of parent-extension similarity and self regulatory focus on evaluations of brand extensions. *Journal of Consumer Psychology, 16*(3), 272-282.

*Yi, S., & Baumgartner, H. (2008). Motivational compatibility and the role of anticipated feelings in positively valenced persuasive message framing. *Psychology & Marketing, 25*(11), 1007-1026.

Yoda, L. U., Nahl, D., & Crosby, M. E. (2013). *Stage-based mHealth communication interventions for HPV education*. Paper presented at the System Sciences (HICSS), 2013 46th Hawaii International Conference on System Sciences.

*Yoo, D., Kim, J., & Doh, S.-J. (2018). The dual processing of donation size in cause-related marketing (crm): The moderating roles of construal level and emoticons. *Sustainability, 10*(11), 4219.

*York, V. K., Brannon, L. A., & Miller, M. M. (2012a). Increasing the effectiveness of messages promoting responsible undergraduate drinking: Tailoring to personality and matching to context. *Health Communication, 27*(3), 302-309.

*York, V. K., Brannon, L. A., & Miller, M. M. (2012b). Marketing responsible drinking behavior: Comparing the effectiveness of responsible drinking messages tailored to three possible "personality" conceptualizations. *Health marketing quarterly, 29*(1), 49-65.

*Yu, N., & Shen, F. (2013). Benefits for me or risks for others: A cross-culture investigation of the effects of message frames and cultural appeals. *Health Communication, 28*(2), 133-145.

*Zawisza, M., & Pittard, C. (2015). When do warmth and competence sell best? The “golden quadrant” shifts as a function of congruity with the product type, targets’ individual differences, and advertising appeal type. *Basic and Applied Social Psychology, 37*(2), 131-141.

*Zemack-Rugar, Y., & Klucarova, S. (2018). Should donation ads include happy victim images? The moderating role of regulatory focus. *Marketing Letters, 29*(4), 421-434.

*Zhang, X., Fung, H., & Ching, B. H. H. (2009). Age differences in goals: Implications for health promotion. *Aging and Mental Health, 13*(3), 336-348.

*Zhang, Y., & Gelb, B. D. (1996). Matching advertising appeals to culture: The influence of products' use conditions. *Journal of Advertising, 25*(3), 29-46.

*Zhang, H., Sun, J., Liu, F., & Knight, J. G. (2014). Be rational or be emotional: Advertising appeals, service types and consumer responses. *European Journal of Marketing, 48*(44147), 2105-2126.

*Zhang, M., Zhang, G.-Y., Gursoy, D., & Fu, X.-R. (2018). Message framing and regulatory focus effects on destination image formation. *Tourism Management, 69*, 397-407. doi:https://doi.org/10.1016/j.tourman.2018.06.025

*Zhao, M., Dahl, D. W., & Hoeffler, S. (2014). Optimal visualization aids and temporal framing for new products. *Journal of Consumer Research, 41*(4), 1137-1151.

*Zhao, G., Li, W., Teng, L., & Lu, T. (2014). Moderating role of consumer self-concept on the effectiveness of two nostalgia appeals. *Journal of Promotion Management, 20*(1), 43849.

*Zhao, X., Nan, X., Iles, I. A., & Yang, B. (2015). Temporal framing and consideration of future consequences: Effects on smokers' and at-risk nonsmokers' responses to cigarette health warnings. *Health Communication, 30*(2), 175-185.

*Zhao, G., & Pechmann, C. (2007). The impact of regulatory focus on adolescents' response to antismoking advertising campaigns. *Journal of Marketing Research*, *44*(4), 671-687.

*Zhao, X., Villagran, M. M., Kreps, G. L., & Mchorney, C. (2012). Gain versus loss framing in adherence-promoting communication targeting patients with chronic diseases: The moderating effect of individual time perspective. *Health Communication, 27*(1), 75-85.

*Zhu, L., Brescoll, V. L., Newman, G. E., & Uhlmann, E. L. (2015). Macho nachos: The implicit effects of gendered food packaging on preferences for healthy and unhealthy foods. *Social Psychology, 46*(4), 182-196.

*Zhu, L., He, Y., Chen, Q., & Hu, M. (2017). It's the thought that counts: The effects of construal level priming and donation proximity on consumer response to donation framing. *Journal of Business Research, 76*, 44-51.

*Zhuang, J., Lapinski, M. K., & Peng, W. (2018). Crafting messages to promote water conservation: Using time-framed messages to boost conservation actions in the united states and china. *Journal of Applied Social Psychology, 48*(5), 248-256.

14. Appendices

Appendix A. Summaries of Select Past Meta-Analyses

Table A1. Summary of a Sample of Key Meta-Analyses from the Message Matching Literature.

[a]Source, N, k, r	Interventions Surveyed	Comparisons Explored	Outcomes Examined	Moderators Examined (r or B)[b]
O'Keefe & Jensen (2006). N = 50,780; k = 165; r = .05 to .03				
	(a) Gain frame for illness prevention behaviors (b) Loss frames for illness detection behaviors	(a) Loss frame for illness prevention behaviors (b) Gain frames for illness detection behaviors	(a) Short-term persuasive effects (attitude change, post communication agreement, behavioral intention, behavior) on health behaviors	Moderators were not examined
Noar et al. (2007). N = 58,454; k = 57; r = .07				
	(a) Print-based tailored materials	(a) Non-tailored condition (b) No-treatment control (c) "Less tailored" condition	(a) Health Behavior	(a) Female only samples (.08) vs combined gender samples (.07) (b) Study conducted outside U.S. (.12) vs. within the U.S. (.06) (c) Health behavior type: Smoking cessation (.09); Diet (.08); Mammography screening (.05); Pap test (.14) (d) Type of behavior targeted: Preventive behavior (.09); Screening behavior (.08); Vaccination/immunization (.04) (e) Comparison condition: Comparison message (.06); no-treatment control (.11) (f) Type of print material: letter (.06);

			manual/booklet (.04); pamphlet/leaflet (.17); newsletter/magazine (.11) (g) Intervention contacts: one contact (.07); multiple contacts (.09) (h) recruitment venues: clinic/health center (.04); reactive recruitment (.09); proactive recruitment (.09) (i) Tailoring combinations: behavior only (.03); theoretical concepts only (.07); theoretical concepts and demographics (.09); theoretical concepts and behavior (.09); theoretical concepts, behavior and demographics (.12) (j) Number of concepts targeted: 0-3 (.06); 4-5 (.09); 6-9 (.07)
Sohl & Moyer (2007). N = 33,237; k = 31; r = .10			
(a) Interventions with a tailored component	(a) No-treatment control (b) Active treatment (e.g., non-tailored intervention)	(a) Adherence to mammography screening behavior	(a) Tailored to/using: Age (.08); ethnicity (.01), risk (.08); barriers to care (.11); health-belief model variables (.25); transtheoretical model stage (.11); motivational interviewing (.13) (b) Intervention delivery: In-person (.21); telephone (.09); print (.07) (c) Intervention included a physician recommendation (.24) or not (.07) (d) Active control (.09) vs. no-treatment control (.11)
Krebs et al. (2010). N = 106,243; k = 119; r = .09			
(a) Computer-tailored interventions	(a) Non-tailored comparison group (either a minimal intervention group or an assessment-only control)	(a) Health behaviors in the domains of smoking cessation, physical activity, dietary practices, and	(a) Type of behavior targeted: smoking cessation (.08); dietary fat reduction (.11); fruit/vegetable consumption (.08); mammography (.08); physical activity (.08) (b) static tailoring (.07) vs. dynamic tailoring

		mammography screening	(.10) (c) single intervention contact (.07) vs multiple intervention contacts (.10) (d) reactive (.09) vs proactive recruitment (.09) (e) Intervention delivery: Computer (.08); print (.09); automated phone (.10) (f) Outcome assessment time: 1-3 months (.09); 4-6 months (.10); 7-12 months (.10); 13+months (.06) (g) engaged in behavior at baseline (.09) or not (.08) (h) Comparison Group: Assessment only (.09) vs. minimal intervention (.08) (i) Country: U.S. (.09) vs not U.S. (.07) (j) Number of behaviors targeted: 1 (.08); 2 (.10); 3 (.12); 4 (.06)
Carpenter (2012). N = 1,460; k = 38; r = .37			
(a) Messages matched on an attitudinal function (b) Functions targeted included one or all of the following: Utilitarian, social-adjustive, value-expressive, knowledge, ego-defensive	(a) Messages mismatched on an attitudinal function	(a) Persuasiveness ("attitudes or a similar construct")	(a) Function targeted: utilitarian (.40); social-adjustive (.38); value-expressive (.35); [could not accurately estimate knowledge or ego-defensive] (b) matching to self-monitoring scale (.31)
Gallagher & Updegraff (2012). k = 189; r = .03 to .08			
(a) Gain frame for illness prevention behaviors (b) Loss frames for illness detection behaviors	(a) Loss frame for illness prevention behaviors (b) Gain frames for illness detection behaviors	(a) Attitudes (b) Intentions (c) Behaviors (self-report or objective) (d) Above outcomes had	(a) For prevention behaviors, by outcome type: attitudes (.04); intentions (.03); behavior (.08) (b) For detection behaviors, by outcome type: attitudes (.03); intentions (.03); behavior (.04) (c) Effects on behavior outcome by different

		to be for health prevention or illness detection behaviors)	types of prevention behaviors: diet (-.01); obesity (.04); oral health (.05); physical activity (.16); safe sex (.08); skin cancer (.24); smoking (.20); virus/vaccine (-.02); other (0.0) (d) Effects on behavior outcome by different types of detection behaviors: breast cancer (.05); heart (-.16); oral health (.39); safe sex (-.05); other (.04)
Lustria et al. (2013). N = 20,180; k = 40; r = .07			
(a) Web-based computer-tailored interventions.	(a) No treatment control (b) Nontailored website (c) Nontailored print materials	(a) Health behavior	(a) Population type: general population (.09); children (.00); patients (.07) (b) Country: US (.05); Non-US (.09) (c) Gender: Mixed (.07); Female (.05) (d) Single behaviors effects reported (.07) vs. multiple behaviors (.06) (e) Behavior Type: Smoking/tobacco (.08); nutrition/diet (.11); physical activity (.03); drinking (.04) (f) Study Design: randomized control trial (.08); quasi-experimental (.03) (g) Comparison: no treatment (.04); non-tailored website (.09); non-tailored print (.04)
Motyka et al. (2014). N = 23,690; k = 306; r = .27 to .33			
(a) Regulatory fit condition (intervention designed to sustain regulatory focus orientation)	(a) Not defined explicitly.	(a) Evaluations (b) Behavioral intentions (c) Behavior	(a) Type of outcome: Evaluation (.27); behavioral intention (.33); behavior (.30). [**Note**: Effects all broken down by outcome type] (b) Source of focus: self-primed (B = .18, .18, -.19); situation-prime (B = .20) as each are compared to chronic regulatory focus (B = .20, .35, -.05)

			(c) Fit creation: sustaining compared to matching (B = .04, .55, -.10) (d) Fit construction: Action compared to observation (B = .00, .08, -.25) (e) Fit scope: Incidental compared to integral (B = -.26, -.53, .27) Route: mixed (B = -.06, .16, -.04); nonverbal (B = .14, -.06, ,07) each compared to verbal (f) Types of participants: Students compared to non-students (B = .14, -.07, -.20) (g) Study environment: Online compared to offline (B = .13, -.06, .16) (h) Orientation: Prevention fit (r = .15, .26, .30) vs Promotion fit (r = .29, .25, .23) (i) Involvement: High (.11. .03, .00) vs. low (.26, .23, .52)
Huang & Shen (2016). N = 30,006, k = 58, r = .12			
(a) Cancer-related messages culturally tailored to ethnic or racial categories	(a) Nonculturally tailored comparison group. Either: Mismatched message (tailored to another group); standard intervention; no treatment	(a) "Persuasion" defined as one of or the average between attitudes, behavioral intentions, or actual behaviors (b) Outcomes in the domain of cancer-related behaviors	(a) Outcome type: behavior (.11); behavioral intentions (.19); attitude (.10) (b) Deep cultural tailoring (.19) vs. surface cultural tailoring (.04) (c) Tailoring involved narrative component (.17) or not (.06) (d) Delivery channel: audio/video (.17); print (.04); mixed (.06). (e) Based message design on formative research (..05) vs. without formative research (.11) (f) Cancer type: Lung cancer (.16); colorectal cancer (.10); breast cancer (.08); prostate cancer (.05); cervical cancer (.04) (g) Gender: Mixed (.07); female only (.07); males only (.05)

		(h) Ethnic/Racial Group: Pacific islanders (.13); Asians (.12); Hispanics (.07); African Americans (.02) (i) Comparison Group: Mismatched comparison (.29); no-treatment (.13); standard comparison (.05) (j) Design: lab experiment (.11) vs. field studies (.07)

[a]Table lists the meta-analysis source, the total sample size (N), the number of effects synthesized (k), and the overall estimated matching effect sizes expressed in a correlation coefficient r.

[b]The effects associated to the moderator analyses reflect the size of the matching effect (expressed in a correlation coefficient r) at different levels of a moderator variable. A few of the moderation effect of Motyka et al. (2014) are instead presented as Betas in a meta-regression instead. These specific effects are identified in the table using "B = #".

Appendix B. Project 1 - Adherence to PRISMA Guidelines

Table B1. Annotated PRISMA 2009 Checklist

Section / topic	#	Checklist item	Location in Manuscript; Notes
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	The heading for section 4 acts as the title for this project. It explicitly labels the project as both a systematic review and meta-analysis. Furthermore, the title of this dissertation also explicitly states this.
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	Given that the synthesis is only one project included in this dissertation, this limits some of the details that can be included in the abstract. The abstract for the dissertation states background information, the objectives of the synthesis, and the primary results. Summary elements of the project's PICOS question are provided: the Population is omitted as the synthesis concerns the whole human population; the Intervention is described as involving functional message matching; the specific types of Comparisons are omitted for simplicity; the four outcomes of interest are listed, and; the Study Type is defined as experiments. The abstract further provides registration numbers/links, where the full protocol of the review is freely accessible.
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	The literature review for this dissertation provides an extensive review of what is known in the message matching literature, along with a rationale for the given study.

Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	Provided in the opening of section 4.
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	Section 5.0.1. provides details on the registration of the current synthesis. The bibliography provides the registration number for the PROSPERO registration, as well as web addresses to access both the OSF and PROSPERO registration documents.
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	Section 5.2. provides detailed descriptions of each inclusion and exclusion criteria. These are in accordance with the PICOS formulation of the research question outlined in Section 4.1.
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	The details on the search strategy are provided in sections 5.1., 5.2., and 6.1. The appendices further provide additional details.
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	The full search strategy is provided in Appendix D. Section 5.1. also provides an overview and summary.
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	The study selection procedure is outlined in Section 5.2.
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	Coding and data extraction procedures are described in section 5.3. Additionally, Appendices E-H provide additional details including the codebook, and how effects were extracted.
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	Appendices F & G provide the codebook coders used, and a dictionary that defines all the variables that were extracted.
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	This information is provided in section 5.4.2 of the dissertation.
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	This is described in section 5.3.3.

Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	The method for handling data and conducting the meta-analytic modeling is described in section 5.4.
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	This information is provided in section 5.4.2 of the dissertation.
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	This is described in Section 5.4. The subgroups were specified according to the hypotheses and research questions outlined in Section 4., as well as in the registered protocols.
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	Details are provided in Section 6.1., and a flow diagram is also included (see Figure 10).
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	The citation information for each study is provided in the bibliography. Individual coding information for specific studies is omitted, given the large scope of the meta-analysis (i.e., separate characteristics were coded for each of the 4,228 effect sizes extracted).
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	The results of the evaluation of bias is provided in Section 6.4. This information is supplemented by detailed appendices N and O. Information on risk of bias for each individual study is omitted given the large scope of the research.
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	Detailed results are presented at the aggregate level in Section 6. Information for each given study is not included, given the large scope of the review, and that separate summary data was coded for each of the 4,228 effect size estimates.
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	The results of each meta-analysis are presented in Sections 6. Additional details on each meta-analysis (including reports of prediction intervals as a measure of consistency) are provided in appendices M, O, P, Q, R, S, T, U, V, W, X, and Y.

Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	The results of analyses used to evaluate bias are reported in Section 6.3.2. of the dissertation. Additional details are provided in Appendices M and N.
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	All details/results for each meta-analysis conducted are provided in Section 6 and supplemented by additional information using appendices M, O, P, Q, R, S, T, U, V, W, X, and Y.
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	Summaries and discussions are provided in Sections 7 and 12 of the dissertation.
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	Limitations are discussed both in the results (Section 6) and the discussion (section 7) for Project 1. In particular, Section 7.4. is especially devoted to this. Further, several limitations are discussed again in Section 12.
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	Provided in the discussion for project 1 (Section 7) and in the overall conclusion for the dissertation (section 12).
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	This information is described in the acknowledgements. No funding agency played any role at any stage of the review.

Appendix C. Project 1 - Development and Evaluation of Search Strategy

C.1. Selecting Databases for Electronic Search. In order to determine which databases to include for a systematic search of the literature, I compiled a list of 38 articles from across the message matching literature (this list is available in Table C1). Articles were selected to represent a diverse set of designs, domains of application, and outcomes. In May, 2018, I systematically searched for the presence/absence of each article in 10 distinct databases: *PsycInfo* (via *Ovid*), *MEDLINE* (via *Ovid*), *Web of Science*, *Business Source Premier* (via *EBSCOhost*), *Communication and Mass Media Complete* (via *EBSCOhost*), *CINAHL* (via *EBSCOhost*), *PAIS Index* (via *ProQuest*), *PubMed*, *EconLit* (via *ProQuest*), and *Scopus*. The results of this search are presented in Table C1. Overall, the databases that contained the most articles were *PsycInfo* (captured 28 articles), *MEDLINE* (captured 24 articles), *Web of Science* (captured 31 articles), *PubMed* (captured 24 articles), and *Scopus* (captured 37 articles). After consulting with an information specialist at the University of Minnesota Libraries, I opted to select *PsycInfo*, *MEDLINE* and *Scopus* as the main databases to use for my systematic search strategy. *Web of Science* was omitted as its coverage varies according to University subscriptions. *Web of Science* was instead chosen as the primary tool to conduct forward and backward citation searches. *PsycInfo* was used in order to develop an initial search strategy, which was subsequently adapted to *MEDLINE* and *Scopus*.

Table C1. Inclusion of 38 Different Articles on Message Matching Across 10 Literature Databases.

#	Article / Citation	PsycInfo	MEDLINE	Web of Science	Business Source Premier	Communication and Mass Media	CINAHL	PAIS Index	PubMed	EconLit	Scopus
1	Snyder, M., & DeBono, K. G. (1985). Appeals to image and claims about quality: Understanding the psychology of advertising. *Journal of personality and Social Psychology*, *49*(3), 586.	1	0	1	0	1	0	0	0	0	1
2	Clary, E. G., Snyder, M., Ridge, R. D., Copeland, J., Stukas, A. A., Haugen, J., & Miene, P. (1998). Understanding and assessing the motivations of volunteers: a functional approach. *Journal of Personality and Social Psychology*, *74*(6), 1516.	1	1	1	1	0	0	0	1	0	1
3	Lavine, H., & Snyder, M. (1996). Cognitive processing and the functional matching effect in persuasion: The mediating role of subjective perceptions of message quality. *Journal of Experimental Social Psychology*, *32*(6), 580-604.	1	1	1	0	0	0	0	1	0	1
4	Shavitt, S. (1990). The role of attitude objects in attitude functions. *Journal of Experimental Social Psychology*, *26*, 124–148.	1	0	1	0	0	0	0	0	0	1
5	Uskul, A. K., & Oyserman, D. (2010). When message-frame fits salient cultural-frame, messages feel more persuasive. *Psychology and Health*, *25*(3), 321-337.	1	1	1	0	0	1	0	1	0	1
6	Spivey, W. A., Munson, J. M., & Locander, W. B. (1983). Improving the effectiveness of persuasive communications: Matching message with functional profile. *Journal of Business Research*, *11*(2), 257-269.	1	0	1	0	1	0	0	0	0	1
7	Petty, R. E., & Wegener, D. T. (1998). Matching versus mismatching attitude functions: Implications for scrutiny of persuasive messages. *Personality and Social Psychology Bulletin*, *24*(3), 227-240.	1	0	1	0	0	0	0	0	0	1

8	Han, S.-P., & Shavitt, S. (1994). Persuasion and culture: Advertising appeals in individualistic and collectivistic societies. *Journal of Experimental Social Psychology*, *30*(4), 326-350.	1	0	1	0	1	0	0	0	0	1
9	Kidwell, B., Farmer, A., & Hardesty, D. M. (2013). Getting liberals and conservatives to go green: Political ideology and congruent appeals. *Journal of Consumer Research*, *40*(2), 350-367.	1	0	1	1	1	0	0	0	1	1
10	Voelkel, J. G., & Feinberg, M. (2017). Morally reframed arguments can affect support for political candidates. *Social Psychological and Personality Science*, 1948550617729408.	0	0	0	0	0	0	0	0	0	1
11	Latimer, A. E., Katulak, N. A., Mowad, L., & Salovey, P. (2005). Motivating cancer prevention and early detection behaviors using psychologically tailored messages. *J Health Commun*, *10*(S1), 137-155.	1	1	1	0	1	0	0	1	0	1
12	Julka, D. L., & Marsh, K. L. (2005). An Attitude Functions Approach to Increasing Organ-Donation Participation. *Journal of Applied Social Psychology*, *35*(4), 821-849.	0	0	1	1	0	0	0	0	0	1
13	Kang, E., & Lakshmanan, A. Narcissism and Self- Versus Recipient-Oriented Imagery in Charitable Giving. *Personality and Social Psychology Bulletin*, *0*(0), 0146167218764658. doi:10.1177/0146167218764658	0	1	0	0	0	0	0	1	0	0
14	Skinner, C. S., Strecher, V. J., & Hospers, H. (1994). Physicians' recommendations for mammography: do tailored messages make a difference?. *American Journal of Public Health*, *84*(1), 43-49.	0	1	0	1	0	0	0	1	0	1
15	Hirsh, J. B., Kang, S. K., & Bodenhausen, G. V. (2012). Personalized persuasion tailoring persuasive appeals to recipients' personality traits. *Psychol Sci*, *23*(6), 578-581.	0	1	1	1	0	0	0	1	0	1
16	Strecher, V. J., McClure, J. B., Alexander, G. L., Chakraborty, B., Nair, V. N., Konkel, J. M., . . . Wiese, C. J. (2008). Web-based smoking-cessation programs: results of a randomized trial. *Am J Prev Med*, *34*(5), 373-381.	1	1	1	0	1	1	0	1	0	1
17	Ko, L. K., Campbell, M. K., Lewis, M. A., Earp, J., & DeVellis, B. (2010). Mediators of fruit and vegetable consumption among colorectal cancer survivors. *Journal of Cancer Survivorship*, *4*(2), 149-158.	1	1	1	0	0	1	0	1	0	1

18	Orleans, C. T., Boyd, N. R., Bingler, R., Sutton, C., Fairclough, D., Heller, D., ... & Baum, S. (1998). A self-help intervention for African American smokers: tailoring cancer information service counseling for a special population. *Preventive Medicine*, *27*(5), S61-S70.	1	1	1	0	0	1	0	1	0	1
19	Tu, S. P., Taylor, V., Yasui, Y., Chun, A., Yip, M. P., Acorda, E., ... & Bastani, R. (2006). Promoting culturally appropriate colorectal cancer screening through a health educator. *Cancer*, *107*(5), 959-966.	0	1	1	0	0	0	0	1	0	1
20	Chiauzzi, E., Green, T. C., Lord, S., Thum, C., & Goldstein, M. (2005). My student body: a high-risk drinking prevention web site for college students. *Journal of American College Health*, *53*(6), 263-274.	1	1	1	0	0	1	0	1	0	1
21	Campbell, M. K., DeVellis, B. M., Strecher, V. J., Ammerman, A. S., DeVellis, R. F., & Sandler, R. S. (1994). Improving dietary behavior: the effectiveness of tailored messages in primary care settings. *American Journal of Public Health*, *84*(5), 783-787.	1	1	1	1	0	0	0	1	0	1
22	de Vet, E., de Nooijer, J., de Vries, N. K., & Brug, J. (2007). Testing the transtheoretical model for fruit intake: comparing web-based tailored stage-matched and stage-mismatched feedback. *Health Education Research*, *23*(2), 218-227.	1	1	1	0	0	1	0	1	0	1
23	Brinberg, D., Axelson, M. L., & Price, S. (2000). Changing food knowledge, food choice, and dietary fiber consumption by using tailored messages. *Appetite*, *35*(1), 35-43.	1	1	1	0	0	0	0	1	0	1
24	Meldrum, P., Turnbull, D., Dobson, H. M., Colquhoun, C., Gilmour, W. H., & McIlwaine, G. M. (1994). Tailored Written Invitations for Second round Breast Cancer Screening: A Randomised Controlled Trial. *Journal of Medical Screening*, *1*(4), 245-248. doi:10.1177/096914139400100412	0	1	0	0	0	0	0	1	0	1
25	Hébert, E. T., Stevens, E. M., Frank, S. G., Kendzor, D. E., Wetter, D. W., Zvolensky, M. J., . . . Businelle, M. S. (2017). An ecological momentary intervention for smoking cessation: The associations of just-in-time, tailored messages with lapse risk factors. *Addictive Behaviors*, *78*, 30-35.	0	1	1	0	0	1	0	1	0	1
26	Rothman, A. J., Salovey, P., Antone, C., Keough, K., & Martin, C. D. (1993). The influence of message framing on intentions to perform health	1	0	1	0	0	0	0	0	0	1

	behaviors. *Journal of Experimental Social Psychology*, *29*(5), 408-433.										
27	Mann, T., Sherman, D., & Updegraff, J. (2004). Dispositional motivations and message framing: a test of the congruency hypothesis in college students. *Health Psychology*, *23*(3), 330.	1	1	1	0	0	1	0	1	0	1
28	Gallagher, K. M., Updegraff, J. A., Rothman, A. J., & Sims, L. (2011). Perceived susceptibility to breast cancer moderates the effect of gain-and loss-framed messages on use of screening mammography. *Health Psychology*, *30*(2), 145.	1	1	1	0	0	1	0	1	0	1
29	Cesario, J., Corker, K. S., & Jelinek, S. (2013). A self-regulatory framework for message framing. *Journal of Experimental Social Psychology*, *49*(2), 238-249.	1	0	1	0	0	0	0	0	0	1
30	Lu, H., Siemer, W. F., Baumer, M. S., & Decker, D. J. (2018). Exploring the role of gain versus loss framing and point of reference in messages to reduce human–bear conflicts. *The Social Science Journal*, *55*(2), 182-192.	0	0	0	0	0	0	0	0	0	1
31	Lee, H. C., Liu, S. F., & Cheng, Y. C. (2018). Positive or Negative? The Influence of Message Framing, Regulatory Focus, and Product Type. *International Journal of Communication*, *12*, 18.	0	0	0	0	0	0	0	0	0	1
32	Shen, L., & Dillard, J. P. (2007). The influence of behavioral inhibition/approach systems and message framing on the processing of persuasive health messages. *Communication Research*, *34*(4), 433-467.	1	0	1	1	1	0	0	0	0	1
33	Aaker, J. L., & Lee, A. Y. (2001). “I” seek pleasures and “we” avoid pains: The role of self-regulatory goals in information processing and persuasion. *Journal of Consumer Research*, *28*(1), 33-49.	1	0	1	1	1	0	0	0	1	1
34	Lee, A. Y., & Aaker, J. L. (2004). Bringing the frame into focus: the influence of regulatory fit on processing fluency and persuasion. *Journal of Personality and Social Psychology*, *86*(2), 205.	1	1	1	1	1	0	0	1	0	1
35	Pfeffer, I. (2013). Regulatory fit messages and physical activity motivation. *Journal of Sport and Exercise Psychology*, *35*(2), 119-131.	1	1	1	0	0	1	0	1	0	1

36	Abhyankar, P., O'connor, D. B., & Lawton, R. (2008). The role of message framing in promoting MMR vaccination: Evidence of a loss-frame advantage. *Psychology, Health and Medicine*, *13*(1), 1-16.	1	1	0	0	0	1	0	1	0	1
37	Lueck, J. A. (2017). Matching Message Design and Depressed Cognition: An Exploration of Attention Patterns for Gain- and Loss-Framed Depression Help-Seeking Messages. *J Health Commun*, *22*(7), 593-603. doi:10.1080/10810730.2017.1324538	1	1	1	0	1	1	0	1	0	1
38	Campbell, T. H., & Kay, A. C. (2014). Solution aversion: On the relation between ideology and motivated disbelief. *J Pers Soc Psychol*, *107*(5), 809.	1	1	1	1	0	0	0	1	0	1
	Total Articles Captured by Each Database	**28**	**24**	**31**	**10**	**10**	**12**	**0**	**24**	**2**	**37**

Note. 1 indicates article is included in database, 0 indicates it is not included.

C.2. Using Controlled Vocabulary in Electronic Search. In order to determine whether controlled vocabulary could be used to create an effective search strategy, I reviewed each of the 28 articles from Table C1 that were indexed in *PsycInfo*, and examined the *subject headings*, *MeSH* terms, and *classification codes* associated to each citation within the database. Table C2 presents a summary of relevant subject headings used to describe each article in *PsycInfo*. The most common subject headings were "Messages" (used for 12 articles), "Persuasive Communication" (used for 6 articles), and "Health Promotion" (Used for 6 articles). These terms were judged to be too broad in scope for the current review and the remaining subject headings were too heterogeneous (i.e., typically only used for 1-2 articles) to be useful for inclusion into a formal search strategy. Consequently, I decided not to use subject headings in building a systematic search query. Table C3 presents the most relevant MeSH terms used for the 28 articles, and Table C4 presents the classification codes used to index each citation in *PsycInfo*. In both cases, the most common terms associated to each article were too broad in scope, and other terms were highly heterogeneous across sources. Consequently, I decided not to generally use controlled vocabulary going forward in establishing the search strategy.

Table C2. Relevant Subject Headings Used Across the 28 Sources Indexed by *PsycInfo*.

Source #	**Subject Headings**																														
	Advertising	Self-monitoring (personality)	Motivation	Persuasive communication	Attitudes	Adult advertising	Messages	Attitude Change	Persuasive Communication	Consumer Research	Adult Attitudes	Cross Cultural Differences	Consumer Behavior	Health Promotion	Communication	Intervention	Drug Education	Health Education	Behavior Change	Stages of Change	Transtheoretical Model	Information	Health behavior	Personality	Framing Effects	Risk perception	Individual Differences	Consumer Processes	Consumer Attitudes	Marketing	Goals
1	x	x																													
2			x																												
3				x	x																										
4	x					x																									
5				x			x																								
6								x	x	x																					
7		x		x							x																				
8	x			x								x																			
9									x				x																		
11							x							x																	
16							x								x	x															
17														x		x															
18																															
20																x	x														

21																	x														
22																		x	x	x											
23							x																								
26																					x	x									
27			x				x							x									x	x							
28							x		x																x	x					
29							x		x																		x				
32							x		x					x																	
33																												x	x	x	
34	x						x		x																	x					x
35			x				x							x									x								
36							x							x																	
37							x																		x						
38			x																												
Total	**4**	**2**	**4**	**4**	**1**	**1**	**12**	**1**	**6**	**1**	**1**	**1**	**1**	**6**	**1**	**3**	**1**	**1**	**1**	**1**	**1**	**1**	**3**	**1**	**2**	**2**	**1**	**1**	**1**	**1**	**1**

Note. Source # refers to the number assigned to each article on the 1st column of Table C1. An “x” in any column of Table S2 indicates that a given Subject Heading was used to describe the Article in *PsycInfo*.

Table C3. Relevant MeSH Terms Used Across the 28 Sources Indexed by *PsycInfo*.

Source #	**MeSH terms**												
	Motivation	Persuasive Communication	Social Values	Health Promotion	Health Education	Choice Behavior	Health Behavior	Health Knowledge, Attitudes, Practice	Attitude to Health	Advertising as Topic	Attitude	Marketing	Health Communication
1													
2	x	x	x										
3													
4													
5		x		x									
6													
7													
8													
9													
11													
16													
17	x			x									
18													
20													
21					x								
22					x								
23					x	x	x	x					
26													
27	x						x		x				
28		x											
29													
32													
33													
34	x	x								x	x	x	
35	x	x		x					x				
36		x		x					x				
37		x											x
38	x												
Total	**6**	**7**	**1**	**4**	**3**	**1**	**2**	**1**	**3**	**1**	**1**	**1**	**1**

Note. Source # refers to the number assigned to each article on the 1st column of Table C1. An "x" in any column indicates that a given MeSH was used to describe the Article in *PsycInfo*.

Table C4. Relevant Classification Codes Used Across the 28 Sources in Indexed by *PsycInfo*.

Source #	**Classification Code**														
	Marketing & Advertising [3940]	Cognitive processes [2340]	Personnel Attitudes & Job Satisfaction [3650]	Personality Scales & Inventories [2223]	Promotion & Maintenance of Health & Wellness [3365]	Consumer Psychology [3900]	Personality Traits & Processes [3120]	Political Processes & Political Issues [2960]	Drug & Alcohol Rehabilitation [3383]	Cancer [3293]	Substance Abuse & Addiction [3233]	Mass Media Communications [2750]	Consumer Attitudes & Behavior [3920]	Health & Mental Health Treatment & Prevention [3300]	Environmental Issues & Attitudes [4070]
1	x														
2			x	x											
3		x													
4	x														
5					x										
6						x									
7							x								
8	x														
9								x							
11					x										
16									x						
17					x					x					
18									x						
20											x				
21					x										
22					x										
23					x										
26					x										
27					x										
28					x										
29							x								
32												x			
33													x		
34	x	x													
35					x										
36					x										
37														x	
38								x							x
Total	**4**	**2**	**1**	**1**	**11**	**1**	**2**	**2**	**2**	**1**	**1**	**1**	**1**	**1**	**1**

Note. Source # refers to the number assigned to each article on the 1st column of Table C1. An "x" in any column indicates that a given Classification Code was used to describe the Article in *PsycInfo*.

C.3. Using Titles and Abstracts for Electronic Search. Because the use of controlled vocabulary is unlikely to be useful in a systematic search of message matching studies, I examined the frequency with which various terms associated to message matching appeared in the titles and abstracts of the sample of 38 articles I identified. Variants of a set of theoretically meaningful terms were searched for using wildcards. Example terms included “function*”, “match*”, “mismatch*”, “frame*”, “tailor*”, and “messag*”. The frequency with which each term appeared in the titles and abstracts are presented below (Table C5 for the Titles, and C6 for the Abstracts). Although heterogeneity exists across articles in their terminology, most articles use a combination of the terms I examined to describe their studies. This suggests that searching for theoretically relevant vocabulary in titles and abstracts may be a viable way to identify articles in the message matching literature. Consequently, I chose this method as the primary way to search for relevant literature using *PsycInfo*.

Table C5. Terminology Used in the *Titles* of the 38 Sources outlined in Table C1.

Source #	Term Appears in Article Title																							Total
	appeal*	attitud*	function*	match*	mismatch*	messag*	persuas*	frame*	framing	gain	loss	positive*	negative*	cultur*	tailor*	individuali*	personali*	communicat*	print	congruen*	intervention	feedback	motiv*	
1	x																							**1**
2			x																				x	**2**
3			x	x		x	x																	**4**
4		x	x																					**2**
5						x	x	x						x										**4**
6			x	x		x	x											x						**5**
7		x	x	x	x	x	x																	**6**
8	x						x							x		x								**4**
9	x																			x				**2**
10								x																**1**
11						x									x								x	**3**
12		x	x																					**2**
13																								**0**
14						x									x									**2**
15	x						x								x		x							**4**
16																								**0**
17																								**0**
18															x						x			**2**
19														x										**1**
20																								**0**
21						x									x									**2**
22				x	x										x							x		**4**

23						x									x									**2**
24															x									**1**
25						x									x						x			**3**
26						x			x															**2**
27						x			x											x			x	**4**
28						x		x		x	x													**4**
29						x		x	x															**3**
30						x			x	x	x													**4**
31						x			x			x	x											**4**
32						x	x		x															**3**
33							x																	**1**
34							x	x																**2**
35						x																	x	**2**
36						x		x	x		x													**4**
37				x		x		x		x	x													**5**
38																							x	**1**
Total	**4**	**3**	**6**	**5**	**2**	**19**	**9**	**7**	**7**	**3**	**4**	**1**	**1**	**3**	**9**	**1**	**1**	**1**	**0**	**2**	**2**	**1**	**5**	

Note. Source # refers to the number assigned to each article on the 1st column of Table C1. An "x" in any column indicates that a given term (or a variant thereof) was used in the articles' titles. An asterisk (*) used with a term indicates a wildcard such that variants of the term's ending were also counted (e.g., tailor* counts both "tailor" and "tailoring"). Row totals indicates the number of terms used in a single source. Column totals indicate the number of sources using a particular term and/or its variants.

Table C6. Terminology Used in the *Abstracts* of the 38 Sources outlined in Table C1.

Source #	Term Appears in Article Abstract																							
	appeal*	attitud*	function*	match*	mismatch*	messag*	persuas*	frame*	framing	gain	loss	positive*	negative*	cultur*	tailor*	individuali*	personali*	communicat*	print	congruen*	intervention	feedback	motiv*	**Total**
1	x		x	x	x	x	x																x	**7**
2	x	x																						**2**
3		x	x	x		x	x																x	**6**
4	x	x	x				x																	**4**
5				x		x	x	x						x	x	x				x				**8**
6		x	x	x		x																		**4**
7	x	x	x	x	x	x	x																	**7**
8	x						x							x		x								**4**
9	x					x	x									x				x				**5**
10	x					x	x									x				x				**5**
11				x	x	x	x								x			x		x			x	**8**
12						x									x		x	x			x			**5**
13															x			x	x		x		x	**5**
14						x									x				x					**3**
15	x					x	x	x	x	x	x	x			x		x	x					x	**12**
16						x									x		x	x			x			**5**
17															x			x	x		x		x	**5**
18	x													x	x						x			**4**
19														x							x		x	**3**
20													x		x						x			**3**
21						x									x						x			**3**
22				x	x											x						x		**4**

23		x				x									x									**3**
24												x			x									**2**
25						x									x						x		x	**4**
26						x		x				x	x											**4**
27						x		x	x	x	x									x	x		x	**8**
28			x			x		x	x	x	x													**6**
29						x	x	x	x			x	x											**6**
30				x		x			x	x	x							x		x				**7**
31				x		x		x	x			x	x											**6**
32		x				x	x	x	x			x	x											**7**
33	x					x	x																	**3**
34	x			x		x	x	x	x	x	x	x	x											**10**
35				x		x						x	x					x	x				x	**7**
36						x		x	x	x	x													**5**
37				x		x	x	x	x	x	x		x					x			x			**10**
38																							x	**1**
Total	**11**	**7**	**6**	**12**	**4**	**27**	**15**	**11**	**10**	**7**	**7**	**8**	**8**	**4**	**14**	**5**	**3**	**9**	**4**	**6**	**11**	**1**	**11**	

Note. Source # refers to the number assigned to each article on the 1st column of Table C1. An “x” in any column indicates that a given term (or a variant thereof) was used in the articles’ abstracts. An asterisk (*) used with a term indicates a wildcard such that variants of the term’s ending were also counted (e.g., tailor* counts both “tailor” and “tailoring”). Row totals indicates the number of terms used in a single source. Column totals indicate the number of sources using a particular term and/or its variants.

C4. Electronic Search Query. In order to determine the specific search query to use with *PsycInfo*, I generated a list of terms related to message matching research, and examined the results of using various combination of terms with the Boolean operators AND (e.g., “match* AND message*”) and ADJ (e.g., “match* ADJ3 messag*”; this example requires the two terms to be separated by fewer than 3 words, and would capture terms such as “messages that are matched”). Between May 14-26, 2018, I examine the results of 312 combination of terms. For each combination, I noted the number of total hits returned in *PsycInfo*, went through the 1st ten hits of each search, and noted down the number of hits that were relevant to message matching research. This process is depicted in Table C7. This exercise allowed me to gauge which search terms were too broad or narrow (e.g., searching “match* AND function*” returned over 28,000 hits, whereas "matched communication” returned 0 hits). Using what I learned, I created a two-part search query to use with *PsycInfo*. The first part contains a combination of terms that were prioritized for use for theoretical reasons and convey various forms of message matching. These search terms were then complemented by a set of additional terms that attempt to identify more specific types of message matching studies. The final set of search terms developed for *PsycInfo* is presented in Appendix D.

To examine the degree to which different search terms provided unique information over one another, I examined the cumulative number of hits obtained in PsycInfo with each additional search term added. The results of this exercised are presented in Table C8. The column “cumulative” indicates the total number of results obtained with a given search string when added to every other search string included above it in the table. The column “New” indicates the number of unique results added when adding a given search string to every search string that preceded it in the table. The column “searched alone” indicates the total number of hits obtained when only searching for the terms included in a given row. A comparison of these last two columns allows us to get a sense of whether the search terms are redundant with prior terms in the table. What I found in completing Table C8, was that most search terms used were non-redundant and provided unique information beyond one another.

Once a search query was finalized for *PsycInfo*, it was then adapted for use with *MEDLINE* and *Scopus*, going through a similar process as was used to develop the PsycInfo query (i.e., going through equivalent procedures as depicted in Table C7 and Table C8).

Table C7. Examining Hits Obtained with the Use of Different Search Queries in PsycInfo

Search String	**Total Hits**	**Rel. in 1st 10[a]**	**Search String**	**Total Hits**	**Rel. in 1st 10[a]**
(match* AND appeal*).ab,id,mh,sh,ti.	345	3	(match* ADJ3 appeal*).ab,id,mh,sh,ti.	32	7
(match* AND messag*).ab,id,mh,sh,ti.	848	2	(match* ADJ3 messag*).ab,id,mh,sh,ti.	127	8
(match* AND (frame OR framing OR frames)).ab,id,mh,sh,ti.	1025	1	(match* ADJ3 (frame OR framing OR frames)).ab,id,mh,sh,ti.	63	6
(match* AND cultur*).ab,id,mh,sh,ti.	3820	SK	(match* ADJ3 cultur*).ab,id,mh,sh,ti.	249	1
(match* AND communicat*).ab,id,mh,sh,ti.	4532	SK	(match* ADJ3 communicat*).ab,id,mh,sh,ti.	126	0
(match* AND feedback*).ab,id,mh,sh,ti.	2234	SK	(match* Adj3 feedback*).ab,id,mh,sh,ti.	142	1
(match* AND function*).ab,id,mh,sh,ti.	28033	SK	(match* ADJ3 function*).ab,id,mh,sh,ti.	756	0
(mismatch* AND appeal*).ab,id,mh,sh,ti.	49	3	(mismatch* ADJ3 appeal*).ab,id,mh,sh,ti.	5	5
(mismatch* AND messag*).ab,id,mh,sh,ti.	139	3	(mismatch* ADJ3 messag*).ab,id,mh,sh,ti.	31	7
(mismatch* AND (frame OR framing OR frames)).ab,id,mh,sh,ti.	140	1	(mismatch* ADJ3 (frame OR framing OR frames)).ab,id,mh,sh,ti.	10	4
(mismatch* AND cultur*).ab,id,mh,sh,ti.	508	0	(mismatch* ADJ3 cultur*).ab,id,mh,sh,ti.	102	0
(mismatch* AND communicat*).ab,id,mh,sh,ti.	428	1	(mismatch* ADJ3 communicat*).ab,id,mh,sh,ti.	18	0
(mismatch* AND feedback*).ab,id,mh,sh,ti.	278	0	(mismatch* ADJ3 feedback*).ab,id,mh,sh,ti.	48	0
(mismatch* AND function*).ab,id,mh,sh,ti.	1643	0	(mismatch* ADJ3 function*).ab,id,mh,sh,ti.	57	0
(frame* AND appeal*).ab,id,mh,sh,ti.	1558	1	(frame* ADJ3 appeal*).ab,id,mh,sh,ti.	120	5
(messag* AND fram*).ab,id,mh,sh,ti.	3841	SK	(messag* ADJ3 fram*).ab,id,mh,sh,ti.	904	6
(cultur* AND fram*).ab,id,mh,sh,ti.	28227	SK	(cultur* ADJ3 fram*).ab,id,mh,sh,ti.	2870	SK
(frame* AND communicat*).ab,id,mh,sh,ti.	16489	SK	(frame* ADJ3 communicat*).ab,id,mh,sh,ti.	789	0
(frame* AND print).ab,id,mh,sh,ti.	624	0	(frame* ADJ3 print).ab,id,mh,sh,ti.	19	1
(frame* AND feedback).ab,id,mh,sh,ti.	3748	SK	(frame* ADJ3 feedback).ab,id,mh,sh,ti.	129	1
(positive* AND appeal*).ab,id,mh,sh,ti.	1634	2	(positive* ADJ3 appeal*).ab,id,mh,sh,ti.	114	2
(positive* AND message*).ab,id,mh,sh,ti.	5304	SK	(positive* ADJ3 message*).ab,id,mh,sh,ti.	759	1
(positive* AND fram*).ab,id,mh,sh,ti.	20881	SK	(positive* ADJ3 fram*).ab,id,mh,sh,ti.	1038	4
(positive* AND communicat*).ab,id,mh,sh,ti.	2189	SK	(positive* ADJ3 communicat*).ab,id,mh,sh,ti.	1678	0

	4				
(negative* AND appeal*).ab,id,mh,sh,ti.	1019	1	(negative* ADJ3 appeal*).ab,id,mh,sh,ti.	109	1
(negative* AND message*).ab,id,mh,sh,ti.	3997	SK	(negative* ADJ3 message*).ab,id,mh,sh,ti.	733	3
(negative* AND fram*).ab,id,mh,sh,ti.	13066	SK	(negative* ADJ3 fram*).ab,id,mh,sh,ti.	636	3
(negative* AND communicat*).ab,id,mh,sh,ti.	13668	SK	(negative* ADJ3 communicat*).ab,id,mh,sh,ti.	966	0
(type* AND appeal*).ab,id,mh,sh,ti.	1812	0	(type* ADJ3 appeal*).ab,id,mh,sh,ti.	235	0
(type* AND messag*).ab,id,mh,sh,ti.	4312	SK	(type* ADJ3 messag*).ab,id,mh,sh,ti.	717	2
(type* AND frame*).ab,id,mh,sh,ti.	18590	SK	(type* ADJ3 frame*).ab,id,mh,sh,ti.	472	0
(tailor* AND appeal*).ab,id,mh,sh,ti.	182	4	(tailor* ADJ3 appeal*).ab,id,mh,sh,ti.	15	4
(tailor* AND messag*).ab,id,mh,sh,ti.	974	3	(tailor* ADJ3 messag*).ab,id,mh,sh,ti.	480	4
(tailor* AND frame*).ab,id,mh,sh,ti.	1562	SK	(tailor* ADJ3 frame*).ab,id,mh,sh,ti.	68	0
(tailor* AND communicat*).ab,id,mh,sh,ti.	1770	SK	(tailor* ADJ3 communicat*).ab,id,mh,sh,ti.	238	2
(tailor* AND print).ab,id,mh,sh,ti.	160	1	(tailor* ADJ3 print).ab,id,mh,sh,ti.	70	8
(tailor* AND feedback*).ab,id,mh,sh,ti.	799	1	(tailor* ADJ3 feedback*).ab,id,mh,sh,ti.	234	5
(tailor* AND function*).ab,id,mh,sh,ti.	2380	SK	(tailor* ADJ3 function*).ab,id,mh,sh,ti.	51	0
(individuali* AND appeal*).ab,id,mh,sh,ti.	288	0	(individuali* ADJ3 appeal*).ab,id,mh,sh,ti.	31	2
(individuali* AND messag*).ab,id,mh,sh,ti.	416	1	(individuali* ADJ3 messag*).ab,id,mh,sh,ti.	45	0
(individuali* AND frame*).ab,id,mh,sh,ti.	3082	SK	(individuali* ADJ3 frame*).ab,id,mh,sh,ti.	152	0
(individuali* AND communicat*).ab,id,mh,sh,ti.	2580	SK	(individuali* ADJ3 communicat*).ab,id,mh,sh,ti.	263	0
(individuali* AND print).ab,id,mh,sh,ti.	104	0	(individuali* ADJ3 print).ab,id,mh,sh,ti.	6	1
(individuali* AND feedback*).ab,id,mh,sh,ti.	1112	0	(individuali* ADJ3 feedback*).ab,id,mh,sh,ti.	395	1
(personali* AND appeal*).ab,id,mh,sh,ti.	1050	0	(personali* ADJ3 appeal*).ab,id,mh,sh,ti.	51	0
(personali* AND messag*).ab,id,mh,sh,ti.	1456	2	(personali* ADJ3 messag*).ab,id,mh,sh,ti.	243	2
(personali* AND frame*).ab,id,mh,sh,ti.	9736	SK	(personali* ADJ3 frame*).ab,id,mh,sh,ti.	555	1
(personali* AND communicat*).ab,id,mh,sh,ti.	7981	SK	(personali* ADJ3 communicat*).ab,id,mh,sh,ti.	1581	SK
(personali* AND print).ab,id,mh,sh,ti.	175	0	(personali* ADJ3 print).ab,id,mh,sh,ti.	6	0
(personali* AND feedback*).ab,id,mh,sh,ti.	2883	SK	(personali* ADJ3 feedback*).ab,id,mh,sh,ti.	1131	0
(congruen* AND appeal*).ab,id,mh,sh,ti.	131	2	(congruen* ADJ3 appeal*).ab,id,mh,sh,ti.	9	8
(congruen* AND messag*).ab,id,mh,sh,ti.	409	5	(congruen* ADJ3 messag*).ab,id,mh,sh,ti.	92	6
(congruen* AND fram*).ab,id,mh,sh,ti.	1638	SK	(congruen* ADJ3 fram*).ab,id,mh,sh,ti.	91	3
(congruen* AND function*).ab,id,mh,sh,ti.	3266	SK	(congruen* ADJ3 function*).ab,id,mh,sh,ti.	150	0

(cultur* AND appeal*).ab,id,mh,sh,ti.	2361	SK	(cultur* ADJ3 appeal*).ab,id,mh,sh,ti.	121	2
(cultur* AND messag*).ab,id,mh,sh,ti.	4313	SK	(cultur* ADJ3 messag*).ab,id,mh,sh,ti.	513	0
(cultur* AND fram*).ab,id,mh,sh,ti.	28227	SK	(cultur* ADJ3 fram*).ab,id,mh,sh,ti.	2870	SK
(target* AND appeal*).ab,id,mh,sh,ti.	997	1	(target* ADJ3 appeal*).ab,id,mh,sh,ti.	94	1
(target* AND messag*).ab,id,mh,sh,ti.	3239	SK	(target* ADJ3 messag*).ab,id,mh,sh,ti.	624	0
(target* AND frame*).ab,id,mh,sh,ti.	9938	SK	(target* ADJ3 frame*).ab,id,mh,sh,ti.	296	0
(target* AND communicat*).ab,id,mh,sh,ti.	8716	SK	(target* ADJ3 communicat*).ab,id,mh,sh,ti.	618	0
(target* AND print).ab,id,mh,sh,ti.	479	1	(target* ADJ3 print).ab,id,mh,sh,ti.	34	2
(target* AND feedback*).ab,id,mh,sh,ti.	5405	SK	(target* ADJ3 feedback*).ab,id,mh,sh,ti.	330	1
(motiv* AND match*).ab,id,mh,sh,ti.	3895	SK	(motiv* ADJ3 match*).ab,id,mh,sh,ti.	173	0
(motiv* AND tailor*).ab,id,mh,sh,ti.	1640	SK	(motiv* ADJ3 tailor*).ab,id,mh,sh,ti.	91	1
(motiv* AND congruen*).ab,id,mh,sh,ti.	1290	0	(motiv* ADJ3 congruen*).ab,id,mh,sh,ti.	151	0
(cultur* AND tailor*).ab,id,mh,sh,ti.	2243	SK	(cultur* ADJ3 tailor*).ab,id,mh,sh,ti.	724	2
(cultur* AND target*).ab,id,mh,sh,ti.	10372	SK	(cultur* ADJ3 target*).ab,id,mh,sh,ti.	587	1
(framed appeal*).ab,id,mh,sh,ti.	28	10	("culturally matched" OR "cultural match*" OR "match cultural").ab,id,mh,sh,ti.	80	2
(framed messag*).ab,id,mh,sh,ti.	339	10	("matched communication").ab,id,mh,sh,ti.	0	0
(message fit).ab,id,mh,sh,ti.	5	3	("communication match*").ab,id,mh,sh,ti.	7	0
(gain-frame*).ab,id,mh,sh,ti.	351	9	(match* ADJ function*).ab,id,mh,sh,ti.	226	0
(loss-frame*).ab,id,mh,sh,ti.	402	8	(functional match*).ab,id,mh,sh,ti.	24	5
(regulatory fit).ab,id,mh,sh,ti.	256	2	((match* adj3 function*) not (imaging or neural or brain or magnetic)).ab,id,mh,sh,ti.	552	0
(congruency hypothesis).ab,id,mh,sh,ti.	69	1	("functional matching" OR "functionally matched").ab,id,mh,sh,ti.	33	3
(functional hypothesis).ab,id,mh,sh,ti.	41	0	(messag* ADJ2 fram*).ab,id,mh,sh,ti.	821	5
(framing effect).ab,id,mh,sh,ti.	389	0	(messag* ADJ fram*).ab,id,mh,sh,ti.	599	8
(functional theory).ab,id,mh,sh,ti.	266	0	(cultur* ADJ2 fram*).ab,id,mh,sh,ti.	1963	0
(functional approach).ab,id,mh,sh,ti.	720	1	(cultur* ADJ fram*).ab,id,mh,sh,ti.	964	0
(functional strategy).ab,id,mh,sh,ti.	20	0	(frame ADJ3 communication).ab,id,mh,sh,ti.	43	0
(tailored intervention*).ab,id,mh,sh,ti.	1167	0	(framed ADJ3 communication).ab,id,mh,sh,ti.	34	0
(Psychological* target*).ab,id,mh,sh,ti.	11	1	(positive* ADJ fram*).ab,id,mh,sh,ti.	367	5
(Psychological* tailor*).ab,id,mh,sh,ti.	4	3	(negative* ADJ appeal*).ab,id,mh,sh,ti.	27	4

(message fram*).ab,id,mh,sh,ti.	541	7	(negative* ADJ message*).ab,id,mh,sh,ti.	355	0
("self-congruity" OR "self-congruence").ab,id,mh,sh,ti.	870	0	(negative* ADJ fram*).ab,id,mh,sh,ti.	382	4
(attitud* AND function*).ab,id,mh,sh,ti.	2060 1	SK	(attitud* ADJ3 function*).ab,id,mh,sh,ti.	1352	1
(gain AND fram*).ab,id,mh,sh,ti.	4451	SK	(gain ADJ3 fram*).ab,id,mh,sh,ti.	563	7
(loss AND fram*).ab,id,mh,sh,ti.	4464	SK	(loss ADJ3 fram*).ab,id,mh,sh,ti.	607	4
(non-gain AND fram*).ab,id,mh,sh,ti.	9	5	(non-gain ADJ3 fram*).ab,id,mh,sh,ti.	4	3
(non-loss AND fram*).ab,id,mh,sh,ti.	8	5	(non-loss ADJ3 fram*).ab,id,mh,sh,ti.	3	2
(cultur* AND sensitiv*).ab,id,mh,sh,ti.	1357 2	SK	(cultur* ADJ3 sensitiv*).ab,id,mh,sh,ti.	6967	SK
(cultur* AND adapt*).ab,id,mh,sh,ti.	1944 0	SK	(cultur* ADJ3 adapt*).ab,id,mh,sh,ti.	5297	SK
(cultur* AND appropriate).ab,id,mh,sh,ti.	1204 0	SK	(cultur* ADJ3 appropriate).ab,id,mh,sh,ti.	3922	SK
(cultur* AND competen*).ab,id,mh,sh,ti.	1379 2	SK	(cultur* ADJ3 competen*).ab,id,mh,sh,ti.	6607	SK
(persuas* AND function*).ab,id,mh,sh,ti.	1220	0	(persuas* ADJ3 function*).ab,id,mh,sh,ti.	108	1
(motiv* AND function*).ab,id,mh,sh,ti.	2277 4	SK	(motiv* ADJ3 function*).ab,id,mh,sh,ti.	1997	SK
(functional* AND relevan*).ab,id,mh,sh,ti.	1378 7	SK	(functional* ADJ3 relevan*).ab,id,mh,sh,ti.	1580	SK
(match* AND (social-adjustive OR value-expressive OR hedonic OR utilitarian OR knowledge)).ab,id,mh,sh,ti.	5795	SK	(type* ADJ appeal*).ab,id,mh,sh,ti.	3	1
(tailor* AND (social-adjustive OR value-expressive OR hedonic OR utilitarian OR knowledge)).ab,id,mh,sh,ti.	2457	SK	(personali* ADJ communicat*).ab,id,mh,sh,ti.	1205	0
(congru* AND (social-adjustive OR value-expressive OR hedonic OR utilitarian OR knowledge)).ab,id,mh,sh,ti.	1616	SK	(congruen* ADJ5 appeal*).ab,id,mh,sh,ti.	22	5
(function* AND (social-adjustive OR value-expressive OR hedonic OR utilitarian OR knowledge)).ab,id,mh,sh,ti.	3191 2	SK	(congruen* ADJ5 messag*).ab,id,mh,sh,ti.	171	5
(match* AND (social-adjustive AND value-expressive)).ab,id,mh,sh,ti.	7	2	(congruen* ADJ2 function*).ab,id,mh,sh,ti.	72	1
(match* AND (social-adjustive AND hedonic)).ab,id,mh,sh,ti.	0	0	(congruen* ADJ function*).ab,id,mh,sh,ti.	11	1
(match* AND (social-adjustive AND	1	0	(cultur* ADJ appeal*).ab,id,mh,sh,ti.	71	0

utilitarian)).ab,id,mh,sh,ti.					
(match* AND (social-adjustive AND knowledge)).ab,id,mh,sh,ti.	0	0	(target* ADJ messag*).ab,id,mh,sh,ti.	131	1
(match* AND (value-expressive AND hedonic)).ab,id,mh,sh,ti.	0	0	(target* ADJ communicat*).ab,id,mh,sh,ti.	119	2
(match* AND (value-expressive AND utilitarian)).ab,id,mh,sh,ti.	4	2	(target* ADJ3 feedback*).ab,id,mh,sh,ti.	27	0
(match* AND (value-expressive AND knowledge)).ab,id,mh,sh,ti.	3	3	(motiv* adj2 tailor*).ab,id,mh,sh,ti.	62	1
(match* AND (hedonic AND utilitarian)).ab,id,mh,sh,ti.	21	8	(cultur* ADJ tailor*).ab,id,mh,sh,ti.	550	1
(match* AND (hedonic AND knowledge)).ab,id,mh,sh,ti.	5	0	(cultur* ADJ target*).ab,id,mh,sh,ti.	90	2
(match* AND (utilitarian AND knowledge)).ab,id,mh,sh,ti.	3	0	(functional AND (approach OR theory) AND (attitude OR persuasion)).ab,id,mh,sh,ti.	288	0
(congru* AND (social-adjustive AND value-expressive)).ab,id,mh,sh,ti.	3	0	(attitud* ADJ function*).ab,id,mh,sh,ti.	235	1
(congru* AND (social-adjustive AND hedonic)).ab,id,mh,sh,ti.	0	0	(cultur* ADJ3 sensitive ADJ3 messag*).ab,id,mh,sh,ti.	19	2
(congru* AND (social-adjustive AND utilitarian)).ab,id,mh,sh,ti.	0	0	(cultur* ADJ3 adapt* ADJ3 messag*).ab,id,mh,sh,ti.	4	0
(congru* AND (social-adjustive AND knowledge)).ab,id,mh,sh,ti.	0	0	(cultur* ADJ3 appropriate ADJ3 messag*).ab,id,mh,sh,ti.	27	0
(congru* AND (value-expressive AND hedonic)).ab,id,mh,sh,ti.	0	0	(cultur* ADJ3 sensitive ADJ3 appeal*).ab,id,mh,sh,ti.	0	0
(congru* AND (value-expressive AND utilitarian)).ab,id,mh,sh,ti.	1	1	(cultur* ADJ3 adapt* ADJ3 appeal*).ab,id,mh,sh,ti.	2	0
(congru* AND (value-expressive AND knowledge)).ab,id,mh,sh,ti.	0	0	(cultur* ADJ3 appropriate ADJ3 appeal*).ab,id,mh,sh,ti.	3	0
(congru* AND (hedonic AND utilitarian)).ab,id,mh,sh,ti.	20	7	(cultur* ADJ3 conpeten* ADJ3 messag*).ab,id,mh,sh,ti.	0	0
(congru* AND (hedonic AND knowledge)).ab,id,mh,sh,ti.	5	0	(motiv* ADJ function*).ab,id,mh,sh,ti.	603	0
(congru* AND (utilitarian AND knowledge)).ab,id,mh,sh,ti.	5	0	(motiv* ADJ3 function* ADJ3 attitud*).ab,id,mh,sh,ti.	25	1
(match* AND ("construal level")).ab,id,mh,sh,ti.	35	2	(functional* ADJ relevan*).ab,id,mh,sh,ti.	1131	0
(tailor* AND ("construal level")).ab,id,mh,sh,ti.	6	3	((messag* OR appeal*) AND (congru*) AND ("self-construal")).ab,id,mh,sh,ti.	5	4

(congru* AND ("construal level")).ab,id,mh,sh,ti.	16	7	((messag* OR appeal*) AND (fit) AND ("self-construal")).ab,id,mh,sh,ti.	2	2
(fit AND ("construal level")).ab,id,mh,sh,ti.	23	2	((messag* OR appeal*) AND (match*) AND (interdependen* AND independen*)).ab,id,mh,sh,ti.	9	9
(match* AND ("volunteer function*")).ab,id,mh,sh,ti.	5	1	((messag* OR appeal*) AND (tailor*) AND (interdependen* AND independen*)).ab,id,mh,sh,ti.	3	3
(tailor* AND ("volunteer function*")).ab,id,mh,sh,ti.	1	0	((messag* OR appeal*) AND (congru*) AND (interdependen* AND independen*)).ab,id,mh,sh,ti.	6	6
(congru* AND ("volunteer function*")).ab,id,mh,sh,ti.	2	0	((messag* OR appeal*) AND (fit) AND (interdependen* AND independen*)).ab,id,mh,sh,ti.	1	1
(fit AND ("volunteer function*")).ab,id,mh,sh,ti.	2	0	((messag* OR appeal*) AND (match*) AND (individual* AND collectiv*)).ab,id,mh,sh,ti.	15	4
(match* AND ("self-construal")).ab,id,mh,sh,ti.	26	3	((messag* OR appeal*) AND (tailor*) AND (individual* AND collectiv*)).ab,id,mh,sh,ti.	13	4
(tailor* AND ("self-construal")).ab,id,mh,sh,ti.	3	2	((messag* OR appeal*) AND (congru*) AND (individual* AND collectiv*)).ab,id,mh,sh,ti.	12	7
(congru* AND ("self-construal")).ab,id,mh,sh,ti.	38	0	((messag* OR appeal*) AND (fit) AND (individual* AND collectiv*)).ab,id,mh,sh,ti.	12	2
(fit AND ("self-construal")).ab,id,mh,sh,ti.	51	0	((messag* OR appeal*) AND (match*) AND (self-monitor*)).ab,id,mh,sh,ti.	15	7
(match* AND (interdependen* AND independen*)).ab,id,mh,sh,ti.	72	2	((messag* OR appeal*) AND (tailor*) AND (self-monitor*)).ab,id,mh,sh,ti.	23	1
(tailor* AND (interdependen* AND independen*)).ab,id,mh,sh,ti.	11	1	((messag* OR appeal*) AND (congru*) AND (self-monitor*)).ab,id,mh,sh,ti.	4	3
(congru* AND (interdependen* AND independen*)).ab,id,mh,sh,ti.	51	0	((messag* OR appeal*) AND (fit) AND (self-monitor*)).ab,id,mh,sh,ti.	3	0
(fit AND (interdependen* AND independen*)).ab,id,mh,sh,ti.	63	0	(match* ADJ3 advert*).ab,id,mh,sh,ti.	58	2
(match* AND (individual* AND collectiv*)).ab,id,mh,sh,ti.	284	0	(mismatch* ADJ3 advert*).ab,id,mh,sh,ti.	0	0
(tailor* AND (individual* AND collectiv*)).ab,id,mh,sh,ti.	94	0	(frame* ADJ3 advert*).ab,id,mh,sh,ti.	112	1
(congru* AND (individual* AND collectiv*)).ab,id,mh,sh,ti.	190	0	(cultur* ADJ3 advert*).ab,id,mh,sh,ti.	348	0
(fit AND (individual* AND collectiv*)).ab,id,mh,sh,ti.	346	0	(tailor* ADJ3 advert*).ab,id,mh,sh,ti.	24	1
(match* AND (self-monitor*)).ab,id,mh,sh,ti.	219	0	(individuali* ADJ3 advert*).ab,id,mh,sh,ti.	50	2
(tailor* AND (self-monitor*)).ab,id,mh,sh,ti.	113	0	(personali* ADJ3 advert*).ab,id,mh,sh,ti.	182	2

(congru* AND (self-monitor*)).ab,id,mh,sh,ti.	54	3	(congruen* ADJ3 advert*).ab,id,mh,sh,ti.	47	6
(fit AND (self-monitor*)).ab,id,mh,sh,ti.	88	0	(target* ADJ3 advert*).ab,id,mh,sh,ti.	387	0
"matching effect".id.	8	6	(match* AND ("stage* of change") AND (appeal* OR messag* OR advert*)).ab,id,mh,sh,ti.	6	4
(match* AND advert*).ab,id,mh,sh,ti.	554	2	(congru* AND ("stage* of change") AND (appeal* OR messag* OR advert*)).ab,id,mh,sh,ti.	0	0
(mismatch* AND advert*).ab,id,mh,sh,ti.	36	5	(tailor* AND ("stage* of change") AND (appeal* OR messag* OR advert*)).ab,id,mh,sh,ti.	29	2
(frame* AND advert*).ab,id,mh,sh,ti.	1600	SK	(match* AND ("transtheoretical model") AND (appeal* OR messag* OR advert*)).ab,id,mh,sh,ti.	5	2
(cultur* AND advert*).ab,id,mh,sh,ti.	2,193	SK	(congru* AND ("transtheoretical model") AND (appeal* OR messag* OR advert*)).ab,id,mh,sh,ti.	0	0
(tailor* AND advert*).ab,id,mh,sh,ti.	169	2	(tailor* AND ("transtheoretical model") AND (appeal* OR messag* OR advert*)).ab,id,mh,sh,ti.	17	4
(individuali* AND advert*).ab,id,mh,sh,ti.	237	0	(congru* AND ("stage* of change")).ab,id,mh,sh,ti.	22	0
(personali* AND advert*).ab,id,mh,sh,ti.	767	0	(tailor* AND ("stage* of change")).ab,id,mh,sh,ti.	269	2
(congruen* AND advert*).ab,id,mh,sh,ti.	303	1	(match* AND ("transtheoretical model")).ab,id,mh,sh,ti.	143	0
(target* AND advert*).ab,id,mh,sh,ti.	1,830	SK	(congru* AND ("transtheoretical model")).ab,id,mh,sh,ti.	9	0
(match* AND ("stage* of change")).ab,id,mh,sh,ti.	196	4	(tailor* AND ("transtheoretical model")).ab,id,mh,sh,ti.	202	1

[a]For the row entitled, “Rel. in 1st 10”, I examined the titles and abstracts of the first 10 results obtained in each query, and noted the number of hits that were publications related to message matching phenomena. In this column, “SK” means that I did not examine the results of a specific search strategy because it returned a very large number of hits and it was assumed that many of the hits would be unwanted results. This was operationalized as any single search query which resulted in over 1500 results.

Table C8. Cumulative and unique number of results obtained by adding an increasingly large number of search terms to a search strategy in *PsycInfo*.

Search Terms	Cumulative	New	Searched Alone
Set of Terms Prioritized for Theoretical Meaning (Conducted on 5/29/2018)			
(match* AND appeal*).ab,id,mh,sh,ti.	345	345	345
(match* AND messag*).ab,id,mh,sh,ti.	1129	784	848
(mismatch* AND appeal*).ab,id,mh,sh,ti.	1154	25	49
(mismatch* AND messag*).ab,id,mh,sh,ti.	1211	57	139
(frame* ADJ3 appeal*).ab,id,mh,sh,ti.	1324	113	120
(messag* ADJ3 fram*).ab,id,mh,sh,ti.	2125	801	904
(tailor* AND appeal*).ab,id,mh,sh,ti.	2283	158	182
(tailor* AND messag*).ab,id,mh,sh,ti.	3132	849	974
(congruen* AND appeal*).ab,id,mh,sh,ti.	3249	117	131
(congruen* AND messag*).ab,id,mh,sh,ti.	3570	321	409
(functional match*).ab,id,mh,sh,ti.	3579	9	80
("functionally matched").ab,id,mh,sh,ti.	3591	12	18
(Psychological* target*).ab,id,mh,sh,ti.	3601	10	11
(Psychological* tailor*).ab,id,mh,sh,ti.	3602	1	4
(match* AND advert*).ab,id,mh,sh,ti.	4038	436	554
(mismatch* AND advert*).ab,id,mh,sh,ti.	4047	9	36
(frame* ADJ3 advert*).ab,id,mh,sh,ti.	4136	89	112
(tailor* ADJ3 advert*).ab,id,mh,sh,ti.	4150	14	112
(congruen* AND advert*).ab,id,mh,sh,ti.	4316	166	303
Added Complementary Terms (Conducted on 5/29/2018)			
(match* ADJ3 (frame OR framing OR frames)).ab,id,mh,sh,ti.	4356	40	63
(mismatch* ADJ3 (frame OR framing OR frames)).ab,id,mh,sh,ti.	4364	8	10
(tailor* ADJ3 print).ab,id,mh,sh,ti.	4419	55	70
(tailor* ADJ3 feedback*).ab,id,mh,sh,ti.	4603	184	234
(congruen* ADJ3 fram*).ab,id,mh,sh,ti.	4678	75	91
(positive* ADJ fram*).ab,id,mh,sh,ti.	4950	272	367
(negative* ADJ appeal*).ab,id,mh,sh,ti.	4976	26	27
(negative* ADJ fram*).ab,id,mh,sh,ti.	5111	135	382
(message fit).ab,id,mh,sh,ti.	5115	4	5
(gain-frame*).ab,id,mh,sh,ti.	5203	88	351
(loss-frame*).ab,id,mh,sh,ti.	5256	53	402
(non-gain AND fram*).ab,id,mh,sh,ti.	5261	5	9
(non-loss AND fram*).ab,id,mh,sh,ti.	5262	1	8
(gain ADJ3 fram*).ab,id,mh,sh,ti.	5374	112	563
(loss ADJ3 fram*).ab,id,mh,sh,ti.	5476	102	607
(match* AND (social-adjustive AND value-expressive)).ab,id,mh,sh,ti.	5477	1	7
(match* AND (value-expressive AND utilitarian)).ab,id,mh,sh,ti.	5477	0	4
Additional Terms Added on 9/6/2018. Last step on this new date gave **5577 hits.**			
(match* AND (value-expressive AND knowledge)).ab,id,mh,sh,ti.	5577	0	3
(congru* AND (value-expressive AND utilitarian)).ab,id,mh,sh,ti.	5578	1	1
(congru* AND (hedonic AND utilitarian)).ab,id,mh,sh,ti.	5590	12	20
(match* AND ("construal level")).ab,id,mh,sh,ti.	5606	16	37
(tailor* AND ("construal level")).ab,id,mh,sh,ti.	5608	2	6
(congru* AND ("construal level")).ab,id,mh,sh,ti.	5615	7	17
(tailor* AND ("self-construal")).ab,id,mh,sh,ti.	5616	1	3

((messag* OR appeal*) AND (congru*) AND ("self-construal")).ab,id,mh,sh,ti.	5617	1	5
((messag* OR appeal*) AND (fit) AND ("self-construal")).ab,id,mh,sh,ti.	5619	2	2
((messag* OR appeal*) AND (match*) AND (interdependen* AND independen*)).ab,id,mh,sh,ti.	5619	0	9
((messag* OR appeal*) AND (tailor*) AND (interdependen* AND independen*)).ab,id,mh,sh,ti.	5619	0	3
((messag* OR appeal*) AND (congru*) AND (interdependen* AND independen*)).ab,id,mh,sh,ti.	5619	0	6
((messag* OR appeal*) AND (fit) AND (interdependen* AND independen*)).ab,id,mh,sh,ti.	5620	1	1
((messag* OR appeal*) AND (match*) AND (individual* AND collectiv*)).ab,id,mh,sh,ti.	5620	0	15
((messag* OR appeal*) AND (tailor*) AND (individual* AND collectiv*)).ab,id,mh,sh,ti.	5620	0	13
((messag* OR appeal*) AND (congru*) AND (individual* AND collectiv*)).ab,id,mh,sh,ti.	5620	0	12
((messag* OR appeal*) AND (fit) AND (individual* AND collectiv*)).ab,id,mh,sh,ti.	5630	10	12
((messag* OR appeal*) AND (match*) AND (self-monitor*)).ab,id,mh,sh,ti.	5630	0	15
((messag* OR appeal*) AND (congru*) AND (self-monitor*)).ab,id,mh,sh,ti.	5630	0	4
(match* AND ("stage* of change")).ab,id,mh,sh,ti.	5819	189	197
(tailor* AND ("stage* of change") AND (appeal* OR messag* OR advert*)).ab,id,mh,sh,ti.	5820	1	31
(match* AND ("transtheoretical model") AND (appeal* OR messag* OR advert*)).ab,id,mh,sh,ti.	5820	0	5
(tailor* AND ("transtheoretical model") AND (appeal* OR messag* OR advert*)).ab,id,mh,sh,ti.	5820	0	17

C5. Evaluating the Electronic Search Queries. To examine the success of my electronic search strategy to find articles on message matching, I put together a list of 60 previously published articles on message matching. This list was made up of the 38 articles I used in Table C1, along with an additional 22 articles.

Then, I examined the number of these articles identified by the final search queries I developed (see Appendix D), and compared this to the actual number of articles contained in the *PsycInfo* (Table C9), *MEDLINE* (Table C10), and *Scopus* databases (Table C11). This evaluation procedure was completed on November 18th, 2018.

Overall, 47 of the 60 articles were contained in *PsycInfo*, and the *PsycInfo* search query identified 40. In other words, the electronic search strategy correctly identified 85% of the articles in the *PsycInfo* sample.

Overall, 38 of the 60 articles were contained in *MEDLINE*, and the *MEDLINE* search query identified 29. In other words, the electronic search strategy correctly identified 76% of the articles in the *MEDLINE* sample.

Overall, 60 of the 60 articles were contained in *SCOPUS*, and the *SCOPUS* search query identified 45. In other words, the electronic search strategy correctly identified 75% of the articles in the *SCOPUS* sample.

Combined across databases, 49 articles were identified out of the set of 60, reflecting a coverage rate of around 82% for our electronic search strategy used in isolation.

Table C9. Examining Which Articles from a Sample of 60 Articles are (a) Accessible via *PsycInfo*, and (b) Identifiable via the Electronic Search Query Outlined in Appendix D

Article	In *PsycInfo*	Identified	Article	In *PsycInfo*	Identified
Aaker & Lee (2001)	1	0	Latimer, Katulak, Mowad, & Salovey (2005)	1	1
Abhyankar, O'Connor, & Lawton (2008)	1	1	Lavine & Snyder (1996)	1	1
Apanovitch, McCarthy, & Salovey (2003)	1	1	Lee & Aaker (2004)	1	1
Banks et al. (1995)	1	1	Lee, Liu, & Cheng (2018)	0	0
Bazzini & Shaffer (1995)	1	1	Lu et al. (2017)	0	0
Brinberg, Axelson, & Price (2000)	1	1	Lueck (2017)	1	1
Bull, Kreuter, & Scharff (1999)	1	1	Mann et al. (2004)	1	1
Campbell & Kay (2014)	1	0	Meldrum et al. (1994)	0	0
Campbell et al. (1994)	1	1	Nansel et al. (2002)	1	1
Cesario et al. (2013)	1	1	O'Connor, Ferguson, & O'Connor (2005)	1	1
Chiauzzi, Green, Lord, Thum, & Goldstein (2005)	1	0	Orbell & Kyriakaki (2008)	1	0
Clary et al. (1998)	1	1	Orleans et al. (1998)	1	1
de Vet et al. (2007)	1	0	Petty & Wegener (1998)	1	1
DeBono (1987)	1	1	Pfeffer (2013)	1	1
Detweiler, Bedell, Salovey, Pronin, & Rothman (1999)	1	1	Rothman et al. (1993)	1	1
Dutta-Bergman (2003)	1	1	Rothman, Martino, Bedell, Detweiler, & Salovey (1999)	1	1
Evans & Petty (2003)	1	1	Shavitt (1990)	1	1
Gallagher & Updegraff (2011).	1	1	Shen & Dillard (2007)	1	1
Gallagher et al. (2011)	1	1	Skinner et al. (1994)		0
Gerend et al. (2013)	0	0	Snyder & DeBono (1985)	1	0
Gotay et al. (2000)	0	0	Spittaels, De Bourdeaudhuij, Brug, & Vandelanotte (2006)	1	1
Han & Shavitt (1994)	1	1	Spivey et al. (1983)	1	1
Hébert et al. (2017)	0	0	Strecher et al. (2008)	1	1
Hirsh et al. (2012)	0	0	Tu et al. (2006)	0	0
Hullett & Boster (2001)	1	1	Uskul & Oyserman (2010)	1	1
Julka & Marsh (2005)	0	0	van Doorn & Hoekstra (2013)	1	0
Kang & Lakshmanan (2018)	0	0	Van't Riet, Ruiter, Werrij, Candel, & de Vries (2010)	1	1
Kidwell, Farmer, & Hardesty (2013)	1	1	Voelkel & Feinberg (2017)	0	0
Kingsbury, Gibbons, & Gerrard (2015)	1	1	Xue (2015)	1	1
Ko, Campbell, Lewis, Earp & DeVellis (2010)	1	1	Zhang et al. (2018)	0	0

Summary: In Total, 47 of the 60 articles were accessible via *PsycInfo*. Of these 47 articles, 40 (85%) were identified using the electronic search strategy in Appendix B.

Table C10. Examining Which Articles from a Sample of 60 Articles are (a) Accessible via *MEDLINE*, and (b) Identifiable via the Electronic Search Query Outlined in Appendix D

Article	In *MEDLINE*	Identified	Article	In *MEDLINE*	Identified
Aaker & Lee (2001)	0	0	Latimer, Katulak, Mowad, & Salovey (2005)	1	1
Abhyankar, O'Connor, & Lawton (2008)	1	1	Lavine & Snyder (1996)	1	1
Apanovitch, McCarthy, & Salovey (2003)	1	1	Lee & Aaker (2004)	1	1
Banks et al. (1995)	1	1	Lee, Liu, & Cheng (2018)	0	0
Bazzini & Shaffer (1995)	0	0	Lu et al. (2017)	0	0
Brinberg, Axelson, & Price (2000)	1	1	Lueck (2017)	1	1
Bull, Kreuter, & Scharff (1999)	1	0	Mann et al. (2004)	1	1
Campbell & Kay (2014)	1	0	Meldrum et al. (1994)	1	0
Campbell et al. (1994)	1	1	Nansel et al. (2002)	1	0
Cesario et al. (2013)	0	0	O'Connor, Ferguson, & O'Connor (2005)	1	1
Chiauzzi, Green, Lord, Thum, & Goldstein (2005)	1	0	Orbell & Kyriakaki (2008)	1	0
Clary et al. (1998)	1	1	Orleans et al. (1998)	1	1
de Vet et al. (2007)	1	1	Petty & Wegener (1998)	0	0
DeBono (1987)	0	0	Pfeffer (2013)	1	1
Detweiler, Bedell, Salovey, Pronin, & Rothman (1999)	1	1	Rothman et al. (1993)	0	0
Dutta-Bergman (2003)	1	1	Rothman, Martino, Bedell, Detweiler, & Salovey (1999)	0	0
Evans & Petty (2003)	1	1	Shavitt (1990)	0	0
Gallagher & Updegraff (2011).	1	1	Shen & Dillard (2007)	0	0
Gallagher et al. (2011)	1	1	Skinner et al. (1994)	1	1
Gerend et al. (2013)	1	1	Snyder & DeBono (1985)	0	0
Gotay et al. (2000)	1	0	Spittaels, De Bourdeaudhuij, Brug, & Vandelanotte (2006)	1	1
Han & Shavitt (1994)	0	0	Spivey et al. (1983)	0	0
Hébert et al. (2017)	1	1	Strecher et al. (2008)	1	0
Hirsh et al. (2012)	1	1	Tu et al. (2006)	1	0
Hullett & Boster (2001)	0	0	Uskul & Oyserman (2010)	1	1
Julka & Marsh (2005)	0	0	van Doorn & Hoekstra (2013)	0	0
Kang & Lakshmanan (2018)	1	1	Van't Riet, Ruiter, Werrij, Candel, & de Vries (2010)	0	0
Kidwell, Farmer, & Hardesty (2013)	0	0	Voelkel & Feinberg (2017)	0	0
Kingsbury, Gibbons, & Gerrard (2015)	1	1	Xue (2015)	0	0
Ko, Campbell, Lewis, Earp & DeVellis (2010)	1	1	Zhang et al. (2018)	0	0

Summary: In Total, 38 of the 60 articles were accessible via *MEDLINE*. Of these 38 articles, 29 (76%) were identified using the electronic search strategy in Appendix B.

Table C11. Examining Which Articles from a Sample of 60 Articles are (a) Accessible via *Scopus*, and (b) Identifiable via the Electronic Search Query Outlined in Appendix D

Article	In *Scopus*	Identified	Article	In *Scopus*	Identified
Aaker & Lee (2001)	1	0	Latimer, Katulak, Mowad, & Salovey (2005)	1	0
Abhyankar, O'Connor, & Lawton (2008)	1	1	Lavine & Snyder (1996)	1	1
Apanovitch, McCarthy, & Salovey (2003)	1	1	Lee & Aaker (2004)	1	1
Banks et al. (1995)	1	1	Lee, Liu, & Cheng (2018)	1	1
Bazzini & Shaffer (1995)	1	1	Lu et al. (2017)	1	1
Brinberg, Axelson, & Price (2000)	1	1	Lueck (2017)	1	1
Bull, Kreuter, & Scharff (1999)	1	0	Mann et al. (2004)	1	1
Campbell & Kay (2014)	1	0	Meldrum et al. (1994)	1	0
Campbell et al. (1994)	1	1	Nansel et al. (2002)	1	0
Cesario et al. (2013)	1	1	O'Connor, Ferguson, & O'Connor (2005)	1	1
Chiauzzi, Green, Lord, Thum, & Goldstein (2005)	1	0	Orbell & Kyriakaki (2008)	1	0
Clary et al. (1998)	1	1	Orleans et al. (1998)	1	0
de Vet et al. (2007)	1	1	Petty & Wegener (1998)	1	1
DeBono (1987)	1	1	Pfeffer (2013)	1	1
Detweiler, Bedell, Salovey, Pronin, & Rothman (1999)	1	1	Rothman et al. (1993)	1	1
Dutta-Bergman (2003)	1	1	Rothman, Martino, Bedell, Detweiler, & Salovey (1999)	1	1
Evans & Petty (2003)	1	1	Shavitt (1990)	1	1
Gallagher & Updegraff (2011).	1	1	Shen & Dillard (2007)	1	1
Gallagher et al. (2011)	1	1	Skinner et al. (1994)	1	1
Gerend et al. (2013)	1	1	Snyder & DeBono (1985)	1	0
Gotay et al. (2000)	1	0	Spittaels, De Bourdeaudhuij, Brug, & Vandelanotte (2006)	1	1
Han & Shavitt (1994)	1	1	Spivey et al. (1983)	1	1
Hébert et al. (2017)	1	1	Strecher et al. (2008)	1	1
Hirsh et al. (2012)	1	1	Tu et al. (2006)	1	0
Hullett & Boster (2001)	1	1	Uskul & Oyserman (2010)	1	1
Julka & Marsh (2005)	1	0	van Doorn & Hoekstra (2013)	1	0
Kang & Lakshmanan (2018)	1	1	Van't Riet, Ruiter, Werrij, Candel, & de Vries (2010)	1	1
Kidwell, Farmer, & Hardesty (2013)	1	1	Voelkel & Feinberg (2017)	1	0
Kingsbury, Gibbons, & Gerrard (2015)	1	1	Xue (2015)	1	1
Ko, Campbell, Lewis, Earp & DeVellis (2010)	1	1	Zhang et al. (2018)	1	1

Summary: In Total, 60 of the 60 articles were accessible via *Scopus*. Of these 60 articles, 45 (75%) were identified using the electronic search strategy in Appendix B.

C6. Forward and Backward Citation Searches. To complement the electronic search, I made use of two types of citation searches. First, I conducted a backward citation search by looking through the reference lists of past reviews and discussions of message matching techniques. In total, I identified 81 sources to use for a backward citation search, including narrative reviews, systematic reviews, meta-analyses, chapters, dissertations, and editorials. In addition to the backward citation search, I also conducted a forward citation search using the same 81 sources. The search was accomplished via *Web of Science* to identify reports that have cited these sources. The forward citation search also sought to identify works that cited a set of 33 influential and/or foundational studies in the message matching literature. The total of 114 sources are explicitly identified/listed in Appendix D (which provides the full registered search protocol). When an article was not indexed in *Web of Science,* a hand search of their reference list was conducted instead to accomplish the backwards citation search.

C7. Additional strategies to identify literature. Over the last few years, I have accumulated a list of message matching reports which were also used for this project. Many of the accumulated reports were identified via Google Scholar alerts for the terms "message matching", "message framing", and "message tailoring". The last alert considered for the current meta-analysis was received on December 19th, 2018.

Appendix D. Project 1 - Full Registered Search Strategy

D1. Electronic Search Strings. Tables D1, D2, and D3 present the electronic search queries used with *PsycInfo*, *MEDLINE*, and *Scopus*, respectively. The search strategies are broken up into steps for simplicity and organization of search terms. The steps were applied in order during the search process. However, a single search string can also combine every step to achieve the same result.

Table D1. Electronic Search Strategy for Use with *PsycInfo*

Steps	Label[a]	Search String
1	**Theoretically Preferred terms**	
1.1	a	((congruen* AND advert*) OR (congruen* AND appeal*) OR (congruen* AND messag*) OR (match* AND advert*) OR (match* AND appeal*) OR (match* AND messag*) OR (mismatch* AND advert*) OR (mismatch* AND appeal*) OR (mismatch* AND messag*) OR (tailor* AND appeal*) OR (tailor* AND messag*)).ab,id,ti.
1.2	b	((frame* ADJ3 advert*) OR (frame* ADJ3 appeal*) OR (messag* ADJ3 fram*) OR (tailor* ADJ3 advert*)).ab,id,ti.
1.3	c	(("functionally matched") OR (functional match*) OR (Psychological* tailor*) OR (Psychological* target*)).ab,id,ti.
2	**Additional Specific terms**	
2.1	a	((congru* AND ("construal level")) OR (match* AND ("construal level")) OR (match* AND ("self-construal")) OR (match* AND ("stage* of change")) OR (non-gain AND fram*) OR (non-loss AND fram*) OR (tailor* AND ("construal level")) OR (tailor* AND ("self-construal"))).ab,id,ti.
2.2	b	((congruen* ADJ3 fram*) OR (cultur* ADJ2 messag*) OR (cultur* ADJ3 appeal*) OR (gain ADJ3 fram*) OR (individuali* ADJ3 advert*) OR (individuali* ADJ3 appeal*) OR (loss ADJ3 fram*) OR

		(motiv* ADJ2 tailor*) OR (negative* ADJ appeal*) OR (negative* ADJ fram*) OR (positive* ADJ fram*) OR (positive* ADJ3 appeal*) OR (tailor* ADJ3 feedback*) OR (tailor* ADJ3 print) OR (target* ADJ3 print)).ab,id,ti.
2.3	c	(("attitud* function*") OR ("computer tailor*") OR ("congruency hypothesis") OR ("cultural tailoring") OR ("self-congruence") OR (gain-frame*) OR (loss-frame*) OR (message fit)).ab,id,ti.
2.4	d	((congru* AND (hedonic AND utilitarian)) OR (congru* AND (value-expressive AND utilitarian)) OR (match* ADJ3 (frame OR framing OR frames)) OR (match* AND (social-adjustive AND value-expressive)) OR (match* AND ("transtheoretical model") AND (appeal* OR messag* OR advert*)) OR (match* AND (value-expressive AND knowledge)) OR (match* AND (value-expressive AND utilitarian)) OR ((messag* OR appeal*) AND (congru*) AND ("self-construal")) OR ((messag* OR appeal*) AND (congru*) AND (individual* AND collectiv*)) OR ((messag* OR appeal*) AND (congru*) AND (interdependen* AND independen*)) OR ((messag* OR appeal*) AND (congru*) AND (self-monitor*)) OR ((messag* OR appeal*) AND (fit) AND ("self-construal")) OR ((messag* OR appeal*) AND (fit) AND (individual* AND collectiv*)) OR ((messag* OR appeal*) AND (fit) AND (interdependen* AND independen*)) OR ((messag* OR appeal*) AND (match*) AND (individual* AND collectiv*)) OR ((messag* OR appeal*) AND (match*) AND (interdependen* AND independen*)) OR ((messag* OR appeal*) AND (match*) AND (self-monitor*)) OR ((messag* OR appeal*) AND (tailor*) AND (individual* AND collectiv*)) OR ((messag* OR appeal*) AND (tailor*) AND (interdependen* AND independen*)) OR (mismatch* ADJ3 (frame OR framing OR frames)) OR (tailor* AND ("stage* of change") AND (appeal* OR messag* OR advert*)) OR (tailor* AND ("transtheoretical model") AND (appeal* OR messag* OR advert*)) OR (tailor* AND communicat* AND generic)).ab,id,ti.
3	**Subject Heading**	
3.1		("Framing Effects").mh,sh.
4	**Limits**	
4.1		NOT (Authored Book OR Book OR Chapter OR Edited Book).pt
4.2		and English.lg.

[a]For Labels: a = 2 terms combined with an "AND" operator; b = 2 terms combined with an adjacency operator; c = exact expressions (allowing wildcard); d = more complex combination of 3 or more terms.

Table D2. Electronic Search Strategy for Use with *MEDLINE*

Steps	Label[a]	Search String
1	**Theoretically Preferred terms**	
1.1	a	((congruen* AND advert*) OR (congruen* AND messag*) OR (match* AND appeal*) OR (match* AND messag*) OR (mismatch* AND advert*) OR (mismatch* AND appeal*) OR (mismatch* AND messag*) OR (tailor* AND appeal*)).mp.
1.2	b	((congruen* ADJ3 appeal*) OR (frame* ADJ3 advert*) OR (frame* ADJ3 appeal*) OR (match* ADJ3 advert*) OR (messag* ADJ3 fram*) OR (tailor* ADJ messag*) OR (tailor* ADJ3 advert*)).mp.
1.3	c	(("functionally matched") OR (functional match*) OR (psychological* tailor*) OR (psychological* target*)).mp.
2	**Additional Specific terms**	
2.1	a	((congru* AND ("construal level")) OR (congru* AND ("self-construal")) OR (fit AND ("self-construal")) OR (match* AND ("construal level")) OR (match* AND ("self-construal")) OR (match* AND ("stage* of change")) OR (match* AND ("transtheoretical model")) OR (match* AND ("volunteer function*")) OR (non-gain AND fram*) OR (non-loss AND fram*) OR (tailor* AND ("construal level"))).mp.
2.2	b	((congruen* ADJ3 fram*) OR (cultur* adj2 appeal*) OR (cultur* ADJ2 messag*) OR (frame* ADJ3 print) OR (gain ADJ3 fram*) OR (individuali* ADJ3 advert*) OR (individuali* ADJ3 appeal*) OR (individuali* ADJ3 messag*) OR (loss ADJ3 fram*) OR (motiv* ADJ2 tailor*) OR (motiv* ADJ3 congruen*) OR (negative* ADJ1 fram*) OR (negative* ADJ3 appeal*) OR (personali* ADJ3 advert*) OR (personali* ADJ3 appeal*) OR (positive* ADJ3 appeal*) OR (positive* ADJ1 fram*) OR (tailor* ADJ3 print) OR (target* ADJ3 print) OR

		(type* ADJ3 appeal*)).mp.
2.3	c	(("attitud* function*") OR ("computer tailor*") OR ("congruency hypothesis") OR ("cultural tailoring") OR ("tailored feedback") OR (gain-frame*) OR (loss-frame*) OR (message fit)).mp.
2.4	d	((match* ADJ3 (frame OR framing OR frames)) OR (match* AND (hedonic AND utilitarian)) OR (match* AND (social-adjustive AND value-expressive)) OR ((messag* OR appeal*) AND (congru*) AND ("self-construal")) OR ((messag* OR appeal*) AND (congru*) AND (individual* AND collectiv*)) OR ((messag* OR appeal*) AND (congru*) AND (interdependen* AND independen*)) OR ((messag* OR appeal*) AND (congru*) AND (self-monitor*)) OR ((messag* OR appeal*) AND (fit) AND ("self-construal")) OR ((messag* OR appeal*) AND (match*) AND (individual* AND collectiv*)) OR ((messag* OR appeal*) AND (match*) AND (interdependen* AND independen*)) OR ((messag* OR appeal*) AND (match*) AND (self-monitor*)) OR ((messag* OR appeal*) AND (tailor*) AND (individual* AND collectiv*)) OR ((messag* OR appeal*) AND (tailor*) AND (interdependen* AND independen*)) OR ((messag* OR appeal*) AND (tailor*) AND (self-monitor*)) OR (tailor* AND ("transtheoretical model") AND (appeal* OR messag* OR advert*))).mp.
3	**Limits**	
3.1		NOT (Autobiography OR Advertisements OR Almanacs OR Animation OR Annual Reports OR Biography OR Comment OR Congresses OR "Consensus Development Conference" OR Dictionary OR Editorial OR Eulogies OR "Government Publications" OR Guideline OR Interview OR "Introductory Journal Article" OR Lectures OR Letter OR News OR "Newspaper Article" OR "Patient Education Handout" OR "Practice Guideline" OR "Published Erratum" OR "Retracted Publication").pt
3.2		and English.lg.

[a]For Labels: a = 2 terms combined with an “AND” operator; b = 2 terms combined with an adjacency operator; c = exact expressions (allowing wildcard); d = more complex combination of 3 or more terms.

Table D3. Electronic Search Strategy for Use with *Scopus*

Steps	Label[a]	Search String
1	**Theoretically Preferred terms**	
1.1	a	TITLE-ABS-KEY ((congruen* AND advert*) OR (congruen* AND messag*) OR (mismatch* AND advert*))
1.2	b	TITLE-ABS-KEY ((congruen* W/3 appeal*) OR (frame* W/1 appeal*) OR (frame* W/3 advert*) OR (match* W/3 advert*) OR (match* W/3 appeal*) OR (match* W/3 messag*) OR (messag* W/0 fram*) OR (mismatch* W/3 appeal*) OR (mismatch* W/3 messag*) OR (tailor* W/3 advert*) OR (tailor* W/3 appeal*) OR (tailor* W/3 messag*))
1.3	c	TITLE-ABS-KEY (("functional match*") OR ("functionally matched") OR ("psychological* tailor*") OR ("psychological* target*"))
2	**Additional Specific terms**	
2.1	a	TITLE-ABS-KEY ((congru* AND ("construal level")) OR (congru* AND ("self-construal")) OR (congru* AND (self-monitor*)) OR (fit AND ("construal level")) OR (fit AND ("self-construal")) OR (match* AND ("construal level")) OR (match* AND ("self-construal")) OR (match* AND ("stage* of change")) OR (match* AND ("transtheoretical model")) OR (non-gain AND fram*) OR (non-loss AND fram*) OR (tailor* AND ("construal level")) OR (tailor* AND ("self-construal")))
2.2	b	TITLE-ABS-KEY ((congruen* W/3 fram*) OR (cultur* W/2 messag*) OR (individuali* W/3 advert*) OR (individuali* W/3 appeal*) OR (individuali* W/3 messag*) OR (motiv* W/1 tailor*) OR (negative* W/3 appeal*) OR (tailor* W/2 feedback*) OR (tailor* W/3 print) OR (type* W/3 appeal*))
2.3	c	TITLE-ABS-KEY (("attitud* function*") OR ("computer tailored") OR ("computer tailoring") OR ("cultural tailoring") OR ("gain fram*") OR ("gain-frame*") OR ("loss fram*") OR

		("loss-frame*") OR ("message fit") OR ("negatively framed") OR ("positively framed") OR ("self-congruence"))
2.4	d	TITLE-ABS-KEY ((congru* AND ("big 5" OR "big five") AND (appeal* OR messag*)) OR (congru* AND (hedonic AND utilitarian)) OR (congru* AND (liberal* AND conservative*)) OR (congru* AND (partisan AND nonpartisan)) OR (congru* AND ((selfish OR egoistic) AND (altruistic OR selfless))) OR (congru* AND (utilitarian AND knowledge)) OR (congru* AND (value-expressive AND knowledge)) OR (congru* AND (value-expressive AND utilitarian)) OR (match* AND ("big 5" OR "big five") AND (appeal* OR messag*)) OR (match* AND (hedonic AND utilitarian)) OR (match* AND (interdependen* AND independen*)) OR (match* AND (liberal* AND conservative*)) OR (match* AND ((selfish OR egoistic) AND (altruistic OR selfless))) OR (match* AND (social-adjustive AND knowledge)) OR (match* AND (social-adjustive AND object-appraisal)) OR (match* AND (social-adjustive AND utilitarian)) OR (match* AND (social-adjustive AND value-expressive)) OR (match* AND (value-expressive AND knowledge)) OR (match* AND (value-expressive AND utilitarian)) OR ((messag* OR appeal*) AND (congru*) AND (individual* AND collectiv*)) OR ((messag* OR appeal*) AND (fit) AND (individual* AND collectiv*)) OR ((messag* OR appeal*) AND (match*) AND (individual* AND collectiv*)) OR ((messag* OR appeal*) AND (match*) AND (self-monitor*)) OR ((messag* OR appeal*) AND (tailor*) AND (individual* AND collectiv*)) OR (mismatch* W/3 (frame OR framing OR frames)) OR (tailor* AND ("big 5" OR "big five") AND (appeal* OR messag*)) OR (tailor* AND (interdependen* AND independen*)) OR (tailor* AND ("stage* of change") AND (appeal* OR messag* OR advert*)))
3	**Limits**	
3.1	-	(LIMIT-TO (LANGUAGE , "English"))
3.2	-	NOT DOCTYPE(bk OR ch OR cr OR ed OR er OR le OR no OR pr OR re)

[a]For Labels: a = 2 terms combined with an “AND” operator; b = 2 terms combined with an adjacency operator; c = exact expressions (allowing wildcard); d = more complex combination of 3 or more terms.

D2. Forward and Backward Citation Searches. To complement the electronic search, I made use of two types of citation searches: backward and forward citation searches. First, I identified 81 reviews to use for a backward citation search, including narrative reviews, systematic reviews, meta-analyses, chapters, dissertations, and editorials. These sources are indicated in the reference list within Table D4. In addition to the backward citation search, I also conducted a forward citation search using the same 81 sources. Additionally, a forward citation search was also conducted to identify works that have cited a set of 33 influential and/or foundational empirical studies in the message matching literature. These articles are also identified in the reference list in Table D4. The citation searches were accomplished using *Web of Science.*

Table D4. List of Sources used for Backward and Forward Citation Searches

Source	Empirical Study	Review
Aaker, J. L., & Lee, A. Y. (2001). "I" seek pleasures and "we" avoid pains: The role of self-regulatory goals in information processing and persuasion. *Journal of Consumer Research, 28*(1), 33-49.	x	
Abrams, D. B., Mills, S., & Bulger, D. (1999). Challenges and future directions for tailored communication research. *Annals of Behavioral Medicine, 21*(4), 299-306.		x
Alden, D. L., Friend, J., Schapira, M., & Stiggelbout, A. (2014). Cultural targeting and tailoring of shared decision making technology: a theoretical framework for improving the effectiveness of patient decision aids in culturally diverse groups. *Social Science & Medicine, 105*, 1-8.		x
Anderson, L. R. (2011). *Refining what works in tailoring: Comprehensive meta-analysis of computer-tailored interventions*. Dissertations and Master's Theses (Campus Access). Paper AAI3465908. Retrieved from https://digitalcommons.uri.edu/dissertations/AAI3465908		x
Apanovitch, A. M., McCarthy, D., & Salovey, P. (2003). Using message framing to motivate HIV testing among low-income, ethnic minority women. *Health Psychology, 22*(1), 60.	x	
Bridle, C., Riemsma, R. P., Pattenden, J., Sowden, A. J., Mather, L., Watt, I. S., & Walker, A. (2005). Systematic review of the effectiveness of health behavior interventions based on the transtheoretical model. *Psychology & Health, 20*(3), 283-301.		x

Brug, J., Campbell, M., & van Assema, P. (1999). The application and impact of computer-generated personalized nutrition education: a review of the literature. *Patient Education and Counseling, 36*(2), 145-156.		x
Brug, J., Oenema, A., & Campbell, M. (2003). Past, present, and future of computer-tailored nutrition education. T*he American Journal of Clinical Nutrition, 77*(4), 1028S-1034S.		x
Bull, F. C., Kreuter, M. W., & Scharff, D. P. (1999). Effects of tailored, personalized and general health messages on physical activity. *Patient Educ Couns, 36*(2), 181-192.	x	
Campbell, M. K., DeVellis, B. M., Strecher, V. J., Ammerman, A. S., DeVellis, R. F., & Sandler, R. S. (1994). Improving dietary behavior: the effectiveness of tailored messages in primary care settings. *American Journal of Public Health, 84*(5), 783-787.	x	
Carpenter, C. J. (2012). A meta-analysis of the functional matching effect based on functional attitude theory. *Southern Communication Journal, 77*(5), 438-451.		x
Carpenter, C., Boster, F. J., & Andrews, K. R. (2013). *Functional attitude theory.* The Sage handbook of persuasion: Developments in theory and practice, 104-119.		x
Cesario, J., Corker, K. S., & Jelinek, S. (2013). A self-regulatory framework for message framing. *Journal of Experimental Social Psychology, 49*(2), 238-249.	x	
Clary, E. G., & Snyder, M. (1999). The Motivations to Volunteer: Theoretical and Practical Considerations. *Current Directions in Psychological Science, 8*(5), 156-159. doi:10.1111/1467-8721.00037	x	
Clary, E. G., Snyder, M., Ridge, R. D., Miene, P. K., & Haugen, J. A. (1994b). Matching Messages to Motives in Persuasion: A Functional Approach to Promoting Volunteerism. *Journal of Applied Social Psychology, 24*(13), 1129-1146. doi:10.1111/j.1559-1816.1994.tb01548.x	x	
Clary, E. G., Snyder, M., Ridge, R. D., Copeland, J., Stukas, A. A., Haugen, J., & Miene, P. (1998). Understanding and Assessing the Motivations of Volunteers: A Functional Approach. *J Pers Soc Psychol, 74*(6), 1516-1530	x	
Conway, N., Webster, C., Smith, B., & Wake, D. (2017). eHealth and the use of individually tailored information: a systematic review. *Health Informatics Journal, 23*(3), 218-233.		x
Covey, J. (2014). The role of dispositional factors in moderating message framing effects. *Health Psychology, 33*(1), 52.		x
DeBono, K. G. (1987). Investigating the social-adjustive and value-expressive functions of attitudes: Implications for persuasion processes. *J Pers Soc Psychol, 52*(2), 279.	x	
DeBono, K. G. (2000). Attitude functions and consumer psychology: Understanding perceptions of product quality. In G. R. Maio & J. M. Olson (Eds.), *Why we evaluate: Functions of attitudes* (1 ed., pp. 195-221). New York: Psychology Press.		x
Detweiler, J. B., Bedell, B. T., Salovey, P., Pronin, E., & Rothman, A. J. (1999). Message framing and sunscreen use: gain-framed messages motivate beach-goers. *Health Psychology*, *18*(2), 189.	x	
Dijkstra, A. (2008). The psychology of tailoring-ingredients in computer-tailored persuasion. *Social and Personality Psychology Compass, 2*(2), 765-784.		x
Enwald, H. P. K., & Huotari, M. L. A. (2010). Preventing the obesity epidemic by second generation tailored health communication: an interdisciplinary review. *Journal of medical Internet research, 12*(2).		x
Finitsis, D. J., Pellowski, J. A., & Johnson, B. T. (2014). Text message intervention designs to promote adherence to antiretroviral therapy (ART): a meta-analysis of randomized controlled trials. *PloS one, 9*(2), e88166.		x
Gallagher, K. M., & Updegraff, J. A. (2012). Health message framing effects on attitudes, intentions, and behavior: a meta-analytic review. *Ann Behav Med, 43*(1), 101-116. doi:10.1007/s12160-011-9308-7		x
Ganzach, Y., & Karsahi, N. (1995). Message framing and buying behavior: A field experiment. *Journal of Business Research, 32*(1), 11-17.	x	
Gardner, W. L., Gabriel, S., & Lee, A. Y. (1999). “I” value freedom, but “we” value	x	

relationships: Self-construal priming mirrors cultural differences in judgment. *Psychol Sci, 10*(4), 321-326.

Gerend, M. A., & Shepherd, J. E. (2007). Using message framing to promote acceptance of the human papillomavirus vaccine. *Health Psychology, 26*(6), 745. x

Gould, G. S., McEwen, A., Watters, T., Clough, A. R., & van der Zwan, R. (2013). Should anti-tobacco media messages be culturally targeted for Indigenous populations? A systematic review and narrative synthesis. *Tobacco Control, 22*(4), e7-e7. x

Grewal, D., Motyka, S., Puccinelli, N. M., Roggeveen, A. L., Daryanto, A., de Ruyter, K., & Wetzels, M. (2011). Understanding how to achieve competitive advantage through regulatory fit: a meta-analysis. *Marketing Science Institute Research Report*, 10-117. x

Han, S.-P., & Shavitt, S. (1994). Persuasion and culture: Advertising appeals in individualistic and collectivistic societies. *Journal of Experimental Social Psychology, 30*(4), 326-350. x

Hartmann-Boyce, J., Lancaster, T., & Stead, L. F. (2014). Print-based self-help interventions for smoking cessation. *Cochrane Database of Systematic Reviews*, (6). x

Hawkins, R. P., Kreuter, M., Resnicow, K., Fishbein, M., & Dijkstra, A. (2008). Understanding tailoring in communicating about health. *Health Educ Res*, *23*(3), 454-466. x

Head, K. J., Noar, S. M., Iannarino, N. T., & Harrington, N. G. (2013). Efficacy of text messaging-based interventions for health promotion: a meta-analysis. *Social Science & Medicine, 97*, 41-48. x

Heo, H. H., & Braun, K. L. (2014). Culturally tailored interventions of chronic disease targeting Korean Americans: a systematic review. *Ethnicity & Health, 19*(1), 64-85. x

Herek, G. M. (1986). The Instrumentality of Attitudes: Toward a Neofunctional Theory. *Journal of Social Issues, 42*(2), 99-114. x

Herek, G. M. (1987). Can functions be measured? A new perspective on the functional approach to attitudes. *Social Psychology Quarterly*, 285-303. x

Hornikx, J. M. A., & O'Keefe, D. J. (2009a). *Adapting consumer advertising appeals to cultural values: A meta-analytic review of effects on persuasiveness and ad liking*. In C. S. Beck (Ed.), Communication Yearbook 33 (pp. 38-71). New York: Lawrence Erlbaum. x

Hornikx, J., & O'Keefe, D. J. (2009b). Adapting consumer advertising appeals to cultural values a meta-analytic review of effects on persuasiveness and ad liking. *Annals of the International Communication Association, 33*(1), 39-71. x

Huang, Y., & Shen, F. (2016). Effects of Cultural Tailoring on Persuasion in Cancer Communication: A Meta-Analysis. *Journal of Communication, 66*(4), 694-715. x

Hutchison, A. J., Breckon, J. D., & Johnston, L. H. (2009). Physical activity behavior change interventions based on the transtheoretical model: a systematic review. *Health Education & Behavior, 36*(5), 829-845 x

Johar, J. S., & Sirgy, M. J. (1991). Value-expressive versus utilitarian advertising appeals: When and why to use which appeal. *Journal of Advertising, 20*(3), 23-33. x

Katz, D. (1960). The functional approach to the study of attitudes. *Public Opinion Quarterly*, 24(2), 163-204. doi:10.1086/266945 x

Keller, P. A., & Lehmann, D. R. (2008). Designing effective health communications: a meta-analysis. *Journal of Public Policy & Marketing, 27*(2), 117-130. x

Kidwell, B., Farmer, A., & Hardesty, D. M. (2013). Getting liberals and conservatives to go green: Political ideology and congruent appeals. *Journal of Consumer Research, 40*(2), 350-367. x

Krebs, P., Prochaska, J. O., & Rossi, J. S. (2010). A meta-analysis of computer-tailored interventions for health behavior change. *Prev Med, 51*(3-4), 214-221. x

Kreuter, M. W., & Skinner, C. S. (2000). Tailoring: what's in a name? *Health Educ Res, 14*(1), 1-4. doi:https://doi.org/10.1093/her/15.1.1 x

Kreuter, M. W., Strecher, V. J., & Glassman, B. (1999). One size does not fit all: the case for tailoring print materials. *Annals of Behavioral Medicine, 21*(4), 276-283. x

Kroeze, W., Werkman, A., & Brug, J. (2006). A systematic review of randomized trials on the effectiveness of computer-tailored education on physical activity and dietary behaviors. *Annals of Behavioral Medicine, 31*, 205–223. doi: 10.1207/s15324796abm3103_2		x
Lagisetty, P. A., Priyadarshini, S., Terrell, S., Hamati, M., Landgraf, J., Chopra, V., & Heisler, M. (2017). Culturally targeted strategies for diabetes prevention in minority population: a systematic review and framework. *The Diabetes Educator, 43*(1), 54-77.		x
Lancaster, T., & Stead, L. F. (2005). Self-help interventions for smoking cessation. *Cochrane Database Syst Rev, 3*(3).		x
Latimer, A. E., Brawley, L. R., & Bassett, R. L. (2010). A systematic review of three approaches for constructing physical activity messages: what messages work and what improvements are needed?. *International Journal of Behavioral Nutrition and Physical Activity, 7*(1), 36.		x
Lavine, H., & Snyder, M. (1996). Cognitive processing and the functional matching effect in persuasion: The mediating role of subjective perceptions of message quality. *Journal of Experimental Social Psychology, 32*(6), 580-604.	x	
Lavine, H., & Snyder, M. (2000). Cognitive processes and the functional matching effect in persuasion: Studies of personality and political behavior. In G. R. Maio & J. M. Olson (Eds.), *Why we evaluate: Functions of attitudes* (pp. 97-131). Mahwah. New Jersey: Lawrence erlbaum Associates.		x
Lee, A. Y., & Aaker, J. L. (2004). Bringing the frame into focus: the influence of regulatory fit on processing fluency and persuasion. *Journal of Personality and Social Psychology, 86*(2), 205.	x	
Levin, I. P., Schneider, S. L., & Gaeth, G. J. (1998). All frames are not created equal: A typology and critical analysis of framing effects. *Organizational Behavior and Human Decision Processes, 76*(2), 149-188.		x
Ludolph, R., & Schulz, P. J. (2015). Does regulatory fit lead to more effective health communication? A systematic review. *Soc Sci Med, 128*, 142-150.		x
Lustria, M. L., Cortese, J., Noar, S. M., & Glueckauf, R. L. (2009). Computer-tailored health interventions delivered over the Web: review and analysis of key components. *Patient Educ Couns, 74*(2), 156-173. doi:10.1016/j.pec.2008.08.023		x
Lustria, M. L. A., Noar, S. M., Cortese, J., Van Stee, S. K., Glueckauf, R. L., & Lee, J. (2013). A meta-analysis of web-delivered tailored health behavior change interventions. *J Health Commun, 18*(9), 1039-1069.		x
Maio, G. R., & Olson, J. M. (1994). Value—attitude-behaviour relations: The moderating role of attitude functions. *British Journal of Social Psychology, 33*(3), 301-312.	x	
Maio, G. R., & Olson, J. M. (1995). Relations between values, attitudes, and behavioral intentions: The moderating role of attitude function. *Journal of Experimental Social Psychology, 31*(3), 266-285.	x	
Mann, T., Sherman, D., & Updegraff, J. (2004). Dispositional motivations and message framing: a test of the congruency hypothesis in college students. *Health Psychology, 23*(3), 330.	x	
Marcus, B. H., Lewis, B. A., Williams, D. M., Dunsiger, S., Jakicic, J. M., Whiteley, J. A., … Parisi, A. F. (2007). A comparison of Internet and print-based physical activity interventions. *Archives of Internal Medicine, 167*, 944–949. doi: 10.1001/archinte. 167.9.944		x
Marshall, S. J., & Biddle, S. J. (2001). The transtheoretical model of behavior change: a meta-analysis of applications to physical activity and exercise. *Annals of Behavioral Medicine, 23*(4), 229-246.		x
Meyerowitz, B. E., & Chaiken, S. (1987). The effect of message framing on breast self-examination attitudes, intentions, and behavior. *J Pers Soc Psychol, 52*(3), 500.	x	
Motyka, S., Grewal, D., Puccinelli, N. M., Roggeveen, A. L., Avnet, T., Daryanto, A., . . . Wetzels, M. (2014). Regulatory fit: A meta-analytic synthesis. *Journal of Consumer Psychology, 24*(3), 394-410.		x

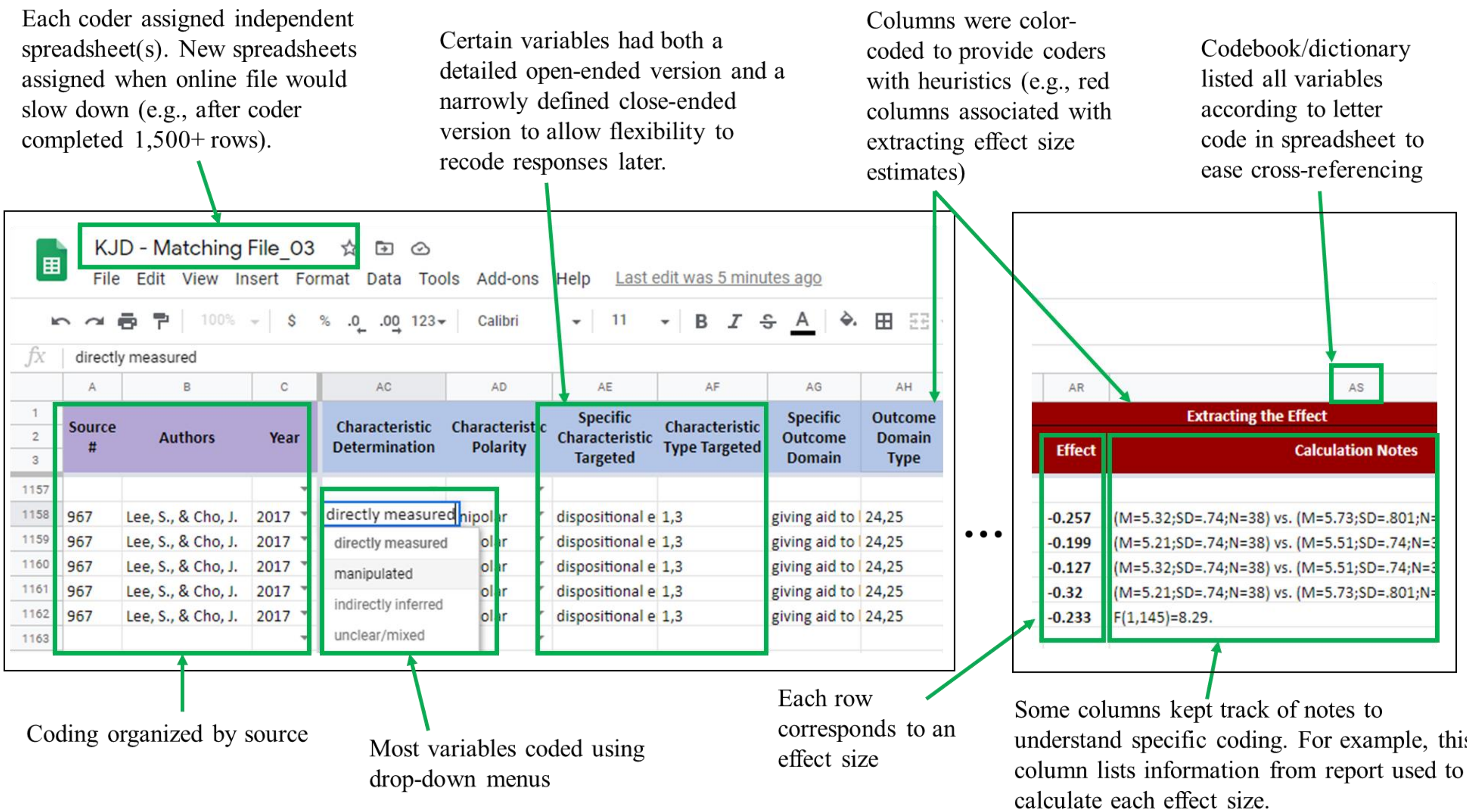
Neville, L. M., Milat, A. J., & O'Hara, B. (2009). Computer-tailored weight reduction interventions targeting adults: A narrative systematic review. *Health Promotion Journal of Australia*, *20*, 48–57. x
Neville, L. M., O'Hara, B., & Milat, A. J. (2009). Computer-tailored dietary behaviour change interventions: A systematic review. *Health Education Research, 24,* 699–720. doi: 10.1093/her/cyp006 x
Neville, L. M., O'Hara, B., & Milat, A. J. (2009). Computer-tailored physical activity behavior change interventions targeting adults: A systematic review. *International Journal of Behavioral Nutrition and Physical Activity, 6*, e30. doi: 10.1186/1479-5868-6-30 x
Noar, S. M., Benac, C. N., & Harris, M. S. (2007). Does tailoring matter? Meta-analytic review of tailored print health behavior change interventions. *Psychol Bull, 133*(4), 673-693. doi:10.1037/0033-2909.133.4.673 x
Noar, S. M., Black, H. G., & Pierce, L. B. (2009). Efficacy of computer technology-based HIV prevention interventions: a meta-analysis. *Aids, 23*(1), 107-115. x
Noar, S. M., & Harrington, N. G. (2016). Tailored Communications for Health-Related Decision-Making and Behavior Change. In M. A. Diefenbach, S. Miller-Halegoua, & D. J. Bowen (Eds.), *Handbook of Health Decision Science* (pp. 251-263). New York, NY: Springer. x
Noar, S. M., Harrington, N. G., & Aldrich, R. S. (2009). The role of message tailoring in the development of persuasive health communication messages. *Annals of the International Communication Association, 33*(1), 73-133. x
Noar, S. M., Harrington, N. G., Van Stee, S. K., & Aldrich, R. S. (2011). Tailored health communication to change lifestyle behaviors. *American Journal of Lifestyle Medicine, 5*(2), 112-122. x
Noar, S. M., Pierce, L. B., & Black, H. G. (2010). Can computer-mediated interventions change theoretical mediators of safer sex? A meta-analysis. *Human Communication Research*, *36*(3), 261-297. x
O'Keefe, D. J., & Jensen, J. D. (2006). The advantages of compliance or the disadvantages of noncompliance? A meta-analytic review of the relative persuasive effectiveness of gain-framed and loss-framed messages. *Annals of the International Communication Association*, *30*(1), 1-43. x
O'Keefe, D. J., & Jensen, J. D. (2007). The relative persuasiveness of gain-framed and loss-framed messages for encouraging disease prevention behaviors: a meta-analytic review. *J Health Commun, 12*(7), 623-644. doi:10.1080/10810730701615198 x
O'Keefe, D. J., & Jensen, J. D. (2008). Do loss-framed persuasive messages engender greater message processing than do gain-framed messages? A meta-analytic review. *Communication Studies, 59*(1), 51-67. x
O'Keefe, D. J., & Jensen, J. D. (2009). The relative persuasiveness of gain-framed and loss-framed messages for encouraging disease detection behaviors: A meta-analytic review. *Journal of Communication, 59*(2), 296-316. x
O'Keefe, D. J., & Jensen, J. D. (2011). The relative effectiveness of gain-framed and loss-framed persuasive appeals concerning obesity-related behaviors: Meta-analytic evidence and implications. In R. Batra, P. A. Keller, & V. J. Strecher (Eds.), *Leveraging consumer psychology for effective health communications: The obesity challenge* (pp. 171-185). New York: ME Sharpe. x
O'Keefe, D. J., & Nan, X. (2012). The relative persuasiveness of gain-and loss-framed messages for promoting vaccination: A meta-analytic review. *Health communication, 27*(8), 776-783. x
O'Keefe, D. J., & Wu, D. (2012). Gain-framed messages do not motivate sun protection: A meta-analytic review of randomized trials comparing gain-framed and loss-framed appeals for promoting skin cancer prevention. *International Journal of Environmental Research and Public health, 9*(6), 2121-2133. x
Penţa, M. A., & Băban, A. (2018). Message Framing in Vaccine Communication: A x

Systematic Review of Published Literature. *Health Communication, 33*(3), 299-314.
Petty, R. E., & Wegener, D. T. (1998). Matching versus mismatching attitude functions: Implications for scrutiny of persuasive messages. *Personality and Social Psychology Bulletin, 24*(3), 227-240 x
Petty, R. E., Wheeler, S. C., & Bizer, G. Y. (2000). Attitude functions and persuasion: An elaboration likelihood approach to matched versus mismatched messages. In G. R. Maio & J. M. Olson (Eds.), *Why we evaluate: Functions of attitudes* (pp. 133-162). New York: Psychology Press. x
Pope, J. P., Pelletier, L., & Guertin, C. (2018). Starting Off on the Best Foot: A Review of Message Framing and Message Tailoring, and Recommendations for the Comprehensive Messaging Strategy for Sustained Behavior Change. *Health communication, 33*(9), 1068-1077. x
Portnoy, D. B., Scott-Sheldon, L. A., Johnson, B. T., & Carey, M. P. (2008). Computer-delivered interventions for health promotion and behavioral risk reduction: a meta-analysis of 75 randomized controlled trials, 1988–2007. *Preventive Medicine, 47*(1), 3-16. x
Rakowski, W. (1999). The potential variances of tailoring in health behavior interventions. *Annals of Behavioral Medicine, 21*(4), 284. x
Ratcliff, C. L., Kaphingst, K. A., & Jensen, J. D. (2018). When Personal Feels Invasive: Foreseeing Challenges in Precision Medicine Communication. *Journal of Health Communication, 23*(2), 144-152. x
Revere, D., & Dunbar, P. J. (2001). Review of computer-generated outpatient health behavior interventions: Clinical encounters “in absentia.” *Journal of the American Medical Informatics Association, 8*, 62–79. doi: 10.1136/jamia.2001.0080062 x
Richards, K. C., Enderlin, C. A., Beck, C., McSweeney, J. C., Jones, T. C., & Roberson, P. K. (2007). Tailored biobehavioral interventions: a literature review and synthesis. *Research and Theory for Nursing Practice, 21*(4), 271. x
Rimer, B. K., & Glassman, B. (1998). Tailoring communications for primary care settings. *Methods of Information in Medicine, 37*, 171–177. x
Rimer, B. K., & Kreuter, M. W. (2006). Advancing tailored health communication: A persuasion and message effects perspective. *Journal of Communication, 56*(s1). x
Rothman, A. J., Bartels, R. D., Wlaschin, J., & Salovey, P. (2006). The Strategic Use of Gain- and Loss-Framed Messages to Promote Healthy Behavior: How Theory Can Inform Practice. *Journal of Communication, 56*(s1), S202-S220. doi:10.1111/j.1460-2466.2006.00290.x x
Rothman, A. J., Martino, S. C., Bedell, B. T., Detweiler, J. B., & Salovey, P. (1999). The systematic influence of gain-and loss-framed messages on interest in and use of different types of health behavior. *Personality and Social Psychology Bulletin, 25*(11), 1355-1369. x
Rothman, A. J., & Salovey, P. (1997). Shaping Perceptions to Motivate Healthy Behavior: The Role of Message Framing. *Psychol Bull, 121*(1), 3-19. x
Rothman, A. J., Salovey, P., Antone, C., Keough, K., & Martin, C. D. (1993). The Influences of Message Framing on Intentions to Perform Health Behaviors. *Journal of Experimental Social Psychology, 29*(5), 408-433. doi:10.1006/jesp.1993.1019 x
Rothman, A. J., & Updegraff, J. A. (2010). Specifying When and How Gain- and Loss-Framed Messages Motivate Healthy Behavior: An Integrated Approach. In G. Keren (Ed.), *Perspectives on Framing*. London: Psychology Press / Taylor & Francis. x
Shavitt, S. (1990). The role of attitude objects in attitude functions. *Journal of Experimental Social Psychology, 26*(2), 124-148. x
Shavitt, S., & Nelson, M. R. (2002). The role of attitude functions in persuasion and social judgment. The persuasion handbook: Developments in theory and practice, 137-153. x
Schmid, K. L., Rivers, S. E., Latimer, A. E., & Salovey, P. (2008). Targeting or tailoring? Maximizing resources to create effective health communications. *Marketing Health* x

Services, 28(1), 32.		
Short, C. E., James, E. L., Plotnikoff, R. C., & Girgis, A. (2011). Efficacy of tailored-print interventions to promote physical activity: a systematic review of randomised trials. *International Journal of Behavioral Nutrition and Physical Activity, 8*(1), 113.		x
Skinner, C. S., Campbell, M. K., Rimer, B. K., Curry, S., & Prochaska, J. O. (1999). How effective is tailored print communication? *Annals of Behavioral Medicine, 21*(4), 290-298		x
Skinner, C. S., Strecher, V. J., & Hospers, H. (1994). Physicians' recommendations for mammography: do tailored messages make a difference? *American Journal of Public Health, 84*(1), 43-49.	x	
Snyder, M., & DeBono, K. G. (1985). Appeals to image and claims about quality: Understanding the psychology of advertising. *J Pers Soc Psychol, 49*(3), 586.	x	
Sohl, S. J., & Moyer, A. (2007). Tailored interventions to promote mammography screening: a meta-analytic review. *Prev Med, 45*(4), 252-261.		x
Spencer, L., Adams, T. B., Malone, S., Roy, L., & Yost, E. (2006). Applying the transtheoretical model to exercise: a systematic and comprehensive review of the literature. *Health Promot Pract, 7*(4), 428-443.		x
Strecher, V. J., McClure, J. B., Alexander, G. L., Chakraborty, B., Nair, V. N., Konkel, J. M., . . . Wiese, C. J. (2008). Web-based smoking-cessation programs: results of a randomized trial. *Am J Prev Med, 34*(5), 373-381.	x	
Updegraff, J. A., & Rothman, A. J. (2013). Health Message Framing: Moderators, Mediators, and Mysteries. *Social and Personality Psychology Compass, 7*(9), 668-679. doi:10.1111/spc3.12056		x
Van’t Riet, J., Cox, A. D., Cox, D., Zimet, G. D., De Bruijn, G.-J., Van den Putte, B., . . . Ruiter, R. A. (2016). Does perceived risk influence the effects of message framing? Revisiting the link between prospect theory and message framing. *Health Psychol Rev, 10*(4), 447-459.		x
Velicer, W. F., Velicer, W. F., Prochaska, J. O., Velicer, W. F., Prochaska, J. O., Redding, C. A., ... & Redding, C. A. (2006). Tailored communications for smoking cessation: Past successes and future directions. *Drug and alcohol review, 25*(1), 49-57.		x
Wanyonyi, K. L., Themessl-Huber, M., Humphris, G., & Freeman, R. (2011). A systematic review and meta-analysis of face-to-face communication of tailored health messages: implications for practice. *Patient Educ Couns, 85*(3), 348-355.		x
White, T. B., Zahay, D. L., Thorbjørnsen, H., & Shavitt, S. (2008). Getting too personal: Reactance to highly personalized email solicitations. *Marketing Letters, 19*(1), 39-50.	x	
Wilson, D. K., Purdon, S. E., & Wallston, K. A. (1988). Compliance to health recommendations: A theoretical overview of message framing. *Health Educ Res, 3*(2), 161-171.		x

Appendix E. Project 1 - Interface Used During Coding

Figure E1. Example of the Spreadsheet Interface Coders Used to Extract Information from Studies



Appendix F. Project 1 - Full Codebook

Codebook for Systematic Review and Meta-Analysis

General Usage Notes:

- This file references variables and definitions as outlined by the dictionary of terms in the "*Definitions*" document.
- The current file describes the procedure to be followed when extracting information from studies. The extracted information from studies will be inputted into unique spreadsheets for each coder
- Text in **blue, bold font** in the current file refers to the names of columns in the spreadsheet where data will be extracted
- Wherever you see "…", this indicates that categories may be added as we continue
- If you reach a point that states (stop coding). You can stop extracting data from the source, and move to the next source.
    - Note that there still needs to be a row for EVERY study we exclude so that we track reasons for exclusion. *At a minimum, every row will contain citation info and 1 reason for exclusion.*
- Elements in [square brackets] are response options for the extracted data
- When creating new rows in the shared spreadsheet, make sure to organize rows giving priority to elements that appear first. For example, for a study with multiple "groups" (comes earlier in coding sheet) and "types of outcome" (comes later): Create a row for group 1, code the first type of outcome. Then, code the second type of outcome for group 1, and so on, until you cover all types of outcomes. Then, code each type of outcome for the second group (and so on).
- If you are completely unable to code a particular element from the codebook, leave the cell blank in the spreadsheet. This will treat the cell as "missing data"
- See end of workflow document for instructions to *petition an article to be excluded or coded later*

Additional Notes Regarding Spreadsheet Formatting:

1. The top row(s) are color coded to help fill the document:
    - Columns in **purple highlight** refer to citation information. The information in these columns will not vary within a source and can safely be copied across rows
        - Columns in purple will always be completed regardless of whether we include/exclude a given study.
    - Columns using **red font** signal points where you might stop coding the source depending on the data you extract.
    - Columns in **yellow highlight**, signal points when you might have to divide a source into several rows. The first such column corresponds to the **study number** column

- Columns in **blue highlight**, signal information that will most commonly be invariant within a given study (e.g., be the same for all row corresponding to study 1 for a given source). There will be exceptions though.
- Columns in **green highlight** concerns information that will usually vary across rows within a given study.
- Columns in **red highlight and white font** pertain to extracting effect sizes.

0. Before Beginning to Code a Report…

FOR ALL CODERS:

1. Open the spreadsheet called "**List of Matching Reports**"
    a. This contains a list of all the reports identified for use in the current project.
2. Look at the column "**Coder 1**". Identify the next article that has not been coded by anyone to date (i.e., the first row for which this column is blank). **Add your initials** in this column to identify that you are coding this article (can use the drop-down menu).
3. Look for a **copy of the Full Text** for the given report.
    a. Do your best to find a copy of the report. Prioritize finding a PDF over other formats, and look for the published version of the report (e.g., not a pre-print version). If the full text is available on a web-page and a downloadable file is not available, you can create a file (e.g., convert page to PDF)
    b. If you simply *cannot find a copy of the full text* (e.g., if it seems like your University subscriptions doesn't give you access to the journal), indicate an "x" in the column "**cannot access**". Then, move on to the next report instead.
        i. Before doing this, try a few ways to get the report first. For reports we ultimately cannot access, we will try and get access through *interlibrary loans*.
4. Once you have found a copy of the full text, save/index a copy in the shared folder called "**Articles**".
    a. In the folder, find or create a folder according to the name of the *Journal in which the paper is published* (use full journal name). Then, save the file in one of the following formats:
        i. "Author, date_" followed by your initials (single authors; e.g., "Austin, 2010_KJD.pdf")
        ii. "Author 1 & Author 2, date_" followed by your initials (two authors; e.g., "Austin & Roberts, 2010_KJD.pdf")
        iii. "Author et al., date_" followed by your initials (3+ authors; e.g., "Austin et al., 2010_KJD.pdf")
    b. When coding articles, *feel free to save notes/comments directly onto the PDF saved*. If we need to revisit coding for any articles, we will be able to benefit from seeing notes from the corresponding coder (hence why you will note your initials).
    c. In addition to saving copies of articles themselves, feel free to save supplemental files as well. Just make sure to identify them as well (e.g.:

"Austin, 2010–supplemental_KJD.pdf" or "Austin, 2010–messages_KJD.pdf").

5. If the article ends up being **excluded**, add an "x" to the column "**Excl**."

FOR CODERS EXTRACTING EFFECT SIZES:

1. When coding articles, add your initials to the column "Effects 1" in addition to "coder 1".
2. Before coding new articles, look at the next row where the effects haven't been coded (as indicate by "Effects 1"). If someone has coded the article apart from the effects (i.e., initials in "coder 1" but not in "effects 1"), then extract the effects for this article next.
    a. Skip articles noted for exclusion under "**Excl**."
    b. When you identify an article to code effect sizes for, open the spreadsheet used by the coder identified in "coder 1".
    c. Copy the rows corresponding to the article to <u>your own spreadsheet</u> and <u>delete from original coder's spreadsheet</u>. Then, <u>extract the effect sizes</u>. At this stage, you may need to re-organize rows/information if the initial coder did not set them up properly for data extraction.

RELIABILITY CODING:

1. If the "NEEDED" designation is present in column "coder 2" and "effects 2", then do not code the article in your own spreadsheet. Instead, use the "reliability" spreadsheet.
2. Extract information into the sheet of the reliability spreadsheet with your initials instead of using your own spreadsheet.
3. If you are coding effects, write your initials under "effects 2" on the list of articles, and extract the effect sizes directly into the sheet of the person who is listed under "Coder 2". Do not use your own spreadsheet/sheet

4. If an article has not been coded by a second coder yet (i.e., the "coder 2" and/or "effects 2" columns still say "NEEDED"), then code this article before moving on to a new article. When extracting information as a second coder, extract the information to the sheet with your initials of the "reliability" spreadsheet instead of using your own spreadsheet.

- Overall, columns "coder 2" and "effects 2" indicate a random set of articles that we will have a second person coding.

1. Citation Info for Report (purple highlight):

Extract the following Information About the Overall citation information (*can copy info from reports list, and simply verify info is correct*).

A. Source #

B. Authors (in APA format)

C. Year (of publication)

i. Include actual year of publication (e.g., 1998)
ii. [in press]

D. Title (of report)

F. Journal (name) - only complete if report is a journal article. Otherwise, skip to column X ("Publication format").

D. Vol. Volume number for journal article

D. Iss. Issue number for journal article

D. Pg. Page range/numbers for journal article

2. Overall Report Inclusion/Exclusion Criteria:

Consider the *overall report*. Ensure the following criteria are met before continuing with data extraction:

E. Duplicate: Usually leave blank. If while reading article, it the authors note that results were also reported elsewhere, notify Keven and stop coding for now. Then:

Write "**yes**:" in this column followed by the "source #" of any reports from the "List of Matching Reports" document that may contain duplicate information with the current report.

E.g., "Yes-345,643". This would indicate that the article present duplicate info with reports #345 and #643. For these, we will choose 1 article to code only.

E. Publication Format

i. [journal article]
ii. [dissertation/thesis] (stop coding study; will be put aside for later)
iii. [other] (stop coding source)

G. English: Is the report in the English language?

i. [yes]
ii. [no] (stop coding source)

H. Empirical Study: Does report contain one or more empirical study?

i. [yes]
ii. [no] (stop coding source)

I. Retraction: Was the study retracted? Use retractiondatabase.org

i. [yes] (stop coding source)
ii. [no] Select if cannot find article on website

J. Correction: Was a correction made to the article since its initial publication? Use retractiondatabase.org

i. [yes] If correction found, take corrections into account when coding
ii. [no] Select if cannot find article on website

3. Setting up of Rows According to Number of Studies in Report:

For each empirical study included in a given report (including pilot studies), complete the following steps:

- First, create an additional row per study, and copy down the information from the previous columns (e.g., Authors, Year, Title, Publication Format, Journal, Empirical Study) for each new row created. Then, assign a study number for each created row:

K. Study number: Label the study number according to order in which it appears in the source (Study 1, 2, Etc.)

4. Study-Wise Inclusion/Exclusion Criteria:

First, for each study/row, ensure the following categories are met:

L. Message-Based Experiment: Make sure study contains at least 2 message conditions, and that assignment to the conditions is random (i.e., not systematically based on some other characteristic). Note that "randomized clinical trials" is often used synonymously with "experiment".

i. [yes] – *article explicitly says randomization or experimental design used*

ii. [likely] – *article doesn't explicitly use "randomization/experimental" language, but it seems to be experimental as far as you can tell*
iii. [no] (stop coding study)
iv. [unclear] (stop coding study)

M. Outcome of Interest: Study includes at least 1 outcome of interest (attitude, intention, self-report behavior, objective behavior)

i. [yes]
ii. [no] (stop coding study)

N. Matching Paradigm Used: Make sure that the message feature manipulated is theoretically matched to a characteristic, such a message can be classified as "matched", and at least 1 other can be classified as a comparison condition.

i. [yes]
ii. [no] (stop coding study)

Second, identify which **literatures** the given study falls into. *Note that a given study may be part of multiple literatures*.

O. Functional Matching. Targeted characteristic(s) has a motivational element to it (e.g., matching to a person's orientation, matching to an object's common associated attitude function).

i. [yes]
ii. [no] (Stop coding study & put aside for coding in larger project later.)

Note: Functional matching deals with differences in **what** motivates people, and **why** they hold certain beliefs, attitudes, etc. Studies that match to motivation simply to engage in the behavior promoted by a message do not count.

P. Message Framing: Manipulated feature is a message frame (doesn't matter what the targeted characteristic is)

i. [yes]
ii. [no]

Q. Message Tailoring: Matching is to *people's characteristics* (e.g., individuals or groups, but not matching to the characteristic of an object or behavior)

i. [yes]
ii. [no]

R. Context Matching: Features of the message are matched to other features of the message (or product/behavior), or to the context in which the message appears (e.g., following a prime) rather than to characteristics of a person.

i. [yes]
ii. [no]
iii. [yes - consistency] – Pick this option over [yes] if two message features are matched to each other, but one cannot be clearly identified as the characteristic. If you pick this option, choose one feature randomly to be coded as the characteristic matched to (the other will serve as the message conditions)

S. Research Design (in receiving the manipulation; not in measuring/assessing outcome):

i. [between person]
ii. [within person] (stop coding study)

5. Identifying Study Type & Adding More Rows if Necessary:

T. Study Type:

i. [type I]
ii. [type II]
iii. [type III] (Stop coding study & put aside for coding in larger project later.)
iv. [none/cannot classify] (stop coding study)

Notes:

- If you can extract more than one type, then extract multiple.
- If it is Type II, but there is an additional comparison group (e.g., Type II with matched/mismatched conditions plus a mixed condition), then use the extra condition to create a Type I row (e.g., Matched vs. mixed).
- Whenever an ordinal factor has an intermediate level, use only the two extreme levels (e.g., if there are 3 levels of message appeal as “liberal”, “moderate”, and “conservative”, ignore the “moderate” level”).
- If unsure, check in with group

U. Type of Comparison: Two-steps to identifying the comparison. Each category has a strict definition in the definitions document.

a) First, identify which of the following comparison is used. **Select *all that apply*** and separate by comma (e.g., [1,6]). *Order numbers from smallest to largest.*

i. [1] mismatch
ii. [2] generic message
iii. [3] low match (cannot overlap with #1,6,7)
iv. [4] mixed appeal
v. [5] none/cannot classify (stop coding study) –pick if can't pick anything else. This includes cases where the control receives no intervention, or an intervention that is unrelated (e.g., about a different outcome domain)

Note: If the study contains a comparison coded as [5] in addition to another comparison group, you do not need to add an extra row just for this additional comparison (e.g., if study has a match, mismatch and no-intervention group; you can simply code 1 row comparing the match/mismatch and ignore the no-intervention)

b) Second, if the type of comparison above is a mismatch (#1), can it be further specified as either of the following two categories? If so, add number to list.

i. [6] negative match - Select only if *clearly* negative match
ii. [7] non-match - Select only if *clearly* non-match

Do not pick both 6 and 7, as these should be mutually exclusive. To help distinguish between *negative matches* and *non-matches*, see the "Matching Classification Heuristic" entry in the definitions document.

If there are 2 or more types of comparison, add an extra row for the study per additional comparison group used. Duplicate preceding columns. The extra comparisons can be differentiated using the column "Message Condition Description"

V. Message Condition Description: Write a description of the 2 levels of the message feature being compared

- Note: The message conditions cannot be the type of product/behavior. If it seems like the message feature manipulated is the product/behavior type, ask yourself if this can be coded instead as the characteristic being matched to. If not, then code the field "message-based experiment" as no, and exclude article

From this point onward, data extraction is completed *per row*. You may choose to complete a full row/study within a source before moving on to extracting information about the next row.

6. Qualifying the Matching effect to aid extraction:

Characterize and break down the nature of the effect by completing the following columns:

Number of Characteristics in Intervention:

W. Number of characteristics in intervention:

i. Will usually be a number (e.g., "1" if matches to just 1 characteristic).
ii. Can write [unclear] if you cannot tell, or if what they are matching to appears to be a grouping variable made up of a large number of characteristics)

X. Number of characteristics in comparison:

iii. Will usually be a number (e.g., "0" if systematically mismatches a characteristic).
iv. Can write [unclear] if you cannot tell (same as above)
i. Mark "NA" if not applicable (e.g., if ONLY a generic message)

Y. Characteristic Determination Process:

i. [directly measured]
ii. [manipulated]
iii. [indirectly inferred] -> *(e.g., assuming a characteristic based on group membership; assuming a class of behaviors shares a characteristic)*
iv. [unclear/mixed]

Z. Characteristic Polarity:

i. [unipolar]
ii. [bipolar]
iii. [categorical]
iv. [mixed] -> Can select this if there are multiple characteristics, and they fall in 2+ categories above (i.e., unipolar, bipolar, categorical)
v. [other/undefined]

AA. Specific Characteristic Targeted.

i. This is open-ended. List all characteristic targeted if multiple. If comparison is "low match", consider *only what additional characteristics are targeted in the positive match on top of what is in the comparison condition.*

AB. Characteristic Type Targeted. Select *all that apply* and separate by comma (e.g., [3,5]). *Order numbers from smallest to largest.* Be **liberal in selection** (i.e., err on selecting over not selecting). If comparison is "low match", consider *only what additional characteristics are targeted in the positive match on top of what is in the comparison condition.*

- *v.* [1] motivation – trait (note. Will generally entail #3)
- *vi.* [2] motivation - state
- vii. [3] personality - trait
- viii. [4] personality - state
- ix. [5] culture/nationality
- x. [6] barriers/facilitators *(e.g., tailoring instructions, of how to overcome personal barriers, self-efficacy)*
- xi. [7] ideology/schema
- xii. [8] behavioral beliefs *(e.g., matching to attitudes, risk perceptions, norms)*
- xiii. [9] behavior stage//behavior enactment *(e.g., engages in behavior or not; stages of behavior: transtheoretical model, precaution adoption process)*
- *xiv.* [10] behavior type *(e.g., in health: prevention, promotion, detection)*
- xv. [11] unique personal identifier *(e.g., name)*
- xvi. [12] ethnic/racial group
- xvii. [13] gender
- xviii. [14] age
- xix. [15] socio-economic status
- xx. [16] product/service type
- xxi. [17] message location
- xxii. [18] mood/emotion/affect

- xxiii. [99] other
- xxiv. […] (may add new categories -> confer with group first)
- xxv.

AC. Specific Outcome Domain: (i.e., what behavior/outcome is the study targeting?)

- i. Open-ended response -> can note the specific outcome measure of interest to help effects extraction

AD. Outcome Domain Type: Select *all that apply* and separate by comma (e.g., [3,5]). *Order numbers from smallest to largest.* Can pick multiple even within a cluster. Be **conservative in selection** (i.e., err on not selecting over selecting when unsure).

i. [1] health behavior – illness prevention (pick only if clearly identified as such; prioritize the 2nd cluster of health categories below)
ii. [2] health behavior – illness detection (pick only if clearly identified as such; prioritize the 2nd cluster of health categories below)
iii. [3] health behavior – health promotion (i.e., promoting good health, not avoiding illness) (pick only if clearly identified as such; prioritize the 2nd cluster of health categories below)

iv. [4] health behavior – treatment adherence
v. [5] health behavior – smoking related
vi. [6] health behavior – nutrition/diet related
vii. [7] health behavior – physical activity related
viii. [8] health behavior – vaccination/immunization
ix. [9] health behavior – cancer-related
x. [10] health behavior – sexual health related
xi. [11] health behavior – drinking/drug use related
xii. [12] health behavior – oral health
xiii. [13] health behavior – cardiovascular disease (e.g., heart; stroke)
xiv. [14] health behavior – obesity (e.g., weight management/reduction)
xv. [15] health behavior – mental health
xvi. [16] health behavior – other (not captured by #4-15); ignore whether you picked 1-3

xvii. [17] environmental behavior – recycling
xviii. [18] environmental behavior – waste reduction & composting
xix. [19] environmental behavior – energy conservation
xx. [20] environmental behavior – diet-related
xxi. [21] environmental behavior – green product/service
xxii. [22] environmental behavior – ecological responsibility
xxiii. [23] environmental behavior – other (not captured by #17-22)

xxiv. [24] prosocial behavior – volunteerism
xxv. [25] prosocial behavior – donations/charity (financial/materialistic contributions)
xxvi. [26] prosocial behavior – blood/organ donation
xxvii. [27] prosocial behavior – other (not captured by #24-26)

xxviii. [28] political behavior – voting/endorsements
xxix. [29] political behavior – policy support
xxx. [30] political behavior – other (not captured by #28-29)

xxxi. [31] product/service – tourism
xxxii. [32] product/service – food & drinks (specific types of products/brands)
xxxiii. [33] product/service – electronic device
xxxiv. [34] product/service – cars/vehicles
xxxv. [35] product/service – other (not captured by #31-34; but excluding #21)

xxxvi. [36] misc – disaster-related behaviors (e.g., earthquakes/floods)
xxxvii. [37] misc – antisocial behaviors
xxxviii. [38] misc – registration/recruitment
xxxix. [39] misc – job applications
xl. [40] misc – personal Finance
xli. [41] misc – workplace behaviors
xlii. [42] misc – cyber behaviors (e.g., cyber-security, online behaviors)
xliii. [43] misc – academic behaviors (e.g., studying, exams)
xliv. [44] misc – safety behaviors (e.g., injury & accidental death prevention)

xlv. [99] other category not above (select if cannot fit into any category above)

xlvi. […] (may add categories if needed -> confer with group first)

AE. Change Type desired by the intervention *(defined by what the message attempts to do; not by how the outcome is actually assessed)*

i. [promoting]
ii. [limiting]
iii. [other/unclear/both]

7. Setting Up Additional Rows to Code Each Individual Effect:

AF. Group: If there are subgroups, assign a number to each Group. Mark [na] if the study doesn't break outcomes per group. *Only report findings broken down by groups if the effects are not reported at the aggregate level*.

- Note**.** Groups are 3rd variables that create subgroups, not the matching condition.

- Adding rows: if the study reports outcomes separately for 2 groups, assign a number to each, and code them in separate rows. If the study separates some outcomes per groups, but not other outcomes, mark [na] when the outcomes correspond to the full sample.

AG. Group Description, describe the group [open-ended filed; e.g., "Diagnosed Group" vs. "Non-diagnosed group").

If study doesn't break results down by group, mark [na].

AI. Assessment Time Category for the effect you are recording:

i. [first assessment] (First time outcome is assessed regardless of how far out after intervention. Every study should have at least 1 first assessment time category)
ii. [last assessment] (last time point assessed, skip coding anything between first and last assessment time points)

Adding rows: If the assessment time category differs between some of the outcomes you have recorded above, separate them into different rows according to assessment time category. Do not code outcomes measured between the 1st and last time points (i.e., this can only create 1 extra set of rows)

AJ. Type of Outcome corresponding to a given effect.

i. [attitude] – (*note: exclude attitude towards message itself*)
ii. [intention] – (*note: includes most motivation/willingness measures & hypothetical decisions*)
iii. [self-report behavior]
iv. [objective behavior]

Adding rows: When a study codes more than one type of outcome, code these on separate rows.

AK. Type of Effect:

i. [message|characteristic]
ii. [characteristic|message]
iii. [interaction effect]

Adding rows: When a study codes more than one type of effect, code these on separate rows. Keep in mind how many we can extract per type of outcome according to different study designs:

1. **Type I**:
   a. message|characteristic -> 1 effect
2. **Type II**:
   a. message|characteristic -> 2 effects

b. characteristic|message -> <u>2 effects</u>
c. interaction -> <u>1 effect</u>

3. **Type III**:
   a. characteristic|message -> <u>2 effects</u>
   b. interaction -> <u>1 effect</u>

AL. Compare [X] Given [Y] / Interaction: describe in open-ended terms the type of effect using the format "X, given Y" (e.g., "Message Frame, given High Promotion Focus").

i. If the "Type of effect" is an <u>interaction</u>, just write [na]

8. Data Extraction for Effect Sizes

When extracting effect sizes, should refer to the guidelines on extracting and converting effect sizes document

For any given outcome, extract the following information:

AM. N: The sample size

i. If Unavailable, mark [na]

AN. Rel: The reliability information associated to the outcome measure (round to 2 decimals)

i. If unavailable, mark [na]

Note: Accept internal consistency indices with similar metric such as *Cronbach's Alpha*, *Standardized Alpha*, *correlation between two items*, etc.

AO. Effect: The effect size, **expressed in r** (round to 3 decimals)

i. If unavailable, mark [na]

ii. *Note*: When calculating the effect size, <u>make sure to take direction into account</u>.

   a. E.g., for Type I & II studies, *set the matched condition as the intervention group* (group #1 in calculators). For an interaction term, a positive direction signifies that the interaction is in the expected direction.
   b. E.g., If the goal of the study is to REDUCE a behavior, then a reduction is considered a POSITIVE effect
   c. DO NOT CODE if direction of effect is unclear to you (e.g., they provide an R^2 or an F-test without any means or stating which group has a larger mean).

iii. *Note*: when calculating an effect, use the ‘calculation notes” column to keep track of how you calculated the effect

AP. Calculation Notes. A column to take notes about how the effect was calculated. Write down any numbers from the article that you used to calculate effect sizes, N, or Rel.

AQ. Stated Direction. According to the author’s verbal description of the effect (in-text/paragraphs, <u>not tables/numbers</u>), what is the direction of the effect? Authors need to EXPLICITLY present comparison in the verbal text description, otherwise mark as na.

i. [match advantage] -> *matched message is more effective*
ii. [comparison advantage] -> *matched message is less effective*
iii. [na] -> *Unreported or there isn’t enough information to classify as any of the above. This will be a common answer for many effects.*

AQ. Stated Significance. According to the author’s description of the effect (in-text/paragraphs, not tables), what is the significance of the effect? If they give a p-value in the text, it needs to be less than .05 (i.e., if they say “significant” but give p=.07, mark as non-significant).

i. [non-significant]
ii. [significant]
iii. [na] -> *Unreported or there isn’t enough information to classify as any of the above. This will be a common answer for many effects.*

<u>Note</u>: When determining the authors’ report of significance: First, look at their reported p-value, and see it is below .05. If the authors report significance, but the p-value is > .05, mark as non-significant. If no p-value is provided, use whatever the authors report (i.e., whether they label the effect “significant”). If the wording is less strong (e.g., “trend”) do not select significant.

9. Extracting Components of Study Design:

AR-AU. Assessment time delay, which is composed of multiple parts:

AR. Day of Study: Outcome assessed same day?

i. [yes]
ii. [no]

iii. [na] if missing or unclear

If answer No for "Day of Study", provide the following info (<u>otherwise leave these columns blank</u>):

AS. Months: Indicate # of months

i. Leave blank if it was less than 1 month
ii. Write [na] if # is unclear, but it could have been 1 or more months

AT. Weeks: Indicate # of weeks

i. Leave blank if it was less than 1 week
ii. Write [within week] if within a week but unclear how long
iii. Write [na] if # is unclear, but it could have been 1 or more weeks
iv. If study states a number larger than a month, but it is expressed in weeks, use that number instead (e.g., 10 weeks). In such a case, leave "months" column blank

AU. Days: Indicate # of days:

i. Leave blank if assessment time only expressed in months/weeks
ii. [na] if missing or unclear, but could have been more than 1 day

<u>Note</u>. Can combine months, weeks and days (E.g., if study reports 2 weeks and 2 days)

AV. Full Message Available:

i. [yes] -> select if the *complete message manipulation* (and *all versions* thereof) is made publicly available to the reader.
    - Count if in manuscript, if in appendix, or available in supplemental files. If message isn't actually accessible, can write "no"
    - If available, access message to help code other elements.
ii. [no] -> don't provide the full message; may provide just an excerpt, or say something such as "materials can be given upon request"

AW. Message Length:

i. [short]
ii. [medium]
iii. [long]
iv. [unclear] -> Select this unless it is very clear it falls under one of the other categories

AX. **Message Modality** that is being *manipulated* (e.g., images in the message that aren't manipulated don't count)

i. [text only]
ii. [static image only]
iii. [text and images]
iv. [audio only]
v. [audio-visual]
vi. [interpersonal]
vii. [unclear/other]

AY. **Delivery Setting**:

i. [in person]
ii. [online]
iii. [environment]
iv. [by mail]
v. [other/multiple]

AZ. Intervention Contacts:

i. [single contact]
    - (e.g., most in-lab studies; intervention embedded in a survey people can't go back to)

ii. [ensured multiple contacts]
iii. [potential multiple contacts]
    - (e.g., booklet sent by mail, access given to a website; ads placed in the environment; message to play occasionally on radio)

10. Note attributes of the overall study sample

BA. Female. Mark the % of the sample that is *female* (up to 1 decimal point).

i. Mark [na] if unavailable

BB. Male. Mark the % of the sample that is *male* (up to 1 decimal point).

ii. Mark [na] if unavailable

BC. Overall N: The total N (sample size) used in this study (total sample recruited, not accounting for attrition AND including all groups within experiment, even those we aren't coding such as extra controls)

BD. Nationality: Note the Countries represented in the sample (separate using commas)

iii. Mark [na] if unavailable

BE. Average age: Note the average age of participants (up to 1 decimal point; prioritize mean, but can accept median)

i. Mark [na] if unavailable

BF. Population type: Choose among the following to characterize the participants:

i. [offline community sample] – Pick only if another category doesn't describe more accurately
ii. [online community sample] (e.g., panel, MTurk, Crowdflower)
iii. [children/adolescents]
iv. [diagnosed patients]
v. [undiagnosed population at risk]
vi. [college/university students]
vii. [other] (e.g. a mix of 2 categories)
viii. Mark [na] if unavailable/unclear

11. Note Risk of Bias Variables

BG. Characteristic Assessment Time: When was the characteristic assessed relative to the delivery of the message?

i. [before]
ii. [after]
iii. [unclear]
iv. [na] -> Not applicable, such as when characteristic is not measured

BH. Reliability Statistic (Characteristic): What is the internal consistency/reliability statistic for the characteristic if it was measured? If more than 1 instrument was used (e.g., using a median split of 2 variables), take average.

i. Indicate # (up to 2 decimal places)
ii. [na] if unavailable or not measured

[the following 2 variables (in yellow) can be skipped – they have been blacked out in the coding spreadsheets]

BI. Categorized Continuous: If the study was type I or II and directly measured the characteristic, was the characteristic:

i. [yes] -> variable was categorized. E.g., *Cutoffs were selected (e.g., median) to create categories for an otherwise continuous variable*
ii. [no] -> variable is naturally categorical. E.*g., gender may be categorical*
iii. [na] – Not applicable because study was type III or did not measure the characteristic
iv. [unclear] – Cannot classify as one of the above

BJ. Fused Dimensions: If the underlying characteristics are theoretically dimensional AND are theoretically distinct dimensions, did the authors combined them into a single index?

i. [yes] – e.g., used a difference score
ii. [no] – retained a separate assessment of each dimension
iii. [na] – Only targeted one characteristic, and/or the characteristics were categorical
iv. [unclear]

BK. Pre-Registered: Was the study indicated as pre-registered in some way?

i. [yes]
ii. [no] – no indication of pre-registration

BL. Data Open Access: Is the data freely available (with a link provided)?

i. [available]
ii. [not available]

BM. Analysis Script Available: Is the code/script file for doing the analyses made available? (in a link, supplemental files, etc.)

i. [available]
ii. [not available]

BN. Analysis Involves Covariates: Do the primary analyses involve covariates in addition to the main matching variables (i.e., characteristic and message features)? -> Note this corresponds to the effect size extracted (not the test reported).

i. [yes] – covariates included
ii. [no] – No covariates; clearest interpretation
iii. [unclear]
iv. Leave blank if did not extract an effect size

BO. Intervention is Matching Specific: Did the intervention groups differ in any other component that the matching/tailoring?

i. [purely matching] – Matching is the *only* dimension of difference. *Pick this option only if you are fairly certain.*
ii. [more than matching] – Conditions differed in more than just degree of matching.
iii. [unclear]

12. Cochrane Risk of Bias Tool Assessments

BP. Selection Bias: Code at <u>study</u> level; be picky here.

i. [high] – High risk. E.g., Either randomization sequence was flawed, or someone had the ability and required knowledge to interfere in the randomization
ii. [low] – Low risk. E.g., Randomization sequence fully random, no reason to believe someone could have interfered with assignment
iii. [unclear] – Not enough information provided (e.g., authors say people were randomized, but not *how* they were randomized). Saying that randomization used clustering/stratification does not count towards picking "low". *Most common option.*

BQ. Performance Bias: Code at <u>study</u> level

i. [high] – High risk. E.g., Participants not blind to the condition they are in, or interventionists not blind.
ii. [low] – Low risk. E.g., all participants/researchers blind to conditions/hypotheses and this is <u>explicitly stated</u>; OR study done electronically or by mail so that no intervention personnel is interacting directly with participants for intervention
iii. [unclear] – Not enough information provided to tell blind status of people/ *This will be the most common answer*

BR. Detection Bias: Code at <u>outcome</u> level

i. [high] – High risk. E.g., external, non-blind, raters used to assess outcomes and measures required them to use some judgement. Reason to believe response bias differed across conditions for participants giving self-reports (uncommon)
ii. [low] – Low risk. E.g., observers did not know which condition participants were or used a truly objective assessment. Participants gave self-reports, and there isn't an explicit reason to expect different response bias across conditions. Will be the most common answer.
iii. [unclear] – Not enough information provided

BS. Attrition Bias: Code at outcome level. Compare N used for randomization to N used for analyses.

i. [high] – High risk. E.g., substantial missing data (more than 20%) from recruitment. May not be random
ii. [low] – Low risk. E.g., not much missing data (less than 20%) or data missing at random. If *proximal time point*, usually low bias.
iii. [unclear] – Not enough information provided

BT. Reporting Bias: Code at study level & consider only our primary outcomes of interest (i.e., intentions, attitudes, behaviors)

i. [high] – High risk. E.g., do not report effect sizes for all outcomes; certain groups excluded from report.
   1. Note it is fine if effect sizes cannot be extracted for this review if they are still reported somehow.
   2. If report only a verbal description of an effect (e.g. "it wasn't significant") without giving any stats, pick high bias.
   3. If study could have been reported at a Type II but they report effects aggregated as Type I, can pick "low" instead
ii. [low] – Low risk. E.g., have effect sizes for all subgroups/outcomes.
iii. [unclear] – Not enough information provided (probably won't use this option frequently)

BU. RoB_Notes: Use this column to add in any notes about your ratings with this risk of bias tool

13. Other

BW. Notes: Mark down any notes about the article you have here.

15. Petitioning Procedure:

Occasionally, an article may be particularly challenging to code such that you feel you cannot make out the structure of the study(studies) in a reliable manner. This may be because the article is very complex (e.g., some 2x2x2x2 designs), or because reporting within the article doesn't match our workflow very closely (e.g., they report the matching effects with less detail because this wasn't the main focus of the paper).
In such cases, you can petition for one of two options:

1. That the article be **excluded altogether from the review**.
2. That the article be **put aside for later coding**. This option may entail having multiple coders go through the article and achieve coding through a consensus method.

<u>Process for Petition</u>:

- First, make sure you have tried your best to attempt to code the article. If this does not seem to work out, then:
- Email Keven about the article. In your email, make sure to:
    - Clearly state which article is being considered
    - Point to which option above you think would be most appropriate (exclusion vs. delayed coding)
    - List reasons why you think the option you are advocating for is appropriate
- If we decide to remove the article:
    - Copy rows from your sheet; move to either:
        - "Delay": Articles we choose to delay coding
        - "Exclude": Articles we choose to exclude
    - Delete rows corresponding to article from your main coding sheet

Example Reasons:

- For excluding the article:
    - The writing of the report lacks a substantial amount of information.
        - Appears to concern matching, but it might not be clear what is being matched to what. This may be because they outline many lines of arguments that do not converge/
        - Quality of writing may lack substantial clarity
        - May have measures our outcomes of interest, but it does not seem like we will be able to extract any effects (and perhaps they provide limited interpretations as well)
- To delay coding of the article:
    - Much of the information needed for coding appears present in the article, but it is presented in a way that makes you very unsure of the way in which you should be coding
        - May provide all necessary info to extract effects, but may have a very complex design that could be coded in many different ways
        - Report unusual outcome measures that you cannot tell whether they fit in any of our categories of interest

Appendix G. Project 1 - Dictionary of Terms to Complement Codebook

Dictionary of Terms Used in Codebook

1. Citation Info for Report

A. Source #: corresponds to the source # available on the *reports list*. This is a number to keep track of all the reports identified in the systematic search.

B. Authors: List authors of report according to APA format. (e.g., John, M., Terry, Q., & Sylian, P.). Can usually copy and paste from the reports list.

C. Year: Year of Publication of the report

D. Title: Title of the report

E. Journal: Full name of the journal in which the publication appears (*do not use abbreviated name*). Only relevant if the report is a journal article. If not relevant, leave blank.

F. Vol.: Volume number associated to a journal article. If no volume number is available, may leave blank. Article volume/issue info often presented as: *Journal Name*, *X(Y)*. X is usually the volume number, and Y the issue number.

G. Iss.: Issue number associated to a journal article. If no issue number is available, may leave blank. Article volume/issue info often presented as: *Journal Name*, *X(Y)*. X is usually the volume number, and Y the issue number.

H. Pg: Pages of the report. Present the page range in the format "##-##". If only first page is available, may use that instead.

2. Overall Report Inclusion/Exclusion Criteria

I. Publication Format: What kind of format is the report? Is it:

- *Journal Article* (i.e., a peer-reviewed article appearing in a scientific journal)
- *Dissertation/Thesis* (e.g., masters or doctoral thesis)
- *Other* (e.g., poster, book, pre-print article, chapter, etc.).

G. English. Is the report in the English language?

H. Empirical Study: An empirical study is one which involves data collection. For the current review, the study must also be quantitative (e.g., involve a survey, assessment) rather than qualitative (e.g., data from focus groups, informal interviews, literature reviews, etc)

I. Retraction: Was the report retracted? To verify, can use retractiondatabase.org. If the article does not show up on the database, this means there is no record of it being retracted. Can usually search the database using elements like the author's name and/or the report's title.

J. Correction: Was a correction made to the report? To verify, can use retractiondatabase.org. If the article does not show up on the database, this means there is no record of it being corrected. Can usually search the database using elements like the author's name and/or the report's title. If a correction is available for a given report, then this should be considered when extracting data from the report.

3. Setting up of Rows According to Number of Studies in Report

K. Study Number: A number assigned for each study included in a report, including any pilot studies. Only mark down a number (e.g., "1", "2")

4. Study-Wise Inclusion/Exclusion Criteria:

L. Message-Based Experiment: A study that contains at least 2 message conditions, and that assignment to the conditions is random (or at least approximately random). Note that "randomized clinical trials" is often used synonymously with the term "experiment".

M. Outcome of Interest: Includes one of the 4 types of outcomes of interest for the current review. These outcomes are defined in the sections on "attitudes", "intentions", "self-report-behaviors", and "objectively assessed behaviors"

N. Matching Paradigm Used: The study is designed in a way such that the message feature manipulated is sometimes matched to a characteristic (such a message can be classified as "matched") and at other times classified as a comparison message. This question can be considered together with the "study type" under consideration (see below).

O-Q. Literatures: Literatures are the broad area of research (or research tradition) in which a study is located. These are defined loosely, and are not mutually exclusive categories. For example, a study may be considered part of both the "Functional Message Matching" and the "Message Framing" literature. Specific definitions of the types of literatures are included below.

O. Functional Matching: Refers to the literature on "functional message matching". In this category, the characteristic(s) targeted for matching explicitly has a motivational element to how it is defined/conceptualized. This includes values, goals, identities (i.e., when people actively identify with and value them), and many personality-based variables, among others. It also includes matching to the common motivational domain (e.g., attitude base) associated to a given object/behavior. Importantly, functional matching deals with differences in **what** motivates people and/or **why** they engage in particular actions or hold certain beliefs, attitudes, etc.

- Examples: Volunteer Functions (from VFI); Regulatory Focus; BIS/BAS; Self-Construal; Self-Monitoring; self-construal. Also includes matching to "hedonistic" vs "utilitarian" products.
- If a study matches to the person's level of motivation specifically to engage in the behavior being promoted by a study, *this does not count as functional matching*

P. Message Framing: The message feature manipulated consists of message frames. Specifically, messages conditions are composed of a comparison of gain, loss, non-gain, and/or non-loss frames.

- Typical definitions of frames involve the following:
  - Gain frames emphasize the benefits obtained by adhering to a recommended behavior
  - Loss frames emphasize the costs incurred by not adhering to a recommended behavior
  - Non-gain frames emphasize the benefits not obtained by not adhering to a recommended behavior
  - Non-loss frames emphasize the costs not incurred by adhering to a recommended behavior
- Generally, messages that vary in terms of message frame are factually equivalent, and the only difference is in how they are presented. If a message consists of gains and losses of acting in a single way (i.e., emphasizes the pros and cons of an action), this is not a message framing distinction. It may, however, still fall in one of the other literatures described.
- Often, message framing studies will also be functional matching (e.g. matching to BIS/BAS, regulatory focus)

Q. Message Tailoring: Messages are matched to any characteristic of a person. These can be personality characteristics, identifying information such as a person's name, age, demographic group, etc. These studies can also include matching to a characteristic linked to enacting behaviors (e.g., giving a risk message when individuals perceive a harmful behavior as low risk, as suggested by theories like the HBM), or to behavioral stages (e.g., stages of change models).

- Many message matching studies make references to a large category of variables. When such variables also include a person's values, motives, goals, a message tailoring study may also be marked as a "functional message matching" study.
- Note: Whenever studies match to a personal characteristic, they will be coded as tailoring. Therefore, there will be a lot of overlap between tailoring and the other two categories. Studies that are not tailoring will usually be matching to the predominant function of an attitude object, matching to a behavior, or context matching

R. Context Matching: Features of the message are matched to other features of the message, or to the context in which the message appears rather than to characteristics of a person.

- Examples include ensuring that the content of an ad is congruent with other ads/content around it, that a message is internally congruent, that a celebrity sponsor matches the product being advertised, matching messages to a prime.
- Includes matching to a product's attitudinal base
- When message features are matched to another feature of the message itself, and one of these cannot be clearly identified as the characteristic matched to, the choice between which is the message feature and the characteristic matched to will be made on an arbitrary basis. Use a random means to assign which is which. An exception is made in cases when message framing is involved. In such cases, generally designate the message frame as the message feature.

S. Research Design: Which of the following two types of research design was used to evaluate the matching effect?

- **Between Person**: The effect between the intervention and comparison is done between individuals (e.g., different people receive the two types of messages)
- **Within Person**: The effect between the intervention and comparison is done within the same individual (i.e., they are exposed to both the interventions and the comparison message)

5. Identifying Study Type & Adding More Rows if Necessary:

T. Study Type: The way in which a message matching study is constructed. This meta-analysis will consider three types of designs. *Figure A1* provides a depiction of the 3 types of studies (showing a few additional types we are excluding). The 3 types are defined further below.

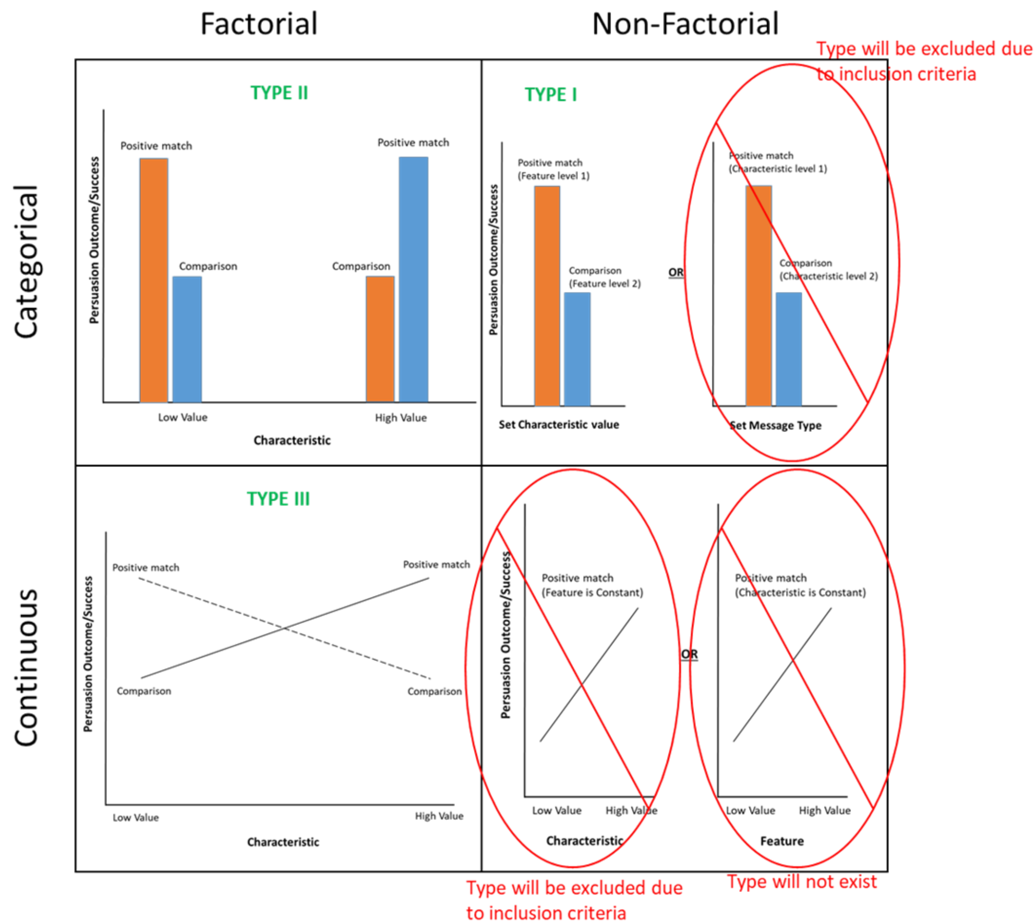


Figure G1. Examples of each Study Type.

- **Type I:** The message feature takes 2 possible forms (either positively matched or not). Matching is conceptualized categorically. This may be because the characteristic is invariant (e.g., everyone in the sample is a member of the same targeted group), or because their content within the matched condition varies according to the characteristics of the individual.
- **Type II:** Matching is conceptualized categorically, and the study is set up such that each level of the feature can either positively match or not each level of the characteristic. There are usually 2 levels of the characteristic, and 2 levels of the feature. Each level of the message feature is a match for one level of the characteristic but not for the other. The 2 levels of the feature are matched to different levels of the characteristic from one another.
  - In some cases, a type II study may have an additional comparison group (e.g., a mixed message condition). In such cases, can be coded as a Type II study ignoring the additional group at first, and then, we can separately code

comparisons between the two positive match conditions and the additional comparison group (coded as two Type I study type effects)

- **Type III:** Study design allows for matching effects to vary in terms of degree of match (i.e., uses a continuous operationalization). Generally uses 2 levels of a message features, crossed with a continuous operationalization of a characteristic

U. Type of Comparison (what are positive matches compared to). *For the current project, all studies will be framed in terms of positive matching effects*. That is, they will either compare studies with the main experimental condition being a positive match OR will consist of a continuous matching effect for which one pole of the IV will be framed as a "positive matching pole". Although the experimental direction/group will be consistently operationalized across studies, the comparison (control group or reference direction) will be allowed to vary in types. Each type are described below (and summarized in *Figure A3* and *Figure A4* below):

- **[1] Mismatch**: The message is clearly <u>not positively aligned with</u> a target characteristic condition. Can be defined slightly differently depending on the Study Type. Note that the "Mismatch" category can be divided into "non-match" and "negative match".
  - *Mismatch Condition* (Study Type I or II): The message condition is clearly not positively aligned with a target characteristic condition (e.g., people primed with value-expressive themes are given a message that does NOT contain value expressive themes).
  - *Mismatch Pole* (study Type III): The pole opposite to the positive matching pole is clearly not positively aligned with a message condition (e.g., for a value-expressive message, the comparison pole characterized by a low motivation to seek value expression).
  - <u>Notes</u>*:*
    - Note: All non-matches and all negative matches are mismatches, but mismatches are not necessarily non-matches nor necessarily negative matches. Mismatches are a broader and more encompassing category.
    - An example mismatch message that does not clearly fall into non-match and negative match conceptualizations is when 2 or more dimensions are merged into a single dimension. For example, this include: (1) Using a difference score to merge 2 dimensions like prevention/promotion regulatory focus; (2) Using within-person standardized or ipsatized scores such that ratings are in relation to other scores rather than a raw rating (e.g., sometimes used with VFI)
- **[2] Generic Message:** A *generic message condition* (AKA; a non-tailored message) is one in which everyone gets the same message regardless of

their characteristic. Generic messages are only defined in study Type I and Type II. They do not exist for Type III (i.e., as a distinct pole)

- **[3] Low match:** A *low match condition* is one that involves positive matching, but to a lesser extent than the main intervention group (e.g., the intervention, or "positive match" message is matched to multiple characteristics, and the comparison, the "low match" is matched to only one). This is more likely to occur as a Type I study than type II.
    - E.g., Studies that examine a high tailoring depth condition to a low tailoring depth condition will consist of a positive match (the high depth condition) and a low match condition (the low depth condition).
- **[4] Mixed Appeal:** *Mixed appeal condition OR pole* (Study Type I, II, or III) is a condition that contains more than one level of the manipulated message feature. For example, it may contain both gain and loss frames.
- **[6] Negative Match**: The message condition is <u>negatively</u> aligned with (i.e., opposed to) the target characteristic. Can also be defined slightly differently depending on the Study Type.
    - *Negative Match Condition* (Study Type I or II): The message condition is negatively aligned with (i.e., opposed to) the target characteristic (e.g., for a value-expressive motivation, this might be a message endorsing the opposite value to what the individual holds)
    - *Negative Match Pole* (Study type III): The pole opposite to the positive matching pole is negatively aligned with the message condition (e.g., for a liberally-oriented message, the negative match pole is the degree to which people are conservative).
    - Negative match examples include: (1) Giving a conservative message to a liberal, or a liberal message to a conservative; (2) Giving a person a message that threatens an important need/motive; (3) A message tailoring intervention that misidentifies a demographic variable that is important to an individual's identity.
- **[7] Non-Match**: The message is <u>not positively aligned with</u>, but <u>also not in opposition to</u> the target characteristic. Can also be defined slightly differently depending on the Study Type.
    - *Non-Match Condition* (Study Type I or II): The message condition is not positively aligned with, but also not in opposition to the target characteristic.
    - *Non-Match Pole* (Study type III): The pole opposite to the positive matching pole is not positively aligned with, nor in opposition to, the message condition (e.g., for a value-expressive motive, the comparison pole is characterized by a low motivation to seek value expression).
    - Non-Match examples include: (1) Message tailoring in which no references is made to a person's demographics/name; (2) a message whose feature level is deemed irrelevant to a given characteristic, such as matching to an unimportant function (e.g., VFI function with low rating); (3) targeting the wrong stage of change for a model

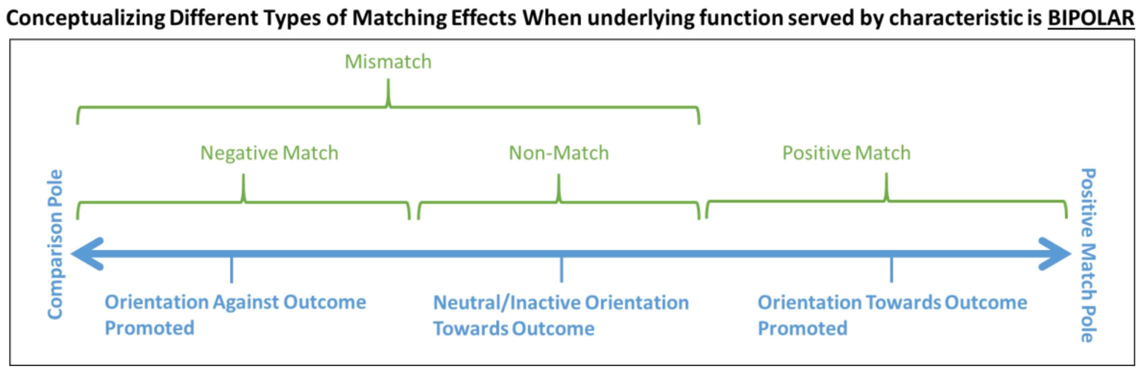


Figure G2. Visual Depiction of different types of matching conditions

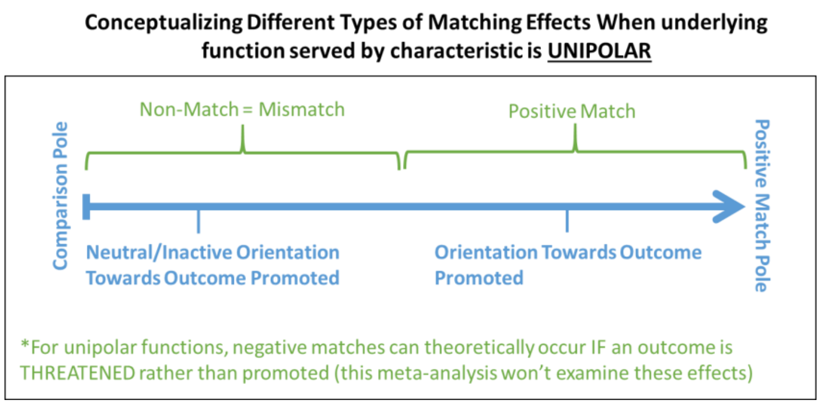


Figure G3. Visual Depiction of the two types of matching poles

- <u>Matching Classification Heuristic</u> to determine whether a comparison is a negative match or non-match:
  - If message feature manipulation represents 2 opposites AND the characteristic is naturally bipolar (e.g., not 2 dimensions merged together with a difference score), then the comparison is more likely a *negative match*
  - If the message contains an element such as "people like X don't like this", it is likely a *negative match* to people with the characteristic "X" (e.g., a message states that introverts don't typically like the promoted volunteer organization)
  - If the message mentions that doing the recommended behavior leads to greater costs in the domain participants care about, then it can likely be considered a *negative match* (e.g., for people who care about short-term outcomes over long-term outcomes, short-term costs may represent a negative match, whereas long-term costs may be a non-match)
  - If the characteristic is nominal in nature, a non-match is more likely (unless the second bullet point applies).

V. Message Condition Description: An open-ended description of the different levels of the message feature, as pertains to the 2 groups being compared (the positive match and the comparison group). For example, if the study compares gain and loss framed message, may write "gain vs. loss frames".

W. Number of characteristics in intervention: The number of characteristics that correspond to *individually manipulated* aspects of a message in the intervention condition.

- Will commonly be equal to 1 (e.g., the messages are systematically made to match one specific characteristics).
- Will most commonly be another number in studies interested in "tailoring depth"
- Will depend on how many features of a message are dependent on distinct characteristics from one another
- E.g., If matching to the VFI as a whole (e.g., to dominant motive of a set of 6), mark 1 for that condition, but if matching to each individual element (e.g., 6 statements correspond to 1 VFI motive each and the delivery of each individual statement is dependent on VFI scores), then mark 6.

X. Number of characteristics in comparison: The number of characteristics that correspond to *individually manipulated* aspects of a message in the comparison condition.

- Most of the time, will be equal to 0 (e.g., the messages are systematically made to match zero characteristics)
- Coding is done the same way as for the number of characteristics in intervention variable

Y. Characteristic Determination: How are the levels of the characteristic variable determined? Classified into 3 distinct ways:

- **Directly Measured**: Characteristic is measured using a psychological instrument (e.g., assessing individual differences in value-expressive tendencies using a self-monitoring scale; explicitly asking what goals a person endorses)
- **Manipulated:** Characteristic is induced in the person via the study design (e.g., priming high vs. low value-expressive themes), or matching is do to some other type of contextual characteristic that is determined by the interventionist (e.g., manipulating the type of organization being promoted)
    - Note: Contextual matching studies will generally involve this
- **Indirectly Inferred:** Characteristic is inferred contextually (i.e., assumed that certain types of attitudes/behaviors are predominantly guided by

certain themes; e.g., engagement in public environmental behavior is guided by value-expressive functions) or by virtue of another correlated characteristic such as group membership (e.g., wealthier individuals are more guided by value-expressive functions)

Z. Characteristic Polarity: How is the targeted characteristic *theoretically conceived* when thinking about different values it can take? Can fall under several categories:

- **Unipolar**: The targeted characteristic is understood as a unipolar construct. For instance, scoring high may mean a predisposition towards something, and scoring low may reflect the lack of a predisposition. This may also characterize a dimension where one pole contrasts with the other, but not in a way that opposes the other (e.g., concreteness is the same as low abstraction, rather than being the opposite, so a dimension from concrete to abstract is unipolar).
    - Note: Generally, targeting a unipolar characteristic should almost always lead to a comparison between a "positively matched message" and a "non-match message"
- **Bipolar:** The targeted characteristic is understood as a bipolar construct, such that scoring high means a predisposition towards something, scoring low reflects a predisposition against something, and scoring somewhere in between (midpoint on many raw scales) reflects a relative lack of a predisposition either towards or against (e.g., political ideology is an example. The midpoint is neutral. Moving towards the liberal pole may mean increasingly having a disposition against conservatism)
    - Note: Generally, targeting a bipolar characteristic should lead to a comparison between a "positively matched message" and a "negatively matched message". That said, this assumes the levels nearing the poles are represented (e.g., if a measure is skewed such that people either score high or near the midpoint, but not low, you should not see negative matching effects. Manipulating the 2 poles of the construct is perhaps likely to be more efficient).
- **Categorical**: The targeted characteristic is not understood as a continuous variable, or the polarity is debated/undefined.
    - Examples: ethnic grouping, gender, etc.
- **Mixed:** The authors are matching to more than one type of characteristics, and the characteristics fall in at least 2 of the categories above (unipolar, bipolar, categorical)
- **Other/Undefined:** The polarity of the construct is undefined, debated, or not understood
    - Example: Two or more distinct dimensions are merged into one, making it difficult to say where on a range of scores people lack a predisposition vs where they are predisposed against something. Generally, when distinct dimensions are

merged into one, this category should be picked (e.g., difference scores, ipsatized scores)

AA. Specific Characteristics Targeted: The specific characteristic(s) that was targeted by the message matching intervention. Take note of the characteristic. Be as specific in naming the characteristic as needed.

- Examples: Extroversion. Independent Self-Construal. Utilitarian function. Social-adjustive function. Value-expressive function. Participant Name. Participant gender. Ethnic group (levels: White vs. racial minority). Ethnic group (levels: European Americans vs. Asian Americans). Nationality (levels: Koreans vs. Americans).

AB. Characteristic Type Targeted: Messages can be matched to a number of different types of characteristics. Note whether each of the following characteristic type was targeted by the message matching intervention (i.e., whether messages were matched to this particular type of characteristic). Note that a single characteristic could be counted towards multiple types. These categories are tied to the characteristic that was assessed, induced, or inferred

- **[1] Motivation – Trait**: When the motivational characteristic reflects a person's stable, enduring, pattern of motivations, desires, values, or goals
    - E.g., Volunteer Functions Inventory, Regulatory Focus, Self-Monitoring,
- **[2] Motivation – State**: When the motivational characteristic reflects a short-term, situational, or induced state of motivations, values, desires, goals (e.g., following priming, threat, etc)
    - E.g., primed regulatory focus; asking about specific goals a person has; asking about the reasons they have for setting a specific goal (e.g., "why do you want to quit smoking this month?")
- **[3] Personality – Trait:** A broad disposition to think, act, or feel in a certain way across a variety of situations. Traits reflects a stable, enduring orientation
    - E.g., Big 5, Plasticity/Stability
- **[4] Personality – State:** When the personality characteristic reflects a short-term, situational, or induced state (e.g., following priming).
    - E.g., Primed neuroticism
- **[5] Culture/Nationality**: Characteristic describes a person's nationality and/or cultural background along some dimension. Excludes ethnic/racial groups within a given country.
    - E.g., Individualism/collectivism measure; Nationality, Power-Distance
- **[6] Barriers/Facilitators**: Assesses a barrier that participants indicate prevents them from engaging in a behavior and/or asks them about their perceived ability/confidence to engage in a behavior (their self-efficacy). May include participants identifying some sort of step they next need to

engage in. Can also be focusing on reasons for (or relative attention to reasons for) doing vs. not doing something, or on barriers vs. facilitators.

  - E.g., Financial or time constraints, needing to travel some distance, interpersonal challenges, self-efficacy, perceived behavioral control

- **[7] Ideology/Schema:** A belief system that shapes how individuals view and understand the world around them
  - E.g., Political Ideology, Self-Construal; Social Dominance Orientation; construal level, etc.
- **[8] Behavioral Beliefs:** Belief-based variables that are specific to a particular behavior. Often tied to specific theoretical frameworks (e.g., Theory of Planned Behavior)
  - E.g., Attitudes, Norms, perceived risk, perceived susceptibility, etc.
- **[9] Behavior Stage/behavior enactment**: Step in a process of distinct stages that a person engages in as they make a decision about something. Also encompasses whether a person is currently engaging in a behavior or not.
  - E.g., Stage of Change; Processes of Change; Precaution Adoption Process; status as smoker or not
- **[10] Behavior Type**: Matching to an element that distinguishes a type of behavior from other types
  - E.g., In health: prevention, promotion and detection behaviors.
- **[11] Unique Personal Identifier:** Something that uniquely characterizes the person
- **[12] Ethnic/Racial Group:** Specific ethnic or racial group within a country
  - E.g., Asian Americans vs. European Americans
- **[13] Gender:** Gender/Sex of participants
- **[14] Age:** How old a participant is
- **[15] Socio-Economic Status:** Income, education, professional status
- **[16] Product/Service Type:** Category of products and/or services that people are asked to make decisions towards. Also includes matching to the associations people have with a product/service/location.
  - E.g., Utilitarian vs. hedonistic product or destinations (for tourism), matching to a "brand's personality"
- **[17] Message Location**: Matching to where/when the message will be delivered
  - E.g., giving a health message when near a clinic; placing ad for tourism during a show that shows exotic locations
- **[18] Mood/Emotion/Affect**: Matching to a person's affective/emotional experience. Commonly matching to positive vs. negative mood.
- **[99] Other:** Characteristic not encompassed by any of the categories above
  - E.g., Social Support

AC. Specific Outcome Domain: Note the specific behavior/outcome that the study is trying to target/change. Be specific. If the study reports multiple outcome types (e.g., intentions, attitudes), can include information which outcomes is linked to which row here.

- E.g., attitude towards meat consumption; Mammography use intentions, donating to an environmental organization, support for a political candidate, 7-day smoking cessation

AD. Outcome Domain Type: Note the broad domain to which the outcome belongs, and the sub-domain as well. May select more than one category if relevant. *(Note: Categories will be updated as we are coding studies through)*

- **Health Behavior**: Intervention seeks to change behaviors that have health-related consequences
  - [1] Illness prevention: Behavior engaged in to *prevent* the onset of some illness (e.g., flossing/brushing to prevent tooth decay)
  - [2] Illness detection: Behavior engaged in to detect whether one has an illness or not (e.g., cancer screening; Pap tests)
  - [3] Health Promotion: Behavior engaged in to promote/improve health (e.g., exercising to get in better shape). This is different from preventing bad health (but a behavior could include both aspects)
  - [4] Treatment adherence: Continuing to follow a treatment plan (e.g., taking medication; following through with appointments, etc)
  - [5] Smoking related: Anything related to smoking and quitting smoking
  - [6] Nutrition/Diet related: Anything related to what people are eating/drinking (aside from alcohol, drugs, medication). For example, encouraging vegetable consumption.
  - [7] Physical activity related: Encouraging people to be physically active (would also be health promoting) or less sedentary (would also be illness preventing)
  - [8] Vaccination/immunization: Anything related to immunization
  - [9] Cancer-related: Behaviors enacted/avoided specifically because of their link to cancer (and this is explicit in the study)
  - [10] Sexual health related: Anything pertaining to sexual health (e.g., STI/STD testing, condom use)
  - [11] Drinking/Drug Use: Use of alcohol and or drugs, excluding medication adherence
  - [12] Oral Health: Behaviors such as flossing, brushing, dental appointments, etc.
  - [13] Cardiovascular disease: Anything related to cardiovascular diseases. However, link to the disease should be apparent in the goals of the article (e.g., physical activity in the context of a health

campaign to decrease heart disease, but NOT marketing campaigns for a gym membership)
    - [14] Obesity: Behaviors to prevent/manage obesity
    - [15] Mental Health: behaviors related to mental health, psychopathology, etc. This can be behaviors such as seeking help/counselling.
    - [16] Other: Anything not captured by the above categories but related to health
- **Environmental Behavior**: Intervention seeks to change behaviors that have environment-related consequences:
    - [17] Recycling: Improving rates of recycling,
    - [18] Waste reduction & composting: discouraging wasteful consumption, encouraging longer use of products. Encouraging composting instead of trash.
    - [19] Energy Conservation: Behaviors that conserve energy or reduce usage (e.g., turning off lights). May also include elements such as carpooling, using public transit, etc.
    - [20] Diet-related: Changing what/how people eat for explicitly environmental reasons
    - [21] Green Product/service: Promoting a product/service that is environmentally friendly (e.g., compostable products, energy-efficient products)
    - [22] Ecological Responsibility: Behaviors that directly involve cleaning/maintaining ecological spaces. E.g., Interacting better with wildlife, cleaning up wild spaces, etc.
    - [23] Other: Environmental behaviors not captured above
- **Prosocial Behavior**: Intervention seeks to change behaviors that are related to prosocial or altruistic behaviors:
    - [24] Volunteerism: Encouraging people to become involved or stay involved with a volunteer opportunity
    - [25] Donations/charity (financial/materialistic contributions): Making a donation of funds or objects for a cause
    - [26] Blood/Organ donation: Behaviors related to donating blood/organs
    - [27] Other: Prosocial behaviors not captured above
- **Political Behavior**: Intervention seeks to promote an outcome related to politics:
    - [28] Voting/endorsements: Voting for a party/ candidate. Can also include behaviors such as expressing support for a candidate
    - [29] Policy support: Expressing support towards a policy rather than a party/candidate
    - [30] Other: Political behaviors not captured above
- **Product/Service**: Intervention seeks to promote a product and/or service:

- [31] Tourism: Anything related to tourism, such as promoting different destinations. Also includes ads for airlines.
- [32] Food & Drinks (specific types of products): E.g., Promoting certain foods, drinks, restaurants, brands, etc.
  - E.g., beer, milk, hamburgers, McDonald's, Kraft
- [33] Electronic device: E.g., computer, cell phone, tablet
- [34] Cars/vehicles: E.g., ads for a given company, or for more environmental cars
- [35] Other (excluding green products/services captured above): Any consumer-related behaviors not captured in above categories

- **Misc**:
  - [36] Disaster-related behaviors: Behaviors related to the occurrence of disasters. E.g., this can be preparing for floods, earthquakes, etc.
  - [37] Antisocial Behaviors: Behaviors that lead to negative/harmful outcomes for others. E.g., aggression/violence, theft, fraud.
  - [38] Registration/recruitment: Asking people to register to a study, participate in a program, answer a survey, etc
  - [39] Job applications: Applications towards a work position
  - [40] Personal finance: Behaviors related to personal finances such as saving funds, investing, etc.
  - [41] Workplace behaviors: Behaviors enacted specifically at the workplace
  - [42] Cyber behaviors: Behaviors that involve the use of computers and other electronic devices. E.g., behaviors related to cyber-security, actions in virtual environments, social media, etc.
  - [43] Academic Behaviors: Behaviors related to school work/success. E.g., studying, taking exams, completing assignments, etc.
  - [44] Safety Behaviors: Behaviors that that put people at risk of injury or death caused by accidents. This can be injuries to the self, or to others (when to others, consider whether the behavior is also an antisocial behavior).
    - Example behaviors: Not following safety protocols at work; driving under the influence; speeding
- **[99] Other Category Not Above**: Select this if could not classify outcome domain into any of the categories above

AE. Change Type: What kind of change is the message intervention trying to induce in terms of the behavior of interest?

- **Promoting:** Intervention is trying to promote greater likelihood of engaging in a behavior, or aims to create more positive attitudes/intentions towards a behavior or object

- **Limiting:** Intervention is trying to promote lesser likelihood of engaging in a behavior, or aims to create more <u>negative</u> attitudes/intentions towards a behavior or object
- **Other/Unclear/Both:** The goal of the message does not clearly fall into the above category. The status of the message goal may be unclear (e.g., does not suggest changing outcomes in a particular direction), or the intervention may be targeted towards a broad class of outcomes that encompass both promoting and limiting types (e.g., states one should eat less meat and eat more vegetables)

7. Setting Up Additional Rows to Code Each Individual Effect:

AF. Group: When the effect between the positive match and the comparison isn't given for the overall sample, but for a subset at a time. The "group" variable assigns a number to the group.

- E.g., The study may assess whether matching operates differently for men and women and report findings broken down by gender.

AG. Group Description: Which of the following two types of research design was used to evaluate the matching effect?

AI. Assessment Time Category: Which time point does the effect correspond to? From the following:

- **First assessment** (of outcome): *First time the outcome variable is assessed after the delivery of the intervention*. Note that some time may still have passed since the intervention (e.g., the first time the outcome is assessed may be 3 months after the intervention. There will be at least one first assessment row coded for *every* study we retain.
- **Final assessment** (of outcome): When there are 2 or more time points when the outcome was assessed, this corresponds to the most distal (last) time point when a particular effect was assessed in a study. For example, if intentions was measured right after the intervention, after 6 weeks, after 6 months, and 1 year out, then this corresponds to the measurement taken 1 year out. We will not code the outcome assessed between the first and final assessment times.

AJ. Type of Outcome: What kind of outcome is being assessed for a particular effect/comparison?

- **Attitude:** "A psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor" (Eagly & Chaiken, 1993; 2007).
  - Assessed towards the behavior/object/brand that a message is targeted towards (i.e., not assessing attitude towards message itself)
  - Usually assessed with a likert-type scale with evaluatively laden poles such as good-bad, enjoyable-unenjoyable, important-unimportant, etc.

    - A measure of the acceptability of a policy or position is also considered an attitude
    - A measure of the worth (e.g., monetary value) associated with an object/service would be an attitude measure
- **Intention:** A state of wanting or planning to act in a given way. Can be in general (e.g., intending to exercise more) or specific (e.g., intending to exercise at 6am tomorrow morning). For this study, we will also include related concepts such as expectations one will engage in a behavior.
    - Includes <u>hypothetical decisions</u> (self reports on how someone would behave in response to a hypothetical scenario) fall under the category of intentions
        - For example, they may be asked to report how they would react in response to a hypothetical volunteer organization with a particular ad. Alternatively, participants could be asked to spend virtual resources.
    - Measures of <u>willingness</u> to engage in a behavior should also fall into this category.
        - Willingness to pay a given amount is also included
- **Self-report behavior:** Participant reports on their own degree of engagement in a given behavior. Engagement in the behavior must come after the message matching intervention exposure
    - This includes self-reported performance measures as well
- **Objectively assessed behavior:** Using a method external to an individual, such as an objective measure of a behavior (e.g., accelerometer; researcher observation) or external record (e.g., record of them going to a gym, implying exercise). Engagement in the behavior must come after the message matching intervention exposure
    - This includes performance measures as well

AK. Types of Effects: The type of effect represented by a given effect size. These depend on the study type, and can be broken down as:

- **Message|Characteristic**: The effect being evaluated corresponds to the main effect of a message condition *given* a particular level of a characteristic (e.g., evaluates the effect of a gain relative to a loss frame, for people who are promotion focused). This type of effect can be extracted for study **Type I** and study **Type II**.
- **Characteristic|Message**: The effect being evaluated corresponds to the main effect of a person's characteristic *given* a particular level of a message manipulation (e.g., evaluates the effect of a higher promotion focused for people who are receiving a gain-framed message). This type of effect can be extracted for study **Type II** and study **Type III**.
- **Interaction**: The effect being evaluated corresponds to the interaction effect between message condition and a characteristic (e.g., message framing X regulatory focus). This type of effect can be extracted for study **Type II** and study **Type III**.

Compare [X] Given [Y] / Interaction: A description, in open-ended terms, of the effect being evaluated. Takes the form of "X, given Y". This stands either for a specific Message|Characteristic effect or a Characteristic|Message effect.

- E.g., "Message Frame, given High Promotion Focus"

8. Data Extraction for Effect Sizes:

AM. N: The sample size corresponding to a specific effect

AN. Rel: The reliability information associated to the outcome measure (rounded to 2 decimals), as it pertains to a given effect

AO. Effect: The effect size, expressed in r (rounded to 3 decimals)

AP. Calculation Notes: A column to take notes about how the effect was calculated. Write down any numbers from the article that you used to calculate effect sizes, N, or Rel.

O-Q. Author Interpretation: How does the author(s) verbally describe/interpret the effect in the text of the manuscript? Broken into two elements:

AQ. Stated Direction: According to the author, what direction is the effect in (whether the matched or comparison group has better outcomes; i.e., "match advantage" = matched message is more effective)? Make sure to consider direction. Code as what the authors EXPLICITLY states as their interpretation in the text, not what can be extrapolated from the numbers/tables. Examples:

- "Group 1 (M = 4.3) was significantly different from Group 2 (M = 3.7)." If group 2 is the matched group, can write "comparison advantage" for the group 2 vs 1 comparison.

AQ. Stated Significance: According to the author, is the effect significant? In the text of the article, do they either report a p value lower than .05, OR state that the effect is "significant"?

- Do NOT count "marginal effects" as significant. If the authors states an effect is significant, but the p-value is greater than .05, count as "non-significant". Generally, if two interpretations of the text are present, pick the more conservative option.

9. Extracting Components of Study Design

AR-AU. Assessment Time Delay: Will keep track of 4 items to track the time lapse between receiving the intervention (i.e., message exposure) and the assessment of the primary outcome. These are listed next.

AR. Day of study: Outcome is assessed the same day that a participant was administered a message intervention (e.g., during a study session, or right after)

AS. Months: The number of months (after the intervention was given) before the outcome was assessed.

AT. Weeks: The number of weeks (after the intervention was given) before the outcome was assessed. Can be combined with the number of months.

AU. Days: The number of months (after the intervention was given) before the outcome was assessed. Can be combined with the number of months and weeks.

AV. Full Message Available: Is the complete message manipulation made available to the reader (e.g., in the manuscript, in the appendix, in supplemental materials)? This must include every version of the message. If the authors provide only an excerpt of the message manipulation (or only describe them), mark no.

AW. Message Length: How much content is contained within the messages participants are exposed to? 4 categories:

- **Short**: Message length is very brief. Must not contain any characteristics in either the "medium" or "long" categories, and may be characterized by any of the following:
  - Text/Script is 2 sentences or less.
  - 1 image
  - Video/Sound of at most 59 seconds
- **Medium**: Message length is moderately long. Must not contain any characteristics in the "long" category. Characterized by at least one of the following:
  - Text/Script is more than 2 sentences but no more than 1 page of double-spaced content (single sided; approx. 300 words max). This may be a short flyer, an email, a slide, etc.
  - 2-9 images
  - Video/Sound of between 1-5 minutes
- **Long**: message length is fairly long. Characterized by any of the following:
  - Text/Script is more than 1 page of double-spaced content (e.g., more than 300 words). This may be a booklet, a series of slides, an essay, etc.
  - 10 + images
  - Video/Sound of more than 5 minutes
- **Unclear**: Cannot classify the length of the message according to the above categories (e.g., not enough information is provided)

AX. Message Modality: Through what medium were *message features manipulated*? This is not the medium through which the message overall was delivered (e.g., if a message intervention contained text and images, but only the text was manipulated across conditions, select "Text only"):

- **Text only**: Feature manipulation involves text-based information, but no images, nor audio. (e.g., essay, email)
- **Static Images Only**: Feature manipulation is conveyed solely via one or more images. No text or audio information is present.
- **Text and Images**: Feature manipulation involves both text-based information, along with images (e.g., pamphlet, flyers)
- **Audio Only**: Feature manipulation is conveyed solely via audio information with no text or images (e.g., automated phone call; audio recording)
- **Audio-Visual**: Feature manipulation is delivered in a video/animation which contains visual elements (requires images, which may or may not be supplemented with text)along with auditory elements (spoken words and/or other sounds).
- **Interpersonal**: Message is communicated by a person, rather than using any of the other modalities (e.g., this could be by the interventionist, a confederate, a health provider)
- **Unclear/Other**: Message modality does not fall into any of the above categories, or it is unclear which category describes the intervention (e.g., not enough information is provided).

AY. Delivery Setting: In what setting was the intervention given to participants?

- **In Person**: Participants came to see the researcher, and were exposed to the materials in a lab setting and/or when using a computer in a lab
- **Online**: Delivered directly to person via internet (e.g., recruited sample online and manipulation administered within survey, targeted people via email, changed ads on Facebook on a per-profile basis)
- **Environment**: Message was not delivered directly to a person, but changes were made to a person's environment, such as by altering naturalistically occurring ads (e.g., billboards, posters, TV ads, radio, ads administered online based on location)
- **Other/multiple**: Cannot classify as any of the above. May be missing information, or may fall under other categories (e.g., mail, phone) or multiple categories (e.g., message given in person, but also administered online)

AZ. Intervention Contacts: Was the message given to participants on multiple occasions? (i.e., did they have a refresher message, a booster session, or was the message given before every assessment?)

- **Single Contact**: Participants were administered a message on only one occasion
- **Ensured Multiple Contacts**: Participants were explicitly exposed to the message on multiple occasions such that multiple exposures to the message was guaranteed by design (e.g., sent texts/emails to participants containing the message on several distinct days)
- **Potential Multiple Contacts**: Participants could feasibly be exposed to a message on multiple occasions, but this was outside the control of experimenters (e.g., this would be the case when messages are administered via radio/TV, or if participants chose whether/when they would view the message).
  - Note: It is feasible that some participants in this condition would never view the message whereas others would view it many times.
  - When materials are sent via mail, email, etc., and are set up such that participants can browse them at their leisure, pick this category. If the materials are embedded in an online survey (i.e., people can't go back to view them), do not pick this

10. Note attributes of the overall study sample

BA. Female: The proportion of the study's sample that is female

BB. Male: The proportion of the study's sample that is male

BC. Overall N: The total N (sample size) used in this study (total sample recruited, *not accounting for attrition* AND *including all groups* within experiment, even those we aren't coding such as extra controls).

BD. Nationality: Note which countries are represented in the sample. Note if information is not available.

BE. Average Age: Note the average age of the sample if such information is available (prioritize mean, but can accept median)

BF. Population Type: Choose among the following categories to describe the sample used

- **Offline community sample**: A non-student, and non-patient sample that is not recruited using internet-based means (e.g., telephone, mail, in-person). For this review, category excludes the other categories below.
- **Online community sample (e.g., panel, MTurk, Crowdflower)**: A non-student, and non-patient sample that is recruited using internet-based means
- **Children/Adolescents**: A sample consisting of individuals below the age of 18 (excluding college/university students)
- **Diagnosed Patients**: A sample of patients that have been formally diagnosed with some illness

- **Undiagnosed population at risk**: A sample of participant that haven't been formally diagnosed, but are part of a group that is known to be at risk for a particular disease of interest
- **College/University Students**: Students at a college or University
- **Other**: A category not included above (e.g., if a mixture)

11. Note Risk of Bias Variables

BG. Characteristic assessment time: If the characteristic matched to was measured (not implied or manipulated), was it measured before or after the delivery of the message?

BH. Reliability Statistic (Characteristic): If applicable, take note of the reliability statistic for the assessed characteristic (i.e., the construct being matched to). This is only feasible if the characteristic was directly measured.

- Accept measures of internal consistency that have a similar metric: correlation between two items, Cronbach's Alpha, Spearman Brown, Standardized Alpha, etc.

BI. Categorized Continuous: If the study was of type I or II, AND directly measured the characteristic, we can note whether the characteristic is theoretically thought of as categorical (e.g., matching to name) or continuous (e.g., most personality traits). If it is theoretically continuous, then was it artificially made into a categorical variable?

- E.g., Self-monitoring is a continuous variable. If people are categorized into "high" and "low" self-monitors, this is artificially categorizing the variable.

BJ. Fused Dimensions: If the characteristic is comprised of 2 or more independent dimensions, were scores along these dimensions somehow combined into a single index (e.g., by taking a difference score, or using within-person standardization)?

- E.g., Promotion and prevention focus are 2 distinct variables. If a researcher matches to the differences score between the 2 foci, or matches to people's predominant orientation (i.e, classifies people as either promotion or prevention focus), this is fusing the 2 dimensions.
- If a manipulation (e.g., a prime) has 2 levels, and each level consist of separate factors, this is also a form of fusing. For example, it isn't fusing if the prime for high vs. low promotion focus. It is fusing if it is for prevention vs. promotion focus.

BK. Pre-registered: Was the study pre-registered? Here, pre-registration deals with the primary outcomes being evaluated.?

BL. Data open Access: Is data freely available? Article must provide a link to access the data, not just mention that it is available. No need to assess the usability of the dataset.

BM. Analysis Script Available: Is the code/script file the investigators used to complete their analyses available? The researchers must provide the code to reproduce their analyses with a link, in supplemental files, etc (not just mention it is or can be made available). No need to assess the quality of the shared code/script file.

BN. Analysis involves covariates: Do the primary analyses involve covariates in addition to the matching effect (as a main effect term), or main effects of message/condition (when the matching effect is considered as an interaction term)? This might include controlling for variables such as gender, demographics, etc.

BO. Intervention Is Matching Specific: Did the intervention involve other components than the matching, which were different between the intervention and control conditions? (e.g., control and experimental group were delivered via different methods, intervention group was tailored and used other techniques).

12. Cochrane Risk of Bias Tool Assessments (Higgins & Green, 2011)

BP. Selection Bias: "Selection bias refers to systematic differences between baseline characteristics of the groups that are compared. *The unique strength of randomization is that, if successfully accomplished, it prevents selection bias in allocating interventions to participants*. Its success in this respect depends on fulfilling several interrelated processes. A *rule for allocating interventions to participants must be specified, based on some chance (random) process*. We call this <u>sequence generation</u>. Furthermore, steps must be taken to secure strict implementation of that schedule of random assignments by preventing foreknowledge of the forthcoming allocations. This process if often termed <u>allocation concealment</u>, although could more accurately be described as allocation sequence concealment. Thus, one suitable method for assigning interventions would be to use a simple random (and therefore unpredictable) sequence, and to conceal the upcoming allocations from those involved in enrolment into the trial." (Higgins & Green, 2011)

- **Low Risk Examples:**
    - Used true randomization.
    - Random number was generated per participant, not in advance.
    - Random numbers generated in advance, but person assigning participants could not see the numbers ahead of time before needing to assign a given participant

- **High Risk Examples:**
    - Using an alternating assignment (e.g., every other participant; assignment based on names, dates, etc), and other “quasi random” methods.
    - Experimenter has a printed list, and can see what allocation is coming up. (e.g., they can decide to change the order in which they call in two participants to be “randomized” based on knowledge of what allocation is upcoming)
- **Unclear Example:**
    - Simply say participants were “allocated”, “randomized”, or does not provide any information on how randomization was performed.
    - If they used some form of restricted randomization (e.g., blocked randomization, stratified randomization), they must still specify further to not be counted as “unclear” (i.e., still want to see some form of true or simple randomization such as with a computer algorithm)

BQ. Performance Bias: “Performance bias refers to systematic differences between groups in the care that is provided, or in exposure to factors other than the interventions of interest. After enrolment into the study, blinding (or masking) of study participants and personnel may reduce the risk that knowledge of which intervention was received, rather than the intervention itself, affects outcomes. Effective blinding can also ensure that the compared groups receive a similar amount of attention, ancillary treatment and diagnostic investigations. Blinding is not always possible, however. For example, it is usually impossible to blind people to whether or not major surgery has been undertaken.” (Higgins & Green, 2011)/

For our meta-analysis, we will ONLY consider whether participants and study personnel are blinded/masked to the intervention. Other elements will be captured by the “purely matching” variable.

- **Low Risk Examples:**
    - Participants and study personnel are stated to have been blind to the condition in which they were assigned
    - If the study was completely delivered by computers/mail, it is usually low risk
- **High Risk Examples:**
    - Either or both participants or study personnel were aware of which condition participants were assigned to
- **Unclear Example:**
    - It isn’t clear whether participants and personnel were blind

BR. Detection Bias: “Detection bias refers to systematic differences between groups in how outcomes are determined. Blinding (or masking) of outcome assessors may reduce the risk that knowledge of which intervention was received, rather than the intervention itself, affects outcome measurement. Blinding of outcome assessors can be especially important for assessment of subjective outcomes, such as degree of postoperative pain." (Higgins & Green, 2011).

- **Low Risk Examples:**
  - observers did not know which condition participants were or used a truly objective assessment.
  - Participants gave self-reports, and there isn't an explicit reason to expect different response bias across conditions (this will be the most common case, and will be typical of self-report outcomes such as attitudes, intentions and self-reported behaviors)
- **High Risk Examples:**
  - external, non-blind, raters used to assess outcomes and the measure required them to use some judgement.
  - Reason to believe response bias differed across conditions for participants giving self-reports (uncommon)
- **Unclear Example:**
  - Not enough information to make a judgment

BS. Attrition Bias: "Attrition bias refers to systematic differences between groups in withdrawals from a study. Withdrawals from the study lead to incomplete outcome data. There are two reasons for withdrawals or incomplete outcome data in clinical trials. Exclusions refer to situations in which some participants are omitted from reports of analyses, despite outcome data being available to the trialists. Attrition refers to situations in which outcome data are not available" (Higgins & Green, 2011).

For our purposes, we will use a more encompassing definition. We will compare the number of participants used at the randomization stage (excluding participants randomized to a group not of interest), and compare that number to the number of participants used for the analyses we are extracting.

- **Low Risk Examples:**
  - Little to no participants dropped out during the study by the time the outcome was assessed (i.e, may differ for proximal and distal outcomes – the proximal outcome usually has low attrition)
  - Missing data is similar across groups, and appears to be missing at random (i.e., tests of this may be reported)
  - Little missing data on the outcome of interest
  - Researchers were not dependent on participants coming back because distal outcome was assessed through some other available record

- **High Risk Examples:**
  - Significantly more people in one group dropped out than in the other
  - There is a substantial amount of attrition and it doesn't seem random (there are systematic differences between groups)
- **Unclear Example:**
  - It isn't clear how much missing data there may be. The authors do not discuss attrition for distal outcome

BT. Reporting Bias: "Reporting bias refers to systematic differences between reported and unreported findings. Within a published report those analyses with statistically significant differences between intervention groups are more likely to be reported than non-significant differences. This sort of 'within-study publication bias' is usually known as outcome reporting bias or selective reporting bias, and may be one of the most substantial biases affecting results from individual studies (Chan 2005)" (Higgins & Green, 2011).

For our purposes, this will only consider our primary outcomes of interest.

- **Low Risk Examples:**
  - Ideal case: There is enough data to extract all effects of interest in the study (e.g., all main effects and interaction effects can be extracted)
  - Still low risk if some effect sizes are reported for each of the outcomes and for each subgroup
- **High Risk Examples:**
  - Effects associated to some outcome are not reported in any form (e.g., assessed behavior but do not report any effects associated to it).
  - Pick high risk if the reported effects are just verbal descriptions without numbers (e.g. "effects were significant"
- **Unclear Example:**
  - Not enough information to judge

BU. RoB_Notes: Use this column to add in any notes about your ratings with this risk of bias tool.

13. Other

BW. Notes: Use this space to write down any extra notes about the report/study. Use this instead of incorporating comments into the spreadsheet.

GENERAL TERMS (Not corresponding to any column)

Features (of a message): Attributes of a message that are experimentally varied to be more (or less) congruent with a particular characteristic

- This can be the content of a message (e.g., different themes), the framing of the message (e.g., gain/loss frames), images/colors used, direct references to the characteristics of an audience, etc.

Characteristics (of a Target): Attribute(s) of a participant to which a message feature can be matched

- This can be individual differences in personality/values/motives, a demographic category (e.g., gender), a type of behavior/goal targeted (e.g., health promotion vs. prevention behaviors; goals to do vs. not do a behavior), etc.

Matching Effect: The differential impact of delivering two messages that vary in the degree to which they are (positively) matched to an individual's characteristics. For the current study, this is operationalized either:

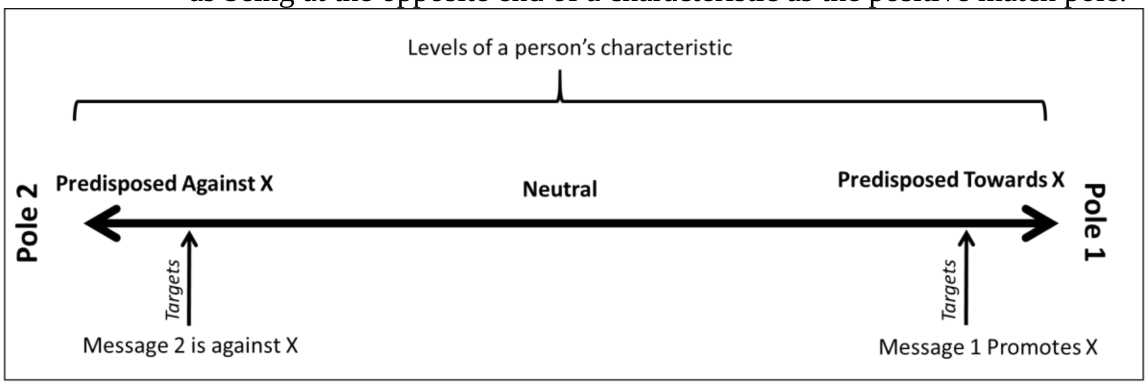
- <u>Categorically defined</u>: The differential impact of receiving (1) a positively matched message compared to (2) a comparison message.
- <u>Continuously defined</u>: The effect of a message being (1) more positively matched (approaching the positive match pole) compared to less positively matched (moving towards the comparison pole).

Positive Match: When message feature is more highly congruent with a target's characteristic(s)

- When matching is *categorical* (Study *type I or II*), this is the experimental condition(s) in which a manipulated message feature(s) is congruent with the characteristic(s) of a target. This condition represents the "positive match message".
- Examples include: (1) Message tailoring condition in which direct mentions to a person's name and/demographic classifications are made; (2) Message conditions in which a person is assigned a message based on their dominant motivational orientation; (3) Message framing studies in which a particular frame is assigned to promoted a behavior that corresponds to a function predisposed to that frame (e.g., loss frames for risky behaviors)
- When matching is *continuously operationalized* (*Study type III*), a message is more positively matched to the extent that an individual's characteristic is closer to the pole that to which the feature is congruent. For a given message feature level, this pole is the "**Positive Match Pole**".

Comparison: What is a positive match being compared to? What is the experimental/matching effect defined in relation to? (dynamic is shown in *Figure A2*)

- When matching is categorical (Study type I or II), this is the “control” condition(s) in which a manipulated message feature(s) is not congruent with the characteristic(s) of a target. This condition represents the “comparison message”.
- When matching is continuously operationalized (Study type III), a message is less positively matched to the extent that an individual’s characteristic is closer to the pole that to which the feature is not congruent with a person’s characteristic. For a given message feature level, this pole is the “Comparison Pole”. The comparison pole is defined as being at the opposite end of a characteristic as the positive match pole.



- For Message 1, Pole 1 is the “Positive Match Pole”. The closer participants score to this pole, the more positively matched a message is. Pole 2 is the “Comparison Pole”, defined as the opposite pole to the positive match pole.
- For Message 2, Pole 2 is the “Positive Match Pole”, and Pole 1 is the Comparison Poll.

Figure G4. Continuous Depiction of how Matching Effects Vary in Degree

Appendix H. Project 1 – Extracting Effect Sizes in a Common Metric (*r*)

In order to reliably convert effects into *r*, I compiled a number of calculator tools in excel which, when provided with a given set of information (e.g., group means, standard deviations, and sample sizes), calculate an effect size in the metric of a correlation coefficient (calculators were developed by: DeCoster, 2012; Lakens, 2013). I also created excel-based calculators using common formulae to convert between effect sizes (e.g., Borenstein, Hedges, Higgins, & Rothstein, 2009; Polanin & Snilstveit, 2016). Figure H1 below shows an example interface for one of these excel calculators. Calculator files allowed coders to accomplish the following conversions

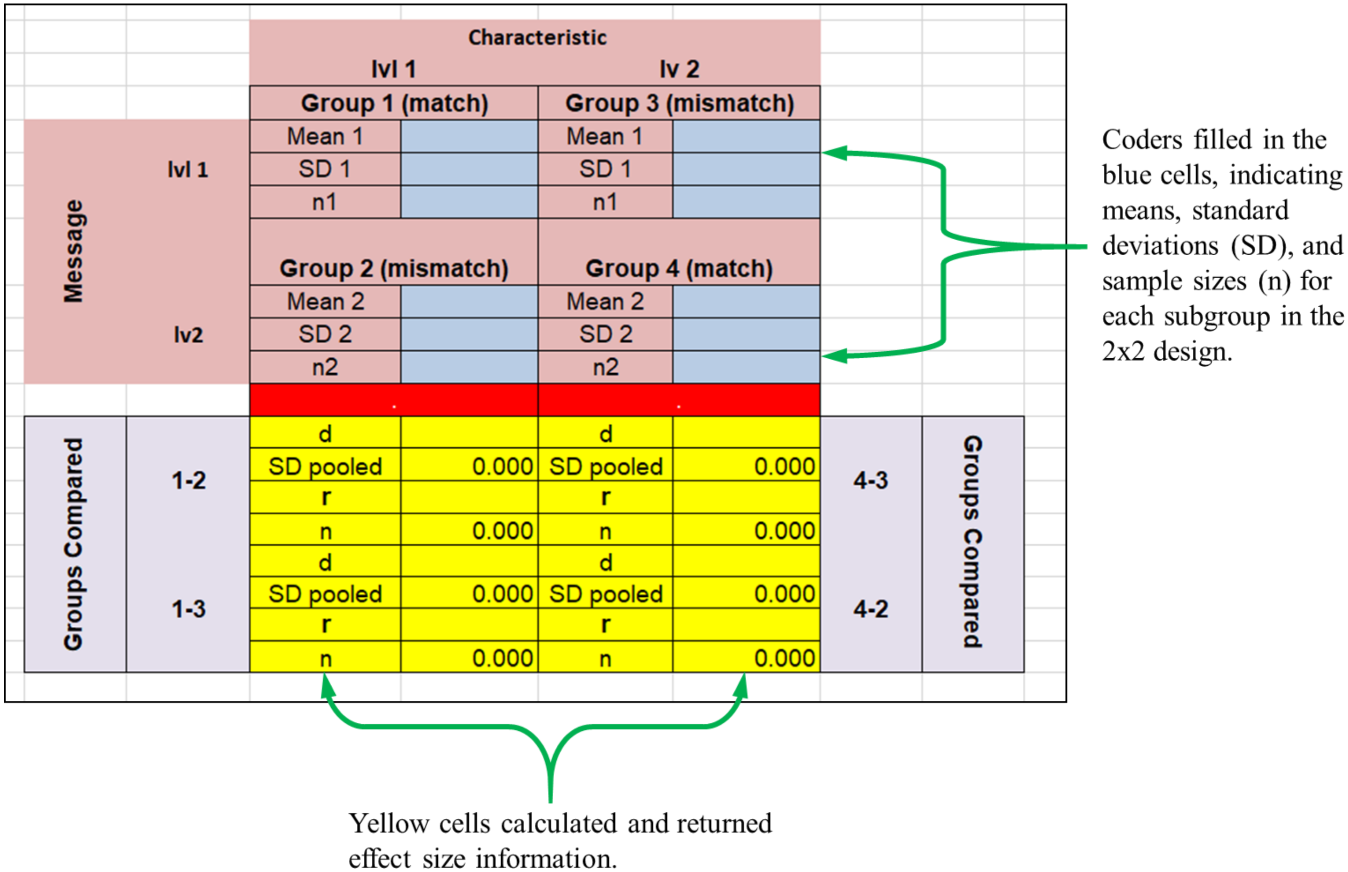
- Convert Cohen's *d* into *r*
- Calculate r when provided with the means, standard deviations, and sample sizes for 2 or more groups
- Convert results from an independent-samples t-test into *r*
- Convert an F-test (e.g., for an ANOVA) into *r*
- Calculate *r* when given % success on a dichotomous outcome for two or more groups
- Convert odds ratios into *r*
- Convert η^2 into *r*
- Calculate standard deviations from a t-test, from confidence intervals, or from standard errors

Coders were instructed to first extract information using data they were most confident did not control for covariates. Most commonly, this meant calculating effects using observed means, standard deviations, and sample sizes (over F-tests from ANOVA tables). When quantifying the differences between groups, it was frequently the case that one or more pieces of information was missing from the report. Under such circumstances, coders were instructed to provide their best guess estimate of the value of the missing information, if enough other information was provided to do so. For example, this involved:

- Using figures to extract means if numbers were not directly presented in text.
- Using figures to extract standard deviations if these showed information such as confidence intervals or standard errors
- Assuming equal sample sizes across experimental conditions if specific sample sizes were not explicitly stated
- Assuming equal standard deviations between different experimental conditions when specific standard deviations were not provided
- Using t-tests to calculate standard deviations
    - E.g., in a Type II study, report may have provided t-tests for two of four pairwise tests. If so, the t-tests were used to calculate *r* for these two effects, and the average SD implied by the two t-tests was imputed as a value to extract effects for the other two comparisons.

Occasionally, information was corrected if authors had clearly made a mistake, and the true value could be easily deduced (e.g., obvious mistake in degrees of freedom for a two-way ANOVA, or when tables/text disagreed but one of the two could be identified as the mistake).

Figure H1. Example Interface of a Calculator File Interface Used by Coders to Extract Effect Sizes



Note. This calculator file was used to extract pairwise comparisons between the four cells making up a Type II study design (which follows a 2x2 factorial design). Two of the extracted effects correspond to the difference between receiving the 2 messages levels given a particular level of the characteristic, whereas the other two effects correspond to the difference between the 2 levels of the characteristic conditional on receipt of one of the two message levels.

Appendix I. Project 1 – Acknowledgement of Unique Team Member Contributions

The full team having made contributions to this project includes: Keven Joyal-Desmarais (KJD), Mark Snyder (MS), Alexander J Rothman (AJR), Alexandra Scharmer (AS), Molly K Madzelan (MM), Jolene See (JS); Amy Riegelman (AR), Hannah Becker (HB), Claire Pardubsky (CP), and Melanie Iversen (MI). This appendix acknowledges the relative contribution of each individual throughout this project.

KJD's Contributions:

- Full project conceptualization and design.
- Generation of hypotheses and research questions
- Generation of full search procedure
- Creation of coding materials and procedures.
- Conducting the full search for reports.
- Conducting the full deduplication, screening by titles, and screening by abstracts
- Conducting screening of full texts, and accumulating PDFs of articles for each screened text.
- Coding of articles (coded around 75% of reports; see Table I1 below)
- Supervised coding/training of AS, MM, JS, HB, CP, and MI.
- Conducted all analyses; prepared all reports of data

MS's Contributions:

- Provided supervisory guidance at all stages of research, including development of research questions and procedures, as well as the interpretations of findings.

AJR's Contributions:

- Provided supervisory guidance at all stages of research, including development of research questions and procedures, as well as the interpretations of findings.

AS's Contributions:

- Took part in training phase of coding; played a role in the refinement of the coding protocol and materials
- Conducting screening of full texts, and accumulating PDFs of articles for each screened text.
- Independently coded a substantial number of reports (see Table I1)

MM's Contributions:

- Took part in training phase of coding; played a role in the refinement of the coding protocol and materials
- Conducting screening of full texts, and accumulating PDFs of articles for each screened text.
- Independently coded a substantial number of reports (see Table I1)

JS's Contributions:

- Took part in training phase of coding; played a role in the refinement of the coding protocol and materials
- Conducting screening of full texts, and accumulating PDFs of articles for each screened text.

- Independently coded a substantial number of reports (see Table I1)

AR's Contributions:

- Provided guidance and feedback to KJD during the development of the search and indexing protocol to identify studies for inclusion into the review

HB's Contributions:

- Took part in training phase of coding; played a role in the refinement of the coding protocol and materials
- Conducted some independent coding (see Table I1), screening of full texts, and accumulating of PDFs of articles

CP's Contributions:

- Took part in training phase of coding; played a role in the refinement of the coding protocol and materials
- Conducted some independent coding (see Table I1), screening of full texts, and accumulating of PDFs of articles

MI's Contributions:

- Took part in training phase of coding; played a role in the refinement of the coding protocol and materials
- Conducted some independent coding (see Table I1), screening of full texts, and accumulating of PDFs of articles

I.1. Individual Contributions to Coding. Table I1 provides a breakdown of the relative contribution of each person involved in coding records for the systematic review and meta-analysis. The main coders were KJD, AS, MM, and JS. However, since CP, HB, and MI also contributed to coding during the training phase, their contributions are also noted. The first column lists the initials of each individual coder. The next three columns list the percentage of the 2,671 records identified for full-text screening which a coder: (1) identified as having at least one study meeting eligibility criteria and therefore coded in full; (2) attempted to extract effect sizes for, which included unsuccessful attempts for which coders noted missing data—this number differs from the previous column, as during the training stage, coders began by familiarizing themselves with all other aspects of coding first—and, (3) identified as not eligible for coding.

Table I1. Relative Contribution of each coder in Coding Articles

Coder	Records Coded in Full (%)[a]	Records for Which Coder Extracted Effects (%)[a]	Records Marked by Coder for Exclusion (%)[a]
CP	3.7	1.8	1.7
HB	1.6	0.0	2.1
MI	2.3	0.0	2.0
JS	13.0	10.0	15.3
MM	6.7	6.8	9.7
AS	11.9	12.1	13.3
KJD	65.0	75.4	60.2
3-7 raters[b]	9.8	3.2	2.4

[c]Percentages add up to more than 100% as coders sometimes worked in pairs during training, and records evaluated for reliability were also coded by two individuals each.

[b]These articles were coded by anywhere between 3-7 coders during the training stage. The relative contribution of each individual coders for this stage was not computed.

During training, coders worked in groups. Early during the training stage, AS, MM, JS, HB, CP, and MI worked in pairs to extract code, and KJD independently coded records. The pairs would then hold weekly meetings with KJD to review their coding, resolve discrepancies, and discuss ways to improve the reliability of coding (e.g., by making small tweaks to the codebook). During this stage, only KJD, AS, and MM extracted effect sizes. Then, AS, MM, JS, HB, and MI continued working in pairs, but each person began coding independently. During weekly meetings with KJD, inconsistencies in code were resolved, and the agreement between coders was again examined. During this stage, JS and CP began to extract effect sizes under the close supervision of KJD. Once coders showed high agreement, felt confident in their coding abilities, and showed small numbers of mistakes, they transitioned out of the training phase.

Appendix J. Project 1 – Interrater Reliability Assessment

Table J1 below provides a detailed summary, with notes of the interrater reliability for each coder pair, and for each variable assessed for reliability. Here are notes on how to read the table's columns:

Column 1: Variable & Notes for Reliability Calculations. This column lists all the variables assessed for variability. It further provides notes on the distribution of response choices selected during coding (i.e., for the reliability coding, not for the full dataset), and other relevant notes to consider to interpret the reliability indices provided.

Column 2: Nesting. This columns outlines the level under which a variable was nested to calculate reliability. Efforts were made such that coding instances were evaluated only once (i.e., to avoid double counting coding). For example, if a study was Type II and had 5 rows, we only coded the "Message Framing" response choice indicted by a coder once, as there was no possible variation in the other 4 rows (i.e., the coder's choice would carry over). There were different types of nesting that could occur in the datasets:

1) **Matching Effect**: Refers to every unique instance of the column "Specific Characteristic Targeted" per study. Variables that are coded according to this don't vary within matching effects (these variables are usually dependent on the specific characteristic targeted).
2) **Study number**: Variables nested under this designation typically did not vary within a given study.
3) **Specific Outcome Domain**: Refers to the outcome measures being

used for assessment. Variables nested under this are usually those that code for attributes of the outcome domain being assessed

4) **Assessment time**: Refers to whether the effect extracted corresponded to the first or last assessment time point

5) **Message condition description**: Refers to the type of message characteristic being manipulated. Variables nested under this designation were usually used to qualify the message manipulation.

For some designations of nesting, it was occasionally possible for variation to occur, and if it did, then multiple instances of coding were entered into the reliability calculation (e.g., study type is usually invariant within studies, but a Type II study with an additional control group could lead to additional rows coded as Type I. These coded the comparisons of the positive match groups with the control group [a comparison that wasn't capturable using the Type II coding scheme].

Column 3: Reliability: Notes the assessment of interrater reliability for each variable. Provides a combination of:

- **CA** = Coder (percent) Agreement
- **r** = Pearson correlation
- **ICC** = ICC calculation (class 3, type 1)
- **Ranges**: provided when coders picked all response options that applied from a list. each possible response options. The "range" is the range of the above reliability indices across each individual response option.
- **Means**: provided when coders picked all response options that applied

from a list. each possible response options. The “mean” is the average of the reliability indices across each individual response option.

- **k:** The k next to each estimate represents the number of unique instances/observations of the variable that were coded by the two coders

Column 3 also provides four numbers for each index reported. These correspond to:

1) The overall reliability index for a variable, aggregated across all coder pairs (KJD, coding with AS, MM, or JS).
2) The reliability index for the coder pair 1
3) The reliability index for the coder pair 2
4) The reliability index for the coder pair 3

Table J1. Detailed Breakdown of Interrater Reliability Per Coder and Per Variable

Variable & Notes for Reliability Calculations	Nesting	Reliability
Message Framing. Dichotomous Variable. Variability: Yes (30.3%); No(69.7%)	**Matching Effect**	[1] CA = 90.1 [k=71] [2] CA = 95.5 [k=22] [3] CA = 88.9 [k=27] [4] CA = 86.4 [k=22]
Message tailoring. Dichotomous Variable. Variability: Yes (47.9%); No(52.1%)	**Matching Effect**	[1] CA = 98.6 [k=71] [2] CA = 100 [k=22] [3] CA = 100 [k=27] [4] CA = 95.5 [k=22]
Context-Matching. Three levels. *Calculation ignores differences between the response options of "yes" and "yes-consistency". Deemed equivalent and are not differentiated in analyses.* Variability: Yes (42.3%); No (39.4%); Yes-consistency (18.3%)	**Matching Effect**	[1] CA = 98.6 [k=71] [2] CA = 100 [k=22] [3] CA = 100 [k=27] [4] CA = 95.5 [k=22]
Study Type. Original variable has 4 possible options. However, only 2 were eligible for inclusion. Consequently, can be considered a dichotomous variable for our purposes. Variance: Type II (61%); Type I (39%)	**Study Number** if no variation within. If variation exists by study number, code unique instances within each study.	[1] CA = 98.3 [k=58] [2] CA =100 [k=16] [3] CA = 100 [k=22] [4] CA = 95 [k=20]
Type of Comparison. Two ways of calculating agreement. This row simply notes whether the entire selection for this variable was in agreement (or not) between coders. The next row provides more specific analyses by response choice. *This is a stringent variable as it requires agreement on 7 choices.*	**Matching Effect** if no variation within. If variation exists within, code unique instances within matching effect.	[1] CA = 85.1 [k=67] [2] CA = 68.2 [k=22] [3] CA = 87 [k=23] [4] CA = 100 [k=22]
Type of Comparison. Breaks down each of the 7 options raters could pick. One option (option 5) isn't considered here, as it was a criteria for exclusion (therefore any row containing this response would have been excluded). *Most categories had very little variance. If mistakes occurred, this was likely the*	**Matching Effect**	**Means** [1] CA = 97.0 [k=402] [2] CA = 93.2 [k=132] [3] CA = 97.8 [k=138]

result of a coder selecting the most common category (i.e., selecting it as a default). The "k's" reported for the reliability are the sum for the 7 categories. For any given category, the k is equal to the k from "Type of Comparison" Variance for the response choices: 1(96%), 2(2%), 3(2%), 4(0%), 6(5%), 7(84%)		[4] CA = 100 [k=132] **Ranges** [1] CA = 89.6-100 [k=402] [2] CA = 72.7-100 [k=132] [3] CA = 91-100 [k=138] [4] CA =100-100 [k=132]
Number of characteristics in intervention. Variable contained a mix of categorical and count-based response options (i.e., a numerical count, or selecting "unclear" or NA"). *Did not differentiate between the "NA" and the "Unclear" response options, as these are treated interchangeably in analyses.* Note: there is very little variation for this variable.	**Study Number** if no variation within. If variation exists by study number, coded unique instances within each study.	[1] CA = 100 [k=60] [2] CA = 100 [k=18] [3] CA = 100 [k=22] [4] CA = 100 [k=20]
Number of characteristics in comparison. Variable contained a mix of categorical and count-based response options. Because treating it as an MC Choice would lead to a lot of response categories, are only coding whether the raters were consistent or not in their coding. *Did not differentiate between the "NA" and the "Unclear" response options.* There is very little variation for this variable.	**Study Number** if no variation within. If variation exists by study number, coded unique instances within each study.	[1] CA = 98.3 [k=60] [2] CA = 100 [k=18] [3] CA = 95.5 [k=22] [4] CA = 100 [k=20]
Characteristic Determination. Categorical variable with 4 response options. *75% of discrepancies between coders came from a single record. Variance per option: directly measured (20%); manipulated (52%); indirectly inferred(29%)*	**Matching Effect**	[1] CA = 93.94 [k=66] [2] CA = 81 [k=21] [3] CA = 100 [k=23] [4] CA = 100 [k=22]
Characteristic Polarity. Categorical variable with 5 response options. *Variance per option: other/undefined (2%); mixed (2%); bipolar (10%); unipolar (23%); categorical (62.9%)*	**Matching Effect**	[1] CA = 87.88 [k=66] [2] CA = 66.7 [k=21] [3] CA = 100 [k=23] [4] CA = 95.5 [k=22]
Characteristic Type Targeted. The first column called "Overall Agree" simply notes whether the entire selection for this variable was in agreement (or not) between coders. Only takes 2 values: Yes vs. No. A **very stringent** way of calculating variability as the coders need to agree **on 19 possible categories**. The lower reliability also seems to predominantly emerge from the second coder pair in very specific categories.	**Matching Effect** if no variation within. If variation exists within, code unique instances within matching effect.	[1] CA = 67.2 [k=64] [2] CA = 33.3 [k=21] [3] CA = 82.6 [k=23] [4] CA = 85 [k=20]

Characteristic Type Targeted. Breaks down each of the 19 options raters could pick. *A lot of variation in terms of how much variance was seen across options. Here is the breakdown of how often each choice was picked: 1(41%), 2(51%), 3(38%), 4(0%), 5(23%), 6(2%), 7(31%), 8(1%), 9(0%), 10(0%), 11(0%), 12(3%), 13(9%), 14(0%), 15(0%), 16(16%), 17(0%), 18(5%), 99(3%). Much of this constriction is due to limiting analyses to the functional literature.*	**Matching Effect**	**Means** [1] CA =97.5 [k=1216] [2] CA =94.5 [k=399] [3] CA =99.1 [k=437] [4] CA =98.9 [k=380] **Ranges** [1] CA =84.1-100 [k=1216] [2] CA = 52.4-100 [k=399] [3] CA = 82.6-100 [k=437] [4] CA = 90-100 [k=380]
Outcome Domain Type. The first column called "Overall Agree" simply notes whether the entire selection for this variable was in agreement (or not) between coders. Only takes 2 values: Yes vs. No. A **stringent** way of calculating variability as the coders need to agree **on 45 possible categories**.	**Specific Outcome Domain**	[1] CA = 85.2 [k=61] [2] CA = 84.2 [k=19] [3] CA = 100 [k=17] [4] CA = 76 [k=25]
Outcome Domain Type. This variable could take 45 different values. This is too much to evaluate reliability due to small cell sizes. Therefore, calculated this based on larger categories (e.g., whether the selection fell into the health vs. environmental categories). This created 7 higher-order categories. *Here is a breakdown of the clusters and how often each cluster was picked: 1-16(25%); 17-23(2%); 24-27(19%); 28-30 (0%); 31-35 (51%); 36-44 (2%); 99 (3%)*	**Specific Outcome Domain** if no variation within. If variation exists within, code unique instances within	**Means** [1] CA = 99.8 [k=427] [2] CA = 100[k=133] [3] CA =100 [k=119] [4] CA =99.4 [k=175] **Ranges** [1] CA =98.4-100 [k=427] [2] CA = 100-100 [k=133] [3] CA =100-100 [k=119] [4] CA =96-100 [k=175]
Change Type. Categorical variable with 3 levels. *Note so much variability. All discrepancies came from one coder picking the unclear category, whereas the other committed to a choice. Variability: promoting (87.9%); limiting (8.9%); other/unclear/both (3.2%).*	**Specific Outcome Domain**	[1] CA = 95.2 [k=62] [2] CA = 100 [k=19] [3] CA = 100 [k=18] [4] CA = 88 [k=25]
Assessment Time. Categorical variable with 2 levels. Coded for each outcome. Will likely be high given default choices. *Not much variance. First assessment (97%); last assessment (3%). Coding of this*	**Specific Outcome Domain**	[1] CA = 100 [k=66] [2] CA = 100 [k=23] [3] CA = 100 [k=19]

variable is straightforward, and less likely to have reliability issues.		[4] CA = 100 [k=24]
Type of outcome. Categorical variable with 4 response options. *Not all levels reflected in reliability coding. Objective behavior (11%); attitude (44%); intention (45%); self-report behavior (0%).*	**Specific Outcome Domain**	[1] CA = 97.3 [k=66] [2] CA = 92.3 [k=23] [3] CA = 100 [k=19] [4] CA = 100 [k=24]
N. A continuous variable. For Type II studies, can extract the 5 rows captured in the "Type of Effect". For Type I studies, can *For the coder agreement evaluation: Considered ANY deviation (regardless of how small) as a disagreement. Used this strict interpretation as sample sizes should be relatively easier to code for.*	No nesting	**Correlation** [1] r = .99 [k=393] [2] r = .96 [k=187] [3] r = 1.00 [k=86] [4] r = .999 [k=120] **Coder Agreement** [1] CA = 93.4 [k=395] [2] CA = 90.9 [k=187] [3] CA = 100 [k=86] [4] CA = 92.6 [k=122] **ICC(3,1)** [1] ICC = .99 [k=393] [2] ICC = .96 [k=187] [3] ICC = 1.00 [k=86] [4] ICC = 1.00 [k=120]
Rel. Continuous variable. *For the coder agreement evaluation: Considered ANY deviation (regardless of how small) as a disagreement. Used this strict interpretation as sample sizes should be relatively easier to code for. The k for coder agreement is higher because it considers cases when reliability is missing ("na"), whereas the correlation indicator only considers cases when a reliability number is extracted.*	**Specific Outcome Domain**	**Correlation** [1] r = .95 [k=49] [2] r = 1.0 [k=11] [3] r = 1.0 [k=17] [4] r = .89 [k=21] **Coder Agreement** [1] CA = 96.3 [k=81] [2] CA = 100 [k=29] [3] CA = 95.7 [k=23] [4] CA = 93.1 [k=29] **ICC(3,1)** [1] ICC = .95 [k=49]

		[2] ICC = 1.00 [k=11] [3] ICC = 1.00 [k=17] [4] ICC = .88 [k=21]
Effect. A continuous variable. *For the coder agreement evaluation:* ***Any deviation greater than r of .01 was coded as discrepant.*** *The k for coder agreement is higher because it considers cases when effect size information is missing ("na"), whereas the correlation only considers cases when a number is extracted.*	No nesting	**Correlation** [1] r = .96 [k=261] [2] r = .94 [k=121] [3] r = .999 [k=52] [4] r = .97 [k=88] **Coder Agreement** [1] CA = 87.1 [k=395] [2] CA = 78.1 [k=187] [3] CA = 94.2 [k=86] [4] CA = 95.9 [k=122] **ICC(3,1)** [1] ICC = .96 [k=261] [2] ICC = .94 [k=121] [3] ICC = 1.00 [k=52] [4] ICC = .96 [k=88]
Stated Direction. Categorical variable with three levels. *Variance: na (70.8%); match advantage (27%); comparison advantage (2%)*	No nesting	[1] CA = 95.7 [k=395] [2] CA = 94.1 [k=187] [3] CA = 97.7 [k=86] [4] CA = 96.7 [k=122]
Stated Significance. Categorical variable with three levels. *Variance: na (62%); significant (23%); non-significant (15%)*	No nesting	[1] CA = 88.9 [k=395] [2] CA = 82.9 [k=187] [3] CA = 97.7 [k=86] [4] CA = 91.8 [k=122]
Day of Study. Categorical variable with 2 options. *Little variance: yes (95%); no (3%); na (2%)*	**Assessment Time**	[1] CA = 96.7 [k=61] [2] CA = 90.5 [k=21] [3] CA = 100 [k=19] [4] CA = 100 [k=21]
months-weeks-days. Composite of 3 variables that were mutually exclusive.	**Assessment Time**	[1] CA = 100 [k=61]

Simply considered whether the coding was in agreement or not between the two coders involved.		[2] CA = 100 [k=21] [3] CA = 100 [k=19] [4] CA = 100 [k=21]
Full Message Available. Dichotomous variable. *Variance: Yes (48%); No (52%)*	**Message Condition Description** (i.e., per comparisons between a given type of message and comparison group)	[1] CA = 87.7 [k=57] [2] CA = 76.5 [k=17] [3] CA = 94.4 [k=18] [4] CA = 90.99 [k=22]
Message Length. Categorical with 4 response options. *Variance: Unclear (18%); short (43%); medium (35%); long (4%)*	**Message Condition Description** (i.e., per comparisons between a given type of message and comparison group)	[1] CA = 80.7 [k=57] [2] CA = 52.9 [k=17] [3] CA = 88.9 [k=18] [4] CA = 95.5 [k=22]
Message Modality. Categorical with 7 response options. *Variance: unclear/other (3%); text only (63%); text and image (9%); static image only (9%); interpersonal (5%); audio-visual (7%); audio only (4%).*	**Message Condition Description** (i.e., per comparisons between a given type of message and comparison group)	[1] CA = 89.5 [k=57] [2] CA = 88.2 [k=17] [3] CA = 100 [k=18] [4] CA = 81.8 [k=22]
Delivery Setting. Categorical with 5 response options. *Variance: other/multiple (8%); online (25%); in person (66%)*	**Study.** (or unique instances in study)	[1] CA = 87.3 [k=55] [2] CA = 82.3 [k=17] [3] CA = 100 [k=18] [4] CA = 80 [k=20]
Intervention Contacts. Categorical with 3 response options. *Variance: single contact (91%); potential multiple contact (2%); ensure multiple contacts (7%).*	**Study**	[1] CA = 96.4 [k=55] [2] CA = 88.2 [k=17] [3] CA = 100 [k=18] [4] CA = 100 [k=20]
Female. Continuous variable *For the coder agreement evaluation: Considered ANY deviation above .1 as a disagreement (i.e., any deviation beyond one coder rounding off at 2 decimals instead of 1). Used this strict interpretation as sample sizes should be relatively easier to code for. The k for coder agreement is a higher because it considers*	**Study**	**Correlation** [1] r = .96 [k=39] [2] r = 1.00 [k=9] [3] r = 1.00 [k=11] [4] r = .92 [k=19]

cases when reliability is missing ("na").		**Coder Agreement** [1] CA = 96.2 [k=52] [2] CA = 100 [k=15] [3] CA = 100 [k=17] [4] CA = 90 [k=20] **ICC(3,1)** [1] ICC = .95 [k=39] [2] ICC = 1.00 [k=9] [3] ICC = 1.00 [k=11] [4] ICC = .91 [k=19]
Male. Continuous variable *For the coder agreement evaluation: Considered ANY deviation above .1 as a disagreement (i.e., any deviation beyond one coder rounding off at 2 decimals instead of 1). Used this strict interpretation as sample sizes should be relatively easier to code for. The k for coder agreement is a higher because it considers cases when reliability is missing ("na").*	**Study**	**Correlation** [1] r = .98 [k=39] [2] r = .96 [k=9] [3] r = 1.00 [k=11] [4] r = .97 [k=19] **Coder Agreement** [1] CA = 94.2 [k=52] [2] CA = 93.3 [k=15] [3] CA = 100 [k=17] [4] CA = 90 [k=20] **ICC(3,1)** [1] ICC = .96 [k=39] [2] ICC = .96 [k=9] [3] ICC = 1.00 [k=11] [4] ICC = .98 [k=19]
Overall N. Continuous variable *For the coder agreement evaluation: Considered ANY deviation (regardless of how small) as a disagreement.*	**Study**	**Correlation** [1] r = 1.00 [k=51] [2] r = 1.00 [k=14] [3] r = 1.00 [k=17] [4] r = 1.00 [k=20] **Coder Agreement** [1] CA = 98.1 [k=52]

		[2] CA = 93.3 [k=15] [3] CA = 100 [k=17] [4] CA = 100 [k=20] **ICC(3,1)** [1] ICC = 1.00 [k=51] [2] ICC =1.00 [k=14] [3] ICC = 1.00 [k=17] [4] ICC = 1.00 [k=20]
Nationality. Open-ended. But evaluated agreement vs. disagreement. *All discrepancies in reliability coding were due to coders assuming (vs. not assuming) that an MTurk sample consisted of participants from the USA.*	**Study**	[1] CA = 92.3 [k=52] [2] CA = 100 [k=15] [3] CA = 100 [k=17] [4] CA = 80 [k=20]
Average age. Continuous variable *For the coder agreement evaluation: Considered ANY deviation above .1 as a disagreement (i.e., any deviation beyond one coder rounding off at 2 decimals instead of 1). Used this strict interpretation as sample sizes should be relatively easier to code for. The k for coder agreement is a higher because it considers cases when reliability is missing ("na").*	**Study**	**Correlation** [1] r = 1.00 [k=33] [2] r = 1.00 [k=6] [3] r =1.00 [k=9] [4] r = 1.00 [k=18] **Coder Agreement** [1] CA = 98.1 [k=52] [2] CA = 93.3 [k=15] [3] CA = 100 [k=17] [4] CA = 100 [k=20] **ICC(3,1)** [1] ICC = 1.00 [k=33] [2] ICC = 1.00 [k=6] [3] ICC = 1.00 [k=9] [4] ICC = 1.00 [k=18]
Population type. Categorical variable with 8 levels. *Variance: undiagnosed population at risk (6%); online community sample (16%); offline community sample (8%); diagnosed patients (2%); college/university students (64%); college/university students (4%)*	**Study**	[1] CA = 98.1 [k=52] [2] CA = 100 [k=15] [3] CA = 100 [k=17] [4] CA = 95 [k=20]
Characteristic Assessment Time. Categorical variable with 4 levels.	**Matching Effect**	[1] CA = 96.8 [k=62]

Variance: unclear (4%0; before (9%); na (85%); after (2%)		[2] CA = 90 [k=20] [3] CA = 100 [k=20] [4] CA = 100 [k=22]
Reliability Statistic (characteristic). Continuous variable. Compared when extracted only. *For the coder agreement evaluation: Considered ANY deviation (regardless of how small) as a disagreement.* *Did not calculate an ICC or a correlation because there are only 4 instances of a number being coded in the reliability coding.*	**Matching Effect**	**Coder Agreement** [1] CA = 100 [k=62] [2] CA = 100 [k=20] [3] CA = 100 [k=20] [4] CA = 100 [k=22]
Analysis involves covariates. Categorical variable with 3 levels. *[only included in reliability table when an effect was extracted by either coder]* *Fairly little variance: no (94%) yes (6%); unclear (0%)*	No nesting	[1] CA = 96.3 [k=270] [2] CA = 95.3 [k=129] [3] CA = 98.1 [k=52] [4] CA = 96.6 [k=89]
Intervention is Matching Specific. Categorical variable with 3 levels. *Variance: Unclear (6%); more than matching (10%); purely matching (84%)*	**Matching Effect**	[1] CA = 86.2 [k=65] [2] CA = 90.9 [k=22] [3] CA = 81 [k=21] [4] CA = 86.4 [k=22]
Selection bias. Categorical variable with 3 levels. *Variance: Unclear (90%); low (7%); high (3%)*	**Study**	[1] CA = 90.4 [k=52] [2] CA = 66.7 [k=15] [3] CA = 100 [k=14] [4] CA = 100 [k=20]
Performance bias. Categorical variable with 3 levels. *Variance: Unclear (62%); low (38%); high (0%)*	**Study**	[1] CA = 84.6 [k=52] [2] CA = 80 [k=15] [3] CA = 88.2 [k=17] [4] CA = 85 [k=20]
Detection bias. Categorical variable with 3 levels. *No Variance: Unclear (0%); low (100%); high (0%)*	**Specific Outcome Domain**	[1] CA = 100 [k=65] [2] CA = 100 [k=23] [3] CA = 100 [k=19] [4] CA = 100 [k=23]
Attrition bias. Categorical variable with 3 levels. *Variance: Unclear (1%); low (93%); high (6%)*	**Specific Outcome Domain**	[1] CA = 98.5 [k=65] [2] CA = 100 [k=23]

		[3] CA = 94.7 [k=19] [4] CA = 100 [k=23]
Reporting bias. Categorical variable with 3 levels. *Variance: Unclear (0%); low (98%); high (2%)*	**Study**	[1] CA = 100 [k=52] [2] CA = 100 [k=15] [3] CA = 100 [k=17] [4] CA = 100 [k=20]

Appendix K. Project 1 – Outlier Identification

To examine the data for possible outliers, I began by producing descriptive analyses on the following four variables:

- The sample size used in the calculation for each effect size (N)
- The effect size estimate extracted (r)
- The Fisher's Z transformation for the effect size (Z)
- The Standard error for the Fisher's Z transformation (SE(Z))

Analyses treated each extractable effect size estimate as the unit of observation (i.e., these are univariate analyses that do not consider the nested structure of the dataset).

Table K1. Descriptives for Overall Sample that Met Inclusion Criteria and Had at Least 1 Extractable Effect Size.

Statistic	**Mean**	**Median**	**SD**	**Min**	**Max**	**Skew**	**Kurtosis**
N	15720.06	72	543239.44	12	24829007	44.65	2032.84
r	.17	0.18	0.27	-1	1	-0.13	1.13
Z	.20	0.18	0.39	-3.8	3.8	0.96	24.9
SE(Z)	.13	0.12	0.05	0	0.33	0.67	0.82

N = Sample size associated to an effect; r = Pearson correlation; Z = Fisher's Z; SE(Z) = standard error for Fisher's Z. SE(Z) is directly proportional to N.

From this Table K1, it was clear that outliers at the very least would be identifiable by sample size. I therefore proceeded to try and identify outliers by sample size and by effect size.

Table K2 outlines the bottom and top 1% values for Ns and SE(Z). The table also notes how much the values change from row to row, expressed as the % increase in N (or decrease in SE(Z)) from one row to the other.

Table K2. Bottom and Top 1% of Values for Sample Sizes (N) and SE(Z).

Bottom 1% (43 rows)				Top 1% (43 rows)			
Values		% increase N / Decrease in SE		Values		% increase N / Decrease in SE	
N	SE(Z)	N	SE(Z)	N	SE(Z)	N	SE(Z)
12	0.333	na	na	1712	0.024	na	na
12	0.333	0.00	0.00	1713	0.024	0.06	0.03
12	0.333	0.00	0.00	1714	0.024	0.06	0.03
12	0.333	0.00	0.00	1714	0.024	0.00	0.00
14	0.302	16.67	9.55	1714	0.024	0.00	0.00
15	0.289	7.14	4.26	1714	0.024	0.00	0.00
15	0.289	0.00	0.00	1714	0.024	0.00	0.00
15	0.289	0.00	0.00	1714	0.024	0.00	0.00
15	0.289	0.00	0.00	1714	0.024	0.00	0.00
15	0.289	0.00	0.00	1714	0.024	0.00	0.00
16	0.277	6.67	3.92	1731	0.024	0.99	0.49
16	0.277	0.00	0.00	1758	0.024	1.56	0.77
16	0.277	0.00	0.00	1758	0.024	0.00	0.00
17	0.267	6.25	3.64	1758	0.024	0.00	0.00
17	0.267	0.00	0.00	1758	0.024	0.00	0.00
17.5	0.263	2.94	1.74	1981	0.022	12.68	5.81
17.5	0.263	0.00	0.00	3501	0.017	76.73	24.80
17.5	0.263	0.00	0.00	3501	0.017	0.00	0.00
17.5	0.263	0.00	0.00	**9095**	**0.010**	**159.78**	**37.97**
17.5	0.263	0.00	0.00	9153	0.010	0.64	0.32
17.5	0.263	0.00	0.00	9748	0.010	6.50	3.10
18	0.258	2.86	1.68	9860	0.010	1.15	0.57
18	0.258	0.00	0.00	**27136**	**0.006**	**175.21**	**39.73**
18	0.258	0.00	0.00	27136	0.006	0.00	0.00
18	0.258	0.00	0.00	38203	0.005	40.78	15.72
18	0.258	0.00	0.00	38203	0.005	0.00	0.00
18	0.258	0.00	0.00	45973	0.005	20.34	8.84
18	0.258	0.00	0.00	45973	0.005	0.00	0.00
18	0.258	0.00	0.00	57040	0.004	24.07	10.22
18	0.258	0.00	0.00	57040	0.004	0.00	0.00
18	0.258	0.00	0.00	**534250**	**0.001**	**836.62**	**67.33**
18	0.258	0.00	0.00	534250	0.001	0.00	0.00
18	0.258	0.00	0.00	**1524415**	**0.001**	**185.34**	**40.80**
18	0.258	0.00	0.00	1524415	0.001	0.00	0.00
18	0.258	0.00	0.00	1553467	0.001	1.91	0.94
18	0.258	0.00	0.00	1553467	0.001	0.00	0.00
18	0.258	0.00	0.00	1576526	0.001	1.48	0.73
18	0.258	0.00	0.00	1576526	0.001	0.00	0.00
18	0.258	0.00	0.00	1605578	0.001	1.84	0.91

18.5	0.254	2.78	1.63	1605578	0.001	0.00	0.00
18.5	0.254	0.00	0.00	**3129993**	**0.001**	**94.94**	**28.38**
18.5	0.254	0.00	0.00	**24829007**	**0.000**	**693.26**	**64.49**
18.5	0.254	0.00	0.00	24829007	0.000	0.00	0.00

Note. Large jumps in Ns and SEs are noted in the table by **bold** font (either N doubling, or SE changing by more than 25%).

The most Notable Jump in the table is from the 14th to the 12th largest values, when there is an 836% increase in sample size. This jump is **underlined** in the table. The rows in red font all come from 2 specific sources:

- Matz, S. C., Kosinski, M., Nave, G., & Stillwell, D. J. (2017). Psychological targeting as an effective approach to digital mass persuasion. *Proceedings of the National Academy of Sciences of the United States of America, 114*(48), 12714-12719 .
- Graham, A. L., Fang, Y., Moreno, J. L., Streiff, S. L., Villegas, J., Muñoz, R. F., Tercyak, K. P., Mandelblatt, J. S., & Vallone, D. M. (2012). Online advertising to reach and recruit latino smokers to an internet cessation program: Impact and costs. *Journal of Medical Internet Research, 14*(4)

These are two large online studies that use sampling frameworks which may have allowed the same participants to be counted multiple times as separate participants. Based on these results, I decided to exclude these 2 sources entirely as being outliers when it comes to sampling.

Next, I computed analyses to identify outliers in terms of effect size estimates. Table K3 lists the top 1% and bottom 1% values for the effect sizes in the dataset, and notes how far the value is from the mean (expressed as a standard deviation, SD, from the mean on either the r or the Z metric).

Table K3. Bottom and Top 1% of Values for Effect Sizes (r and Z)

Bottom 1%				Top 1%			
Values		Deviation (SD)		Values		Deviation (SD)	
r	Z	r	Z	r	Z	r	Z
-0.999	-3.800	-4.297	-10.274	0.906	1.505	2.692	3.362
-0.999	-3.800	-4.297	-10.274	0.912	1.539	2.714	3.450
-0.999	-3.800	-4.297	-10.274	0.913	1.545	2.718	3.466
-0.999	-3.800	-4.297	-10.274	0.914	1.551	2.722	3.481
-0.942	-1.756	-4.088	-5.018	0.917	1.570	2.733	3.529
-0.926	-1.630	-4.029	-4.694	0.919	1.583	2.740	3.562
-0.896	-1.452	-3.919	-4.237	0.920	1.589	2.744	3.578
-0.873	-1.346	-3.835	-3.964	0.925	1.623	2.762	3.665
-0.873	-1.346	-3.835	-3.964	0.928	1.644	2.773	3.719
-0.844	-1.235	-3.728	-3.680	0.928	1.644	2.773	3.719
-0.778	-1.040	-3.486	-3.180	0.930	1.658	2.780	3.757
-0.766	-1.011	-3.442	-3.103	0.939	1.730	2.813	3.939
-0.766	-1.011	-3.442	-3.103	0.941	1.747	2.821	3.984
-0.763	-1.003	-3.431	-3.085	0.945	1.783	2.835	4.076
-0.758	-0.992	-3.413	-3.054	0.949	1.822	2.850	4.176
-0.753	-0.980	-3.394	-3.024	0.950	1.832	2.854	4.202
-0.744	-0.959	-3.361	-2.972	0.955	1.886	2.872	4.341
-0.720	-0.908	-3.273	-2.839	0.955	1.886	2.872	4.341
-0.717	-0.901	-3.262	-2.823	0.956	1.897	2.876	4.370
-0.657	-0.788	-3.042	-2.530	0.957	1.909	2.879	4.401
-0.648	-0.772	-3.009	-2.490	0.957	1.909	2.879	4.401
-0.645	-0.767	-2.998	-2.477	0.961	1.959	2.894	4.529
-0.644	-0.765	-2.995	-2.472	0.962	1.972	2.898	4.563
-0.638	-0.755	-2.973	-2.446	0.965	2.014	2.909	4.670
-0.629	-0.740	-2.940	-2.407	0.967	2.044	2.916	4.747
-0.618	-0.722	-2.899	-2.361	0.970	2.092	2.927	4.872
-0.610	-0.709	-2.870	-2.328	0.971	2.110	2.931	4.916
-0.608	-0.706	-2.862	-2.320	0.971	2.110	2.931	4.916
-0.607	-0.704	-2.859	-2.316	0.972	2.127	2.934	4.962
-0.607	-0.704	-2.859	-2.316	0.972	2.127	2.934	4.962
-0.607	-0.704	-2.859	-2.316	0.973	2.146	2.938	5.009
-0.603	-0.698	-2.844	-2.300	0.973	2.146	2.938	5.009

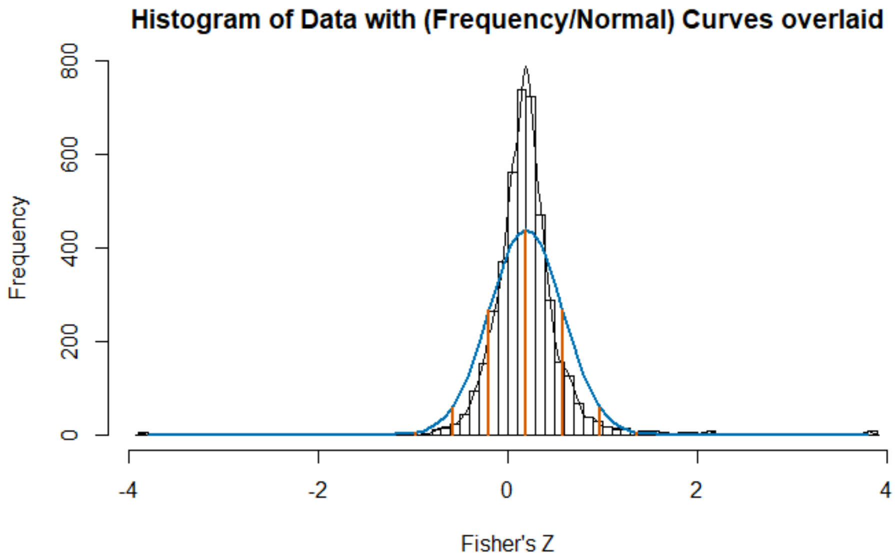
-0.600	-0.693	-2.833	-2.288	0.974	2.165	2.942	5.058
-0.590	-0.678	-2.796	-2.248	0.976	2.205	2.949	5.162
-0.590	-0.678	-2.796	-2.248	0.979	2.273	2.960	5.336
-0.588	-0.675	-2.789	-2.240	0.979	2.273	2.960	5.336
-0.587	-0.673	-2.785	-2.236	0.999	3.800	3.033	9.262
-0.581	-0.664	-2.763	-2.213	0.999	3.800	3.033	9.262
-0.567	-0.643	-2.712	-2.159	0.999	3.800	3.033	9.262
-0.565	-0.640	-2.705	-2.151	0.999	3.800	3.033	9.262
-0.564	-0.639	-2.701	-2.148	0.999	3.800	3.033	9.262
-0.561	-0.634	-2.690	-2.136	0.999	3.800	3.033	9.262
-0.561	-0.634	-2.690	-2.136	0.999	3.800	3.033	9.262

Note. For r, the mean(SD) is 0.1721973(0.2725586). For Z, the mean (SD) is 0.1968682 (0.3890646).

Given the results in this table, it appears important to exclude some of the most extreme outliers. To establish a specific cutoff criterion, I used an SD of +/- 4.5 SDs away from the mean as a cutoff point (using Fisher's Z). This eliminated all the values in red font contained in the table (which includes 28 values, or about 0.65% of observations). Given the observed mean and SD, values this far from the mean have a likelihood of occurring 0.000679535% of the time. Given that we have 4277 observations, values in this range would only be expected to occur about 3 times in the dataset (not 28 times).

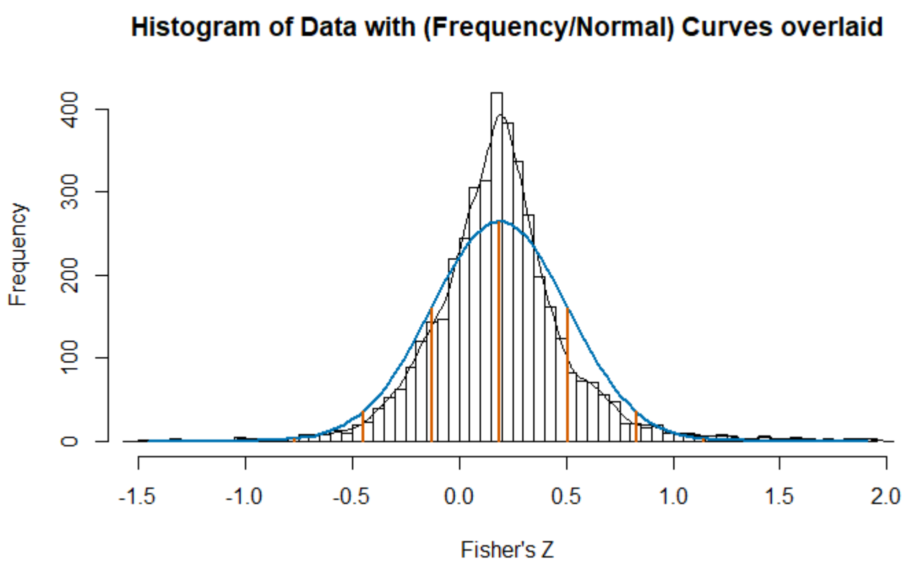
Figures K1 and K2 present histograms of the distribution of effects sizes (expressed in Fisher's Z) without the outlier exclusion applied (Figure K1) and with the outlier exclusion applied (Figure K2).

Figure K1. Histogram of Fisher's Z Before Exclusions



Note. The black curve represents the observed distribution; the blue curve represents a normal distribution with the same mean and standard deviation; the orange lines mark the mean, and each 1SD deviation from it (e.g., +/- 1SD, +/- 2SD).

Figure K2. Histogram of Fisher's Z After Exclusions



Note. The black curve represents the observed distribution; the blue curve represents a normal distribution with the same mean and standard deviation; the orange lines mark the mean, and each 1SD deviation from it (e.g., +/- 1SD, +/- 2SD).

Appendix L. Project 1 – Analyses Documenting Correlated Features of Effects

This appendix reports three tables to document the strength of association between the categorical variables coded in this synthesis. The first table, Table L1, provides information on variable labels used for the other two tables. Table L2 presents a matrix of Cramér's *V* for each variable (Cramér, 1946). Cramér's *V* is a symmetrical measure of covariance, and therefore only numbers above the diagonal are displayed. Table L3 supplements Table L2 by providing a matrix of Goodman and Kruskal's tau (τ; Goodman & Kruskal, 1963). Because τ is an asymmetrical measure of covariance, the full matrix is provided. The diagonal represents the number of unique values for each variable (e.g., possible response options coders selected). Numbers above and below the diagonal then present *τ* (x, y), such that each number exemplifies the degree to which the variable corresponding to the column (y) can be predicted by knowing the value of the variable corresponding to the row (x).

Cells within Tables L2 and L3 have been color-coded to ease their use: values of *V* and τ of a magnitude between .25 and .50 have been highlighted in yellow; values between .50 and .75 have been highlighted in orange, and; values greater than .75 have been highlighted in red. In addition, some cells have been highlighted in black, to indicate that these variables are recoded values from checklist variables (e.g., selecting all types of behavioral domains a study's outcome can be associated with from health behavior to consumer behavior). Typically, many of the response categories for these variables exclude one another.

Table L1. Variables Used to Examine Correlated Features

#	Variable	Description
1	**study_type**	Is the study of Type I or Type II?
2	**char_determination**	How was the characteristic assessed? (e.g., directly measured, indirectly assessed)
3	**char_polarity**	What is the polarity or measurement interval of the characteristic? (e.g., bipolar, unipolar, categorical)
4	**change_type**	Is the matching effect attempting to promote or limit a type of behavior?
5	**type_of_outcome**	What type of outcome is being assessed? (e.g., attitude, intentions)
6	**type_of_effect**	What is the type of effect? (e.g., effect of message given characteristic)
7	**full_message_available**	Are the message manipulation materials accessible?
8	**message_length**	How long is the message? (e.g., short, medium)
9	**delivery_setting**	In what setting did the intervention occur? (e.g., online, in person)
10	**intervention_contacts**	How many times was the intervention message delivered? (e.g., multiple contacts, single contacts)
11	**population_type**	What was the type of population recruited? (e.g., college students, online community sample)
12	**pre.registered**	Was the study pre-registered?
13	**data_open_access**	Is the data for the study readily accessible?
14	**analysis_script_available**	Are analysis script files for the original study freely accessible?
15	**analysis_involves_covariates**	Does the effect size estimate control for any covariate(s)?
16	**intervention_matching_specific**	Do the 2 message conditions vary by anything else than the degree they match a person's characteristic(s)?
17	**selection_bias**	Is there selection bias present?
18	**performance_bias**	Is there performance bias present?
19	**detection_bias**	Is there detection bias present?
20	**attrition_bias**	Is there attrition bias present?
21	**reporting_bias**	Is there reporting bias present?
22	**reporting_bias_2**	Reporting bias version 2. What proportion of effect sizes were we able to extract from this study?
23	**number_char_intervention**	How many characteristics were matched to?
24	**message_modality**	Through what modality were messages delivered? (e.g., audio-visual vs. text-only)
25	**assessment_day**	How long after the intervention were the outcomes assessed?
26	**lit_overall**	Which of the four functional literatures from Figure 2. represented in this meta-analysis does the study fall under?
27	**female**	What proportion of the participants were female?
28	**N_quartile**	When considering the sample size corresponding to this effect estimate, which quartile of sample sizes did the effect correspond to? (e.g., lowest = smallest 25% of samples)

29	**out.health**	Outcome evaluated falls under the health behavior domain
30	**out.env**	Outcome evaluated falls under the environmental behavior domain
31	**out.pros**	Outcome evaluated falls under the prosocial behavior domain
32	**out.pol**	Outcome evaluated falls under the political behavior domain
33	**out.prod**	Outcome evaluated falls under the consumer behavior domain
34	**mismatch**	Comparision group considered a mismatch (yes/no)
35	**neg.match**	Comparision group considered a negative match (yes/no)
36	**non.match**	Comparision group considered a non match (yes/no)
37	**generic**	Comparision group considered a generic message (yes/no)
38	**low.match**	Comparision group considered a low match (yes/no)
39	**mixed**	Comparision group considered a mixed condition (yes/no)

Table L2 (Part 1). Cramér's *V* for Different Variable Pairs

	Variables	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
1	study_type		.35	.37	.13	.38	.41	.27	.42	.29	.30	.35	.19	.02	.03	.04	.25	.25	.21	.17	.28
2	char_determination			.50	.13	.25	.10	.09	.21	.13	.33	.20	.10	.10	.11	.09	.20	.11	.19	.17	.19
3	char_polarity				.19	.31	.11	.13	.27	.21	.43	.22	.21	.08	.09	.10	.28	.25	.24	.21	.20
4	change_type					.21	.05	.08	.16	.11	.30	.27	.08	.03	.13	.10	.11	.13	.10	.11	.09
5	type_of_outcome						.12	.20	.38	.29	.44	.30	.22	.05	.02	.08	.27	.25	.18	.23	.32
6	type_of_effect							.13	.14	.08	.10	.11	.05	.03	.02	.13	.09	.08	.08	.07	.09
7	full_message_available								.59	.20	.18	.20	.10	.07	.06	.05	.29	.07	.18	.06	.08
8	message_length									.28	.37	.32	.19	.13	.05	.10	.31	.24	.20	.18	.29
9	delivery_setting										.38	.43	.26	.15	.07	.15	.15	.23	.60	.09	.24
10	intervention_contacts											.44	.24	.03	.01	.05	.28	.23	.16	.26	.22
11	population_type												.16	.21	.09	.11	.24	.20	.50	.24	.31
12	pre.registered													.01	.00	.13	.10	.25	.04	.01	.06
13	data_open_access														.30	.16	.07	.03	.12	.01	.03
14	analysis_script_available															.02	.03	.01	.06	.01	.02
15	analysis_involves_covariates																.07	.06	.16	.01	.05
16	intervention_matching_specific																	.15	.11	.09	.12
17	selection_bias																		.23	.20	.22
18	performance_bias																			.19	.17
19	detection_bias																				.15
20	attrition_bias																				

Table L2 (Part 2). Cramér's *V* for Different Variable Pairs

	Variables	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
1	study_type	.08	.26	.47	.27	.41	.35	.15	.19	.17	.10	.01	.06	.12	.05	.03	.43	.53	.20	.19
2	char_determination	.14	.05	.34	.21	.24	.56	.10	.08	.22	.09	.08	.10	.19	.06	.06	.30	.26	.47	.04
3	char_polarity	.14	.08	.47	.26	.29	.36	.13	.13	.23	.17	.14	.08	.25	.09	.11	.47	.44	.61	.05
4	change_type	.09	.07	.20	.16	.24	.12	.10	.12	.36	.12	.13	.04	.35	.04	.07	.11	.25	.08	.03
5	type_of_outcome	.12	.10	.37	.24	.50	.21	.13	.18	.41	.14	.17	.14	.49	.10	.07	.35	.49	.33	.01
6	type_of_effect	.04	.17	.14	.08	.13	.10	.06	.17	.08	.05	.01	.02	.05	.02	.03	.16	.22	.09	.08
7	full_message_available	.04	.08	.20	.34	.23	.17	.13	.03	.01	.03	.07	.04	.06	.02	.06	.10	.19	.05	.08
8	message_length	.13	.07	.34	.27	.39	.22	.13	.16	.33	.11	.11	.10	.36	.11	.18	.32	.55	.23	.13
9	delivery_setting	.13	.12	.26	.14	.32	.14	.14	.23	.19	.16	.12	.10	.18	.14	.06	.27	.35	.17	.10
10	intervention_contacts	.14	.10	.46	.33	.50	.24	.14	.19	.32	.10	.11	.07	.33	.08	.07	.34	.44	.40	.03
11	population_type	.12	.15	.32	.29	.30	.18	.17	.23	.40	.14	.13	.15	.26	.25	.11	.32	.41	.33	.09
12	pre.registered	.01	.09	.25	.15	.25	.10	.13	.09	.13	.03	.01	.02	.10	.02	.02	.17	.37	.02	.01
13	data_open_access	.03	.06	.03	.07	.03	.10	.06	.06	.07	.04	.06	.30	.15	.04	.04	.08	.04	.03	.01
14	analysis_script_available	.01	.05	.01	.03	.01	.07	.04	.05	.04	.02	.02	.29	.06	.01	.01	.03	.01	.01	.01
15	analysis_involves_covariates	.05	.14	.06	.12	.08	.10	.07	.07	.18	.05	.05	.07	.16	.08	.08	.07	.05	.03	.02
16	intervention_matching_specific	.06	.08	.30	.32	.27	.18	.15	.10	.10	.16	.04	.12	.08	.14	.07	.29	.30	.28	.03
17	selection_bias	.02	.10	.32	.18	.27	.10	.16	.17	.15	.06	.08	.06	.07	.10	.05	.23	.36	.10	.03
18	performance_bias	.14	.13	.23	.23	.24	.12	.14	.24	.14	.07	.05	.07	.15	.11	.05	.22	.19	.20	.08
19	detection_bias	.12	.02	.24	.13	.26	.09	.05	.09	.10	.02	.03	.02	.07	.00	.00	.13	.08	.19	.01
20	attrition_bias	.08	.07	.27	.13	.35	.21	.19	.24	.21	.04	.09	.05	.18	.04	.04	.24	.29	.20	.24
21	reporting_bias		.26	.14	.09	.16	.16	.08	.05	.29	.05	.10	.02	.07	.01	.06	.06	.15	.08	.03
22	reporting_bias_2			.08	.12	.08	.05	.13	.13	.09	.11	.06	.09	.14	.03	.07	.10	.12	.05	.07
23	number_char_intervention				.27	.43	.26	.18	.19	.33	.06	.10	.06	.27	.03	.07	.55	.59	.75	.02
24	message_modality					.23	.18	.15	.13	.21	.12	.06	.11	.23	.08	.08	.30	.28	.30	.04
25	assessment_day						.18	.10	.18	.39	.07	.08	.05	.31	.06	.07	.35	.54	.28	.02
26	lit_overall							.14	.12	.40	.13	.10	.08	.25	.06	.22	.24	.30	.32	.08
27	female								.11	.27	.13	.14	.06	.14	.06	.13	.24	.21	.16	.07

Table L2 (Part 3). Cramér's *V* for Different Variable Pairs

Variables		**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**
28	N_quartile									.16	.13	.06	.08	.15	.05	.04	.17	.18	.11	.06
29	out.health										.16	.19	.12	.49	.01	.13	.10	.24	.12	.03
30	out.env											.14	.01	.22	.02	.05	.07	.07	.03	.02
31	out.pros												.04	.28	.06	.04	.09	.01	.07	.03
32	out.pol													.22	.00	.05	.01	.05	.04	.04
33	out.prod														.11	.16	.03	.20	.18	.04
34	mismatch															.06	.47	.06	.05	.02
35	neg.match																.47	.06	.05	.02
36	non.match																	.46	.38	.17
37	generic																		.05	.00
38	low.match																			.02
39	mixed																			

Table L3 (Part 1). Goodman and Kruskal's τ for Different Variable Pairs

	Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	**study_type**	**2**	.06	.02	.01	.02	.12	.07	.03	.02	.07	.03	.03	.00	.00	.00	.04	.05	.01	.03	.06
2	**char_determination**	.12	**4**	.24	.03	.04	.01	.01	.04	.01	.16	.02	.02	.02	.02	.01	.06	.01	.01	.03	.05
3	**char_polarity**	.14	.33	**5**	.05	.05	.02	.02	.05	.02	.28	.03	.08	.01	.01	.01	.12	.08	.02	.04	.05
4	**change_type**	.02	.01	.01	**3**	.02	.00	.01	.01	.01	.13	.02	.01	.00	.02	.02	.02	.02	.01	.01	.01
5	**type_of_outcome**	.14	.06	.05	.06	**4**	.02	.04	.08	.04	.29	.06	.08	.01	.00	.01	.12	.09	.02	.05	.15
6	**type_of_effect**	.17	.01	.00	.00	.01	**3**	.02	.01	.00	.01	.01	.01	.00	.00	.03	.01	.01	.00	.01	.01
7	**full_message_available**	.07	.00	.00	.00	.01	.01	**2**	.12	.01	.02	.00	.01	.00	.00	.00	.05	.00	.02	.00	.01
8	**message_length**	.17	.05	.05	.04	.08	.02	.35	**4**	.03	.19	.05	.06	.03	.00	.01	.12	.07	.03	.03	.11
9	**delivery_setting**	.08	.02	.03	.01	.05	.01	.04	.05	**5**	.19	.26	.11	.04	.01	.03	.03	.06	.61	.01	.05
10	**intervention_contacts**	.09	.06	.06	.14	.07	.01	.03	.06	.03	**3**	.07	.09	.00	.00	.00	.12	.07	.01	.07	.07
11	**population_type**	.13	.04	.03	.10	.06	.02	.04	.07	.33	.26	**8**	.04	.08	.01	.01	.07	.05	.34	.08	.11
12	**pre.registered**	.04	.01	.01	.01	.02	.01	.01	.01	.01	.07	.01	**3**	.08	.33	.03	.02	.08	.00	.00	.00
13	**data_open_access**	.00	.01	.01	.00	.00	.00	.01	.02	.03	.00	.04	.16	**3**	.45	.04	.01	.00	.03	.00	.00
14	**analysis_script_available**	.00	.01	.01	.02	.00	.00	.00	.00	.01	.00	.01	.16	.24	**3**	.00	.00	.00	.01	.00	.00
15	**analysis_involves_covariates**	.00	.01	.01	.02	.00	.01	.00	.01	.01	.00	.00	.03	.04	.00	**3**	.01	.00	.02	.00	.00
16	**intervention_matching_specific**	.06	.02	.02	.02	.03	.01	.08	.05	.01	.12	.02	.01	.01	.00	.01	**3**	.03	.00	.01	.01
17	**selection_bias**	.06	.01	.02	.02	.02	.01	.01	.02	.04	.08	.01	.11	.00	.00	.00	.03	**3**	.04	.04	.07
18	**performance_bias**	.05	.01	.01	.02	.02	.01	.03	.02	.39	.04	.17	.00	.03	.00	.02	.02	.05	**3**	.04	.04
19	**detection_bias**	.03	.00	.00	.01	.01	.00	.00	.01	.00	.03	.01	.00	.00	.00	.00	.01	.02	.00	**2**	.02
20	**attrition_bias**	.08	.03	.01	.01	.03	.01	.01	.03	.03	.07	.03	.01	.00	.00	.00	.02	.07	.02	.02	**3**
21	**reporting_bias**	.01	.02	.01	.01	.01	.00	.00	.01	.02	.02	.01	.00	.00	.00	.00	.00	.00	.01	.01	.01
22	**reporting_bias_2**	.07	.01	.00	.01	.01	.02	.01	.01	.02	.01	.02	.01	.01	.00	.03	.01	.01	.02	.00	.00
23	**number_char_intervention**	.23	.09	.08	.06	.07	.03	.04	.07	.04	.32	.05	.10	.00	.00	.00	.13	.13	.02	.06	.11
24	**message_modality**	.07	.03	.03	.03	.04	.01	.12	.07	.01	.16	.03	.04	.01	.00	.01	.15	.05	.01	.02	.03
25	**assessment_day**	.17	.07	.05	.08	.12	.02	.05	.08	.05	.39	.08	.10	.00	.00	.01	.10	.11	.02	.07	.19
26	**lit_overall**	.12	.51	.18	.02	.02	.01	.03	.04	.02	.08	.03	.02	.02	.01	.01	.05	.01	.01	.01	.05
27	**female**	.02	.01	.01	.01	.01	.00	.02	.02	.03	.03	.03	.03	.01	.00	.00	.03	.03	.04	.00	.04
28	**N_quartile**	.04	.01	.01	.02	.02	.02	.00	.02	.07	.05	.07	.01	.01	.00	.01	.01	.04	.08	.01	.08
29	**out.health**	.03	.03	.01	.10	.04	.00	.00	.02	.00	.08	.03	.01	.00	.00	.02	.01	.02	.01	.01	.02
30	**out.env**	.01	.00	.01	.00	.01	.00	.00	.01	.00	.00	.01	.00	.00	.00	.00	.02	.00	.00	.00	.00
31	**out.pros**	.00	.00	.01	.01	.01	.00	.00	.00	.01	.01	.00	.00	.00	.00	.00	.00	.01	.00	.00	.01

Table L3 (Part 2). Goodman and Kruskal's τ for Different Variable Pairs

Variables		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
32	**out.pol**	.00	.00	.00	.00	.01	.00	.00	.00	.01	.00	.01	.00	.08	.06	.00	.01	.00	.00	.00	.00
33	**out.prod**	.02	.02	.02	.10	.08	.00	.00	.03	.00	.08	.01	.01	.02	.00	.02	.00	.00	.01	.00	.01
34	**mismatch**	.00	.00	.00	.00	.01	.00	.00	.01	.01	.01	.01	.00	.00	.00	.00	.01	.00	.01	.00	.00
35	**neg.match**	.00	.00	.01	.00	.00	.00	.00	.01	.00	.00	.00	.00	.00	.00	.01	.00	.00	.00	.00	.00
36	**non.match**	.19	.03	.03	.01	.02	.02	.01	.02	.02	.09	.02	.02	.01	.00	.00	.06	.04	.01	.02	.04
37	**generic**	.28	.03	.02	.05	.04	.03	.04	.05	.01	.15	.03	.11	.00	.00	.00	.07	.09	.01	.01	.06
38	**low.match**	.04	.04	.05	.00	.02	.01	.00	.01	.01	.12	.01	.00	.00	.00	.00	.06	.01	.01	.04	.03
39	**mixed**	.04	.00	.00	.00	.00	.00	.01	.01	.01	.00	.00	.00	.00	.00	.00	.00	.00	.01	.00	.02

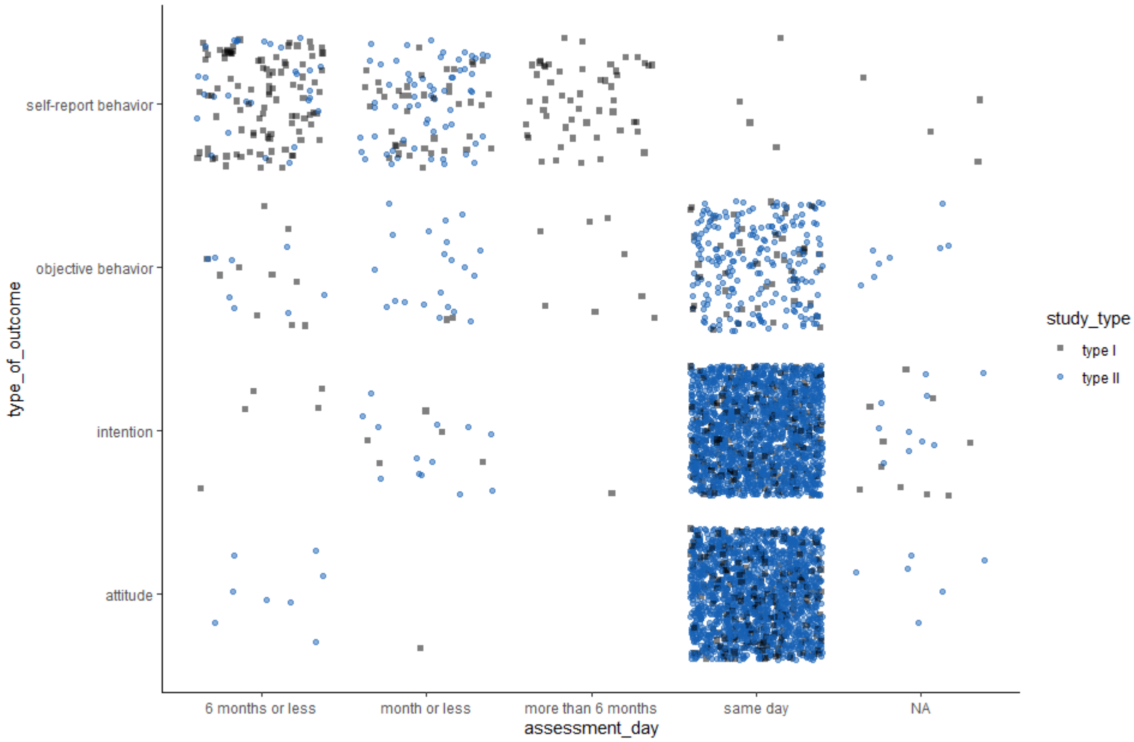
Table L3 (Part 3). Goodman and Kruskal's τ for Different Variable Pairs

	Variables	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
1	**study_type**	.00	.04	.15	.03	.09	.05	.00	.01	.03	.01	.00	.00	.02	.00	.00	.19	.28	.04	.04
2	**char_determination**	.04	.01	.22	.06	.08	.32	.01	.01	.05	.01	.01	.01	.04	.00	.00	.09	.07	.22	.00
3	**char_polarity**	.03	.01	.44	.08	.13	.18	.01	.02	.05	.03	.02	.01	.06	.01	.01	.22	.19	.37	.00
4	**change_type**	.01	.01	.05	.02	.05	.01	.00	.01	.13	.01	.02	.00	.13	.00	.01	.01	.06	.01	.00
5	**type_of_outcome**	.03	.02	.26	.07	.46	.05	.01	.03	.17	.02	.03	.02	.24	.01	.01	.12	.24	.11	.00
6	**type_of_effect**	.00	.03	.03	.01	.02	.01	.00	.02	.01	.00	.00	.00	.00	.00	.00	.03	.05	.01	.01
7	**full_message_available**	.00	.00	.03	.06	.02	.01	.01	.00	.00	.00	.00	.00	.00	.00	.00	.01	.04	.00	.01
8	**message_length**	.03	.01	.23	.09	.26	.05	.01	.03	.11	.01	.01	.01	.13	.01	.03	.10	.30	.05	.02
9	**delivery_setting**	.03	.02	.11	.03	.20	.03	.02	.05	.04	.02	.01	.01	.03	.02	.00	.07	.12	.03	.01
10	**intervention_contacts**	.04	.01	.29	.09	.28	.04	.01	.03	.10	.01	.01	.01	.11	.01	.00	.12	.19	.16	.00
11	**population_type**	.03	.03	.21	.07	.21	.05	.03	.05	.16	.02	.02	.02	.07	.06	.01	.10	.17	.11	.01
12	**pre.registered**	.00	.01	.07	.02	.05	.01	.01	.01	.02	.00	.00	.00	.01	.00	.00	.03	.14	.00	.00
13	**data_open_access**	.00	.01	.00	.01	.00	.01	.01	.00	.01	.00	.00	.09	.03	.00	.00	.01	.00	.00	.00
14	**analysis_script_available**	.00	.00	.00	.00	.00	.01	.00	.00	.00	.00	.00	.09	.01	.00	.00	.00	.00	.00	.00
15	**analysis_involves_covariates**	.00	.02	.00	.01	.01	.01	.00	.00	.03	.00	.00	.01	.03	.01	.01	.01	.00	.00	.00
16	**intervention_matching_specific**	.01	.01	.12	.12	.07	.02	.01	.01	.01	.03	.00	.01	.01	.02	.01	.08	.09	.08	.00
17	**selection_bias**	.00	.01	.10	.02	.07	.01	.01	.02	.02	.00	.01	.00	.00	.01	.00	.05	.13	.01	.00
18	**performance_bias**	.03	.02	.07	.04	.03	.01	.01	.04	.02	.01	.00	.00	.02	.01	.00	.05	.04	.04	.01
19	**detection_bias**	.00	.00	.03	.01	.03	.00	.00	.00	.01	.00	.00	.00	.00	.00	.00	.02	.01	.04	.00
20	**attrition_bias**	.01	.01	.10	.01	.15	.03	.02	.04	.04	.00	.01	.00	.03	.00	.00	.06	.08	.04	.06
21	**reporting_bias**	3	.05	.02	.01	.01	.01	.00	.00	.08	.00	.01	.00	.01	.00	.00	.00	.02	.01	.00
22	**reporting_bias_2**	.13	4	.01	.02	.01	.00	.02	.02	.01	.01	.00	.01	.02	.00	.01	.01	.02	.00	.03
23	**number_char_intervention**	.03	.01	4	.10	.24	.06	.02	.04	.11	.00	.01	.00	.07	.00	.01	.30	.35	.56	.00
24	**message_modality**	.01	.02	.15	4	.07	.03	.02	.02	.04	.02	.00	.01	.05	.01	.01	.09	.08	.09	.00
25	**assessment_day**	.04	.01	.31	.07	5	.06	.01	.03	.17	.01	.01	.00	.11	.00	.01	.13	.29	.08	.00
26	**lit_overall**	.05	.00	.11	.05	.06	5	.02	.02	.16	.02	.01	.01	.06	.00	.05	.06	.09	.10	.01
27	**female**	.01	.03	.06	.03	.02	.02	5	.01	.07	.02	.02	.00	.02	.00	.02	.06	.04	.03	.01
28	**N_quartile**	.00	.03	.05	.02	.05	.02	.01	4	.03	.02	.00	.01	.02	.00	.00	.03	.03	.01	.00
29	**out.health**	.08	.01	.07	.01	.11	.06	.02	.01	2	.03	.04	.01	.24	.00	.02	.01	.06	.02	.00
30	**out.env**	.00	.01	.00	.01	.00	.01	.01	.01	.03	2	.02	.00	.05	.00	.00	.01	.00	.00	.00
31	**out.pros**	.01	.00	.01	.00	.01	.01	.01	.00	.04	.02	2	.00	.08	.00	.00	.01	.00	.00	.00

Table L3 (Part 4). Goodman and Kruskal's τ for Different Variable Pairs

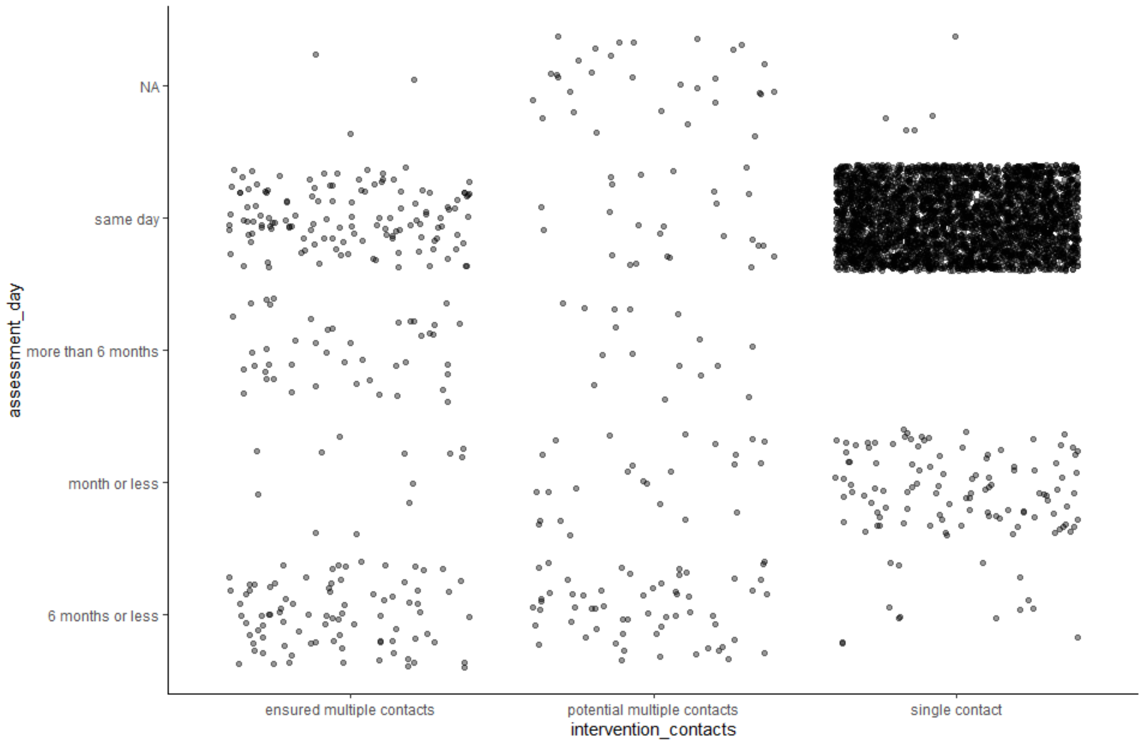
Variables		21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
32	**out.pol**	.00	.01	.00	.01	.00	.00	.00	.00	.01	.00	.00	**2**	.05	.00	.00	.00	.00	.00	.00
33	**out.prod**	.01	.01	.05	.01	.07	.03	.00	.01	.24	.05	.08	.05	**2**	.01	.02	.00	.04	.03	.00
34	**mismatch**	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.01	**2**	.00	.22	.00	.00	.00
35	**neg.match**	.00	.00	.00	.00	.00	.02	.00	.00	.02	.00	.00	.00	.02	.00	**2**	.22	.00	.00	.00
36	**non.match**	.00	.00	.22	.04	.07	.02	.01	.01	.01	.01	.01	.00	.00	.22	.22	**2**	.22	.15	.03
37	**generic**	.02	.01	.21	.03	.15	.04	.01	.01	.06	.00	.00	.00	.04	.00	.00	.22	**2**	.00	.00
38	**low.match**	.00	.00	.35	.04	.04	.02	.01	.00	.02	.00	.00	.00	.03	.00	.00	.15	.00	**2**	.00
39	**mixed**	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.03	.00	.00	**2**

Figure L1. Distribution of Effects by Outcome Type, Study Type, and Assessment Day



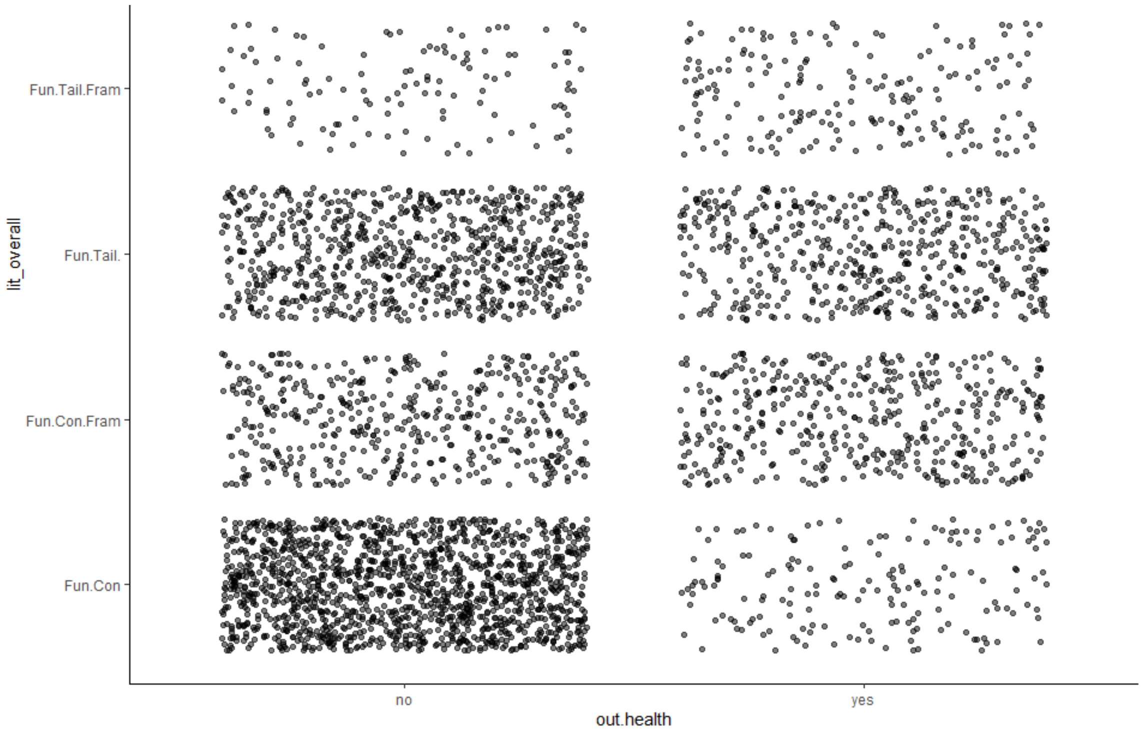
From Figure L1, we can see that whereas most outcome types are assessed the same day as the intervention message is delivered, self-report behaviors tend to be assessed only after some time has passed. This pattern is especially pronounced for Type I studies.

Figure L2. Distribution of Effects by Number of Intervention Contacts and Assessment Time Point



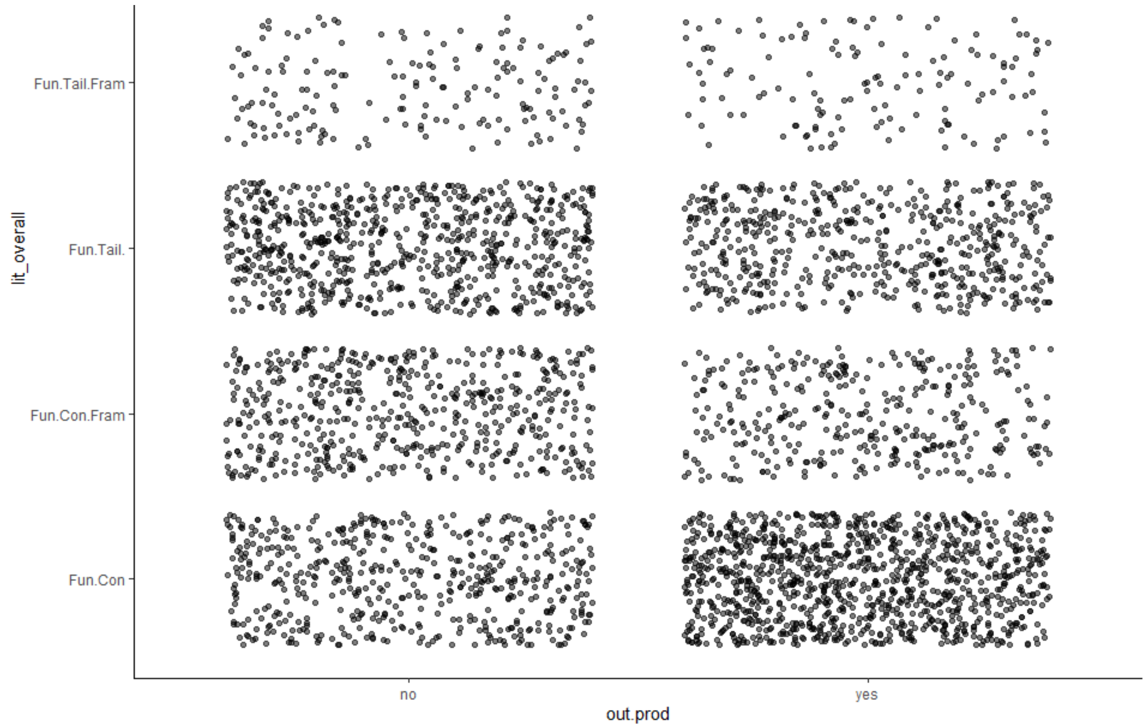
From Figure L2, we can see that whereas most outcomes were assessed the day of the intervention when a single intervention contact was used, interventions making use of (ensured or potential) multiple contact points were relatively more likely to assess outcomes at a future time point.

Figure L3. Distribution of Effects by Whether They are Associated to the Health Behavior Domain, and by Subliterature of Functional Matching



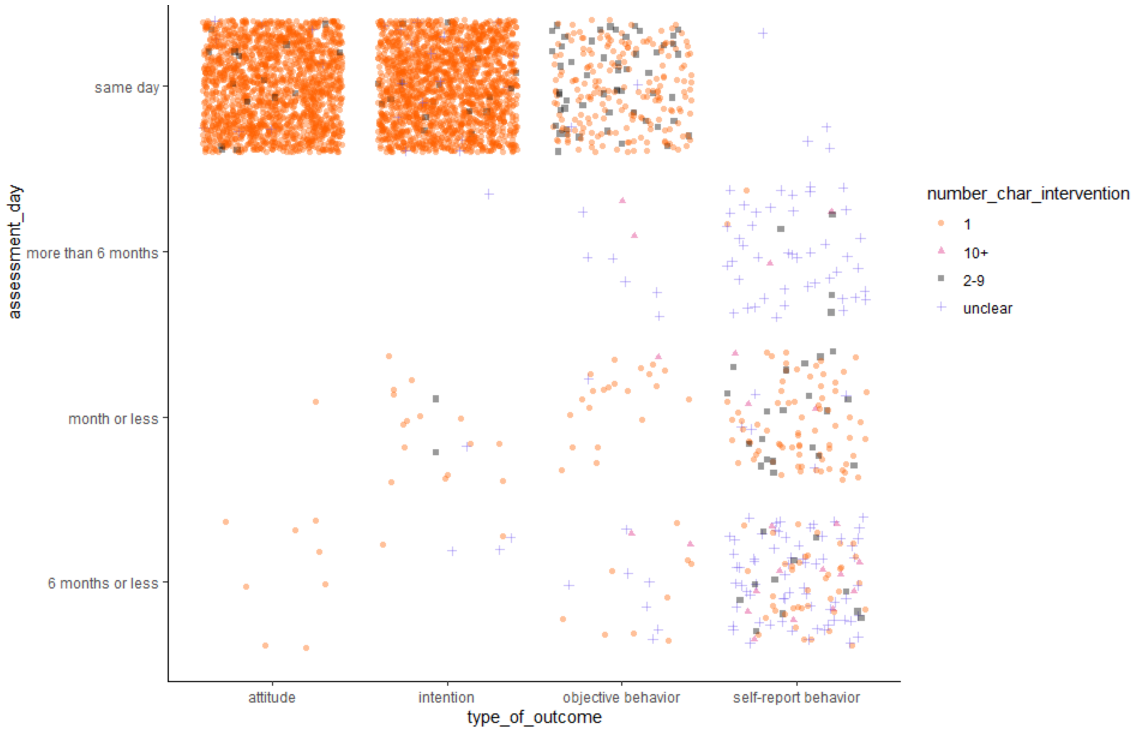
From Figure L3, we can see that effect sizes for functional message matching literature that is context matching, but not message framing, represents proportionately fewer effects from the health behavior domains.

Figure L3. Distribution of Effects by Assessment Day, Type of Outcome, and Number of Characteristics Targeted in the Intervention



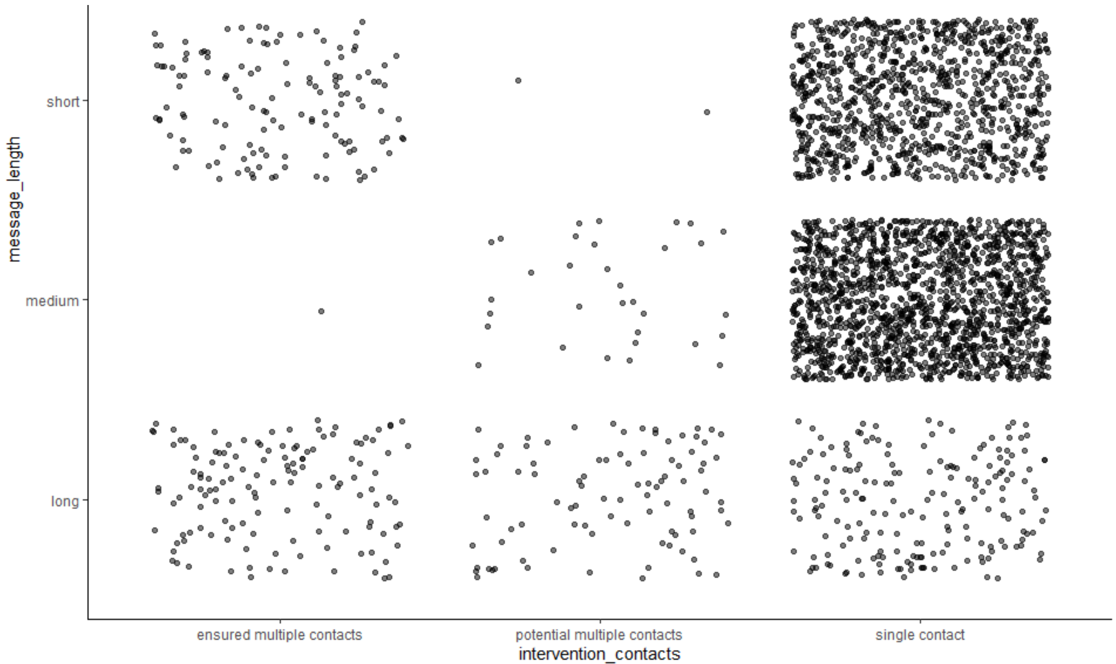
From Figure L4, we can see that effect sizes for functional message matching literature that is context matching, but not message framing, represents proportionately more effects from the consumer behavior domains.

Figure L5. Distribution of Effects by Assessment Day, Type of Outcome, and Number of Characteristics Targeted in the Intervention



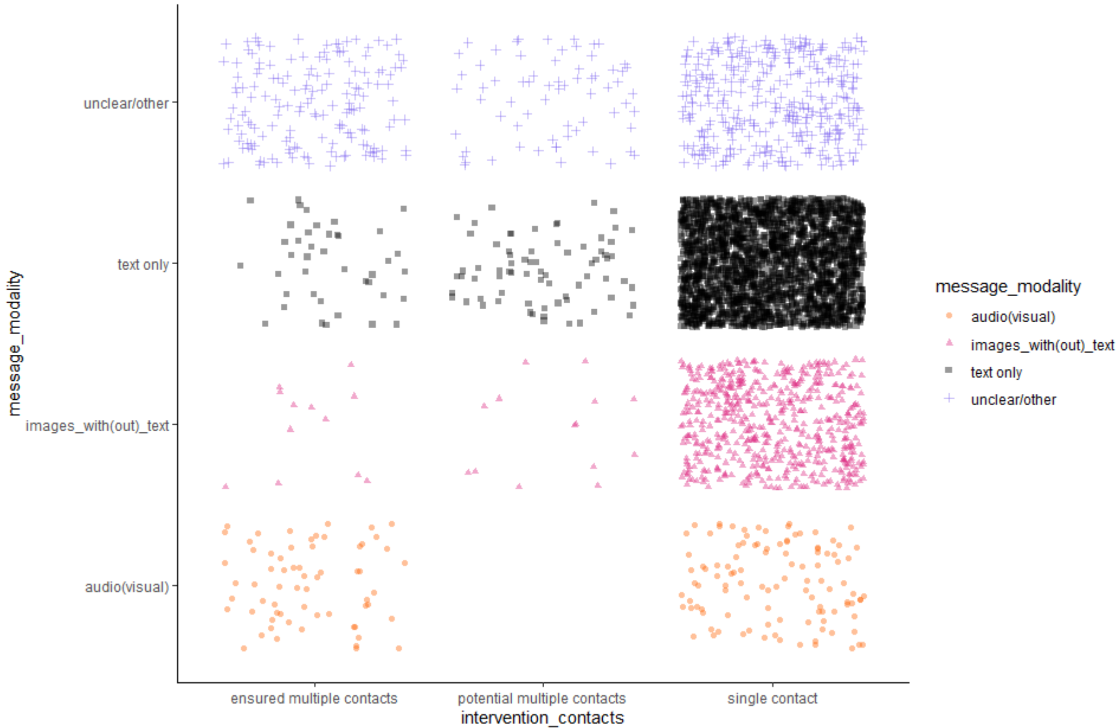
From Figure L5, we can see that effect sizes of messages targeting a larger number of characteristics are more likely to assess effects on self-report behaviors that were assessed at later time points.

Figure L6. Distribution of Effects by Number of Intervention Contacts and Message Length



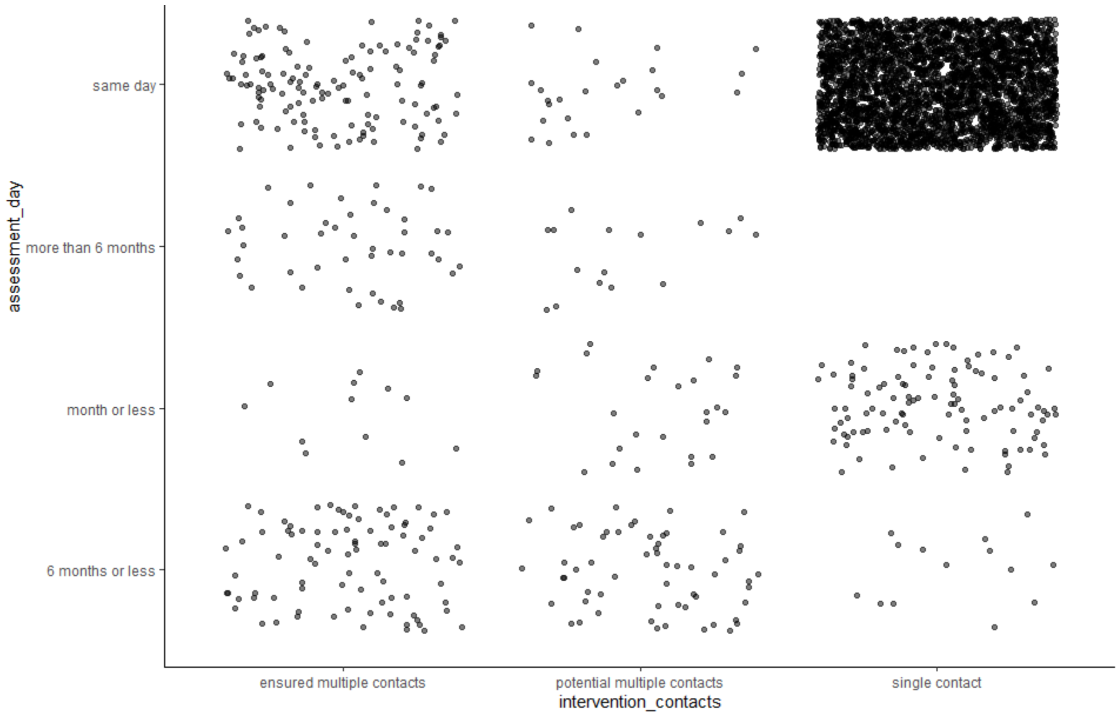
From Figure L6, we can see messages that make use of multiple contact points are more likely to use longer messages.

Figure L7. Distribution of Effects by Number of Intervention Contacts and Message Modality



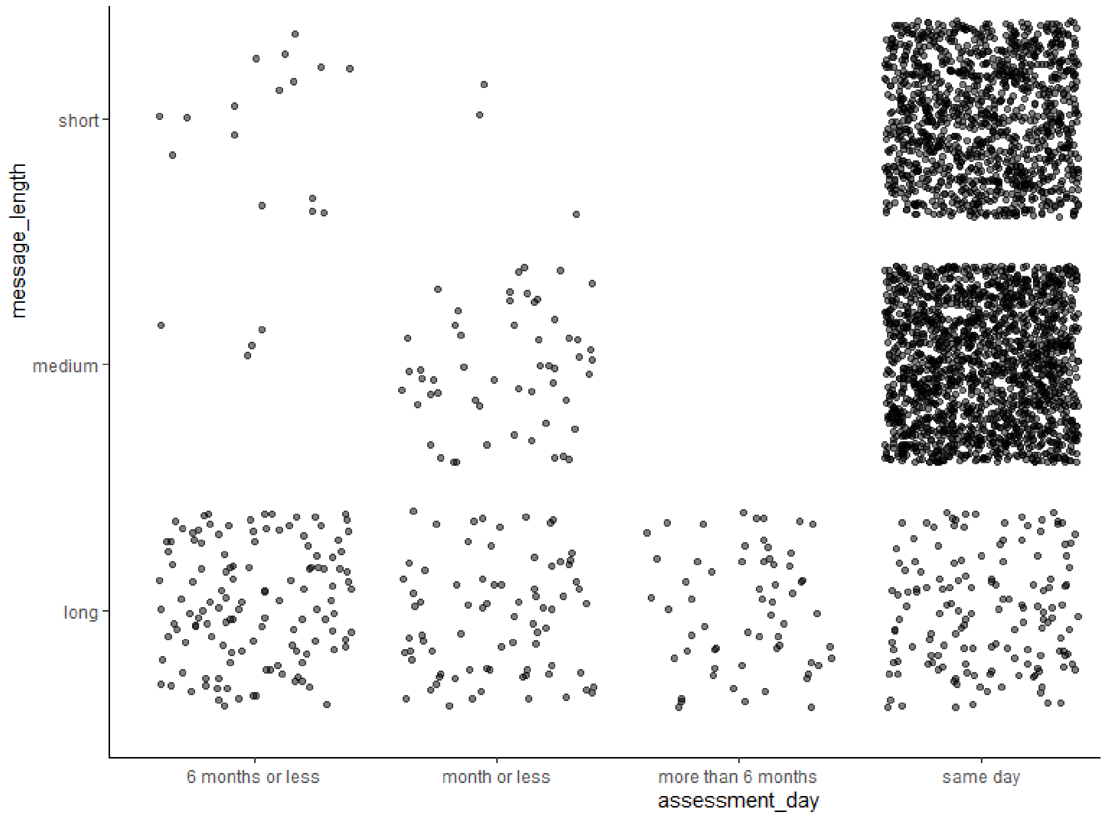
From Figure L7, we can see messages that make use of multiple contact points use different proportions of message modalities. For instance, they are less likely to make use of images in their manipulation of message features.

Figure L8. Distribution of Effects by Number of Intervention Contacts and Assessment Time



From Figure L8, we can see messages that make use of multiple contact points are proportionately more likely to assess outcomes at a time point further in time relative than interventions with a single contact point.

Figure L9. Distribution of Effects by Message Length and Assessment Time



From Figure L9, we can see messages that longer messages are proportionately much more likely to be used in studies that assess outcomes at a time point further in time relative than interventions with that make use of short or medium length messages.

Appendix M. Project 1 – Sensitivity Analyses

Sensitivity analyses are the primary method I used to evaluate the presence and operation of bias. Sensitivity analyses involved evaluating the moderating influence of various variables that are suspected to have a potential biasing effect on results.

Table M1 Provides a summary of the variables used to conduct sensitivity analyses, including a description of each variable, and the percentage with which each coding response for that variable was selected.

Moderation results are provided separately for the 10 variables in Table M2 to M11 to allow inferences to be draw for each variable. For simplicity, analyses are only reported in Fisher's Z. Moderation effects are evaluated using the following strategies:

1. For **categorical variables** (variables 1-8 in Table M1).
    a. Subgroup analyses are performed by running a separate three-level meta-analysis for each level of the moderating variable
    b. The presence/absence of moderation was evaluated by whether the confidence intervals of any levels of the moderator differed from each other. That is, evidence of moderation is displayed if at least two confidence intervals do not interact with one another.
2. For **continuous variables** (variables 9 & 10 in Table M1):
    a. Evaluated these using a single model per each of the 16 study/effect/outcome types.
    b. Entered the moderator into the multi-level meta-analytic model as a predictor.
    c. The results are the estimate corresponding to the effects of the moderator

Table M1. List of Variables used For Sensitivity Analyses (Including Descriptions and Frequencies)

Variable	Description	Levels of Bias (and % response selected)		
		Low	Unclear	High
1. Message fully available	Are the messages/interventions fully available?	Yes (49.6)	No[a] (50.4)	-
2. Covariates included	Were covariates included in the analyses?	Yes (87.8)	Unclear (2.6)	No (9.6)
3. Manipulation confounded	Do messages/interventions differ only in degree of matching? Or is manipulation confounded?	Purely matching (70.6)	Unclear (7.2)	More than matching (22.1)
4. Selection Bias	Is the randomization process explicitly described? Is it truly random?	Low (5.9)	Unclear (91.1)	High (3.0)
5. Performance bias	Blinding/masking to prevent influence on true outcomes (independent of assessment)	Low (35.7)	Unclear (60.7)	High (3.7)
6. Attrition bias	Drop-out rate between assessment time and randomization (used 20% cutoff)	Low [< 20% attrition] (87.4)	Unclear (3.0)	High [>20% attrition] (9.6)
7. Reporting bias	Outcomes are reported for all effects of interest and all subgroups. Do not need to be reported in an extractable form (e.g., Means without SDs)	Low (89.8)	*[Unclear (0.2)]*[c]	High (10.0)
8. Extractable effects (% per study)[b]	Percent of effects we could extract for a given study (alternate measure of reporting bias)	100% (34.9)	80% to <100% (45.4)	< 80% (19.7)
9. Sample size (effect-level)	Sample size (effect-level)	Operationalized Continuously		
10. Sample size (study-level)	Sample size (study-level)	Operationalized Continuously		

[a]Marked under unclear rather than high, as most studies provide a sample of message/intervention components.

[b]Cutoff points were selected for theoretical reasons while ensuring enough observations per group. The variable was not treated continuously, as cutoffs represent qualitatively different patterns of studies. A rate of 100% means all effects of interest could be extracted. For Type II studies, requires authors to produce and analyze data that took an explicit 2x2 factorial design. This subgroup contains 34.9% of all observations. A rate of 80% could represent a certain degree of selective reporting; however, for many Type II studies, this emerges when interaction effects could not be extracted but all pairwise comparisons could. This commonly emerges when all data for each subgroup is presented (i.e., complete reporting), but the F-tests for interactions cannot be extracted because one factor has three levels (e.g., there may be a control group, leading to a 2x3 design, and changing the nature of the F-statistic). About 45.4% of effect sizes are in studies that report 80% to <100% of effects. The last category (<80%) predominantly indicates that at least some degree of selective reporting of necessary components to extract effects (e.g., effect size, standard deviations, test statistics).

[c]This level was omitted from analyses due to the very low level of representation.

Table M2. Sensitivity Analyses - Message fully available

Effect Set / Bias Level of Moderator	Fisher's Z			Effect #	Study #	95% Mod.
	Est.	95% CI				
		Low	High			
1. Message, given characteristic - Type I - Attitude						
Available	0.232	0.091	0.373	63	28	No
Not Available	0.234	0.163	0.305	155	63	
2. Message, given characteristic - Type I – Intention						
Available	0.107	0.060	0.155	69	30	No
Not Available	0.164	0.097	0.232	175	52	
3. Message, given characteristic - Type I - Self-Report Behavior						
Available	-	-	-	-	-	-
Not Available	0.062	0.038	0.087	193	40	
4. Message, given characteristic - Type I - Objective Behavior						
Available	0.111	-0.036	0.257	10	8	No
Not Available	0.118	0.026	0.209	54	19	
5. Message, given characteristic - Type II – Attitude						
Available	0.228	0.183	0.273	385	117	No
Not Available	0.165	0.124	0.206	325	103	
6. Message, given characteristic - Type II – Intention						
Available	0.205	0.166	0.245	415	142	No
Not Available	0.231	0.186	0.276	330	100	
7. Message, given characteristic - Type II - Self-Report Behavior						
Available	0.139	-0.117	0.395	17	5	No
Not Available	0.089	-0.022	0.201	27	7	
8. Message, given characteristic - Type II - Objective Behavior						
Available	0.203	0.066	0.340	61	18	No
Not Available	0.190	0.128	0.252	56	18	
9. Characteristic, given message – Attitude						
Available	0.234	0.177	0.290	347	103	No
Not Available	0.163	0.120	0.205	301	91	
10. Characteristic, given message – Intention						
Available	0.190	0.149	0.230	387	121	No
Not Available	0.247	0.202	0.292	267	86	
11. Characteristic, given message - Self-Report Behavior						
Available	0.192	-0.061	0.444	16	4	No
Not Available	0.080	-0.029	0.189	22	6	
12. Characteristic, given message - Objective Behavior						
Available	0.222	0.084	0.360	56	15	No
Not Available	0.185	0.128	0.242	59	18	
13. Interaction – Attitude						
Available	0.264	0.211	0.316	107	84	No
Not Available	0.196	0.140	0.251	74	65	
14. Interaction – Intention						
Available	0.242	0.196	0.288	144	111	No
Not Available	0.247	0.199	0.295	83	68	
15. Interaction - Self-Report Behavior						
Available	-	-	-	-	-	-

Not Available	-	-	-	-	-	
16. Interaction - Objective Behavior						
Available	0.104	-0.270	0.477	8	7	No
Not Available	0.325	0.206	0.443	8	6	

Note. Cells highlighted in *italicized* font signify the presence of moderation within a set of comparisons. “Down” indicates evidence of downward bias, “Up” indicates presence of upwards bias, “Mixed” indicates evidence of both upward and downward bias, and “No” mean no evidence of moderation. Effects are not included unless a given estimate relied on information from at least 4 studies.

Table M3. Sensitivity Analyses - Covariates Included

Effect Set / Bias Level of Moderator	Fisher's Z			Effect #	Study #	95% Mod.
	Est.	95% CI Low	95% CI High			
1. Message, given characteristic - Type I - Attitude						
Low Bias	0.220	0.157	0.282	184	71	
Unclear Bias	-	-	-	-	-	No
High Bias	0.317	0.076	0.558	28	17	
2. Message, given characteristic - Type I – Intention						
Low Bias	0.154	0.100	0.207	222	72	
Unclear Bias	0.081	-0.082	0.243	8	4	No
High Bias	0.143	0.048	0.237	14	7	
3. Message, given characteristic - Type I - Self-Report Behavior						
Low Bias	0.063	0.034	0.092	164	36	
Unclear Bias	-	-	-	-	-	No
High Bias	0.072	0.034	0.110	33	5	
4. Message, given characteristic - Type I - Objective Behavior						
Low Bias	0.116	0.027	0.205	50	19	
Unclear Bias	-	-	-	-	-	No
High Bias	0.099	-0.066	0.264	13	7	
5. Message, given characteristic - Type II – Attitude						
Low Bias	0.208	0.176	0.241	655	195	
Unclear Bias	0.126	-0.077	0.328	10	4	No
High Bias	0.121	0.009	0.234	45	19	
6. Message, given characteristic - Type II – Intention						
Low Bias	0.224	0.193	0.256	660	218	
Unclear Bias	0.079	-0.040	0.198	30	9	No
High Bias	0.182	0.066	0.298	55	13	
7. Message, given characteristic - Type II - Self-Report Behavior						
Low Bias	0.143	-0.002	0.288	31	8	
Unclear Bias	-	-	-	-	-	-
High Bias	-	-	-	-	-	
8. Message, given characteristic - Type II - Objective Behavior						
Low Bias	0.226	0.161	0.292	103	31	
Unclear Bias	-	-	-	-	-	No
High Bias	0.081	-0.233	0.396	14	5	
9. Characteristic, given message – Attitude						
Low Bias	0.207	0.169	0.245	620	178	
Unclear Bias	-	-	-	-	-	No
High Bias	0.063	-0.151	0.277	20	9	
10. Characteristic, given message – Intention						
Low Bias	0.213	0.182	0.245	592	189	
Unclear Bias	0.269	0.164	0.374	10	5	No
High Bias	0.207	0.105	0.310	52	14	
11. Characteristic, given message - Self-Report Behavior						
Low Bias	0.146	-0.022	0.314	26	7	
Unclear Bias	-	-	-	-	-	-
High Bias	-	-	-	-	-	

12. Characteristic, given message - Objective Behavior						
Low Bias	0.214	0.144	0.285	102	29	
Unclear Bias	-	-	-	-	-	No
High Bias	0.168	-0.055	0.392	12	4	
13. Interaction – Attitude						
Low Bias	0.271	0.225	0.317	124	102	
Unclear Bias	0.217	0.098	0.336	10	8	*Down*
High Bias	0.143	0.065	0.221	47	39	
14. Interaction – Intention						
Low Bias	0.254	0.224	0.284	166	133	
Unclear Bias	0.240	0.116	0.364	17	12	No
High Bias	0.222	0.104	0.339	44	39	
15. Interaction - Self-Report Behavior						
Low Bias	-	-	-	-	-	
Unclear Bias	-	-	-	-	-	-
High Bias	-	-	-	-	-	
16. Interaction - Objective Behavior						
Low Bias	0.263	0.015	0.511	10	7	
Unclear Bias	-	-	-	-	-	No
High Bias	0.149	-0.368	0.666	5	5	

Note. Cells highlighted in *italicized* font signify the presence of moderation within a set of comparisons. “Down” indicates evidence of downward bias, “Up” indicates presence of upwards bias, “Mixed” indicates evidence of both upward and downward bias, and “No” mean no evidence of moderation. Effects are not included unless a given estimate relied on information from at least 4 studies.

Table M4. Sensitivity Analyses - Manipulation confounded

Effect Set / Bias Level of Moderator	Fisher's Z Est.	95% CI Low	95% CI High	Effect #	Study #	95% Mod.
1. Message, given characteristic - Type I - Attitude						
Low Bias	0.269	0.202	0.336	162	68	
Unclear Bias	0.024	-0.030	0.079	38	17	*Down*
High Bias	0.307	-0.093	0.707	18	7	
2. Message, given characteristic - Type I – Intention						
Low Bias	0.185	0.128	0.241	143	55	
Unclear Bias	0.065	-0.068	0.197	33	10	No
High Bias	0.098	-0.014	0.209	68	17	
3. Message, given characteristic - Type I - Self-Report Behavior						
Low Bias	0.024	-0.086	0.135	7	4	
Unclear Bias	0.154	0.002	0.305	32	8	No
High Bias	0.058	0.037	0.078	160	30	
4. Message, given characteristic - Type I - Objective Behavior						
Low Bias	0.112	0.016	0.209	24	14	
Unclear Bias	-	-	-	-	-	No
High Bias	0.130	-0.019	0.279	35	12	
5. Message, given characteristic - Type II – Attitude						
Low Bias	0.192	0.157	0.227	549	174	
Unclear Bias	0.202	0.036	0.369	34	9	No
High Bias	0.235	0.161	0.310	36	127	
6. Message, given characteristic - Type II – Intention						
Low Bias	0.211	0.177	0.246	588	187	
Unclear Bias	0.183	0.116	0.250	49	15	No
High Bias	0.248	0.178	0.319	108	41	
7. Message, given characteristic - Type II - Self-Report Behavior						
Low Bias	0.145	-0.028	0.319	22	7	
Unclear Bias	-	-	-	-	-	No
High Bias	0.075	-0.078	0.229	20	4	
8. Message, given characteristic - Type II - Objective Behavior						
Low Bias	0.211	0.096	0.325	50	22	
Unclear Bias	0.271	0.129	0.413	14	4	No
High Bias	0.151	0.079	0.223	53	10	
9. Characteristic, given message – Attitude						
Low Bias	0.199	0.155	0.243	498	150	
Unclear Bias	0.180	0.038	0.322	37	11	No
High Bias	0.216	0.143	0.289	113	31	
10. Characteristic, given message – Intention						
Low Bias	0.206	0.173	0.240	530	162	
Unclear Bias	0.178	0.085	0.271	28	11	No
High Bias	0.239	0.163	0.316	96	36	
11. Characteristic, given message - Self-Report Behavior						
Low Bias	0.197	-0.036	0.430	16	5	
Unclear Bias	-	-	-	-	-	No
High Bias	0.067	-0.064	0.199	20	4	

12. Characteristic, given message - Objective Behavior						
Low Bias	0.227	0.116	0.338	48	19	
Unclear Bias	0.255	0.150	0.360	14	4	No
High Bias	0.146	0.075	0.216	53	10	
13. Interaction – Attitude						
Low Bias	0.231	0.188	0.274	144	122	
Unclear Bias	-	-	-	-	-	No
High Bias	0.272	0.181	0.363	32	25	
14. Interaction – Intention						
Low Bias	0.251	0.212	0.291	187	143	
Unclear Bias	0.188	0.065	0.311	11	10	No
High Bias	0.220	0.140	0.299	29	26	
15. Interaction - Self-Report Behavior						
Low Bias	0.141	-0.141	0.424	6	4	
Unclear Bias	-	-	-	-	-	-
High Bias	-	-	-	-	-	
16. Interaction - Objective Behavior						
Low Bias	0.149	-0.129	0.427	11	9	
Unclear Bias	-	-	-	-	-	-
High Bias	-	-	-	-	-	

Note. Cells highlighted in *italicized* font signify the presence of moderation within a set of comparisons. "Down" indicates evidence of downward bias, "Up" indicates presence of upwards bias, "Mixed" indicates evidence of both upward and downward bias, and "No" mean no evidence of moderation. Effects are not included unless a given estimate relied on information from at least 4 studies.

Table M5. Sensitivity Analyses - Selection Bias

Effect Set / Bias Level of Moderator	Fisher's Z Est.	95% CI Low	95% CI High	Effect #	Study #	95% Mod.
1. Message, given characteristic - Type I - Attitude						
Low Bias	0.562	0.155	0.970	8	4	
Unclear Bias	0.215	0.152	0.278	207	85	No
High Bias	-	-	-	-	-	
2. Message, given characteristic - Type I – Intention						
Low Bias	-0.002	-0.091	0.087	12	7	
Unclear Bias	0.163	0.111	0.216	223	71	No
High Bias	0.173	0.078	0.268	9	4	
3. Message, given characteristic - Type I - Self-Report Behavior						
Low Bias	0.056	0.026	0.086	98	18	
Unclear Bias	0.102	0.044	0.159	75	18	No
High Bias	0.022	-0.051	0.096	26	6	
4. Message, given characteristic - Type I - Objective Behavior						
Low Bias	0.075	-0.003	0.154	15	8	
Unclear Bias	0.143	0.039	0.248	49	19	No
High Bias	-	-	-	-	-	
5. Message, given characteristic - Type II – Attitude						
Low Bias	0.140	0.022	0.258	28	6	
Unclear Bias	0.202	0.170	0.235	666	207	No
High Bias	0.204	0.064	0.343	16	3	
6. Message, given characteristic - Type II – Intention						
Low Bias	0.075	-0.020	0.170	24	6	
Unclear Bias	0.221	0.190	0.252	699	228	*Up*
High Bias	0.208	-0.062	0.478	22	6	
7. Message, given characteristic - Type II - Self-Report Behavior						
Low Bias	-	-	-	-	-	
Unclear Bias	0.137	0.030	0.244	43	11	-
High Bias	-	-	-	-	-	
8. Message, given characteristic - Type II - Objective Behavior						
Low Bias	-	-	-	-	-	
Unclear Bias	0.222	0.154	0.291	111	33	-
High Bias	-	-	-	-	-	
9. Characteristic, given message – Attitude						
Low Bias	0.150	0.050	0.249	28	6	
Unclear Bias	0.201	0.163	0.240	604	181	No
High Bias	-	-	-	-	-	
10. Characteristic, given message – Intention						
Low Bias	0.075	-0.021	0.170	24	6	
Unclear Bias	0.216	0.184	0.247	610	195	No
High Bias	0.270	0.135	0.406	20	5	
11. Characteristic, given message - Self-Report Behavior						
Low Bias	-	-	-	-	-	
Unclear Bias	0.135	0.017	0.253	38	10	-
High Bias	-	-	-	-	-	

12. Characteristic, given message - Objective Behavior						
Low Bias	-	-	-	-	-	
Unclear Bias	0.227	0.163	0.292	109	30	-
High Bias	-	-	-	-	-	
13. Interaction – Attitude						
Low Bias	-	-	-	-	-	
Unclear Bias	0.236	0.196	0.276	175	144	-
High Bias	-	-	-	-	-	
14. Interaction – Intention						
Low Bias	-	-	-	-	-	
Unclear Bias	0.248	0.214	0.282	222	174	-
High Bias	-	-	-	-	-	
15. Interaction - Self-Report Behavior						
Low Bias	-	-	-	-	-	
Unclear Bias	0.231	0.126	0.336	6	4	-
High Bias	-	-	-	-	-	
16. Interaction - Objective Behavior						
Low Bias	-	-	-	-	-	
Unclear Bias	0.264	0.091	0.436	15	12	-
High Bias	-	-	-	-	-	

Note. Cells highlighted in *italicized* font signify the presence of moderation within a set of comparisons. “Down” indicates evidence of downward bias, “Up” indicates presence of upwards bias, “Mixed” indicates evidence of both upward and downward bias, and “No” mean no evidence of moderation. Effects are not included unless a given estimate relied on information from at least 4 studies.

Table M6. Sensitivity Analyses - Performance bias

Effect Set / Bias Level of Moderator	Fisher's Z Est.	95% CI Low	95% CI High	Effect #	Study #	95% Mod.
1. Message, given characteristic - Type I - Attitude						
Low Bias	0.208	0.128	0.288	78	34	
Unclear Bias	0.255	0.163	0.346	129	55	No
High Bias	-	-	-	-	-	
2. Message, given characteristic - Type I – Intention						
Low Bias	0.147	0.078	0.215	95	30	
Unclear Bias	0.158	0.089	0.227	136	49	No
High Bias	-	-	-	-	-	
3. Message, given characteristic - Type I - Self-Report Behavior						
Low Bias	0.049	0.015	0.083	38	15	
Unclear Bias	0.073	0.023	0.123	107	19	No
High Bias	0.078	0.050	0.105	54	9	
4. Message, given characteristic - Type I - Objective Behavior						
Low Bias	0.181	0.081	0.281	26	14	
Unclear Bias	0.117	-0.038	0.271	25	8	No
High Bias	-0.022	-0.150	0.106	13	5	
5. Message, given characteristic - Type II – Attitude						
Low Bias	0.152	0.116	0.188	200	73	
Unclear Bias	0.222	0.180	0.265	506	141	No
High Bias	-	-	-	-	-	
6. Message, given characteristic - Type II – Intention						
Low Bias	0.177	0.140	0.214	322	96	
Unclear Bias	0.244	0.199	0.289	387	133	No
High Bias	0.217	0.113	0.321	36	11	
7. Message, given characteristic - Type II - Self-Report Behavior						
Low Bias	0.114	-0.057	0.284	29	6	
Unclear Bias	0.182	0.093	0.271	15	6	No
High Bias	-	-	-	-	-	
8. Message, given characteristic - Type II - Objective Behavior						
Low Bias	0.266	0.129	0.403	37	14	
Unclear Bias	0.171	0.109	0.232	80	23	No
High Bias	-	-	-	-	-	
9. Characteristic, given message – Attitude						
Low Bias	0.135	0.085	0.185	189	66	
Unclear Bias	0.237	0.182	0.292	455	122	No
High Bias	-	-	-	-	-	
10. Characteristic, given message – Intention						
Low Bias	0.161	0.123	0.199	266	81	
Unclear Bias	0.242	0.199	0.285	375	118	*Up*
High Bias	0.307	0.195	0.419	13	7	
11. Characteristic, given message - Self-Report Behavior						
Low Bias	0.110	-0.091	0.311	24	5	
Unclear Bias	0.182	0.022	0.341	14	5	No
High Bias	-	-	-	-	-	

12. Characteristic, given message - Objective Behavior						
Low Bias	0.255	0.111	0.400	35	13	
Unclear Bias	0.181	0.133	0.230	80	21	No
High Bias	-	-	-	-	-	
13. Interaction – Attitude						
Low Bias	0.171	0.140	0.203	63	53	
Unclear Bias	0.269	0.211	0.327	116	94	*Up*
High Bias	-	-	-	-	-	
14. Interaction – Intention						
Low Bias	0.219	0.184	0.253	95	81	
Unclear Bias	0.260	0.202	0.319	127	93	No
High Bias	0.235	0.132	0.338	5	5	
15. Interaction - Self-Report Behavior						
Low Bias	-	-	-	-	-	
Unclear Bias	-	-	-	-	-	No
High Bias	-	-	-	-	-	
16. Interaction - Objective Behavior						
Low Bias	0.357	0.197	0.517	6	6	
Unclear Bias	0.083	-0.259	0.425	10	7	-
High Bias	-	-	-	-	-	

Note. Cells highlighted in *italicized* font signify the presence of moderation within a set of comparisons. “Down” indicates evidence of downward bias, “Up” indicates presence of upwards bias, “Mixed” indicates evidence of both upward and downward bias, and “No” mean no evidence of moderation. Effects are not included unless a given estimate relied on information from at least 4 studies.

Table M7. Sensitivity Analyses - Attrition bias

Effect Set / Bias Level of Moderator	Fisher's Z Est.	95% CI Low	95% CI High	Effect #	Study #	95% Mod.
1. Message, given characteristic - Type I - Attitude						
Low Bias	0.242	0.174	0.310	192	82	
Unclear Bias	-	-	-	-	-	No
High Bias	0.121	0.018	0.224	18	8	
2. Message, given characteristic - Type I – Intention						
Low Bias	0.167	0.115	0.219	212	73	
Unclear Bias	-	-	-	-	-	No
High Bias	0.030	-0.083	0.143	22	8	
3. Message, given characteristic - Type I - Self-Report Behavior						
Low Bias	0.062	0.031	0.093	61	16	
Unclear Bias	-	-	-	-	-	No
High Bias	0.074	0.042	0.107	134	28	
4. Message, given characteristic - Type I - Objective Behavior						
Low Bias	0.183	0.075	0.292	40	18	
Unclear Bias	-	-	-	-	-	No
High Bias	0.034	-0.037	0.105	24	10	
5. Message, given characteristic - Type II – Attitude						
Low Bias	0.203	0.171	0.236	642	203	
Unclear Bias	0.144	0.051	0.236	30	4	No
High Bias	0.202	0.037	0.366	38	10	
6. Message, given characteristic - Type II – Intention						
Low Bias	0.224	0.193	0.255	697	232	
Unclear Bias	-	-	-	-	-	*Down*
High Bias	0.017	-0.046	0.079	30	5	
7. Message, given characteristic - Type II - Self-Report Behavior						
Low Bias	0.174	0.026	0.323	27	8	
Unclear Bias	-	-	-	-	-	No
High Bias	0.044	-0.097	0.184	17	5	
8. Message, given characteristic - Type II - Objective Behavior						
Low Bias	0.229	0.150	0.307	103	30	
Unclear Bias	-	-	-	-	-	No
High Bias	0.100	-0.038	0.238	12	5	
9. Characteristic, given message – Attitude						
Low Bias	0.205	0.166	0.244	580	177	
Unclear Bias	0.147	0.081	0.213	30	4	No
High Bias	0.099	-0.006	0.203	38	10	
10. Characteristic, given message – Intention						
Low Bias	0.221	0.191	0.252	606	198	
Unclear Bias	-	-	-	-	-	*Down*
High Bias	0.008	-0.046	0.062	30	5	
11. Characteristic, given message - Self-Report Behavior						
Low Bias	0.186	0.041	0.331	26	7	
Unclear Bias	-	-	-	-	-	No
High Bias	0.016	-0.169	0.201	12	4	

12. Characteristic, given message - Objective Behavior						
Low Bias	0.238	0.164	0.312	107	27	
Unclear Bias	-	-	-	-	-	No
High Bias	0.089	-0.054	0.232	12	5	
13. Interaction – Attitude						
Low Bias	0.240	0.199	0.281	168	140	
Unclear Bias	-	-	-	-	-	No
High Bias	0.138	0.000	0.276	10	7	
14. Interaction – Intention						
Low Bias	0.245	0.210	0.280	218	172	
Unclear Bias	-	-	-	-	-	No
High Bias	0.247	0.055	0.439	6	5	
15. Interaction - Self-Report Behavior						
Low Bias	0.145	-0.144	0.434	6	4	
Unclear Bias	-	-	-	-	-	-
High Bias	-	-	-	-	-	
16. Interaction - Objective Behavior						
Low Bias	0.215	0.025	0.406	16	13	
Unclear Bias	-	-	-	-	-	-
High Bias	-	-	-	-	-	

Note. Cells highlighted in *italicized* font signify the presence of moderation within a set of comparisons. “Down” indicates evidence of downward bias, “Up” indicates presence of upwards bias, “Mixed” indicates evidence of both upward and downward bias, and “No” mean no evidence of moderation. Effects are not included unless a given estimate relied on information from at least 4 studies.

Table M8. Sensitivity Analyses - Reporting bias

Effect Set / Bias Level of Moderator	Fisher's Z Est.	95% CI Low	95% CI High	Effect #	Study #	95% Mod.
1. Message, given characteristic - Type I - Attitude						
Low Bias	0.233	0.168	0.297	209	87	No
High Bias	0.219	0.059	0.380	9	4	
2. Message, given characteristic - Type I – Intention						
Low Bias	0.160	0.108	0.211	220	75	No
High Bias	0.060	-0.050	0.170	22	6	
3. Message, given characteristic - Type I - Self-Report Behavior						
Low Bias	0.069	0.035	0.103	142	28	No
High Bias	0.059	0.025	0.093	53	12	
4. Message, given characteristic - Type I - Objective Behavior						
Low Bias	0.162	0.081	0.243	50	22	*Down*
High Bias	-0.034	-0.148	0.080	14	5	
5. Message, given characteristic - Type II – Attitude						
Low Bias	0.204	0.170	0.238	605	195	No
High Bias	0.169	0.093	0.246	105	21	
6. Message, given characteristic - Type II – Intention						
Low Bias	0.222	0.191	0.254	701	224	No
High Bias	0.126	0.051	0.202	42	15	
7. Message, given characteristic - Type II - Self-Report Behavior						
Low Bias	0.142	0.028	0.255	38	10	-
High Bias	-	-	-	-	-	
8. Message, given characteristic - Type II - Objective Behavior						
Low Bias	0.216	0.148	0.284	115	35	-
High Bias	-	-	-	-	-	
9. Characteristic, given message – Attitude						
Low Bias	0.208	0.168	0.248	553	172	No
High Bias	0.118	0.057	0.180	95	18	
10. Characteristic, given message – Intention						
Low Bias	0.217	0.186	0.248	616	193	No
High Bias	0.128	0.045	0.212	38	13	
11. Characteristic, given message - Self-Report Behavior						
Low Bias	0.156	0.021	0.291	32	8	-
High Bias	-	-	-	-	-	
12. Characteristic, given message - Objective Behavior						
Low Bias	0.222	0.158	0.286	113	32	-
High Bias	-	-	-	-	-	
13. Interaction – Attitude						
Low Bias	0.229	0.188	0.270	163	134	No
High Bias	0.291	0.181	0.401	18	15	
14. Interaction – Intention						
Low Bias	0.249	0.214	0.284	215	168	No
High Bias	0.158	0.024	0.291	11	10	
15. Interaction - Self-Report Behavior						
Low Bias	0.204	0.106	0.302	7	5	No

High Bias	-	-	-	0	0	
16. Interaction - Objective Behavior						
Low Bias	0.215	0.025	0.406	16	13	-
High Bias	-	-	-	-	-	

Note. Cells highlighted in *italicized* font signify the presence of moderation within a set of comparisons. “Down” indicates evidence of downward bias, “Up” indicates presence of upwards bias, “Mixed” indicates evidence of both upward and downward bias, and “No” mean no evidence of moderation. Effects are not included unless a given estimate relied on information from at least 4 studies.

Table M9. Sensitivity Analyses - Extractable effects (% per study)

Effect Set / Bias Level of Moderator	Fisher's Z			Effect #	Study #	95% Mod.
	Est.	95% CI				
		Low	High			
1. Message, given characteristic - Type I - Attitude						
Low Bias	0.215	0.147	0.283	146	69	
Unclear Bias	0.378	0.127	0.629	51	11	No
High Bias	0.175	0.101	0.248	21	11	
2. Message, given characteristic - Type I – Intention						
Low Bias	0.102	0.051	0.153	135	53	
Unclear Bias	0.282	0.164	0.401	80	19	No
High Bias	0.094	0.019	0.169	28	9	
3. Message, given characteristic - Type I - Self-Report Behavior						
Low Bias	0.061	0.028	0.095	136	28	
Unclear Bias	0.053	-0.018	0.125	31	5	No
High Bias	0.095	0.056	0.135	30	8	
4. Message, given characteristic - Type I - Objective Behavior						
Low Bias	0.172	0.069	0.275	28	14	
Unclear Bias	0.159	-0.029	0.347	22	4	*Down*
High Bias	-0.060	-0.159	0.038	13	8	
5. Message, given characteristic - Type II – Attitude						
Low Bias	0.229	0.167	0.292	155	70	
Unclear Bias	0.187	0.137	0.237	382	87	No
High Bias	0.193	0.148	0.237	173	59	
6. Message, given characteristic - Type II – Intention						
Low Bias	0.249	0.197	0.301	233	98	
Unclear Bias	0.197	0.146	0.249	346	84	No
High Bias	0.203	0.151	0.255	166	58	
7. Message, given characteristic - Type II - Self-Report Behavior						
Low Bias	0.326	0.160	0.492	12	4	
Unclear Bias	0.062	-0.071	0.194	20	4	No
High Bias	0.035	-0.204	0.273	12	4	
8. Message, given characteristic - Type II - Objective Behavior						
Low Bias	0.399	0.182	0.617	14	7	
Unclear Bias	0.214	0.167	0.261	78	19	No
High Bias	0.061	-0.108	0.229	25	10	
9. Characteristic, given message – Attitude						
Low Bias	0.226	0.168	0.284	156	70	
Unclear Bias	0.192	0.131	0.253	380	87	No
High Bias	0.171	0.113	0.230	112	33	
10. Characteristic, given message – Intention						
Low Bias	0.238	0.196	0.279	222	96	
Unclear Bias	0.190	0.143	0.238	358	83	No
High Bias	0.199	0.124	0.274	74	27	
11. Characteristic, given message - Self-Report Behavior						
Low Bias	0.317	0.085	0.548	12	4	
Unclear Bias	0.054	-0.069	0.177	20	4	No
High Bias	-	-	-	-	-	

12. Characteristic, given message - Objective Behavior						
Low Bias	0.407	0.201	0.613	14	7	
Unclear Bias	0.204	0.162	0.246	81	19	No
High Bias	0.054	-0.102	0.210	20	7	
13. Interaction – Attitude						
Low Bias	0.224	0.165	0.284	79	70	
Unclear Bias	0.227	0.135	0.319	29	16	No
High Bias	0.246	0.186	0.306	73	63	
14. Interaction – Intention						
Low Bias	0.262	0.211	0.313	117	97	
Unclear Bias	0.147	0.082	0.211	34	17	No
High Bias	0.256	0.206	0.306	75	64	
15. Interaction - Self-Report Behavior						
Low Bias	0.231	0.126	0.336	6	4	
Unclear Bias	-	-	-	-	-	-
High Bias	-	-	-	-	-	
16. Interaction - Objective Behavior						
Low Bias	0.318	0.205	0.431	7	7	
Unclear Bias	-	-	-	-	-	No
High Bias	-	-	-	-	-	

Note. Cells highlighted in *italicized* font signify the presence of moderation within a set of comparisons. “Down” indicates evidence of downward bias, “Up” indicates presence of upwards bias, “Mixed” indicates evidence of both upward and downward bias, and “No” mean no evidence of moderation. Effects are not included unless a given estimate relied on information from at least 4 studies.

Table M10. Sensitivity Analyses - Sample size (effect-level)

Effect Set / Bias Level of Moderator	Fisher's Z Est.	95% CI Low	95% CI High	Effect #	Study #	Sig.	95% Mod.
1. Message, given characteristic - Type I - Attitude							
N (effects)	0.000	-0.002	0.001	218	91	0.400	No
2. Message, given characteristic - Type I – Intention							
N (effects)	-0.001	-0.001	0.000	244	82	0.024	*Up*
3. Message, given characteristic - Type I - Self-Report Behavior							
N (effects)	0.000	0.000	0.000	199	42	0.974	No
4. Message, given characteristic - Type I - Objective Behavior							
N (effects)	0.000	-0.001	0.000	64	27	0.376	No
5. Message, given characteristic - Type II – Attitude							
N (effects)	0.000	-0.001	0.000	710	216	0.077	No
6. Message, given characteristic - Type II – Intention							
N (effects)	-0.001	-0.001	0.000	745	240	0.003	*Up*
7. Message, given characteristic - Type II - Self-Report Behavior							
N (effects)	-0.002	-0.003	0.000	44	12	0.037	*Up*
8. Message, given characteristic - Type II - Objective Behavior							
N (effects)	0.000	0.000	0.000	117	36	0.881	No
9. Characteristic, given message – Attitude							
N (effects)	0.000	-0.001	0.000	648	190	0.105	No
10. Characteristic, given message – Intention							
N (effects)	-0.001	-0.002	0.000	654	206	0.001	*Up*
11. Characteristic, given message - Self-Report Behavior							
N (effects)	-0.002	-0.004	0.000	38	10	0.023	*Up*
12. Characteristic, given message - Objective Behavior							
N (effects)	0.000	0.000	0.000	115	33	0.958	No
13. Interaction – Attitude							
N (effects)	0.000	-0.001	0.000	181	149	0.009	*Up*
14. Interaction – Intention							
N (effects)	-0.001	-0.001	0.000	227	179	0.004	*Up*
15. Interaction - Self-Report Behavior							
N (effects)	0.002	-0.003	0.007	7	5	0.262	No
16. Interaction - Objective Behavior							
N (effects)	0.001	-0.004	0.006	16	13	0.665	No

Note. Cells highlighted in *italicized* font signify the presence of moderation within a set of comparisons. “Down” indicates evidence of downward bias, “Up” indicates presence of upwards bias (i.e., small samples with more bias associated with larger effects. This is indicated by a negative estimate in these analyses). Effects are not included unless a given estimate relied on information from at least 4 studies.

Table M11. Sensitivity Analyses - Sample size (study-level)

Effect Set / Bias Level of Moderator	Fisher's Z Est.	95% CI Low	95% CI High	Effect #	Study #	Sig.	95% Mod.
1. Message, given characteristic - Type I - Attitude							
N (study)	-0.000	0.000	0.000	218	91	0.265	No
2. Message, given characteristic - Type I – Intention							
N (study)	-0.000	0.000	0.000	244	82	0.271	No
3. Message, given characteristic - Type I - Self-Report Behavior							
N (study)	0.000	0.000	0.000	199	42	0.902	No
4. Message, given characteristic - Type I - Objective Behavior							
N (study)	-0.000	0.000	0.000	64	27	0.009	*Up*
5. Message, given characteristic - Type II – Attitude							
N (study)	-0.000	0.000	0.000	710	216	0.039	*Up*
6. Message, given characteristic - Type II – Intention							
N (study)	-0.000	0.000	0.000	745	240	0.001	*Up*
7. Message, given characteristic - Type II - Self-Report Behavior							
N (study)	-0.000	0.000	0.000	44	12	0.106	No
8. Message, given characteristic - Type II - Objective Behavior							
N (study)	-0.000	0.000	0.000	117	36	0.944	No
9. Characteristic, given message – Attitude							
N (study)	-0.000	0.000	0.000	648	190	0.086	No
10. Characteristic, given message – Intention							
N (study)	-0.000	0.000	0.000	654	206	<.001	*Up*
11. Characteristic, given message - Self-Report Behavior							
N (study)	-0.000	0.000	0.000	38	10	0.116	No
12. Characteristic, given message - Objective Behavior							
N (study)	-0.000	0.000	0.000	115	33	0.903	No
13. Interaction – Attitude							
N (study)	-0.000	-0.001	0.000	181	149	0.002	*Up*
14. Interaction – Intention							
N (study)	-0.000	-0.001	0.000	227	179	0.006	*Up*
15. Interaction - Self-Report Behavior							
N (study)	0.002	-0.003	0.006	7	5	0.333	No
16. Interaction - Objective Behavior							
N (study)	0.001	-0.003	0.005	16	13	0.646	No

Note. Cells highlighted in *italicized* font signify the presence of moderation within a set of comparisons. “Down” indicates evidence of downward bias, “Up” indicates presence of upwards bias (i.e., small samples with more bias associated with larger effects. This is indicated by a negative estimate in these analyses). Effects are not included unless a given estimate relied on information from at least 4 studies.

Appendix N. Project 1 – Funnel Plots and P-Curve Analyses

In this appendix, I present funnel plots and p-curve analyses for each of the main estimates making up the primary analyses in this dissertation.

N.1. Funnel Plots. Funnel plots are common tools to evaluate bias. Unfortunately for this review, they have yet to be adapted in a way to take into account the nested structure of a three-level meta-analysis. However, they still provide some descriptive insights as to whether some effects may be biased according to a mixture of sample size and effect size (e.g., whether effects relying on small samples are more likely to be the source of larger effects). To aid interpretations, I will provide two types of funnel plots.

The first is a **standard funnel plot**, centered on the estimated effect sizes. From this plot, we can get a descriptive sense of the asymmetry of effects present in the literature. Frequently, effects calculated using small samples (i.e., having large variance) are prone to being larger and/or more extreme (and this can make small samples more prone to erroneously significant findings). This variation naturally emerges symmetrically around a true effect, but publication biases can lead to an over-representation of these effects in a particular direction (e.g., in support of a hypothesis). Looking at a standard funnel plot can give a descriptive sense of the presence of such a bias. Specifically, to the extent that effects are skewed, and over-represented on either the left- or right-side of a plot, this is indicative of bias.

The second type of plot I present are **contour-enhanced funnel plots**. These are centered around zero (the typical null hypothesis being evaluated against in studies), instead of the estimated effect from the meta-analysis. The plots then present colored regions, corresponding to different levels of significance for each effect.

- Effects within the central white region are non-significant.
- Effects within the yellow region correspond to p-values between .10 and .05 (i.e., just outside significance at 95%)
- Effects within the blue region correspond to p-values between .05 and .01.
- The outer-most grey zone contains effects that would have effects with p-values less than .01.

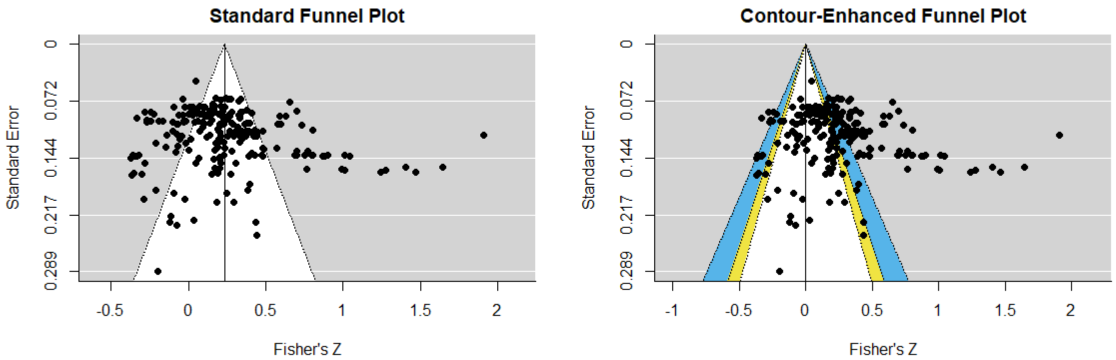
To the extent that there is publication bias (and certain practices such as p-hacking), there should be a greater preponderance of effects within the blue region, especially close to the border of the yellow region.

N.2. P-Curves. P-curves are another popular tool when it comes to evaluating the implications of publication bias (Simonsohn et al., 2014a; 2014b; 2015). Essentially, the analyses aim to determine whether there is evidence of a true effect despite the potential presence of questionable research practices such as p-hacking. If an effect is truly present in the literature, the p-values reported in studies ought to be right-skewed. If p values are left skewed (at least when examining values between 0 and 0.05), this is indicative of questionable practices and a higher clustering of p-values closer to .05 than should be expected.

P-curves allow two tests. The first is a right-skewness test, which can act as evidence for the presence of an effect (ideally, this test should be significant). The second test, is a “flatness test”, which if significant, may indicate that there either is not a true effect underlying the pattern of data, or that there is insufficient power to be able to tell (therefore, this should ideally be non-significant). The full p-curve test evaluates p-values under .05, operating under the assumption that suspicious p-values would fall largely just below this threshold. This makes the test more limited in detecting stronger p-hacking that may, for instance, push p-values below .025. As a solution to that, the half-p-curve test (focusing on the distribution of p-values below .025) was developed. The half p-curve is more sensitive to such cases, but this comes at the cost of a greater likelihood of studies being evaluated as not having evidential value for the presence of an effect. In the analyses presented in this text, I present the results of both the full and half p-curves.

As with funnel plots, p-curves have not been developed to take into consideration dependency in effect size estimates. Consequently, caution is needed when interpreting the results of these tests.

Figure N1. Funnel Plots: Effects of Message given characteristic, Type I, Attitude.



From the plot on the left, there appears to be some skewness, and more extreme values on the right. However, they do not seem associated with smaller samples and there is a decent cluster of values on the left side of the central value. From the plot on the right, there does not seem to be an obvious concentration of p-values within the blue region relative to the others.

Figure N2. P-Curves: Effects of Message given characteristic, Type I, Attitude.

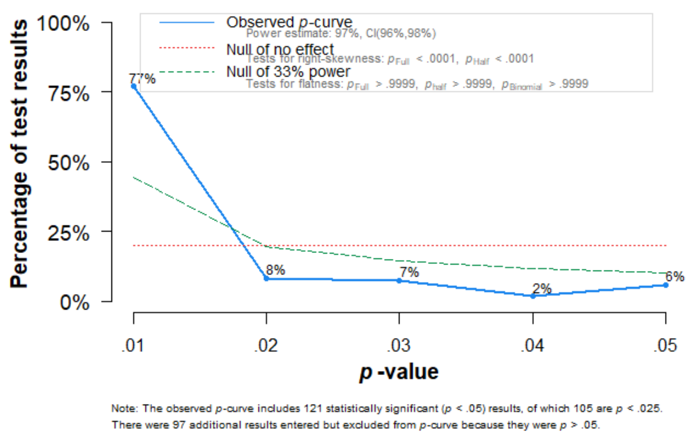
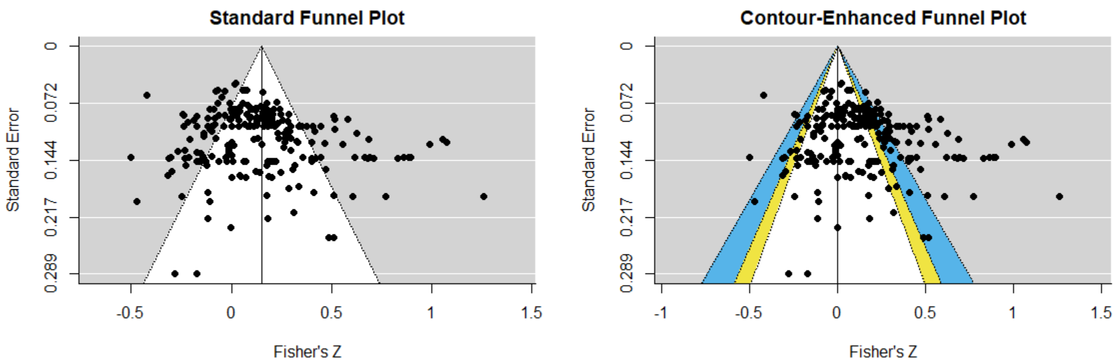


Table N1. P-Curve Results: Effects of Message given characteristic, Type I, Attitude.

Number of effects			Right-Skewness test		Flatness Test		Power	
Total	p< .05	p <.025	Full	Half	Full	Half	Est.	CI
218	121	105	p<.001	p<.001	p > .999	p > .999	97	95.8-98.1

The results of the p-curve analyses do not present caution towards biased p-values (i.e., the data passed both the right-skewness and the flatness tests).

Figure N3. Funnel Plots: Effects of Message given characteristic, Type I, Intention



Pattern from the two plots does not appear too suspicious. There does not appear to be too much skewness on the plot from the left. Additionally, there isn't a highly noticeable concentration of effects within the blue region of the plot on the right.

Figure N4. P-Curves: Effects of Message given characteristic, Type I, Intention.

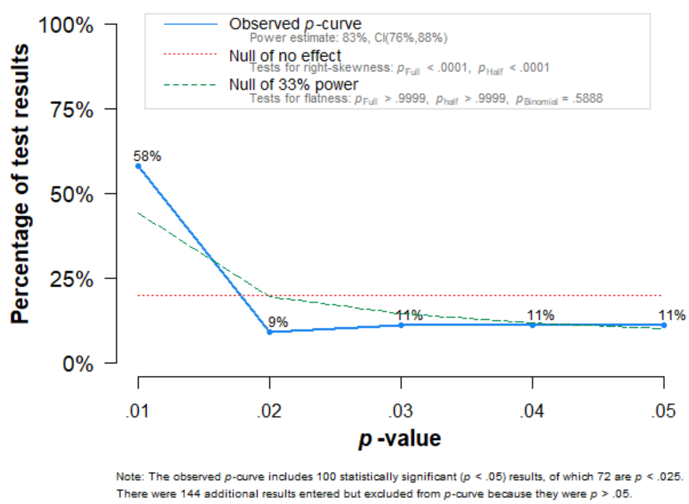
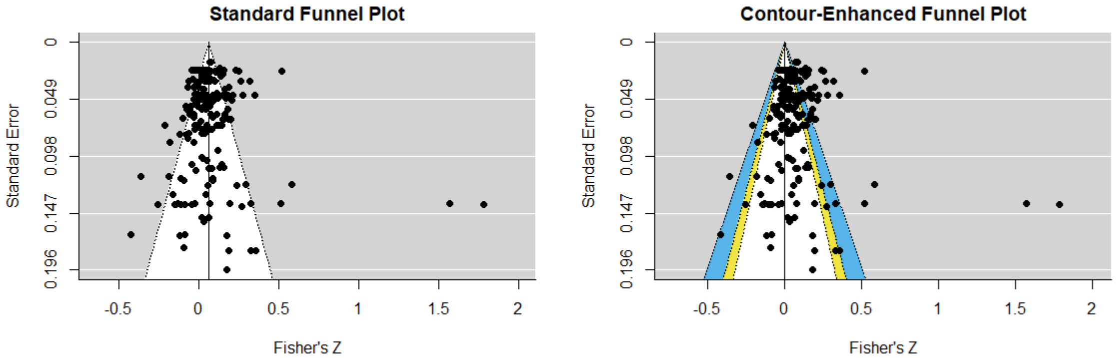


Table N2. P-Curve Results: Effects of Message given characteristic, Type I, Attitude.

Number of effects			Right-Skewness test		Flatness Test		Power	
Total	p< .05	p <.025	Full	Half	Full	Half	Est.	CI
244	100	72	p<.001	p<.001	p > .999	p > .999	83	76.1-87.7

The results of the p-curve analyses do not present caution towards biased p-values (i.e., the data passed both the right-skewness and the flatness tests).

Figure N5. Funnel Plots: Effects of Message given characteristic, Type I, Self-Report Behavior



Pattern from the two plots does not appear too suspicious. There does not appear to be too much skewness on the plot from the left. Additionally, there isn't a highly noticeable concentration of effects within the blue region of the plot on the right.

Figure N6. P-Curves: Effects of Message given characteristic, Type I, Self-Report Behavior.

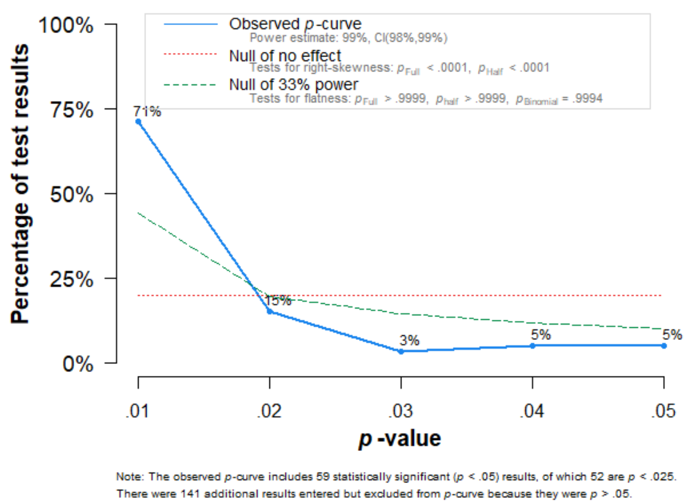
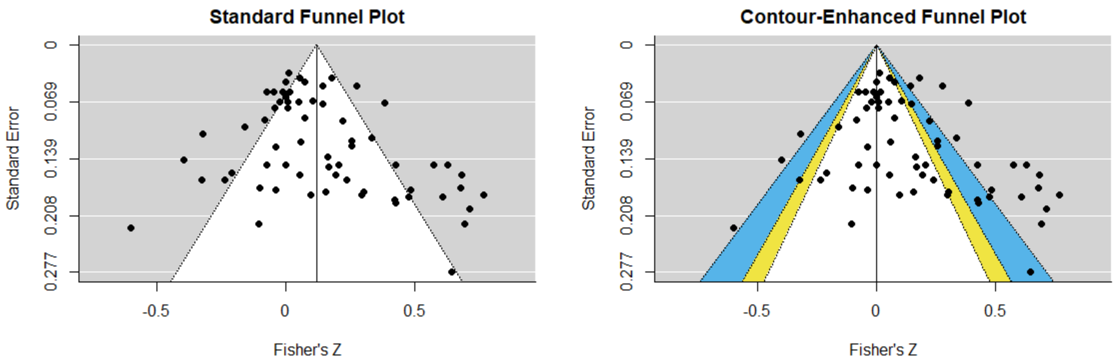


Table N3. P-Curve Results: Effects of Message given characteristic, Type I, Self-Report Behavior.

Number of effects			Right-Skewness test		Flatness Test		Power	
Total	p< .05	p <.025	Full	Half	Full	Half	Est.	CI
200	59	52	p<.001	p<.001	p > .999	p > .999	99	97.6-99

The results of the p-curve analyses do not present caution towards biased p-values (i.e., the data passed both the right-skewness and the flatness tests).

Figure N7. Funnel Plots: Effects of Message given characteristic, Type I, Objective Behavior.



Pattern from the two plots does not appear too suspicious. There does not appear to be too much skewness on the plot from the left. Regarding the plot on the right, there may be a slightly larger concentration of effects in the blue area, but it is very slight (may not be too much of a concern).

Figure N8. P-Curves: Effects of Message given characteristic, Type I, Attitude.

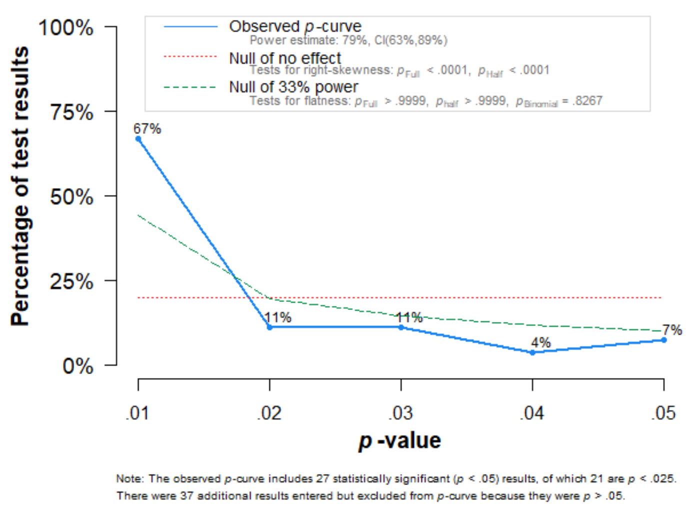
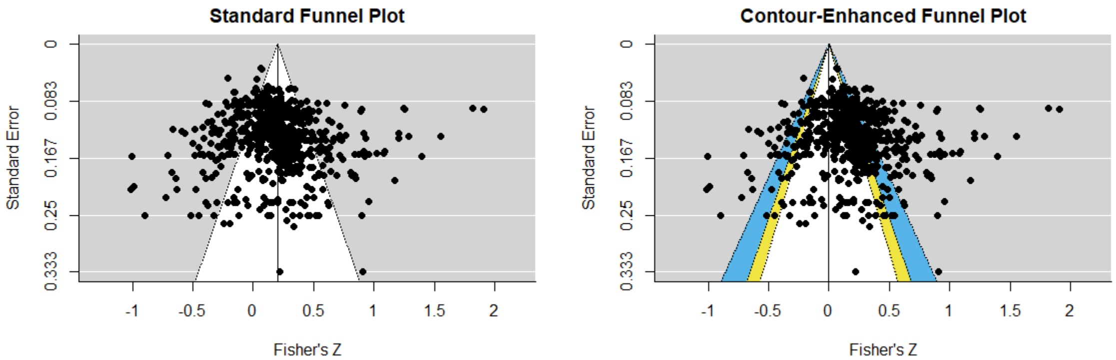


Table N4. P-Curve Results: Effects of Message given characteristic, Type I, Attitude.

Number of effects			Right-Skewness test		Flatness Test		Power	
Total	p< .05	p <.025	Full	Half	Full	Half	Est.	CI
64	27	21	p<.001	p<.001	p > .999	p > .999	79	63.5-88.8

The results of the p-curve analyses do not present caution towards biased p-values (i.e., the data passed both the right-skewness and the flatness tests).

Figure N9. Funnel Plots: Effects of Message given characteristic, Type II, Attitude.



Pattern from the two plots does not appear too suspicious. The plot on the left seems quite symmetrical. As for the plot on the right, there may be too many points to accurately tell, but there are plenty of non-significant points, and effect don't look too clustered in the blue area.

Figure N10. P-Curves: Effects of Message given characteristic, Type II, Attitude.

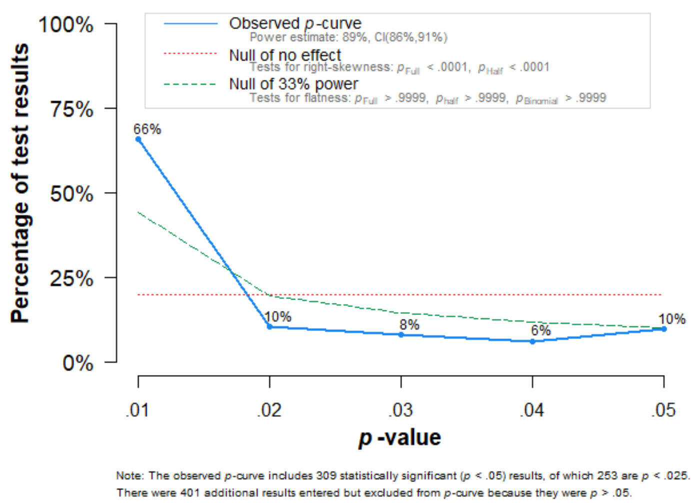
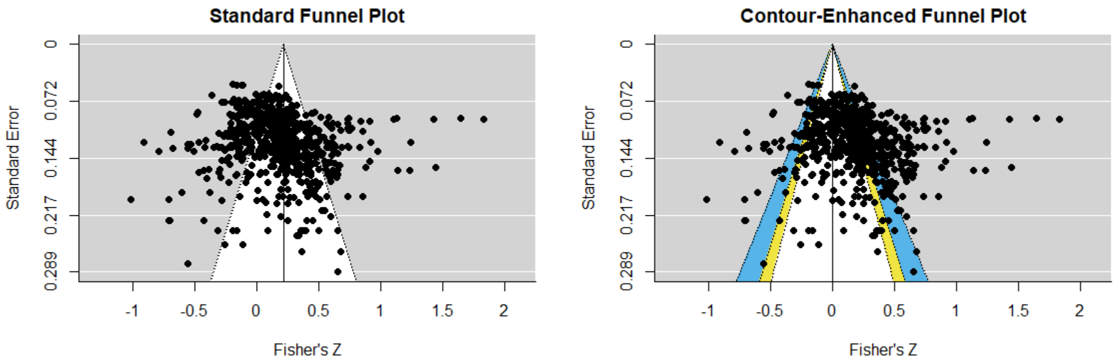


Table N5. P-Curve Results: Effects of Message given characteristic, Type II, Attitude.

Number of effects			Right-Skewness test		Flatness Test		Power	
Total	p< .05	p <.025	Full	Half	Full	Half	Est.	CI
810	309	253	p<.001	p<.001	p > .999	p > .999	89	86.4-91

The results of the p-curve analyses do not present caution towards biased p-values (i.e., the data passed both the right-skewness and the flatness tests).

Figure N11. Funnel Plots: Effects of Message given characteristic, Type II, Intention.



Pattern from the two plots does not appear too suspicious. The plot on the left seems quite symmetrical. As for the plot on the right, there may be too many points to accurately tell, but there are plenty of non-significant points, and effect don't look too clustered in the blue area.

Figure N12. P-Curves: Effects of Message given characteristic, Type II, Intention.

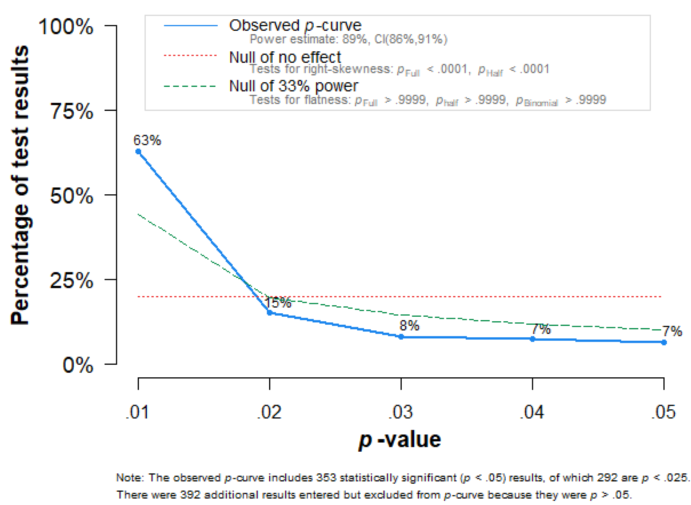
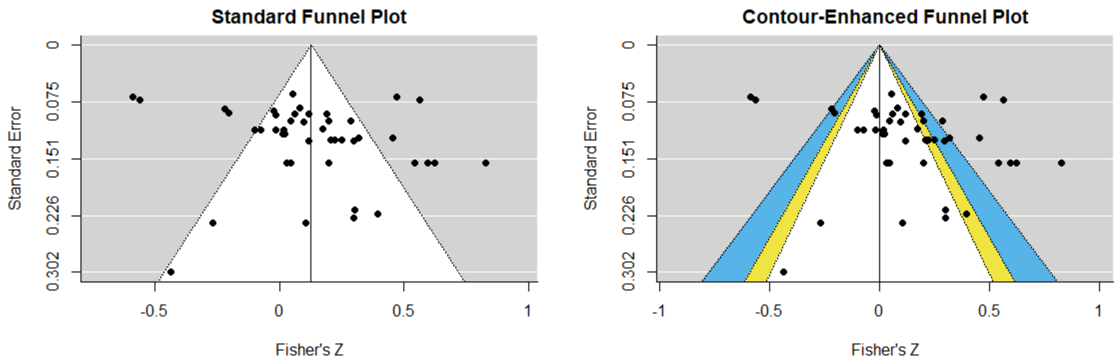


Table N6. P-Curve Results: Effects of Message given characteristic, Type II, Intention.

Number of effects			Right-Skewness test		Flatness Test		Power	
Total	p< .05	p <.025	Full	Half	Full	Half	Est.	CI
745	353	292	p<.001	p<.001	p > .999	p > .999	89	86.3-90.6

The results of the p-curve analyses do not present caution towards biased p-values (i.e., the data passed both the right-skewness and the flatness tests).

Figure N13. Funnel Plots: Effects of Message given characteristic, Type II, Self-Report Behavior



Pattern from the two plots does not appear too suspicious. The plot on the left seems quite symmetrical. As for the plot on the right, effects do not look too clustered in the blue area.

Figure N14. P-Curves: Effects of Message given characteristic, Type II, Self-Report Behavior

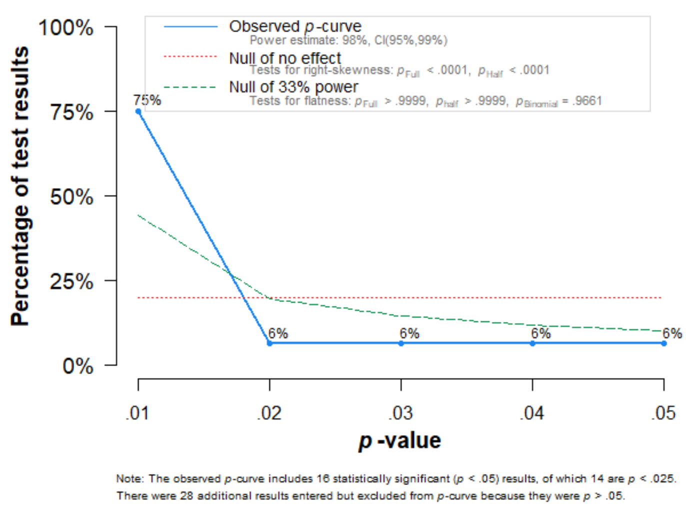
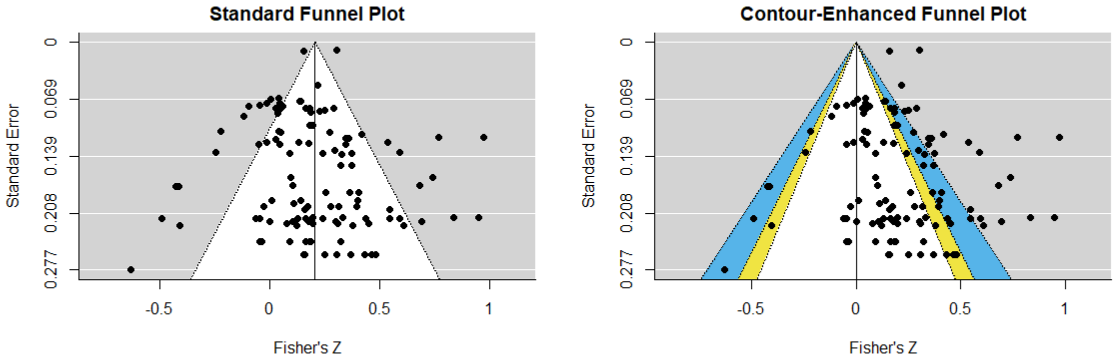


Table N7. P-Curve Results: Effects of Message given characteristic, Type II, Self-Report Behavior

Number of effects			Right-Skewness test		Flatness Test		Power	
Total	p< .05	p <.025	Full	Half	Full	Half	Est.	CI
44	16	31.82	p<.001	p<.001	p > .999	p > .999	98	94.9-99

The results of the p-curve analyses do not present caution towards biased p-values (i.e., the data passed both the right-skewness and the flatness tests).

Figure N15. Funnel Plots: Effects of Message given characteristic, Type II, Objective Behavior.



Pattern from the two plots does not appear too suspicious. The plot on the left seems quite symmetrical. As for the plot on the right, there does look to be some clustering on the border between the yellow and blue regions. However, there is decent spread around it as well. There may be more evidence of bias here than in the other tests so far.

Figure N16. P-Curves: Effects of Message given characteristic, Type II, Objective Behavior.

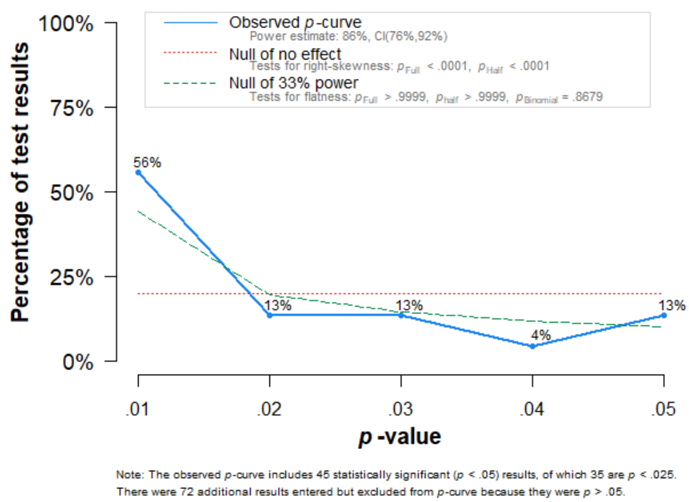
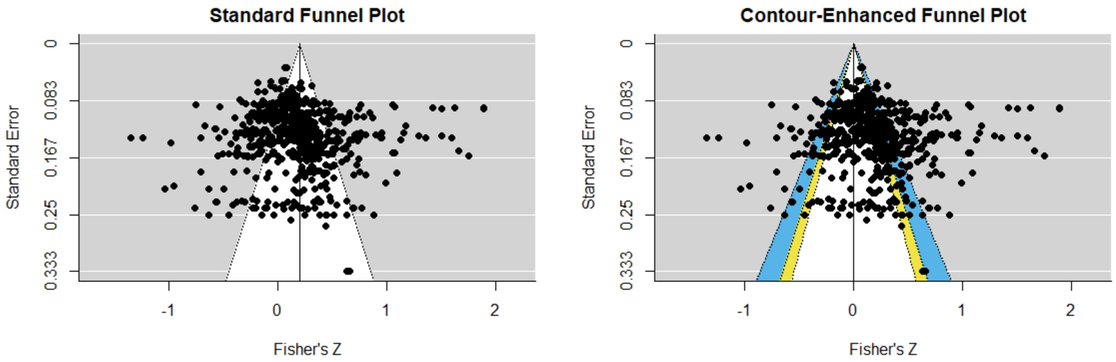


Table N8. P-Curve Results: Effects of Message given characteristic, Type II, Objective Behavior.

Number of effects			Right-Skewness test		Flatness Test		Power	
Total	p< .05	p <.025	Full	Half	Full	Half	Est.	CI
117	45	35	p<.001	p<.001	p > .999	p > .999	86	75.8-92

The results of the p-curve analyses do not present caution towards biased p-values (i.e., the data passed both the right-skewness and the flatness tests).

Figure N17. Funnel Plots: Effects of Characteristic Given Message, Type II, Attitude.



Pattern from the two plots does not appear too suspicious. The plot on the left seems quite symmetrical. As for the plot on the right, there may be too many points to accurately tell, but there are plenty of non-significant points, and effect don't look too clustered in the blue area.

Figure N18. P-Curves: Effects of Characteristic Given Message, Type II, Attitude.

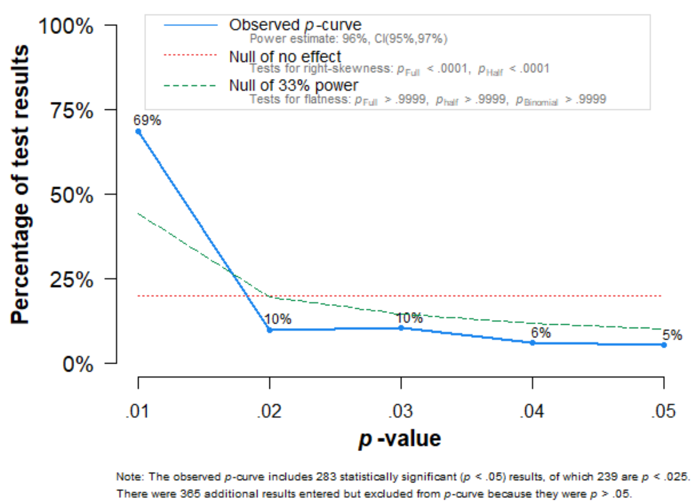
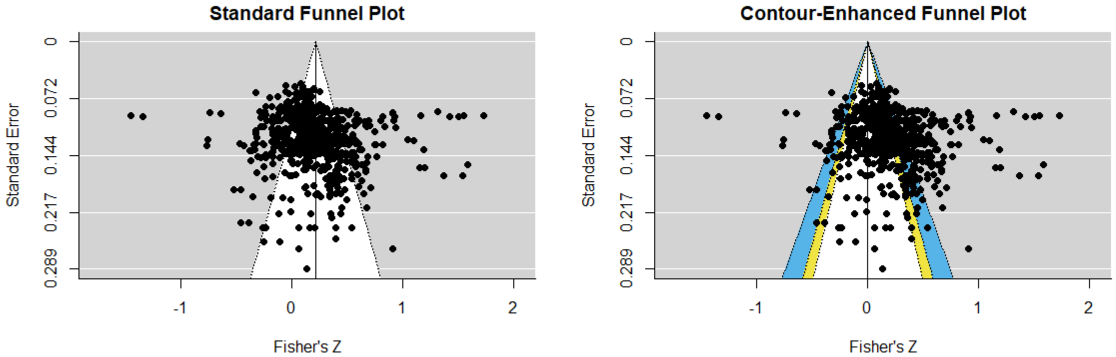


Table N9. P-Curve Results: Effects of Characteristic Given Message, Type II, Attitude.

Number of effects			Right-Skewness test		Flatness Test		Power	
Total	p< .05	p <.025	Full	Half	Full	Half	Est.	CI
648	283	239	p<.001	p<.001	p > .999	p > .999	96	95.4-97.2

The results of the p-curve analyses do not present caution towards biased p-values (i.e., the data passed both the right-skewness and the flatness tests).

Figure N19. Funnel Plots: Effects of Characteristic Given Message, Type II, Intention.



Pattern from the two plots does not appear too suspicious. The plot on the left seems quite symmetrical. As for the plot on the right, there may be too many points to accurately tell, but there are plenty of non-significant points, and effect don't look too clustered in the blue area.

Figure N20. P-Curves: Effects of Characteristic Given Message, Type II, Intention.

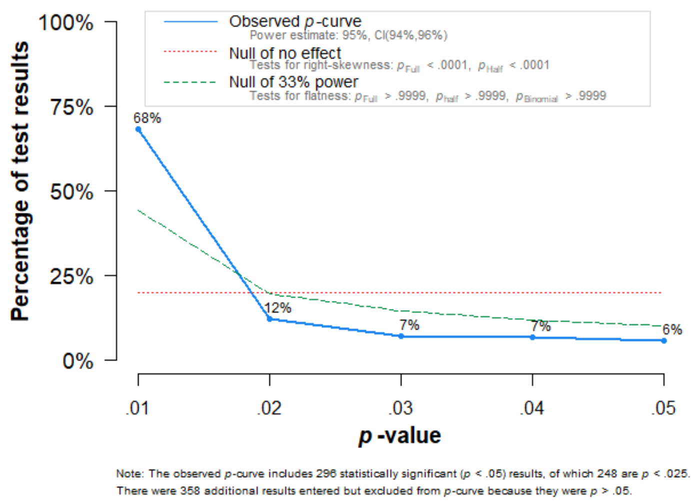
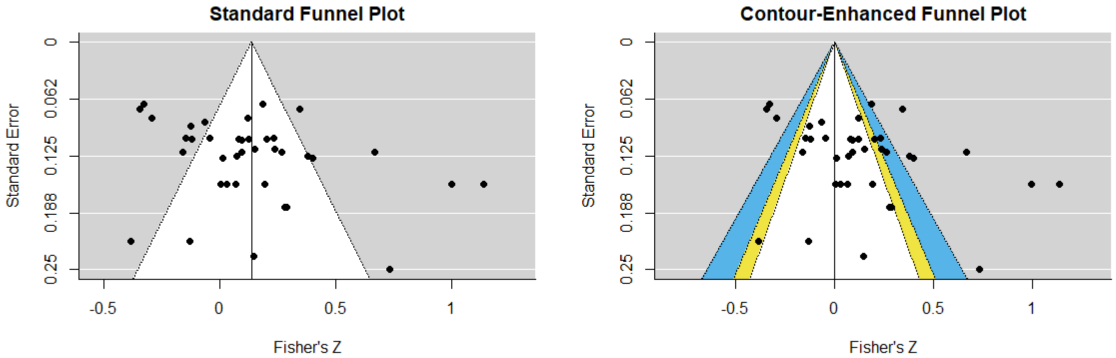


Table N10. P-Curve Results: Effects of Characteristic Given Message, Type II, Intention.

Number of effects			Right-Skewness test		Flatness Test		Power	
Total	p< .05	p <.025	Full	Half	Full	Half	Est.	CI
654	296	248	p<.001	p<.001	p > .999	p > .999	95	93.6-96

The results of the p-curve analyses do not present caution towards biased p-values (i.e., the data passed both the right-skewness and the flatness tests).

Figure N21. Funnel Plots: Effects of Characteristic Given Message, Type II, Self-Report Behavior.



Pattern from the two plots does not appear too suspicious, but there may be a little bit of right skew overall. There isn't a very large concentration of points in the blue area but certainly more so than in the yellow area. Overall, may not bee too large a problem.

Figure N22. P-Curves: Effects of Characteristic Given Message, Type II, Self-Report Behavior.

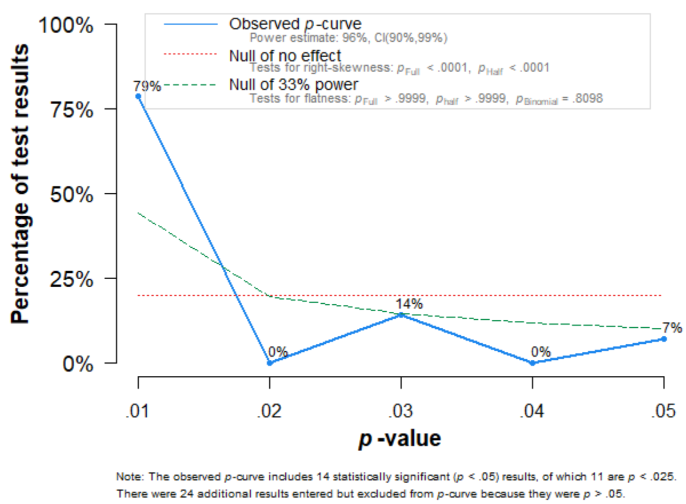
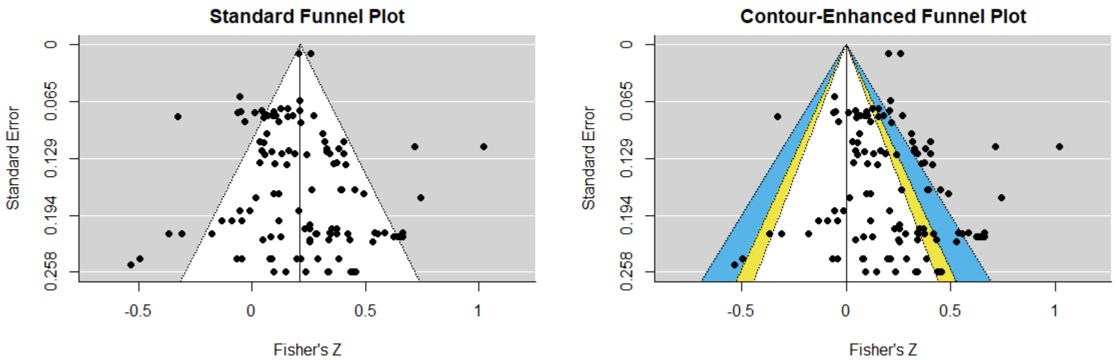


Table N11. P-Curve Results: Effects of Characteristic Given Message, Type II, Self-Report Behavior.

Number of effects			Right-Skewness test		Flatness Test		Power	
Total	p< .05	p <.025	Full	Half	Full	Half	Est.	CI
38	14	11	p<.001	p<.001	p > .999	p > .999	96	90.3-98.9

The results of the p-curve analyses do not present caution towards biased p-values (i.e., the data passed both the right-skewness and the flatness tests).

Figure N23. Funnel Plots: Effects of Characteristic Given Message, Type II, Objective Behavior.



Pattern from the two plots does not appear too suspicious. The plot on the left seems quite symmetrical. As for the plot on the right, there does look to be some clustering on the border between the yellow and blue regions. However, there is decent spread around it as well. There may be more evidence of bias here than in the other tests so far.

Figure N24. P-Curves: Effects of Characteristic Given Message, Type II, Objective Behavior.

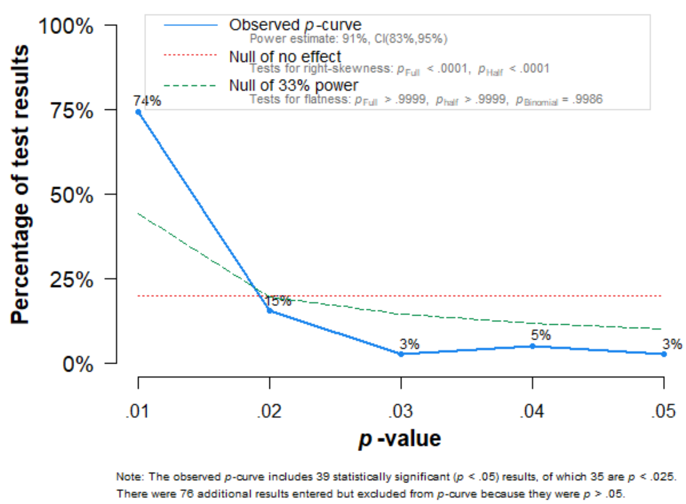
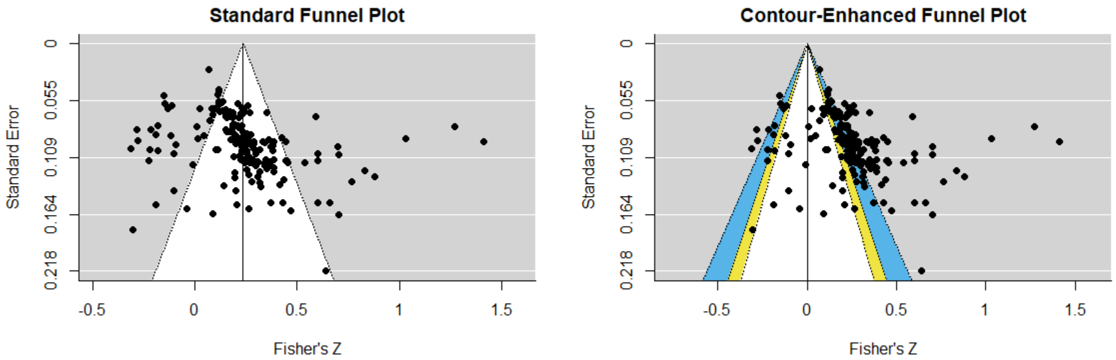


Table N12. P-Curve Results: Effects of Characteristic Given Message, Type II, Objective Behavior.

Number of effects			Right-Skewness test		Flatness Test		Power	
Total	p< .05	p <.025	Full	Half	Full	Half	Est.	CI
115	39	35	p<.001	p<.001	p > .999	p > .999	91	83.2-95.1

The results of the p-curve analyses do not present caution towards biased p-values (i.e., the data passed both the right-skewness and the flatness tests).

Figure N25. Funnel Plots: Interactions, Type II, Attitude.



From the pattern, the plots show a decent amount of spread. However, there is some skewness overall, and there looks to be a fairly strong concentration of values in the blue region of the contour-enhanced plot. This may be a sign of bias.

Figure N26. P-Curves: Interactions, Type II, Attitude.

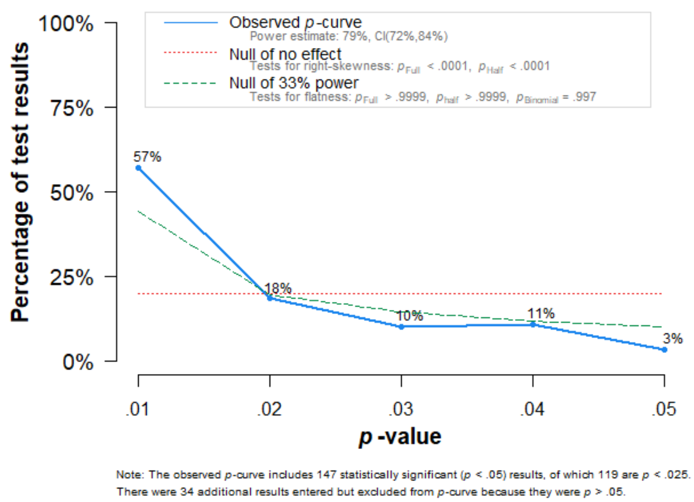
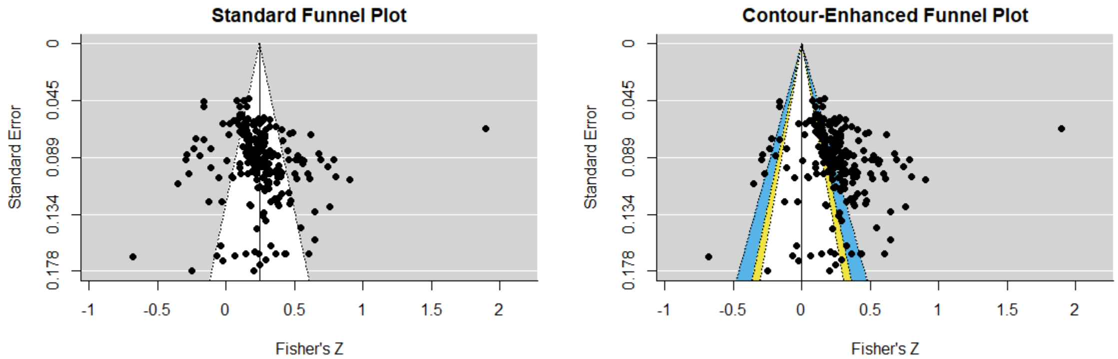


Table N13. P-Curve Results: Interactions, Type II, Attitude.

Number of effects			Right-Skewness test		Flatness Test		Power	
Total	p< .05	p <.025	Full	Half	Full	Half	Est.	CI
181	147	119	p<.001	p<.001	p > .999	p > .999	79	72.5-83.8

The results of the p-curve analyses do not present caution towards biased p-values (i.e., the data passed both the right-skewness and the flatness tests). Overall, it may be the case that there is substantial bias here, but that there is still enough evidence of the effect existing even on top of that bias (i.e., there is an effect, but it is inflated).

Figure N27. Funnel Plots: Interactions, Type II, Intention.



From the pattern, the plots show a decent amount of spread. However, there is some skewness overall, and there looks to be a fairly strong concentration of values in the blue region of the contour-enhanced plot. This may be a sign of bias.

Figure N28. P-Curves: Interactions, Type II, Intention.

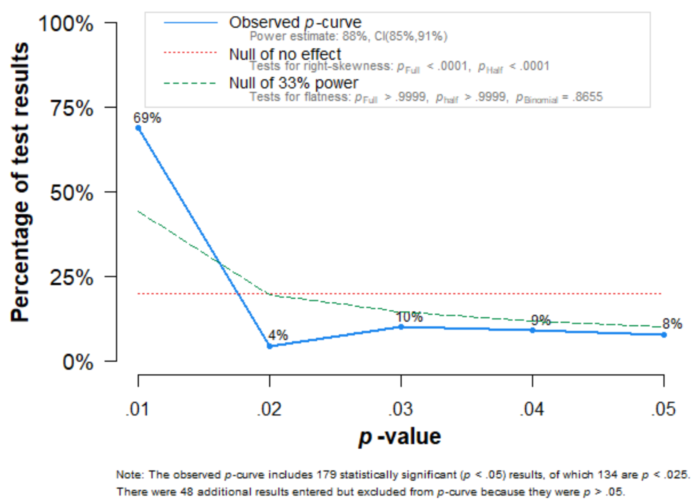
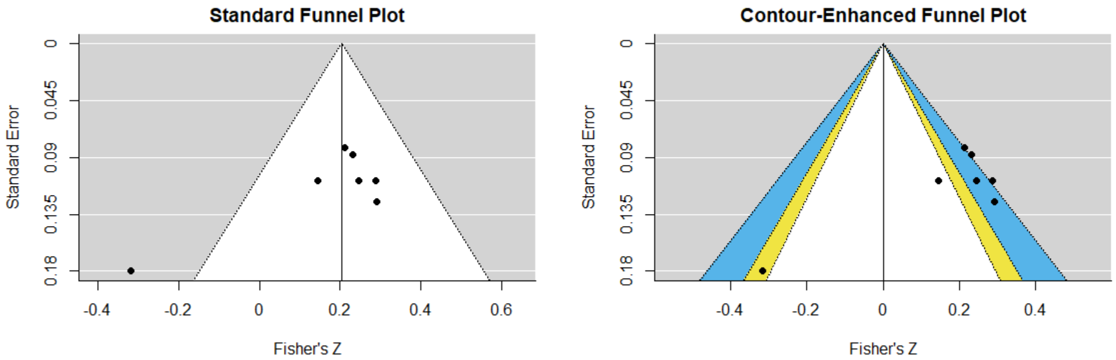


Table N14. P-Curve Results: Interactions, Type II, Intention.

Number of effects			Right-Skewness test		Flatness Test		Power	
Total	p< .05	p <.025	Full	Half	Full	Half	Est.	CI
227	179	134	p<.001	p<.001	p > .999	p > .999	88	84.8-91.1

The results of the p-curve analyses do not present caution towards biased p-values (i.e., the data passed both the right-skewness and the flatness tests). Again, it may be the case that there is substantial bias here, but that there is still enough evidence of the effect existing even on top of that bias (i.e., there is an effect, but it is inflated).

Figure N29. Funnel Plots: Interactions, Type II, Self-Report Behavior.



Very few observations present overall. However, these have a very clear concentration in the blue region of the contour-enhanced plot. This may be a sign of bias.

Figure N30. P-Curves: Interactions, Type II, Self-Report Behavior.

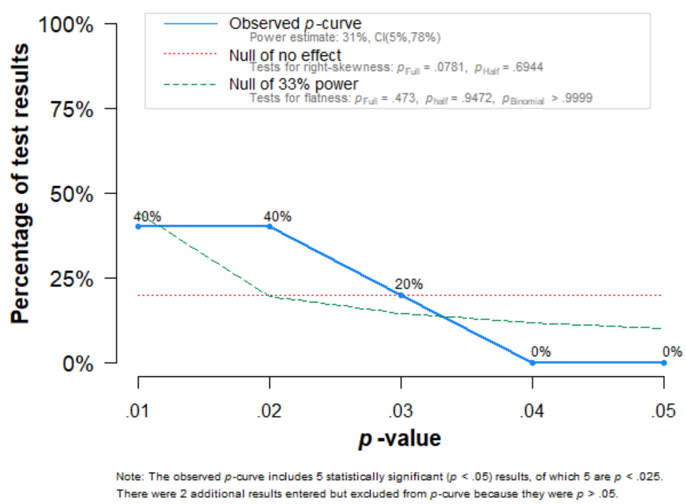
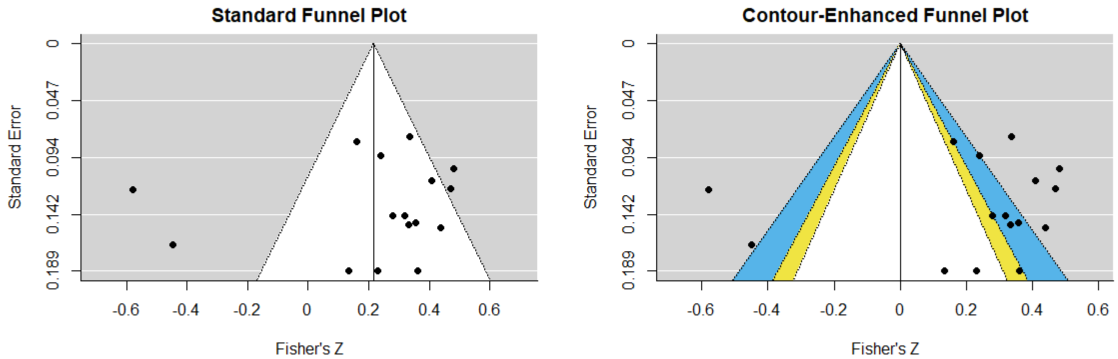


Table N15. P-Curve Results: Interactions, Type II, Self-Report Behavior.

Number of effects			Right-Skewness test		Flatness Test		Power	
Total	p< .05	p <.025	Full	Half	Full	Half	Est.	CI
7	5	5	0.078	0.694	0.473	0.947	31	5%-78.1%

The results of the p-curve analyses are inconclusive. There are likely was too few cases. Overall, it may be the case again that there is substantial bias here. It isn’t too clear whether there is good evidence for the presence of an effect here. The very small number of effects represented likely compounds these issues.

Figure N31. Funnel Plots: Interactions, Type II, Objective Behavior.



Very few observations present overall. However, there is likely a concentration in the blue region of the contour-enhanced plot. This may be a sign of bias.

Figure N32. P-Curves: Interactions, Type II, Objective Behavior.

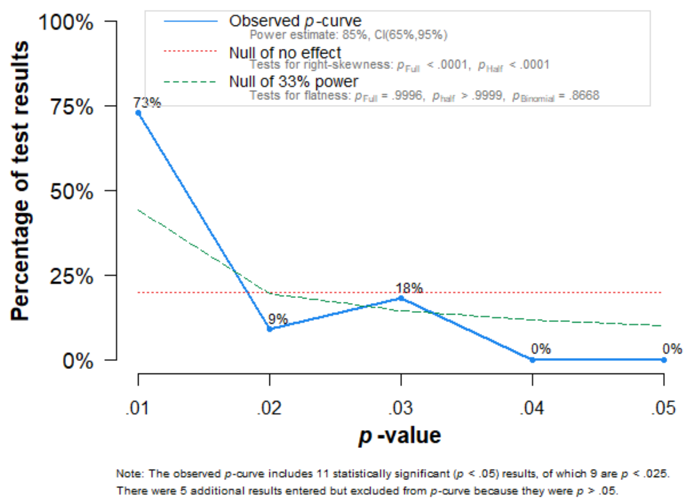


Table N16. P-Curve Results: Interactions, Type II, Objective Behavior.

Number of effects			Right-Skewness test		Flatness Test		Power	
Total	p< .05	p <.025	Full	Half	Full	Half	Est.	CI
16	11	9	p<.001	p<.001	p > .999	p > .999	85	64.5-95

The results of the p-curve analyses do not present caution towards biased p-values (i.e., the data passed both the right-skewness and the flatness tests). Again, it may be the case that there is substantial bias here, but that there is still enough evidence of the effect existing even on top of that bias (i.e., there is an effect, but it is inflated).

Appendix O. Project 1 – Results Broken Down for Each Sub-Literature of Functional Matching

Table O1. Meta-Analytic Results for Effects that are Functional and Tailoring, Not Framing

Outcome, Study & Effect Type		r	95% CI		95% PI		Effect #	Study #	Mean Study N	Sig. (p)
			Low	High	Low	High				
Attitude										
Type I	M|C	.181	.101	.259	-.355	.628	96	45	248	<.001
Type II	M|C	.170	.104	.235	-.450	.680	173	63	220	<.001
	C|M	.163	.089	.235	-.635	.793	162	59	227	<.001
	Int.	.234	.133	.329	-.371	.699	43	39	198	<.001
Intention										
Type I	M|C	.137	.065	.208	-.369	.581	137	47	295	<.001
Type II	M|C	.157	.107	.206	-.332	.580	144	54	206	<.001
	C|M	.146	.094	.196	-.385	.604	139	51	221	<.001
	Int.	.218	.166	.268	-.065	.468	49	34	170	<.001
Self-Report Behavior										
Type I	M|C	.065	.041	.089	-.187	.310	197	40	1051	<.001
Type II	M|C	.071	-.062	.202	-.477	.580	21	4	274	.279
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Objective Behavior										
Type I	M|C	.053	-.004	.109	-.246	.343	43	22	421	.067
Type II	M|C	.138	.056	.218	-.166	.417	34	11	427	.002
	C|M	.139	.056	.220	-.179	.430	37	11	427	.002
	Int.	-	-	-	-	-	-	-	-	-

Notes. r = meta-analytic estimate expressed as a correlation; 95 % CI = 95% confidence interval; 95% PI = 95 % prediction interval; Effect # = number of effect size estimates aggregated; Study # = number of studies used to derive meta-analytic estimate; Mean Study N = average sample size of each study used; Sig (p) = statistical significance level expressed as p-value; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect. Rows are left empty whenever there was fewer than 4 studies reporting a particular type of effect.

Table O2. Meta-Analytic Results for Effects that are Functional, Tailoring, and Framing

Outcome, Study & Effect Type		**r**	**95% CI**		**95% PI**		**Effect**	**Study**	**Mean**	**Sig.**
			Low	**High**	**Low**	**High**	**#**	**#**	**Study N**	**(p)**
Attitude										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	.190	.058	.316	-.369	.648	64	12	261	.006
	C|M	.112	.014	.208	-.469	.626	54	10	288	.026
	Int.	.238	.145	.327	-.007	.456	11	9	162	<.001
Intention										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	.145	.046	.240	-.345	.572	62	21	284	.005
	C|M	.171	.061	.277	-.308	.581	48	17	303	.003
	Int.	.149	.039	.255	-.278	.526	17	17	222	.011
Self-Report Behavior										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Objective Behavior										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	.243	-.125	.552	-.625	.842	17	6	167	.179
	C|M	.223	-.228	.596	-.728	.881	16	5	175	.309
	Int.	.120	-.358	.549	-.734	.827	5	4	85	.535

Notes. r = meta-analytic estimate expressed as a correlation; 95 % CI = 95% confidence interval; 95% PI = 95 % prediction interval; Effect # = number of effect size estimates aggregated; Study # = number of studies used to derive meta-analytic estimate; Mean Study N = average sample size of each study used; Sig (p) = statistical significance level expressed as p-value; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect. Rows are left empty whenever there was fewer than 4 studies reporting a particular type of effect.

Table O3. Meta-Analytic Results for Effects that are Functional and Context Matching, Not Framing

Outcome, Study & Effect Type		r	95% CI Low	95% CI High	95% PI Low	95% PI High	Effect #	Study #	Mean Study N	Sig. (p)
Attitude										
Type I	M|C	.344	.213	.463	-.401	.815	73	27	226	<.001
Type II	M|C	.225	.181	.268	-.350	.677	323	101	210	<.001
	C|M	.239	.178	.298	-.411	.728	298	90	220	<.001
	Int.	.237	.192	.280	-.094	.520	158	81	63	<.001
Intention										
Type I	M|C	.219	.160	.276	-.164	.545	75	30	231	<.001
Type II	M|C	.265	.216	.313	-.344	.717	300	108	234	<.001
	C|M	.266	.218	.313	-.393	.745	275	90	249	<.001
	Int.	.280	.222	.337	-.247	.680	104	79	177	<.001
Self-Report Behavior										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Objective Behavior										
Type I	M|C	.317	.097	.508	-.267	.731	19	4	120	.008
Type II	M|C	.198	.110	.283	-.232	.563	34	14	1510	<.001
	C|M	.214	.168	.259	.084	.337	32	13	1621	<.001
	Int.	.206	-.201	.552	-.684	.850	6	6	93	.250

Notes. r = meta-analytic estimate expressed as a correlation; 95 % CI = 95% confidence interval; 95% PI = 95 % prediction interval; Effect # = number of effect size estimates aggregated; Study # = number of studies used to derive meta-analytic estimate; Mean Study N = average sample size of each study used; Sig (p) = statistical significance level expressed as p-value; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect. Rows are left empty whenever there was fewer than 4 studies reporting a particular type of effect.

Table O4. Meta-Analytic Results for Effects that are Functional, Context Matching, and Framing

Outcome, Study & Effect Type		r	95% CI Low	95% CI High	95% PI Low	95% PI High	Effect #	Study #	Mean Study N	Sig. (p)
Attitude										
Type I	M|C	.208	.108	.303	-.274	.607	43	20	243	<.001
Type II	M|C	.161	.114	.207	-.282	.547	142	48	230	<.001
	C|M	.154	.100	.207	-.371	.604	126	39	252	<.001
	Int.	.219	.139	.297	-.264	.615	44	37	221	<.001
Intention										
Type I	M|C	.047	-.012	.105	-.166	.256	22	7	375	.115
Type II	M|C	.167	.123	.211	-.256	.536	228	71	248	<.001
	C|M	.156	.109	.203	-.295	.551	180	58	266	<.001
	Int.	.214	.167	.261	-.085	.478	53	47	189	<.001
Self-Report Behavior										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	.190	-.071	.427	-.428	.687	14	4	495	.139
	C|M	.184	-.091	.434	-.579	.775	14	4	495	.171
	Int.	-	-	-	-	-	-	-	-	-
Objective Behavior										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	.280	.105	.438	-.152	.622	16	5	243	.004
	C|M	.261	.065	.438	-.160	.602	14	4	281	.014
	Int.	-	-	-	-	-	-	-	-	-

Notes. r = meta-analytic estimate expressed as a correlation; 95 % CI = 95% confidence interval; 95% PI = 95 % prediction interval; Effect # = number of effect size estimates aggregated; Study # = number of studies used to derive meta-analytic estimate; Mean Study N = average sample size of each study used; Sig (p) = statistical significance level expressed as p-value; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect. Rows are left empty whenever there was fewer than 4 studies reporting a particular type of effect.

Appendix P. Project 1 – Moderation: Type of Comparison Group Used

Table P1. Meta-Analytic Results for Using a Mismatch Message as the Comparison Group

Outcome, Study & Effect Type		r	95% CI		95% PI		Effect #	Study #	Mean Study N	Sig. (p)
			Low	High	Low	High				
Attitude										
Type I	M|C	.374	.063	.619	-.486	.866	25	7	278	.022
Type II	M|C	.064	-.011	.139	-.389	.493	51	14	260	.093
	C|M	.064	-.019	.146	-.438	.535	51	14	260	.127
	Int.	.233	.068	.385	-.300	.654	14	10	191	.010
Intention										
Type I	M|C	.383	.116	.598	-.406	.845	30	7	266	.008
Type II	M|C	.200	-.016	.398	-.377	.665	16	7	185	.067
	C|M	.289	.144	.423	-.064	.578	12	5	224	.001
	Int.	.308	.029	.543	-.514	.835	9	9	145	.035
Self-Report Behavior										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Objective Behavior										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-

Notes. r = meta-analytic estimate expressed as a correlation; 95 % CI = 95% confidence interval; 95% PI = 95 % prediction interval; Effect # = number of effect size estimates aggregated; Study # = number of studies used to derive meta-analytic estimate; Mean Study N = average sample size of each study used; Sig (p) = statistical significance level expressed as p-value; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect. Rows are left empty whenever there was fewer than 4 studies reporting a particular type of effect.

Table P2. Meta-Analytic Results for Using a Negatively Matched Message as the Comparison Group

Outcome, Study & Effect Type		r	95% CI Low	95% CI High	95% PI Low	95% PI High	Effect #	Study #	Mean Study N	Sig. (p)
Attitude										
Type I	M|C	.114	-.061	.281	-.429	.596	12	7	201	.179
Type II	M|C	.227	.143	.309	-.278	.634	41	14	304	<.001
	C|M	.236	.149	.319	-.190	.587	42	14	304	<.001
	Int.	.289	.172	.398	-.078	.587	18	10	218	<.001
Intention										
Type I	M|C	.180	.032	.320	-.274	.568	15	9	304	.021
Type II	M|C	.350	.246	.446	-.192	.728	42	23	287	<.001
	C|M	.326	.235	.411	-.202	.707	43	23	287	<.001
	Int.	.251	.169	.329	.048	.433	12	10	176	<.001
Self-Report Behavior										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Objective Behavior										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-

Notes. r = meta-analytic estimate expressed as a correlation; 95 % CI = 95% confidence interval; 95% PI = 95 % prediction interval; Effect # = number of effect size estimates aggregated; Study # = number of studies used to derive meta-analytic estimate; Mean Study N = average sample size of each study used; Sig (p) = statistical significance level expressed as p-value; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect. Rows are left empty whenever there was fewer than 4 studies reporting a particular type of effect.

Table P3. Meta-Analytic Results for Using a Non-Matched Message as the Comparison Group

Outcome, Study & Effect Type		**r**	**95% CI**		**95% PI**		**Effect**	**Study**	**Mean**	**Sig.**
			Low	**High**	**Low**	**High**	**#**	**#**	**Study N**	**(p)**
Attitude										
Type I	M|C	.214	.156	.271	-.308	.637	144	74	238	<.001
Type II	M|C	.204	.170	.237	-.368	.664	612	191	207	<.001
	C|M	.203	.163	.243	-.485	.736	549	164	220	<.001
	Int.	.224	.184	.263	-.219	.590	148	128	183	<.001
Intention										
Type I	M|C	.123	.077	.169	-.236	.453	120	52	304	<.001
Type II	M|C	.205	.175	.235	-.323	.636	683	219	231	<.001
	C|M	.197	.167	.227	-.376	.661	595	186	245	<.001
	Int.	.233	.199	.267	-.190	.583	206	160	186	<.001
Self-Report Behavior										
Type I	M|C	.087	-.066	.235	-.325	.470	10	5	218	.230
Type II	M|C	.133	.020	.243	-.404	.602	41	10	335	.023
	C|M	.131	.005	.253	-.455	.638	36	9	312	<.001
	Int.	-	-	-	-	-	-	-	-	-
Objective Behavior										
Type I	M|C	.215	.087	.336	-.306	.637	20	13	354	.002
Type II	M|C	.220	.146	.291	-.227	.590	83	29	916	<.001
	C|M	.227	.158	.295	-.148	.545	81	26	1011	<.001
	Int.	.255	.068	.424	-.342	.705	13	11	103	.012

Notes. r = meta-analytic estimate expressed as a correlation; 95 % CI = 95% confidence interval; 95% PI = 95 % prediction interval; Effect # = number of effect size estimates aggregated; Study # = number of studies used to derive meta-analytic estimate; Mean Study N = average sample size of each study used; Sig (p) = statistical significance level expressed as p-value; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect. Rows are left empty whenever there was fewer than 4 studies reporting a particular type of effect.

Table P4. Meta-Analytic Results for Using a Generic Message as the Comparison Group

Outcome, Study & Effect Type		**r**	**95% CI**		**95% PI**		**Effect**	**Study**	**Mean**	**Sig.**
			Low	**High**	**Low**	**High**	**#**	**#**	**Study N**	**(p)**
Attitude										
Type I	M|C	.297	-.341	.748	-.834	.948	19	4	187	.344
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Intention										
Type I	M|C	.114	-.009	.233	-.412	.583	48	19	245	.068
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Self-Report Behavior										
Type I	M|C	.064	.035	.094	-.158	.280	133	30	948	<.001
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Objective Behavior										
Type I	M|C	.059	-.060	.177	-.308	.411	32	10	391	.316
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-

Notes. r = meta-analytic estimate expressed as a correlation; 95 % CI = 95% confidence interval; 95% PI = 95 % prediction interval; Effect # = number of effect size estimates aggregated; Study # = number of studies used to derive meta-analytic estimate; Mean Study N = average sample size of each study used; Sig (p) = statistical significance level expressed as p-value; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect. Rows are left empty whenever there was fewer than 4 studies reporting a particular type of effect.

Table P5. Meta-Analytic Results for Using a Low Matched Message as the Comparison Group

Outcome, Study & Effect Type		**r**	**95% CI**		**95% PI**		**Effect**	**Study**	**Mean**	**Sig.**
			Low	**High**	**Low**	**High**	**#**	**#**	**Study N**	**(p)**
Attitude										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Intention										
Type I	M|C	.087	-.094	.262	-.330	.475	15	5	250	.322
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Self-Report Behavior										
Type I	M|C	.060	.009	.111	-.299	.404	59	12	1241	.022
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Objective Behavior										
Type I	M|C	.032	-.174	.234	-.392	.444	6	4	593	.711
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-

Notes. r = meta-analytic estimate expressed as a correlation; 95 % CI = 95% confidence interval; 95% PI = 95 % prediction interval; Effect # = number of effect size estimates aggregated; Study # = number of studies used to derive meta-analytic estimate; Mean Study N = average sample size of each study used; Sig (p) = statistical significance level expressed as p-value; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect. Rows are left empty whenever there was fewer than 4 studies reporting a particular type of effect.

Appendix Q. Project 1 – Moderation: Method of Determining Characteristic Used for Matching

Table Q1. Meta-Analytic Results for Directly Measuring the Characteristic

Outcome, Study & Effect Type		r	95% CI Low	95% CI High	95% PI Low	95% PI High	Effect #	Study #	Mean Study N	Sig. (p)
Attitude										
Type I	M|C	.090	-.004	.182	-.353	.500	42	17	381	.060
Type II	M|C	.164	.089	.237	-.411	.645	123	41	244	<.001
	C|M	.104	.021	.185	-.630	.740	117	40	244	.015
	Int.	.177	.115	.236	-.117	.442	32	29	215	<.001
Intention										
Type I	M|C	.107	.011	.202	-.358	.530	67	22	400	.029
Type II	M|C	.183	.127	.237	-.261	.562	141	48	227	<.001
	C|M	.180	.122	.236	-.289	.579	121	42	240	<.001
	Int.	.202	.142	.262	-.119	.485	41	33	195	<.001
Self-Report Behavior										
Type I	M|C	.074	.033	.114	-.267	.398	119	25	1110	.001
Type II	M|C	.049	-.093	.190	-.508	.578	20	5	198	.479
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Objective Behavior										
Type I	M|C	.080	.010	.149	-.198	.346	23	14	483	.027
Type II	M|C	.180	.034	.318	-.388	.649	40	14	379	.017
	C|M	.174	.028	.313	-.388	.642	43	14	379	.021
	Int.	.151	-.189	.458	-.558	.732	7	5	103	.321

Notes. r = meta-analytic estimate expressed as a correlation; 95 % CI = 95% confidence interval; 95% PI = 95 % prediction interval; Effect # = number of effect size estimates aggregated; Study # = number of studies used to derive meta-analytic estimate; Mean Study N = average sample size of each study used; Sig (p) = statistical significance level expressed as p-value; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect. Rows are left empty whenever there was fewer than 4 studies reporting a particular type of effect.

Table Q2. Meta-Analytic Results for Indirectly Inferring the Characteristic

Outcome, Study & Effect Type		**r**	**95% CI**		**95% PI**		**Effect #**	**Study #**	**Mean Study N**	**Sig. (p)**
			Low	**High**	**Low**	**High**				
Attitude										
Type I	M|C	.236	.175	.295	-.224	.610	92	45	204	<.001
Type II	M|C	.116	.060	.171	-.308	.502	88	26	238	<.001
	C|M	.127	.051	.203	-.481	.653	85	25	245	.002
	Int.	.188	.053	.316	-.283	.586	15	13	177	.010
Intention										
Type I	M|C	.114	.044	.182	-.319	.507	93	32	254	.002
Type II	M|C	.082	.005	.157	-.390	.519	55	20	250	.036
	C|M	.086	-.001	.171	-.484	.605	58	20	266	.052
	Int.	.183	.083	.280	-.185	.506	18	13	201	.001
Self-Report Behavior										
Type I	M|C	.015	-.047	.077	-.135	.164	22	9	303	.623
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Objective Behavior										
Type I	M|C	.102	-.046	.246	-.360	.524	13	8	159	.158
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-

Notes. r = meta-analytic estimate expressed as a correlation; 95 % CI = 95% confidence interval; 95% PI = 95 % prediction interval; Effect # = number of effect size estimates aggregated; Study # = number of studies used to derive meta-analytic estimate; Mean Study N = average sample size of each study used; Sig (p) = statistical significance level expressed as p-value; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect. Rows are left empty whenever there was fewer than 4 studies reporting a particular type of effect.

Table Q3. Meta-Analytic Results for Manipulating the Characteristic

Outcome, Study & Effect Type		**r**	**95% CI**		**95% PI**		**Effect**	**Study**	**Mean**	**Sig.**
			Low	**High**	**Low**	**High**	**#**	**#**	**Study N**	**(p)**
Attitude										
Type I	M|C	.287	.141	.421	-.519	.823	83	31	227	<.001
Type II	M|C	.203	.169	.236	-.332	.639	481	151	210	<.001
	C|M	.215	.169	.260	-.401	.697	428	128	226	<.001
	Int.	.228	.189	.267	-.156	.553	129	103	180	<.001
Intention										
Type I	M|C	.238	.154	.318	-.237	.621	76	30	230	<.001
Type II	M|C	.232	.197	.266	-.319	.665	543	180	235	<.001
	C|M	.231	.196	.266	-.360	.690	469	151	247	<.001
	Int.	.255	.216	.294	-.196	.618	165	133	177	<.001
Self-Report Behavior										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	.176	-.032	.369	-.373	.634	18	5	430	.091
	C|M	.166	-.058	.373	-.562	.749	18	5	430	.136
	Int.	-	-	-	-	-	-	-	-	-
Objective Behavior										
Type I	M|C	.317	.097	.508	-.267	.731	19	4	120	.008
Type II	M|C	.214	.137	.288	-.184	.551	48	18	1238	<.001
	C|M	.212	.165	.259	.048	.365	44	16	1383	<.001
	Int.	.243	-.096	.532	-.593	.827	7	7	93	.128

Notes. r = meta-analytic estimate expressed as a correlation; 95 % CI = 95% confidence interval; 95% PI = 95 % prediction interval; Effect # = number of effect size estimates aggregated; Study # = number of studies used to derive meta-analytic estimate; Mean Study N = average sample size of each study used; Sig (p) = statistical significance level expressed as p-value; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect. Rows are left empty whenever there was fewer than 4 studies reporting a particular type of effect.

Appendix R. Project 1 – Moderation: Number of Characteristics Matched To

Table R1. Meta-Analytic Results for Matching to Just One Characteristic

Outcome, Study & Effect Type		r	95% CI Low	95% CI High	95% PI Low	95% PI High	Effect #	Study #	Mean Study N	Sig. (p)
Attitude										
Type I	M|C	.227	.167	.285	-.371	.692	208	90	244	<.001
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Intention										
Type I	M|C	.168	.118	.217	-.297	.569	205	74	286	<.001
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Self-Report Behavior										
Type I	M|C	.027	-.025	.080	-.089	.143	25	10	361	.292
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Objective Behavior										
Type I	M|C	.193	.081	.300	-.335	.628	39	17	307	.001
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-

Notes. r = meta-analytic estimate expressed as a correlation; 95 % CI = 95% confidence interval; 95% PI = 95 % prediction interval; Effect # = number of effect size estimates aggregated; Study # = number of studies used to derive meta-analytic estimate; Mean Study N = average sample size of each study used; Sig (p) = statistical significance level expressed as p-value; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect. Rows are left empty whenever there was fewer than 4 studies reporting a particular type of effect.

Table R2. Meta-Analytic Results for Matching to 2-9 characteristics

Outcome, Study & Effect Type		r	95% CI Low	95% CI High	95% PI Low	95% PI High	Effect #	Study #	Mean Study N	Sig. (p)
Attitude										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Intention										
Type I	M|C	.075	-.077	.223	-.262	.396	24	4	187	.317
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Self-Report Behavior										
Type I	M|C	.156	.020	.287	-.560	.739	35	4	514	.026
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Objective Behavior										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-

Notes. r = meta-analytic estimate expressed as a correlation; 95 % CI = 95% confidence interval; 95% PI = 95 % prediction interval; Effect # = number of effect size estimates aggregated; Study # = number of studies used to derive meta-analytic estimate; Mean Study N = average sample size of each study used; Sig (p) = statistical significance level expressed as p-value; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect. Rows are left empty whenever there was fewer than 4 studies reporting a particular type of effect.

Table R3. Meta-Analytic Results for Matching to 10+ Characteristics

Outcome, Study & Effect Type		r	95% CI		95% PI		Effect	Study	Mean	Sig.
			Low	High	Low	High	#	#	Study N	(p)
Attitude										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Intention										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Self-Report Behavior										
Type I	M|C	.056	.007	.105	-.107	.216	17	6	1259	.027
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Objective Behavior										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-

Notes. r = meta-analytic estimate expressed as a correlation; 95 % CI = 95% confidence interval; 95% PI = 95 % prediction interval; Effect # = number of effect size estimates aggregated; Study # = number of studies used to derive meta-analytic estimate; Mean Study N = average sample size of each study used; Sig (p) = statistical significance level expressed as p-value; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect. Rows are left empty whenever there was fewer than 4 studies reporting a particular type of effect.

Table R4. Meta-Analytic Results for Matching to an Unclear Number of Multiple Characteristics

Outcome, Study & Effect Type		r	95% CI Low	95% CI High	95% PI Low	95% PI High	Effect #	Study #	Mean Study N	Sig. (p)
Attitude										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Intention										
Type I	M|C	-.060	-.238	.121	-.464	.364	15	5	382	<.001
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Self-Report Behavior										
Type I	M|C	.057	.033	.081	-.118	.228	123	22	1332	<.001
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Objective Behavior										
Type I	M|C	-.007	-.043	.029	-.055	.041	16	6	536	.687
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-

Notes. r = meta-analytic estimate expressed as a correlation; 95 % CI = 95% confidence interval; 95% PI = 95 % prediction interval; Effect # = number of effect size estimates aggregated; Study # = number of studies used to derive meta-analytic estimate; Mean Study N = average sample size of each study used; Sig (p) = statistical significance level expressed as p-value; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect. Rows are left empty whenever there was fewer than 4 studies reporting a particular type of effect.

Appendix S. Project 1 – Moderation: Message Length

Table S1. Meta-Analytic Results for Effects from Messages of a Short Length

Outcome, Study & Effect Type		r	95% CI		95% PI		Effect #	Study #	Mean Study N	Sig. (p)
			Low	High	Low	High				
Attitude										
Type I	M|C	.249	.139	.353	-.124	.560	26	10	222	.000
Type II	M|C	.220	.169	.269	-.340	.665	251	74	211	<.001
	C|M	.227	.170	.282	-.368	.690	229	64	219	<.001
	Int.	.310	.238	.378	-.245	.711	73	56	186	<.001
Intention										
Type I	M|C	.126	.071	.181	-.130	.367	41	18	232	<.001
Type II	M|C	.180	.145	.215	-.262	.560	204	71	220	<.001
	C|M	.189	.148	.229	-.255	.567	197	59	239	<.001
	Int.	.255	.212	.297	-.097	.550	92	66	179	<.001
Self-Report Behavior										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Objective Behavior										
Type I	M|C	-.004	-.194	.187	-.513	.508	10	6	616	.965
Type II	M|C	.238	.126	.345	-.040	.483	37	8	290	<.001
	C|M	.229	.147	.307	-.121	.528	40	8	290	<.001
	Int.	-	-	-	-	-	-	-	-	-

Notes. r = meta-analytic estimate expressed as a correlation; 95 % CI = 95% confidence interval; 95% PI = 95 % prediction interval; Effect # = number of effect size estimates aggregated; Study # = number of studies used to derive meta-analytic estimate; Mean Study N = average sample size of each study used; Sig (p) = statistical significance level expressed as p-value; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect. Rows are left empty whenever there was fewer than 4 studies reporting a particular type of effect.

Table S2. Meta-Analytic Results for Effects from Messages of a Medium Length

Outcome, Study & Effect Type		r	95% CI Low	95% CI High	95% PI Low	95% PI High	Effect #	Study #	Mean Study N	Sig. (p)
Attitude										
Type I	M|C	.286	.207	.362	-.330	.732	109	50	269	<.001
Type II	M|C	.208	.160	.254	-.360	.663	293	96	243	<.001
	C|M	.203	.143	.260	-.539	.767	272	87	254	<.001
	Int.	.203	.162	.244	-.067	.446	61	53	201	<.001
Intention										
Type I	M|C	.209	.121	.294	-.352	.660	92	35	314	<.001
Type II	M|C	.235	.186	.283	-.365	.697	381	119	268	<.001
	C|M	.224	.175	.271	-.450	.735	322	102	276	<.001
	Int.	.225	.164	.284	-.293	.641	92	75	206	<.001
Self-Report Behavior										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	.102	-.252	.432	-.622	.732	13	4	471	.546
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Objective Behavior										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	.173	-.032	.363	-.512	.723	26	12	1830	.094
	C|M	.204	-.002	.394	-.448	.715	22	10	2179	.052
	Int.	.000	-.526	.526	-.885	.885	5	5	114	.998

Notes. r = meta-analytic estimate expressed as a correlation; 95 % CI = 95% confidence interval; 95% PI = 95 % prediction interval; Effect # = number of effect size estimates aggregated; Study # = number of studies used to derive meta-analytic estimate; Mean Study N = average sample size of each study used; Sig (p) = statistical significance level expressed as p-value; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect. Rows are left empty whenever there was fewer than 4 studies reporting a particular type of effect.

Table S3. Meta-Analytic Results for Effects from Messages of a Long Length

Outcome, Study & Effect Type		r	95% CI		95% PI		Effect #	Study #	Mean Study N	Sig. (p)
			Low	High	Low	High				
Attitude										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	.268	-.040	.529	-.520	.809	13	4	195	.082
	C|M	.286	-.061	.571	-.551	.836	12	4	195	.095
	Int.	-	-	-	-	-	-	-	-	-
Intention										
Type I	M|C	.048	-.081	.176	-.357	.438	28	11	243	.453
Type II	M|C	.273	.121	.413	-.115	.589	14	6	171	.002
	C|M	.311	.130	.471	-.206	.692	12	5	171	.003
	Int.	.332	.109	.523	-.117	.668	5	4	119	.015
Self-Report Behavior										
Type I	M|C	.071	.045	.097	-.192	.325	183	35	1039	<.001
Type II	M|C	.113	-.034	.255	-.476	.632	21	6	214	.123
	C|M	.120	-.057	.289	-.493	.653	16	5	149	.168
	Int.	-	-	-	-	-	-	-	-	-
Objective Behavior										
Type I	M|C	.064	-.022	.148	-.238	.354	40	13	396	.140
Type II	M|C	.149	.067	.229	-.188	.455	29	7	310	.001
	C|M	.130	.050	.208	-.046	.298	28	6	341	.003
	Int.	-	-	-	-	-	-	-	-	-

Notes. r = meta-analytic estimate expressed as a correlation; 95 % CI = 95% confidence interval; 95% PI = 95 % prediction interval; Effect # = number of effect size estimates aggregated; Study # = number of studies used to derive meta-analytic estimate; Mean Study N = average sample size of each study used; Sig (p) = statistical significance level expressed as p-value; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect. Rows are left empty whenever there was fewer than 4 studies reporting a particular type of effect.

Appendix T. Project 1 – Moderation: Message Modality

Table T1. Meta-Analytic Results for Messages Delivered through Audio or Audiovisual Means

Outcome, Study & Effect Type		r	95% CI Low	95% CI High	95% PI Low	95% PI High	Effect #	Study #	Mean Study N	Sig. (p)
Attitude										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	.071	-.450	.556	-.843	.879	8	4	204	.771
	C|M	.070	-.445	.551	-.862	.894	8	4	204	.772
	Int.	-	-	-	-	-	-	-	-	-
Intention										
Type I	M|C	.148	-.211	.472	-.656	.795	13	5	182	.388
Type II	M|C	.151	.062	.238	-.388	.613	44	12	233	.002
	C|M	.170	.098	.239	-.237	.525	40	10	262	<.001
	Int.	.095	-.075	.259	-.354	.508	8	8	166	.228
Self-Report Behavior										
Type I	M|C	.164	-.088	.397	-.747	.861	20	4	221	.188
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Objective Behavior										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-

Notes. r = meta-analytic estimate expressed as a correlation; 95 % CI = 95% confidence interval; 95% PI = 95 % prediction interval; Effect # = number of effect size estimates aggregated; Study # = number of studies used to derive meta-analytic estimate; Mean Study N = average sample size of each study used; Sig (p) = statistical significance level expressed as p-value; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect. Rows are left empty whenever there was fewer than 4 studies reporting a particular type of effect.

Table T2. Meta-Analytic Results for Messages Delivered through Images or Text Plus Images

Outcome, Study & Effect Type		**r**	**95% CI**		**95% PI**		**Effect #**	**Study #**	**Mean Study N**	**Sig. (p)**
			Low	**High**	**Low**	**High**				
Attitude										
Type I	M|C	.439	.301	.560	-.272	.840	35	14	218	<.001
Type II	M|C	.182	.143	.222	-.162	.487	134	37	224	<.001
	C|M	.185	.137	.232	-.296	.591	123	32	235	<.001
	Int.	.189	.120	.256	-.149	.488	30	23	229	<.001
Intention										
Type I	M|C	.251	.093	.396	-.455	.763	40	16	264	.003
Type II	M|C	.209	.136	.280	-.187	.547	75	30	258	<.001
	C|M	.191	.121	.259	-.221	.545	76	29	272	<.001
	Int.	.203	.137	.268	-.114	.483	31	24	251	<.001
Self-Report Behavior										
Type I	M|C	.063	.022	.104	-.018	.143	16	7	1560	.005
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Objective Behavior										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-

Notes. r = meta-analytic estimate expressed as a correlation; 95 % CI = 95% confidence interval; 95% PI = 95 % prediction interval; Effect # = number of effect size estimates aggregated; Study # = number of studies used to derive meta-analytic estimate; Mean Study N = average sample size of each study used; Sig (p) = statistical significance level expressed as p-value; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect. Rows are left empty whenever there was fewer than 4 studies reporting a particular type of effect.

Table T3. Meta-Analytic Results for Messages Delivered through Text Only

Outcome, Study & Effect Type		**r**	**95% CI**		**95% PI**		**Effect #**	**Study #**	**Mean Study N**	**Sig. (p)**
			Low	**High**	**Low**	**High**				
Attitude										
Type I	M|C	.202	.136	.267	-.364	.659	161	70	258	<.001
Type II	M|C	.205	.168	.242	-.393	.681	515	159	219	<.001
	C|M	.208	.162	.253	-.497	.747	468	141	231	<.001
	Int.	.250	.206	.292	-.194	.608	133	108	184	<.001
Intention										
Type I	M|C	.123	.076	.170	-.235	.453	142	50	293	<.001
Type II	M|C	.222	.187	.257	-.324	.658	559	174	231	<.001
	C|M	.212	.176	.247	-.399	.693	493	148	240	<.001
	Int.	.256	.216	.295	-.193	.617	167	127	175	<.001
Self-Report Behavior										
Type I	M|C	.071	-.057	.196	-.340	.459	14	5	278	.252
Type II	M|C	.139	.027	.248	-.244	.485	38	10	338	.017
	C|M	.153	.019	.281	-.419	.639	32	8	351	.026
	Int.	.140	-.140	.400	-.398	.607	6	4	100	.255
Objective Behavior										
Type I	M|C	.196	.087	.300	-.231	.560	31	10	382	.001
Type II	M|C	.205	.100	.305	-.300	.620	57	23	1082	<.001
	C|M	.217	.122	.309	-.241	.596	56	21	1178	<.001
	Int.	.133	-.185	.426	-.659	.786	10	8	109	.369

Notes. r = meta-analytic estimate expressed as a correlation; 95 % CI = 95% confidence interval; 95% PI = 95 % prediction interval; Effect # = number of effect size estimates aggregated; Study # = number of studies used to derive meta-analytic estimate; Mean Study N = average sample size of each study used; Sig (p) = statistical significance level expressed as p-value; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect. Rows are left empty whenever there was fewer than 4 studies reporting a particular type of effect.

Appendix U. Project 1 – Moderation: Number of Intervention Contacts

Table U1. Meta-Analytic Results for Messages with Only One Intervention Contact Point

Outcome, Study & Effect Type		r	95% CI Low	95% CI High	95% PI Low	95% PI High	Effect #	Study #	Mean Study N	Sig. (p)
Attitude										
Type I	M|C	.230	.170	.288	-.364	.691	214	90	245	<.001
Type II	M|C	.199	.168	.229	-.362	.654	702	213	218	<.001
	C|M	.198	.162	.234	-.466	.720	639	186	231	<.001
	Int.	.233	.195	.269	-.206	.594	178	146	186	<.001
Intention										
Type I	M|C	.166	.117	.214	-.289	.560	222	75	288	<.001
Type II	M|C	.216	.187	.245	-.314	.643	715	235	231	<.001
	C|M	.213	.183	.242	-.361	.669	624	201	245	<.001
	Int.	.242	.210	.274	-.181	.589	224	176	183	<.001
Self-Report Behavior										
Type I	M|C	.132	-.041	.298	-.663	.787	30	8	222	.129
Type II	M|C	.171	.036	.300	-.285	.564	27	9	300	.016
	C|M	.186	.038	.326	-.452	.698	26	8	332	.016
	Int.	.201	.106	.293	.106	.293	7	5	107	.002
Objective Behavior										
Type I	M|C	.202	.099	.300	-.299	.615	42	17	314	<.001
Type II	M|C	.216	.122	.306	-.320	.647	68	27	229	<.001
	C|M	.226	.136	.313	-.234	.604	66	24	245	<.001
	Int.	.186	-.039	.393	-.505	.732	13	11	102	.097

Notes. r = meta-analytic estimate expressed as a correlation; 95 % CI = 95% confidence interval; 95% PI = 95 % prediction interval; Effect # = number of effect size estimates aggregated; Study # = number of studies used to derive meta-analytic estimate; Mean Study N = average sample size of each study used; Sig (p) = statistical significance level expressed as p-value; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect. Rows are left empty whenever there was fewer than 4 studies reporting a particular type of effect.

Table U2. Meta-Analytic Results for Messages with More than One Intervention Contact Point

Outcome, Study & Effect Type		r	95% CI Low	95% CI High	95% PI Low	95% PI High	Effect #	Study #	Mean Study N	Sig. (p)
Attitude										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	.109	-.104	.311	-.435	.594	9	4	193	.272
	Int.	-	-	-	-	-	-	-	-	-
Intention										
Type I	M|C	-.028	-.175	.120	-.407	.360	22	7	271	.699
Type II	M|C	.156	.071	.239	-.270	.531	30	5	346	.001
	C|M	.151	.057	.243	-.327	.568	30	5	346	.003
	Int.	-	-	-	-	-	-	-	-	-
Self-Report Behavior										
Type I	M|C	.058	.040	.077	-.109	.223	169	34	1198	<.001
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Objective Behavior										
Type I	M|C	.020	-.055	.096	-.209	.248	22	10	453	.581
Type II	M|C	.162	.104	.220	-.036	.348	49	11	1983	<.001
	C|M	.161	.104	.217	-.008	.321	49	11	1983	<.001
	Int.	-	-	-	-	-	-	-	-	-

Notes. r = meta-analytic estimate expressed as a correlation; 95 % CI = 95% confidence interval; 95% PI = 95 % prediction interval; Effect # = number of effect size estimates aggregated; Study # = number of studies used to derive meta-analytic estimate; Mean Study N = average sample size of each study used; Sig (p) = statistical significance level expressed as p-value; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect. Rows are left empty whenever there was fewer than 4 studies reporting a particular type of effect.

Appendix V. Project 1 – Moderation: Characteristic Polarity

Table V1. Meta-Analytic Results for Matching to Bipolar Characteristics

Outcome, Study & Effect Type		r	95% CI		95% PI		Effect #	Study #	Mean Study N	Sig. (p)
			Low	High	Low	High				
Attitude										
Type I	M|C	.111	-.021	.239	-.410	.577	24	12	190	<.001
Type II	M|C	.135	.056	.213	-.405	.605	112	38	223	<.001
	C|M	.106	.036	.174	-.498	.640	103	37	220	<.001
	Int.	.156	.072	.238	-.284	.542	33	28	200	<.001
Intention										
Type I	M|C	.123	-.023	.264	-.361	.555	28	11	330	<.001
Type II	M|C	.187	.124	.249	-.260	.568	122	41	206	<.001
	C|M	.180	.110	.248	-.263	.560	107	36	213	<.001
	Int.	-	-	-	-	-	-	-	-	-
Self-Report Behavior										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Objective Behavior										
Type I	M|C	.064	-.069	.194	-.188	.308	6	5	455	.272
Type II	M|C	.292	.020	.523	-.440	.791	12	6	335	<.001
	C|M	.290	.018	.522	-.421	.780	12	6	335	<.001
	Int.	-	-	-	-	-	-	-	-	-

Notes. r = meta-analytic estimate expressed as a correlation; 95 % CI = 95% confidence interval; 95% PI = 95 % prediction interval; Effect # = number of effect size estimates aggregated; Study # = number of studies used to derive meta-analytic estimate; Mean Study N = average sample size of each study used; Sig (p) = statistical significance level expressed as p-value; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect. Rows are left empty whenever there was fewer than 4 studies reporting a particular type of effect.

Table V2. Meta-Analytic Results for Matching to Unipolar Characteristics

Outcome, Study & Effect Type		r	95% CI Low	95% CI High	95% PI Low	95% PI High	Effect #	Study #	Mean Study N	Sig. (p)
Attitude										
Type I	M|C	.222	.091	.346	-.494	.759	72	32	313	<.001
Type II	M|C	.208	.153	.262	-.256	.595	112	40	203	<.001
	C|M	.173	.089	.254	-.562	.756	102	34	214	<.001
	Int.	.205	.161	.249	.009	.386	36	30	173	<.001
Intention										
Type I	M|C	.227	.110	.337	-.327	.665	39	17	424	<.001
Type II	M|C	.168	.130	.205	-.230	.517	146	52	220	<.001
	C|M	.172	.126	.217	-.314	.586	141	48	223	<.001
	Int.	-	-	-	-	-	-	-	-	-
Self-Report Behavior										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	.098	-.060	.252	-.507	.639	19	5	242	.209
	C|M	.100	-.100	.292	-.545	.671	14	4	168	.299
	Int.	-	-	-	-	-	-	-	-	-
Objective Behavior										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	.165	.105	.224	-.094	.404	47	12	1790	<.001
	C|M	.165	.106	.222	-.007	.328	47	12	1790	<.001
	Int.	-	-	-	-	-	-	-	-	-

Notes. r = meta-analytic estimate expressed as a correlation; 95 % CI = 95% confidence interval; 95% PI = 95 % prediction interval; Effect # = number of effect size estimates aggregated; Study # = number of studies used to derive meta-analytic estimate; Mean Study N = average sample size of each study used; Sig (p) = statistical significance level expressed as p-value; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect. Rows are left empty whenever there was fewer than 4 studies reporting a particular type of effect.

Table V3. Meta-Analytic Results for Matching to Categorical Characteristics

Outcome, Study & Effect Type		r	95% CI Low	95% CI High	95% PI Low	95% PI High	Effect #	Study #	Mean Study N	Sig. (p)
Attitude										
Type I	M|C	.259	.187	.329	-.302	.687	108	47	212	<.001
Type II	M|C	.192	.157	.227	-.353	.640	459	134	222	<.001
	C|M	.202	.153	.249	-.431	.701	417	116	239	<.001
	Int.	.233	.187	.278	-.176	.573	107	87	191	<.001
Intention										
Type I	M|C	.155	.095	.214	-.285	.541	141	49	226	<.001
Type II	M|C	.232	.192	.272	-.351	.686	464	154	243	<.001
	C|M	.241	.200	.282	-.386	.716	396	129	261	<.001
	Int.	.269	.223	.314	-.221	.650	132	112	185	<.001
Self-Report Behavior										
Type I	M|C	.122	-.018	.258	-.597	.733	35	8	455	.086
Type II	M|C	.136	-.131	.385	-.497	.675	15	5	404	.292
	C|M	.184	-.091	.434	-.579	.775	14	4	495	.171
	Int.	.138	-.107	.367	-.335	.555	6	4	116	.207
Objective Behavior										
Type I	M|C	.200	.025	.364	-.429	.699	19	8	111	.028
Type II	M|C	.193	.030	.345	-.440	.697	28	13	179	<.001
	C|M	.228	.094	.354	-.238	.609	24	11	196	<.001
	Int.	.140	-.269	.506	-.758	.855	7	7	70	.439

Notes. r = meta-analytic estimate expressed as a correlation; 95 % CI = 95% confidence interval; 95% PI = 95 % prediction interval; Effect # = number of effect size estimates aggregated; Study # = number of studies used to derive meta-analytic estimate; Mean Study N = average sample size of each study used; Sig (p) = statistical significance level expressed as p-value; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect. Rows are left empty whenever there was fewer than 4 studies reporting a particular type of effect.

Appendix W. Project 1 – Moderation: Assessment Time

Table W1. Meta-Analytic Results When Assessment Occurs the Day of the Intervention

Outcome, Study & Effect Type		**r**	**95% CI Low**	**95% CI High**	**95% PI Low**	**95% PI High**	**Effect #**	**Study #**	**Mean Study N**	**Sig. (p)**
Attitude										
Type I	M|C	.227	.168	.285	-.366	.689	217	91	244	<.001
Type II	M|C	.197	.167	.227	-.363	.653	704	215	218	<.001
	C|M	.197	.161	.232	-.467	.718	642	189	230	<.001
	Int.	.232	.194	.268	-.206	.592	179	147	185	<.001
Intention										
Type I	M|C	.170	.122	.216	-.279	.558	223	76	285	<.001
Type II	M|C	.214	.185	.243	-.316	.642	735	238	234	<.001
	C|M	.210	.181	.238	-.360	.666	644	204	248	<.001
	Int.	.239	.207	.271	-.187	.590	224	177	183	<.001
Self-Report Behavior										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Objective Behavior										
Type I	M|C	.186	.087	.282	-.304	.598	44	18	311	.001
Type II	M|C	.224	.143	.302	-.253	.613	98	29	844	<.001
	C|M	.234	.160	.306	-.176	.575	97	27	900	<.001
	Int.	.212	.025	.385	-.423	.707	16	13	94	.030

Notes. r = meta-analytic estimate expressed as a correlation; 95 % CI = 95% confidence interval; 95% PI = 95 % prediction interval; Effect # = number of effect size estimates aggregated; Study # = number of studies used to derive meta-analytic estimate; Mean Study N = average sample size of each study used; Sig (p) = statistical significance level expressed as p-value; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect. Rows are left empty whenever there was fewer than 4 studies reporting a particular type of effect.

Table W2. Meta-Analytic Results When Assessment Occurs at Least One Day After the Intervention

Outcome, Study & Effect Type		r	95% CI Low	95% CI High	95% PI Low	95% PI High	Effect #	Study #	Mean Study N	Sig. (p)
Attitude										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Intention										
Type I	M|C	-.105	-.252	.047	-.447	.264	11	6	316	.155
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Self-Report Behavior										
Type I	M|C	.064	.038	.089	-.198	.317	192	40	1050	<.001
Type II	M|C	.126	.020	.230	-.398	.589	44	12	298	.021
	C|M	.134	.017	.248	-.433	.626	38	10	300	.026
	Int.	.201	.106	.293	.106	.293	7	5	107	.002
Objective Behavior										
Type I	M|C	.023	-.055	.099	-.212	.255	20	10	453	.547
Type II	M|C	.113	.039	.186	-.098	.315	17	6	469	.005
	C|M	.100	.025	.173	-.100	.293	16	5	538	.012
	Int.	-	-	-	-	-	-	-	-	-

Notes. r = meta-analytic estimate expressed as a correlation; 95 % CI = 95% confidence interval; 95% PI = 95 % prediction interval; Effect # = number of effect size estimates aggregated; Study # = number of studies used to derive meta-analytic estimate; Mean Study N = average sample size of each study used; Sig (p) = statistical significance level expressed as p-value; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect. Rows are left empty whenever there was fewer than 4 studies reporting a particular type of effect.

Table W3. Meta-Analytic Results When Assessment Between 1 Day and 1 Month After the Intervention

Outcome, Study & Effect Type		**r**	**95% CI**		**95% PI**		**Effect**	**Study**	**Mean**	**Sig.**
			Low	**High**	**Low**	**High**	**#**	**#**	**Study N**	**(p)**
Attitude										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Intention										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Self-Report Behavior										
Type I	M|C	.125	-.001	.247	-.573	.718	41	14	633	.052
Type II	M|C	.171	.036	.300	-.285	.564	27	9	300	.016
	C|M	.186	.038	.326	-.452	.698	26	8	332	.016
	Int.	.201	.106	.293	.106	.293	7	5	107	.002
Objective Behavior										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	.133	.064	.200	-.029	.288	11	4	431	.002
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-

Notes. r = meta-analytic estimate expressed as a correlation; 95 % CI = 95% confidence interval; 95% PI = 95 % prediction interval; Effect # = number of effect size estimates aggregated; Study # = number of studies used to derive meta-analytic estimate; Mean Study N = average sample size of each study used; Sig (p) = statistical significance level expressed as p-value; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect. Rows are left empty whenever there was fewer than 4 studies reporting a particular type of effect.

Table W4. Meta-Analytic Results When Assessment Between 1 and 6 Months After the Intervention

Outcome, Study & Effect Type		r	95% CI Low	95% CI High	95% PI Low	95% PI High	Effect #	Study #	Mean Study N	Sig. (p)
Attitude										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Intention										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Self-Report Behavior										
Type I	M|C	.057	.032	.081	-.104	.215	99	28	1212	<.001
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Objective Behavior										
Type I	M|C	.024	-.079	.127	-.230	.275	10	7	301	.609
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-

Notes. r = meta-analytic estimate expressed as a correlation; 95 % CI = 95% confidence interval; 95% PI = 95 % prediction interval; Effect # = number of effect size estimates aggregated; Study # = number of studies used to derive meta-analytic estimate; Mean Study N = average sample size of each study used; Sig (p) = statistical significance level expressed as p-value; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect. Rows are left empty whenever there was fewer than 4 studies reporting a particular type of effect.

Table W5. Meta-Analytic Results When Assessment Beyond 6 Months After the Intervention

Outcome, Study & Effect Type		**r**	**95% CI Low**	**95% CI High**	**95% PI Low**	**95% PI High**	**Effect #**	**Study #**	**Mean Study N**	**Sig. (p)**
Attitude										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Intention										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Self-Report Behavior										
Type I	M|C	.063	.033	.092	-.130	.250	52	11	1446	<.001
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Objective Behavior										
Type I	M|C	.024	-.156	.204	-.374	.415	8	4	682	.759
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-

Notes. r = meta-analytic estimate expressed as a correlation; 95 % CI = 95% confidence interval; 95% PI = 95 % prediction interval; Effect # = number of effect size estimates aggregated; Study # = number of studies used to derive meta-analytic estimate; Mean Study N = average sample size of each study used; Sig (p) = statistical significance level expressed as p-value; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect. Rows are left empty whenever there was fewer than 4 studies reporting a particular type of effect.

Appendix X. Project 1 – Moderation: Outcome Domain

Table X1. Meta-Analytic Results for Interventions Targeting Health Behaviors

Outcome, Study & Effect Type		r	95% CI Low	95% CI High	95% PI Low	95% PI High	Effect #	Study #	Mean Study N	Sig. (p)
Attitude										
Type I	M|C	.039	-.055	.133	-.339	.406	35	15	212	.407
Type II	M|C	.131	.082	.179	-.283	.503	137	37	241	<.001
	C|M	.126	.070	.182	-.412	.599	129	33	260	<.001
	Int.	.180	.124	.234	-.085	.420	34	29	214	<.001
Intention										
Type I	M|C	.061	-.010	.130	-.303	.408	82	29	275	.091
Type II	M|C	.155	.104	.205	-.320	.568	250	72	261	<.001
	C|M	.152	.100	.203	-.312	.557	228	63	275	<.001
	Int.	.183	.122	.243	-.227	.538	57	50	198	<.001
Self-Report Behavior										
Type I	M|C	.064	.040	.088	-.188	.309	198	41	1027	<.001
Type II	M|C	.128	.013	.240	-.412	.601	40	11	310	.031
	C|M	.141	.014	.264	-.427	.630	34	9	315	.031
	Int.	.201	.106	.293	.106	.293	7	5	107	.002
Objective Behavior										
Type I	M|C	.050	-.015	.115	-.203	.297	34	15	345	.129
Type II	M|C	.167	-.042	.363	-.519	.722	25	12	248	.112
	C|M	.190	-.053	.411	-.523	.746	20	9	298	.117
	Int.	.079	-.389	.514	-.826	.870	6	6	83	.697

Notes. r = meta-analytic estimate expressed as a correlation; 95 % CI = 95% confidence interval; 95% PI = 95 % prediction interval; Effect # = number of effect size estimates aggregated; Study # = number of studies used to derive meta-analytic estimate; Mean Study N = average sample size of each study used; Sig (p) = statistical significance level expressed as p-value; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect. Rows are left empty whenever there was fewer than 4 studies reporting a particular type of effect.

Table X2. Meta-Analytic Results for Interventions Targeting Environmental Behaviors

Outcome, Study & Effect Type		r	95% CI Low	95% CI High	95% PI Low	95% PI High	Effect #	Study #	Mean Study N	Sig. (p)
Attitude										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	.121	-.022	.258	-.440	.613	30	15	303	.093
	C|M	.121	-.031	.266	-.579	.718	28	14	314	.113
	Int.	.089	.006	.170	-.193	.358	15	14	322	.037
Intention										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	.215	.127	.299	-.246	.596	79	25	250	<.001
	C|M	.234	.139	.325	-.244	.621	59	21	229	<.001
	Int.	.216	.152	.279	-.042	.448	25	20	208	<.001
Self-Report Behavior										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Objective Behavior										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	.133	.070	.196	-.113	.364	22	9	2542	<.001
	C|M	.134	.068	.199	-.127	.378	22	9	2542	<.001
	Int.	-	-	-	-	-	-	-	-	-

Notes. r = meta-analytic estimate expressed as a correlation; 95 % CI = 95% confidence interval; 95% PI = 95 % prediction interval; Effect # = number of effect size estimates aggregated; Study # = number of studies used to derive meta-analytic estimate; Mean Study N = average sample size of each study used; Sig (p) = statistical significance level expressed as p-value; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect. Rows are left empty whenever there was fewer than 4 studies reporting a particular type of effect.

Table X3. Meta-Analytic Results for Interventions Targeting Prosocial Behaviors

Outcome, Study & Effect Type		r	95% CI		95% PI		Effect	Study	Mean	Sig.
			Low	High	Low	High	#	#	Study N	(p)
Attitude										
Type I	M|C	.377	.164	.556	-.398	.838	26	11	253	.002
Type II	M|C	.157	.029	.281	-.434	.654	34	12	220	.018
	C|M	.146	.008	.279	-.438	.643	32	11	233	.039
	Int.	.165	.099	.230	.076	.251	8	6	242	<.001
Intention										
Type I	M|C	.099	.026	.171	-.192	.375	25	13	207	.010
Type II	M|C	.115	.055	.174	-.302	.495	96	32	169	<.001
	C|M	.130	.066	.192	-.277	.497	83	31	186	<.001
	Int.	.191	.120	.259	-.180	.514	37	30	180	<.001
Self-Report Behavior										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Objective Behavior										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	.207	.113	.298	-.195	.550	26	8	379	<.001
	C|M	.197	.076	.312	-.186	.527	26	8	379	.003
	Int.	-	-	-	-	-	-	-	-	-

Notes. r = meta-analytic estimate expressed as a correlation; 95 % CI = 95% confidence interval; 95% PI = 95 % prediction interval; Effect # = number of effect size estimates aggregated; Study # = number of studies used to derive meta-analytic estimate; Mean Study N = average sample size of each study used; Sig (p) = statistical significance level expressed as p-value; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect. Rows are left empty whenever there was fewer than 4 studies reporting a particular type of effect.

Table X4. Meta-Analytic Results for Interventions Targeting Political Behaviors

Outcome, Study & Effect Type		**r**	**95% CI**		**95% PI**		**Effect**	**Study**	**Mean**	**Sig.**
			Low	**High**	**Low**	**High**	**#**	**#**	**Study N**	**(p)**
Attitude										
Type I	M|C	.229	.141	.313	-.220	.597	40	21	201	<.001
Type II	M|C	.138	.087	.188	-.024	.293	40	15	297	<.001
	C|M	.141	.026	.252	-.485	.671	40	15	297	.018
	Int.	.240	.097	.374	-.218	.612	12	11	287	.004
Intention										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	.149	.017	.275	-.177	.445	17	7	284	.029
	C|M	.242	-.126	.551	-.784	.914	12	6	239	.174
	Int.	.332	-.092	.654	-.507	.848	4	4	159	.087
Self-Report Behavior										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Objective Behavior										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-

Notes. r = meta-analytic estimate expressed as a correlation; 95 % CI = 95% confidence interval; 95% PI = 95 % prediction interval; Effect # = number of effect size estimates aggregated; Study # = number of studies used to derive meta-analytic estimate; Mean Study N = average sample size of each study used; Sig (p) = statistical significance level expressed as p-value; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect. Rows are left empty whenever there was fewer than 4 studies reporting a particular type of effect.

Table X5. Meta-Analytic Results for Interventions Targeting Consumer Behaviors

Outcome, Study & Effect Type		**r**	**95% CI**		**95% PI**		**Effect #**	**Study #**	**Mean Study N**	**Sig. (p)**
			Low	**High**	**Low**	**High**				
Attitude										
Type I	M|C	.244	.167	.318	-.356	.702	138	54	275	<.001
Type II	M|C	.212	.176	.248	-.364	.671	555	154	205	<.001
	C|M	.210	.168	.252	-.455	.725	505	132	216	<.001
	Int.	.245	.198	.292	-.226	.624	127	101	168	<.001
Intention										
Type I	M|C	.224	.146	.299	-.304	.647	129	34	344	<.001
Type II	M|C	.253	.208	.297	-.340	.702	326	109	235	<.001
	C|M	.262	.214	.309	-.380	.734	290	91	252	<.001
	Int.	.261	.220	.301	-.097	.559	104	81	174	<.001
Self-Report Behavior										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Objective Behavior										
Type I	M|C	.224	-.017	.441	-.474	.749	10	6	375	.064
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-

Notes. r = meta-analytic estimate expressed as a correlation; 95 % CI = 95% confidence interval; 95% PI = 95 % prediction interval; Effect # = number of effect size estimates aggregated; Study # = number of studies used to derive meta-analytic estimate; Mean Study N = average sample size of each study used; Sig (p) = statistical significance level expressed as p-value; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect. Rows are left empty whenever there was fewer than 4 studies reporting a particular type of effect.

Appendix Y. Project 1 – Moderation: Type of Behavioral Change Type Targeted

Table Y1. Meta-Analytic Results for Interventions Attempting to Promote a Behavior

Outcome, Study & Effect Type		r	95% CI Low	95% CI High	95% PI Low	95% PI High	Effect #	Study #	Mean Study N	Sig. (p)
Attitude										
Type I	M|C	.232	.172	.289	-.361	.691	212	90	244	<.001
Type II	M|C	.211	.179	.242	-.352	.662	652	194	216	<.001
	C|M	.213	.174	.251	-.446	.722	590	167	230	<.001
	Int.	.247	.208	.286	-.197	.607	162	134	182	<.001
Intention										
Type I	M|C	.156	.105	.207	-.301	.555	204	68	289	<.001
Type II	M|C	.219	.187	.251	-.334	.660	638	205	235	<.001
	C|M	.216	.184	.247	-.359	.672	570	179	249	<.001
	Int.	.236	.200	.271	-.201	.595	198	154	184	<.001
Self-Report Behavior										
Type I	M|C	.063	.017	.109	-.309	.418	102	24	783	.008
Type II	M|C	.138	.009	.263	-.451	.644	34	11	300	.037
	C|M	.154	.003	.298	-.509	.702	28	9	303	.046
	Int.	.201	.106	.293	.106	.293	7	5	107	.002
Objective Behavior										
Type I	M|C	.141	.041	.238	-.290	.524	42	17	377	.007
Type II	M|C	.202	.131	.270	-.209	.552	95	28	954	<.001
	C|M	.194	.122	.264	-.201	.535	97	27	984	<.001
	Int.	.185	-.004	.361	-.284	.582	10	7	115	.054

Notes. r = meta-analytic estimate expressed as a correlation; 95 % CI = 95% confidence interval; 95% PI = 95 % prediction interval; Effect # = number of effect size estimates aggregated; Study # = number of studies used to derive meta-analytic estimate; Mean Study N = average sample size of each study used; Sig (p) = statistical significance level expressed as p-value; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect. Rows are left empty whenever there was fewer than 4 studies reporting a particular type of effect.

Table Y2. Meta-Analytic Results for Interventions Attempting to Limit a Behavior

Outcome, Study & Effect Type		r	95% CI Low	95% CI High	95% PI Low	95% PI High	Effect #	Study #	Mean Study N	Sig. (p)
Attitude										
Type I	M|C	-	-	-	-	-	-	-	-	-
Type II	M|C	.078	.004	.150	-.308	.442	46	19	235	.038
	C|M	.071	-.069	.208	-.669	.740	42	17	252	.312
	Int.	.091	.018	.163	-.130	.303	15	13	224	.018
Intention										
Type I	M|C	.115	-.037	.262	-.406	.580	23	11	235	.130
Type II	M|C	.168	.102	.232	-.223	.513	80	27	239	<.001
	C|M	.170	.085	.253	-.436	.670	60	19	253	.000
	Int.	.245	.136	.348	-.225	.622	20	19	165	.000
Self-Report Behavior										
Type I	M|C	.070	.043	.096	-.132	.266	96	24	1253	<.001
Type II	M|C	-	-	-	-	-	-	-	-	-
	C|M	-	-	-	-	-	-	-	-	-
	Int.	-	-	-	-	-	-	-	-	-
Objective Behavior										
Type I	M|C	.029	-.071	.128	-.251	.304	17	8	417	.550
Type II	M|C	.102	-.132	.325	-.433	.585	14	6	172	.363
	C|M	.152	.056	.246	.056	.246	10	4	217	.006
	Int.	-	-	-	-	-	-	-	-	-

Notes. r = meta-analytic estimate expressed as a correlation; 95 % CI = 95% confidence interval; 95% PI = 95 % prediction interval; Effect # = number of effect size estimates aggregated; Study # = number of studies used to derive meta-analytic estimate; Mean Study N = average sample size of each study used; Sig (p) = statistical significance level expressed as p-value; M|C = effect of message given a characteristic being matched to; C|M = effect of characteristic given a particular message type received; Int = Interaction effect. Rows are left empty whenever there was fewer than 4 studies reporting a particular type of effect.

Appendix Z. Project 2 – Pilot Study

250 participants were recruited using the *MTurk*, managed through *CloudResearch.com*. The pilot survey was deployed using *Qualtrics* (https://www.qualtrics.com).

Z.1. Developing the political orientation measure. Participants began the survey by completing a 25-item measure of political orientation that included items inspired from a variety of past research on matching to political orientation (e.g., Arpan et al., 2018; Day et al., 2014; Dixon et al., 2017; Feinberg & Willer, 2015; Hartman & Weber, 2009; Kaikati et al., 2017; Kidwell et al., 2013; Kim et al., 2018; Malka & Lelkes, 2010; Nelson & Garst, 2005; Wolsko et al., 2016).

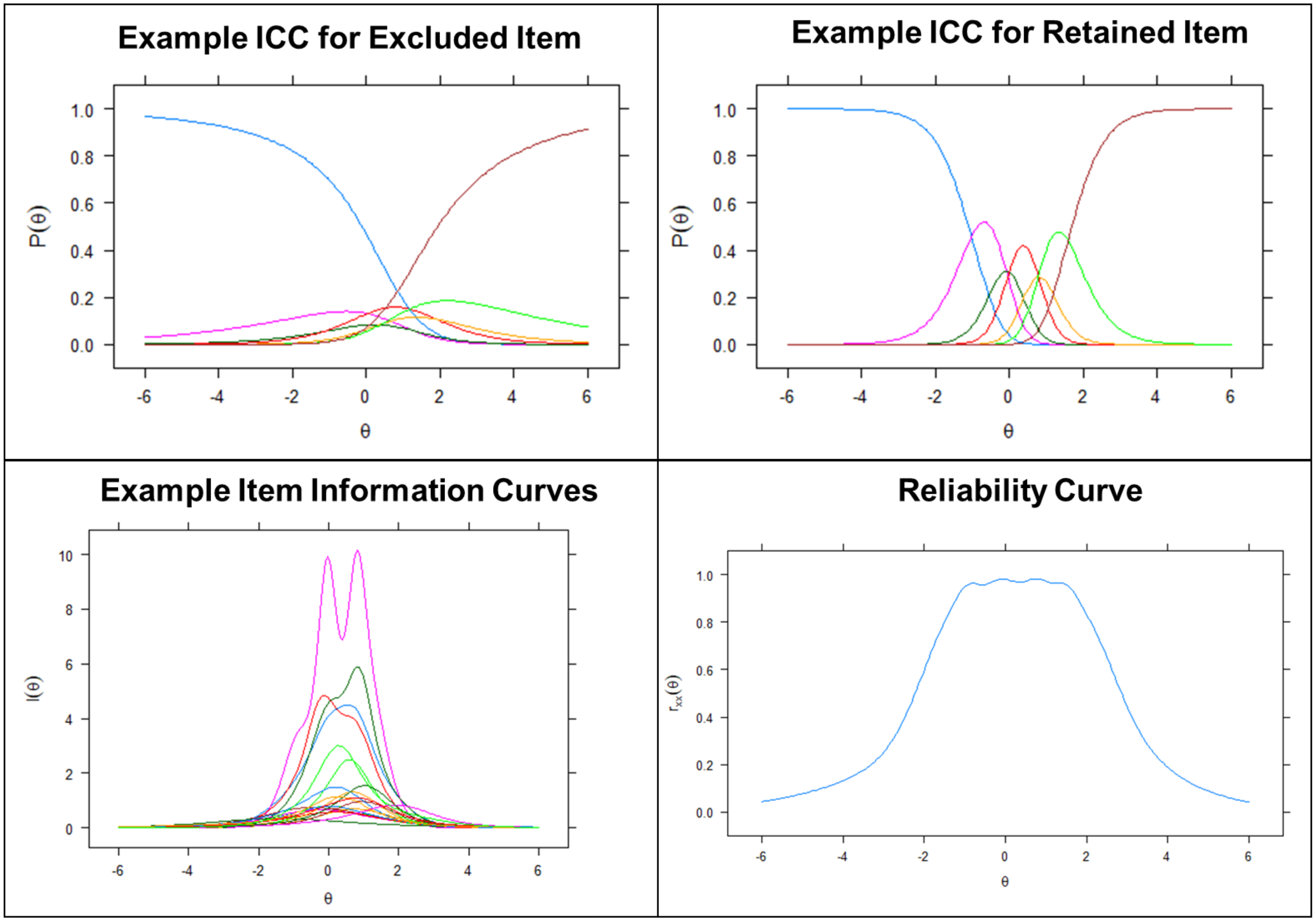
The political orientation measure contained the 6 items ultimately used in Project 2 (see Appendix AA below), along with 19 items asking participants about their views on specific politically-relevant policies. Prior to reading the policy statements, participants read the following prompt: "In the United States today, there is a range of issues and policies that are being discussed. Please indicate the extent to which you are in favor of or against each of the following policies and issues." Then, they rated each policy using a 7-point response scale (1 = "strongly against"; 4 = "neither for nor against"; 7 = "strongly in favor"). The 19 policy-related statements were:

1. Abolishing capital punishment
2. Making abortion illegal
3. Promoting more strict gun control policies
4. Increasing socialized health care
5. Supporting same sex marriage
6. Punishing illegal immigration
7. Promoting traditional American values
8. Keeping church and state separate

9. Increasing taxes to promote basic government services
10. Prioritizing funding for the military and national security
11. Reducing Government regulations on private companies to keep them competitive
12. Promoting the legalization of marijuana
13. Promoting equal access to employment opportunities
14. Imposing laws to reduce carbon emissions
15. Promoting free speech even when it is hurtful speech
16. Increasing public funding for subsidized housing
17. Honoring and defending the Constitution
18. Keeping families free from government surveillance
19. Reducing the federal debt

Responses to these items were subjected to a series of psychometric evaluations. First, an examination of correlation matrices involved ensuring that responses to liberal policies/positions correlated positively with each other, and that responses to conservative policies/positions correlated positively with each other. Items that did not meet these criteria were excluded. Then, exploratory factor analyses were conducted to (1) explore whether multiple dimensions needed to be accounted for in the scale, and (2) further identify items that did not cluster with others. From these analyses a few additional items were excluded, and it was deemed adequate to treat the scale as unidimensional. Lastly, items were subjected to a series of item response theory (IRT) analyses to choose a final pool of items so that the resulting scale would be maximally informative, be able to maximally discriminate between different levels of political orientations, and demonstrate high reliability across the full range of scores. To accomplish this, we used several tools from IRT. For example, item characteristic curves (ICCs; or "trace lines") were used to examine that degree to which response choices for each items were truly ordinal in nature, and discriminated between multiple levels of the latent political orientation variable underlying responses. For instance, ICCs similar to the upper left panel on Figure Z1 led to the exclusion of certain items, whereas items with ICCs similar to the upper right panel on Figure Z1. were retained. I also generally selected items that captured the most information across the range of latent scores. For example, the lower left panel of Figure Z1. plots the amount of information that each item within a selection contributes to the overall scale. The 6 tallest curves correspond to the 6 items I eventually retained as part of the final scale. Lastly, while making decisions, I paid attention to the reliability of the measure across the range of the underlying latent construct being measured. The lower right panel of Figure Z1. presents a plot of the reliability of the final scale (y-axis) for measuring political orientation at different levels of the latent construct (x-axis). For most of the effective range of the scale (i.e., scores of +/- 1.75 standard deviations from the mean), the scale has a reliability of above .80, and approaching 1.0.

Figure Z1. Example IRT Analyses.



Z.2. Selecting persuasive message components. After completing the political orientation items, participants viewed 9 goal statements that a non-profit organization could strive towards. Each statement had three versions (a conservative, a liberal, and a neutral version), and each person was randomized to read one version of each statement. The full set of statements is presented in Table Z1.

Table Z1. Candidate Statements Evaluated by Pilot Participants

Candidate Statement #1	
Neutral	1) Reducing unemployment by working with local stakeholders to build connections between employers and people seeking work
Liberal	1) Alleviating the effects of unemployment and poverty by working with local officials to ensure people can access quality training programs and welfare services
Conservative	1) Increasing wealth in areas by providing funds to local business owners, so that they can grow their businesses and maximize employment opportunities
Candidate Statement #2	
Neutral	2) Reducing crime rates by meeting with community leaders, and identifying strategies that are tailored to the types of crimes in the area
Liberal	2) Reducing crime rates by establishing training programs and services to aid people with criminal records to begin new lives
Conservative	2) Reducing crime rates by creating neighborhood watch groups to monitor unlawful behavior, and establishing programs to build law abiding communities
Candidate Statement #3	
Neutral	3) Improving health services by working with healthcare systems to improve the cost effectiveness of health-related services
Liberal	3) Ensuring equal and fair access to health services by helping state governments develop and support programs to help those most in need
Conservative	3) Improving the efficiency of health services by helping healthcare systems to innovate and by reducing the constraints imposed by government regulations
Candidate Statement #4	
Neutral	4) Promoting environmental efforts through programs that teach individuals how to best make use of local recycling and composting resources
Liberal	4) Helping protect the environment against further degradation by educating people about global warming, and punishing businesses that pollute local areas
Conservative	4) Safeguarding the purity of the natural environment by creating economic programs that support business that pledge to contribute to conservation efforts
Candidate Statement #5	
Neutral	5) Helping communities affected by the opioid crisis by working with local stakeholders to increase public awareness to promote the prevention of new addictions
Liberal	5) Helping communities affected by the opioid crisis by working with local agencies to provide resources for users to get treatment and support

Conservative	5) Helping communities affected by the opioid crisis by working with local authorities to better monitor, identify, and punish those producing and selling opioids
Candidate Statement #6	
Neutral	6) Helping low income students access quality education by increasing support for teachers within the entire community.
Liberal	6) Helping low income students have access to better and fairer educational opportunities by investing in public school programs
Conservative	6) Helping low income students have access to the best educational opportunities by providing them with vouchers to attend the school of their choice.
Candidate Statement #7	
Neutral	7) Encouraging companies to adopt the newest green technologies that have been developed
Liberal	7) Encouraging companies to develop and use green technologies in order to preserve the environment and fight global warming
Conservative	7) Investing in companies that develop green technologies, allowing American enterprises to remain at the forefront of the global economic competition
Candidate Statement #8	
Neutral	8) Improving relations between community members and police forces through educational programs that foster mutual trust.
Liberal	8) Educating police forces about the needs of minority groups and training them to safeguard against prejudice and discrimination.
Conservative	8) Reducing hostile feelings towards the police in areas with higher crime rates by officers by reinforcing respect for the honorable work of police officers.
Candidate Statement #9	
Neutral	9) Supporting high schools in the development of sex education programs that emphasize protection against diseases and unwanted pregnancies.
Liberal	9) Supporting high schools in the development of sex-positive education programs that encourage youths to be informed about sex, and teaches them how to make safe and healthy decisions.
Conservative	9) Supporting high schools in the development of abstinence-based sex education programs that emphasize reductions in teenage pregnancies, and reinforce values of modesty and chastity.

For each statement viewed, participants answered 3 questions:

1) With what political position would you associate the statement above?
    a. Liberal
    b. Neither liberal nor conservative
    c. Conservative
2) How would a typical *conservative* react to this goal?
    a. Strongly against
    b. Moderately against
    c. Slightly against
    d. Neither for nor against
    e. Slightly in favor

    f. Moderately in favor
    g. Strongly in favor
3) How would a typical *liberal* react to this goal?
    a. Strongly against
    b. Moderately against
    c. Slightly against
    d. Neither for nor against
    e. Slightly in favor
    f. Moderately in favor
    g. Strongly in favor

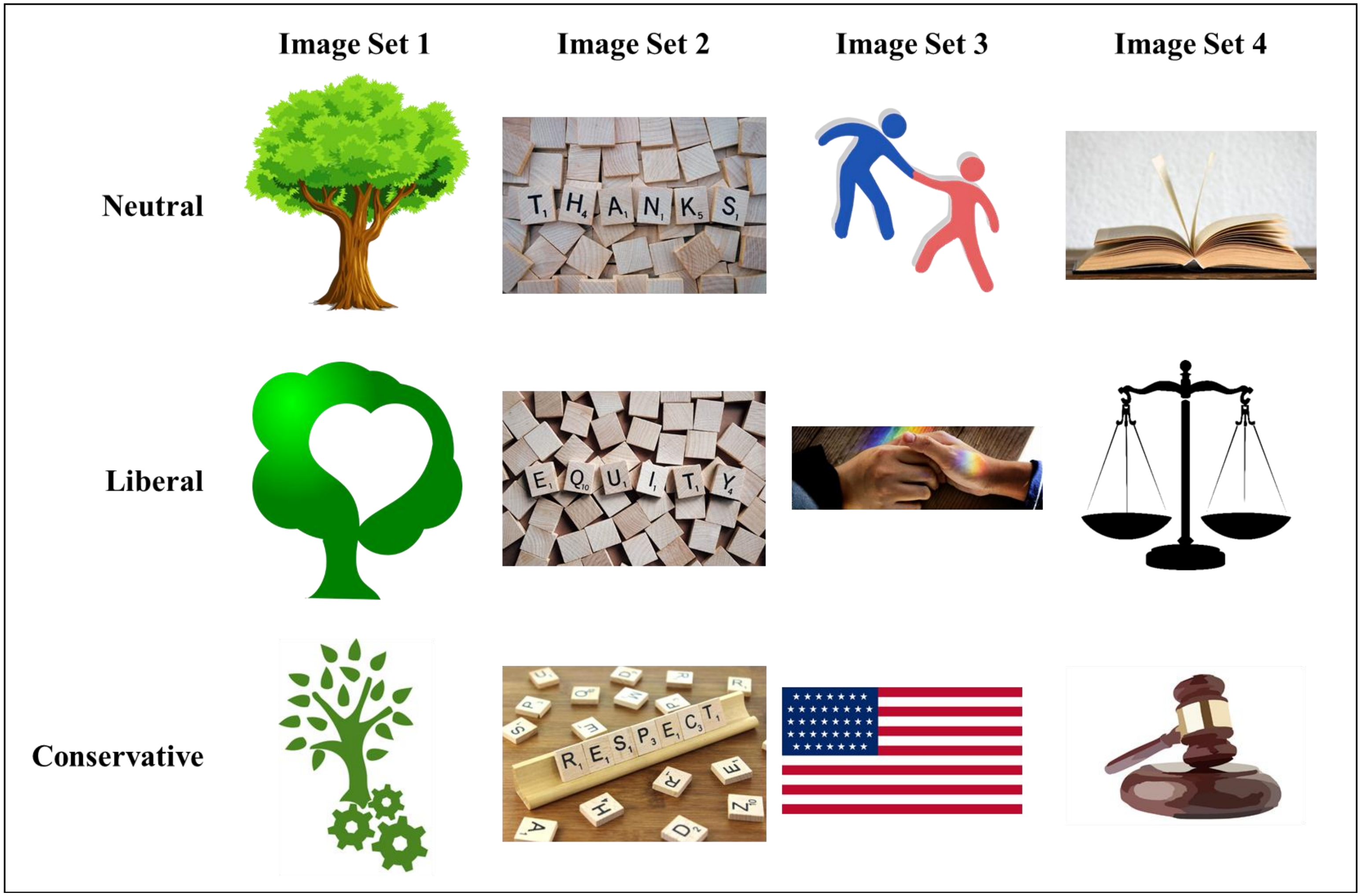
Afterwards, participants were randomized to see one image from each of four sets of three images (i.e., each person one image from each set, for a total of four). The specific images participants viewed are shown in Figure Z2. For each image participants answered:

1) Who do you think would be most likely to use this image in an advert?
    a. A liberal organization
    b. An organization that is neither liberal nor conservative
    c. A conservative organization
2) How much do you think this image would appeal to someone who is *conservative*?
    a. Not at all
    b. A little
    c. A moderate amount
    d. A lot
3) How much do you think this image would appeal to someone who is *liberal*?
    a. Not at all
    b. A little
    c. A moderate amount
    d. A lot

Selection of statements and images was accomplished by ensuring that one version of a statement (or image) could be classified as associated to liberal groups/values, one version as associated to conservative groups/values, and one version to neither liberal nor conservative groups.

Specific results from the pilot are available upon request.

Figure Z2. Images evaluated for possible inclusion into the study



Appendix AA. Project 2 – Details on Screening Procedure During Recruitment

The recruitment strategy was designed to recruit approximately 1100 participants using *Mturk* (managed through CloudResearch.com). Participants were required to be U.S. residents, and 18 years old or older.

To ensure data quality, participants had to meet several criteria to be included into the study. First, participants access to the *MTurk* hit was limited based on the following criteria set through *CloudResearch*:

- Participants could not have participated in the pilot study for Project 2
- Participants had to meet the following worker qualifications:
    - Located in the United States
    - HIT approval rate (%) for all requesters' HITs of 95-100%
    - Number of HITs approved of 500-1,000,000
- Used CloudResearch's "verify worker country and state location" setting to ensure the geographical location of participants
- Enabled CloudResearch's function to block suspicious geocode locations
- Enabled CloudResearch's function to block duplicate IP addresses
- Enabled CloudResearch's function to block duplicate geolocation

When participants began the hit, they were asked to first complete a screener to establish their eligibility to participate in the study. First, they were asked to:

- Verify that they were 18 years or older
- Verify that they resided in the United States
- Complete a reCaptcha

Second, Participants responded to six questions on political ideology. The 6 items were as follows:

1. How would you describe your political party preference?
    - 1 = Strong Democrat
    - 2 = Democrat
    - 3 = Slightly Democrat
    - 4 = Neither Democrat nor Republican
    - 5 = Slightly Republican

- 6 = Republican
- 7 = Strong Republican
- 8 = I do not know
- 9 = Does not apply to me

2. How would you describe your political views in general?
- 1 = Strongly liberal
- 2 = Moderately liberal
- 3 = Slightly liberal
- 4 = Moderate/middle of the road
- 5 = Slightly conservative
- 6 = Moderately conservative
- 7 = Strongly conservative
- 8 = I do not know
- 9 = Does not apply to me

3. In terms of your social/cultural views, where would you place yourself on the following scale?
- 1 = Strongly liberal
- 2 = Moderately liberal
- 3 = Slightly liberal
- 4 = Moderate/middle of the road
- 5 = Slightly conservative
- 6 = Moderately conservative
- 7 = Strongly conservative
- 8 = I do not know
- 9 = Does not apply to me

4. In terms of your economic views, where would you place yourself on the following scale?
- 1 = Strongly liberal
- 2 = Moderately liberal
- 3 = Slightly liberal
- 4 = Moderate/middle of the road
- 5 = Slightly conservative
- 6 = Moderately conservative
- 7 = Strongly conservative
- 8 = I do not know
- 9 = Does not apply to me

Please indicate your opinion towards the following two groups:

5. Democrats *[a reverse-coded item if items are coded from liberal to conservative]*

- 1 = Extremely negative
- 2 = Moderately negative
- 3 = Slightly negative
- 4 = Neither negative nor positive
- 5 = Slightly positive
- 6 = Moderately positive
- 7 = Extremely positive

6. Republicans

- 1 = Extremely negative
- 2 = Moderately negative
- 3 = Slightly negative
- 4 = Neither negative nor positive
- 5 = Slightly positive
- 6 = Moderately positive
- 7 = Extremely positive

The political orientation measure was scored using a mean of the 6 items (treating response options 8 & 9 as missing data when selected on items 1-4). The result was a score assigned to participants that ranged from 1 = strongly liberal to 7 = strongly conservative (with 4 = politically moderate).

Scores on political orientation were then used to establish a quota-based sampling during recruitment of participants. Specifically, we aimed to recruit at least 366 individuals that were:

- Politically liberal (i.e., average scores lower than 3)
- Politically conservative (i.e., average scores higher than 5)
- Politically moderate (i.e., score equal or above 3, or equal or below 5)

Once the quota of 366 participants had been met for a given category, new participants whose score fell in that category were excluded from participation in the study.

Lastly, after completing the political orientation, participants were shown a picture of an eggplant (Figure AA1). Participants were asked to t identify the vegetable in the image. Participants were only allowed to participate if they accurately identified the image as that of an “eggplant” or “egg plant”. Prior work has established that this question can be used to identify and exclude participants which may be answering the survey from outside the U.S., but using an IP masking software to hide their true location (e.g., see: Moss & Litman, 2018). Our study eligibility criteria included a requirement that participants be located within the USA, and this question helped enforce this criterion.

Figure AA1. Picture of Eggplant Used for Screening purposes

Appendix AB. Project 2 – Correlations & Descriptives Per Condition

This appendix contains correlation matrices and descriptive statistics broken down by the three experimental conditions in the study (i.e., the liberal appeal condition, the conservative appeal condition, and the neutral appeal condition).

Table AB1. Correlation Matrix and Descriptives for the Conservative Appeal (N = 370).

Variable	1	2	3	4	5	Mean	SD
1. Political orientation	-	.42***	.41***	.36***	-.35***	3.96	1.78
2. Attitude towards the organization		-	.90***	.67***	-.71***	4.38	1.21
3. Attitude towards contributing			-	.75***	-.72***	4.10	1.34
4. Positive behavioral intention				-	-.48***	2.27	1.11
5. Negative behavioral intention					-	2.12	1.09

Note. SD = Standard Deviation. Correlations were computed using standardized scores for each variable, whereas the means and SDs were calculated using raw variable scores. *p < .05; **p < .01; ***p < .001

Table AB2. Correlation Matrix and Descriptives for the Liberal Appeal (N = 369).

Variable	1	2	3	4	5	Mean	SD
1. Political orientation	-	-.30***	-.34***	-.28***	.24***	3.98	1.73
2. Attitude towards the organization		-	.86***	.60***	-.63***	4.63	1.03
3. Attitude towards contributing			-	.72***	-.63***	4.45	1.18
4. Positive behavioral intention				-	-.39***	2.52	1.09
5. Negative behavioral intention					-	1.91	.95

Note. SD = Standard Deviation. Correlations were computed using standardized scores for each variable, whereas the means and SDs were calculated using raw variable scores. *p < .05; **p < .01; ***p < .001

Table AB3. Correlation Matrix and Descriptives for the Neutral Appeal (N = 362).

Variable	1	2	3	4	5	Mean	SD
1. Political orientation	-	-.012	-.017	-.055	-.011	3.95	1.74
2. Attitude towards the organization		-	.74***	.60***	-.49***	4.90	.73
3. Attitude towards contributing			-	.70***	-.53***	4.65	.92
4. Positive behavioral intention				-	-.37***	2.65	1.07
5. Negative behavioral intention					-	1.72	.81

Note. SD = Standard Deviation. Correlations were computed using standardized scores for each variable, whereas the means and SDs were calculated using raw variable scores. *p < .05; **p < .01; ***p < .001