Let's Get Physical: Source and Frame Effects in Exercise Messages to College-Aged Women

Hannah Bremer

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Abstract

This paper explores the effects of message source and message framing in exercise messages targeted at college-aged women. This study examines how different types of source (corporate, government, or social media influencer) and different message frames (short-term and long-term gain-frame) affect an individual's attitudes and intentions toward exercise. A 3-by-2 cross-sectional experiment involving 111 female undergraduate students at the University of Minnesota exposed participants to one of six messages and then measured participants' perceived value of exercise, perceived benefit of exercise, and intentions to exercise. The findings revealed that the government source had a significant effect ($F(2, 108) = 3.84$, $p = 0.03$) on participants' perceived benefit of exercise compared to the corporate or social media influencer sources. However, there were no main effects of the message frames on individual's attitudes and intentions toward exercises. The observations from this study provide insights for individuals and agencies looking to increase exercise participation among young women through social marketing or health communication campaigns. Further, this study lays the groundwork for future research into the little-explored fields of source type and temporal distance in exercise messages as well as the opportunities that new media and social media influencers influencers offer as a potential tool for social marketing campaigns.

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Introduction

Prevalence rates of obesity and diabetes have steadily climbed over the past several decades, and the illnesses are now two of the most widespread health conditions in the United States. Obesity now affects 93.3 million U.S. adults, while more than 30 million people in the U.S. have diabetes and more than 84 million U.S. adults have prediabetes (Centers for Disease Control and Prevention [CDC], 2018). As a result, promoting healthy habits such as exercise among the general population is one of the greatest challenges faced by government agencies, the healthcare industry, and beyond. Message distributors across platforms and industries have engaged in social marketing and health communication efforts to attempt to influence audience behavior and improve the overall health of society.

The recent rise of digital media and influencer marketing provides new opportunities for social marketers and health communicators to reach younger audiences—specifically college-aged women, who are oftentimes the target audience for influencer messages of any kind. Influencer marketing is commonly used by brands to promote and sell products, but the following that these influencers have could instead be leveraged for a social marketing purpose to sell the audience on a healthy behavior. Further, targeting social marketing campaigns toward this younger population—college-aged women—could have broader public health implications. If the social marketing messages effectively encourage positive changes in exercise attitudes and intentions during young adulthood, these young women could carry these healthy habits with them as they enter adulthood. Targeting a younger audience in this way could lead to a healthier adult population.

Much research has been done in an attempt to identify methods of effectively changing exercise attitudes and behaviors among different segments of the population. This includes past studies focusing on older adults (Gorely & Gordon, 1995; Greaney et al., 2008), lower-income groups (Withall, Jago, & Fox, 2012), overweight adults (Kreuter, Bull, Clark, and Oswald, 1999), pregnant women (Gaston and Gammage, 2011), and healthy midlife women (Segar, Eccles, and Richardson, 2011). However, among these studies few have specifically focused on the population segment of college-aged women. Jones, Sinclair, and Courneya (2003) examined messages promoting physical exercise in college students, and Rosen (2000) studied the processing of exercise messages by sedentary college students. However, both of these studies involved both male and female participants. Similarly, little research has been done surrounding social marketing campaigns focusing on exercise behavior. The purpose of this study, therefore, is to demonstrate the effects of source and message and how they interact in delivering exercise messages to college-aged women.

Examining this topic with this population raises several questions. What type of source can most effectively communicate social marketing messages about exercise to this audience? What message strategy is the target audience most receptive to? Are short-term or long-term benefits more likely to change the exercise attitudes and intentions of the target audience? This research also explores how the source and message factors' effects on participants' attitudes and intentions might be moderated based on participants' existing exercise behaviors and their evaluation of the messages.

By exploring these questions, this study aims to identify possible strategies for communicating exercise messages to female college students. Within the societal goal of

communicating the benefits of exercise so that young women change their attitudes and intentions, this study seeks to evaluate what types of sources can create these messages with the greatest effect. The results of this study can help message creators—government agencies, corporations, and influencers—understand their role in and the best approach to this intersection of health communication and social marketing.

Literature Review

Exercise and Young Women

According to the Centers for Disease Control and Prevention [CDC], only 1 in 5 (21%) U.S. adults meet their physical activity guidelines for a recommended 150 minutes of moderate aerobic activity every week (CDC, 2018). The CDC cites numerous long-term and short-term benefits of regular exercise. Individuals who are physically active can experience improved sleep, mental health, and cognitive capacity in the short term (CDC, 2018). Research also suggests long-term benefits including longevity and decreased risk of heart disease, stroke, hypertension, obesity, type 2 diabetes, depression, some cancers, and other chronic illnesses (CDC, 2018). A 2013 review of longitudinal studies drew evidence of physical activity's effects on overall health during an individual's lifetime, suggesting that physical activity also has a positive effect against the development of dementia and Alzheimer's disease (Reiner, Niermann, Jekauc, & Woll, 2013).

Research has shown that demographic factors—namely age and gender—change an individual's likelihood of meeting recommended physical activity levels. The CDC reports that adult men (54%) are more likely than adult women (46%) to meet their physical activity guidelines (CDC, 2018). While younger adults are more likely to meet these physical activity

guidelines, the gender gap is greater in this population: a 2014 cross-sectional study of college students found that only 75% of females surveyed met the physical activity guidelines compared to 89% of males (Towne et al., 2017). This gender disparity underscores the importance of effectively targeting young women with exercise messages aiming to improve their attitudes and intentions.

Social Marketing and Health Communication

Many population-scale efforts to increase physical activity have been in the form of social marketing campaigns. Marketing scholar Andreason (1995) defined social marketing as "the application of commercial marketing technologies to the analysis, planning, execution, and evaluation of programs designed to influence the voluntary behavior of target audiences in order to improve their personal welfare and that of their society" (cited in Kotler & Lee, 2008, p. 8). Like all marketing campaigns, social marketing campaigns focus on a specific target market. However, the intent is not to sell goods or services for financial gain but rather to sell a desired behavior for societal gain. Kotler and Lee explain that this voluntary behavior change can improve health, prevent injuries, protect the environment, and contribute to communities (Kotler & Lee, 2008).

Social marketing is seen as a departure from conventional methods of enacting social change, such as enacting laws to force behavior change or educating people in the hope of behavior change. Rather, social marketing is believed to be more effective because the campaigns use marketing techniques—like segmentation, competitive analysis, and the marketing mix—to reach the consumer and drive him or her toward voluntary behavior change (Rundle-Thiele, Kubacki, & Gruneklee, 2016). Social marketing scholars Carins and

Rundle-Thiele emphasized the discipline's emphasis on consumer insights and understanding the target audience: "Social marketing seeks to give consumers a voice and uses insights gained from consumers in the intervention planning process" (Carins & Rundle-Thiele, 2014). Rundle-Thiele et al.'s (2016) analysis emphasized the discipline's effort to make the exchange convenient and easy for the consumer by creating benefit packages while minimizing costs and perceived barriers. Further, social marketing campaigns seek to send messages through media that is not only relevant to, but preferred by the target audience. Thus, reaching young women with exercise messages becomes a challenge that can be solved with marketing principles rather than medical principles.

Social marketing is grounded in the foundations of exchange theory. According to exchange theory, consumers must believe that they will receive as much as or more than they give in order for the exchange to seem worthwhile (Lee & Kotler, 2008). Applying this theory to social marketing campaigns focused on physical activity, Rundle-Thiele et al. (2016) specifically highlighted the challenges of convincing consumers of this equal exchange as follows:

> "The benefits (better health via physical exercise) are temporally distant, which may devalue taking up a new activity or increasing the level of physical activity in comparison to a competing or habitualized behavior that offers immediate satisfaction or reward." (p. 185)

This concept of temporal distance as a barrier to behavior change raises the question of whether emphasizing less temporally distant (i.e. short-term) benefits of physical exercise would lead to an increase in behavior change. This study explores this concept of temporally distant benefits more in the discussion of the Construal Level Theory later in this chapter.

Persuasion theory also provides a foundation for understanding how health communicators and social marketers can approach behavior change. Although typically applied in the contexts of marketing and advertising, persuasion theory is also useful in promoting health behaviors rather than purchase behaviors. Within persuasion theory are several models and theories that help us understand individuals' acceptance of messages. The elaboration likelihood model (ELM) of attitude change (Cacioppo, Petty, & Stoltenberg, 1985; Petty & Cacioppo, 1986b) has been applied to health promotion (Kreuter, Bull, Clark, & Oswald, 1999) and, more recently, specifically to research on source and message effects on exercise messages (Jones et al., 2003). This model states that attitude change related to message strength depends on the likelihood that the issue will be elaborated on or thought about (Jones et al., 2003). Based on this theory, audience members must go beyond seeing the persuasive message and actually think about and process the information in order for attitude change to take place. This processing typically involves evaluation of the message source and content. The prior research applying this model to health promotion demonstrates the importance of source and message in health promotion and lays the groundwork for the present study.

Source Effects in Exercise Messages

The existing literature surrounding the source effects of exercise messages is largely focused on the concept of source attributes—most commonly, source credibility. Heesacker and Petty (1983) established that highly credible sources can alter persuasibility by increasing the recipient's message-relevant thinking. Jones et al. (2003) specifically examined source credibility in the context of promoting physical exercise in college students, and this study concluded that a credible source causes more positive exercise intentions than a noncredible source, but source

credibility did not have an effect on exercise attitudes or behavior (Jones et al., 2003). Arora, Stoner and Arora (2006) measured perceived trustworthiness, expertise and credibility in the context of exercise messages, and they concluded that source credibility affects an individual's attitude toward exercise as well as their likelihood of engaging in physical activity (Arora et al., 2006). Thus, existing literature supports the idea that credible sources can have a significant effect on individuals' exercise attitudes and intentions.

Other studies have examined source factors including expertise, attractiveness, and health. DeBono and Harnish (1988) studied source expertise and attractiveness with an audience of male undergraduate students. This study found that high self-monitoring individuals agreed with an expert source regardless of argument quality, whereas attractiveness was only effective with this group when delivering strong arguments. Low self-monitoring individuals, however, agreed with an attractive source regardless of argument quality, whereas expertise was only effective when it was delivering strong arguments (DeBono et al., 1988). Rosen (2000) similarly studied source expertise and respondents' readiness for change in the context of exercise messages to sedentary college students, but he found that source expertise had no significant effect on exercise attitudes for students at any level of change (Rosen, 2000). Finally, Siu (2010) looked at perceived source healthiness in terms of its effects on college students. This study concluded that a healthy source communicating a gain-framed message and an unhealthy source communicating a loss-framed message had the greatest impact on message recipients (Siu, 2010). These studies combine to suggest the importance of the way individuals evaluate and assign attributes to the sources behind the messages they are exposed to.

In addition to source attributes, some research has been done examining source type, which is a primary focus of the present study. Messages that consumers see can come from a variety of sources—corporations, nonprofits, government agencies, celebrities, friends, family members, or strangers. The attributes that individuals assign to these labels can impact how the message itself is processed and evaluated by the individual. For example, research suggests that government and nonprofit sources are viewed as more credible than for-profit sources (Haley & Wilkinson, 1994; Hammond, 1987). Further research suggests that information from a corporate source is perceived as less believable than information from the government (Lirtzman & Shuv-Ami, 1986). These findings suggest that a government source would be more effective than a corporate source, but little research has explored the impact of source specifically in exercise messages. Further, it is important to note that these studies were conducted several decades ago during a different political climate when the U.S. saw higher trust in the government. One must consider how today's polarized political climate would affect motivated reasoning as it relates to individuals' attitudes toward the government and perceptions about government sources.

Similarly, little research has been done about the emerging trends in health communication sources—specifically, social influencer marketing as a source category for social marketing. Bernhardt, Chaney, and Chaney (2013) explore the internet-enabled new media's "enormous potential to revolutionize health education with diverse populations." The authors cite new media's ability to "deeply engage large numbers of targeted individuals and communities over a sustained period of time" and "design and deliver highly relevant and personalized health education messages that are sent through the most accessible and persuasive channels at the most appropriate and influential times," among others (Bernhardt et al., 2013, p. 129). However, the

authors focus on studies about other new media platforms and do not examine networked social media as an opportunity for health communication. Given the increasing prominence and power of these networks, this study further attempts to investigate whether a population of young women would evaluate and assign attributes to this source type differently than government or corporate sources.

Based on this existing literature, this study hypothesizes that exercise messages coming from a government source—as opposed to a corporate source or an influencer source—will have more favorable attitudes and intentions toward exercise. While social influencers might be more relatable or relevant to a young woman, this study theorizes that government sources' credibility will overpower influencers' relatability in the way participants evaluate the messages and rate their attitudes and intentions. Therefore,

H1a. Individuals exposed to exercise messages coming from a government source will report a higher perceived value of exercise compared to individuals exposed to messages from other sources.

H1b. Individuals exposed to these messages from a government source will report a higher perceived benefit of exercise compared to the corporate or influencer source groups.

H1c. Individuals exposed to these messages from a government source will report greater intention to exercise in the near future compared to the individuals who saw messages from the corporate or influencer sources.

Framing Effects in Exercise Messages

Research surrounding message effects is grounded in Kahneman and Tversky's prospect theory (1981), which focuses on decision making under risk. This research found that individuals made different decisions depending on whether the prospects were framed as a gain or a loss (Kahneman & Traversky, 1979). Many subsequent studies have expanded on this idea to conclude that loss-framed messages can inform audiences about consequences, while gain-framed messages are more likely to impact the audience's intentions (Arora et al., 2006; Gray & Harrington, 2011; Jones et al., 2003; Robberson & Rogers, 1988; Siu, 2010). In the context of this study, these findings suggest that in order to influence individuals' intentions to exercise, it would be more effective to communicate the benefits of exercise rather than the consequences of not exercising. This research on the importance of message framing lays the groundwork for message framing as the second independent variable in this study.

Other studies have examined the effects of exercise messages through different frames. Arora et al. (2006) studied prevention versus detection messages and found that message framing has less of an influence when coming from a high-credibility source compared to a low-credibility source. That is, negatively framed messages must be delivered by a credible source in order to be effective, while source credibility does not have as much of an effect for positively framed messages (Arora et al., 2006). Gray et al. (2011) took a different approach in examining narrative versus statistical message framing with exercise messages, but the researchers found no significant differences in the effects of narrative versus statistical exercise messages (Gray et al., 2011). These findings offer opportunities to expand on these studies and

examine prevention versus detection framing or narrative versus statistical framing in messages aimed specifically at college-aged women.

Construal Level Theory and Message Effects. The Construal Level Theory of Psychological Framing establishes perceived similarity or difference of the message recipient from the message source as a form of psychological distance (Young, 2015). The theory states that this psychological distance—which can be temporal, geographical, or social—influences information processing by that individual (Young, 2015). The more distant the concept is, the more abstract the activity and the outcomes—in this case, physical activity and its benefits—will be to the individual. Young (2015) applied this theory to health messaging through the lens of social distance (Young, 2015), but there is little research applying the construal level theory to health messaging through the lens of temporal distance—that is, short-term versus long-term framing. One notable study that employed construal level theory to examine temporal distance in exercise messaging was Segar et al. (2011). This study proposed rebranding exercise as a way to enhance daily quality of life, reasoning that, "larger delayed rewards for exercising, like staying healthy or preventing illness, may not be as motivating or provide as good of feedback as smaller, immediate rewards, like improving mood or decreasing stress" (Segar, Eccles, & Richardson, 2011, p. 10). This study seeks to employ this reasoning and expand current knowledge to apply this theory to social marketing and exercise messages relevant to the target audience.

This study will apply construal level theory to examine the effectiveness of temporally distant (long-term) versus temporally proximal (short-term) message framing in communicating exercise benefits to college-aged women. Based on literature surrounding the construal level

theory and temporal distance, this study hypothesizes that individuals exposed to messages including short-term benefits of exercise will report more favorable exercise attitudes and intentions compared to individuals exposed to messages including long-term benefits of exercise. This study supposes that due to the population's young age and busy college lifestyle, individuals will be more interested in benefits that they might feel in a matter of days—like improved sleep and ability to focus—rather than benefits that they will not see for several decades—like decreased risk of chronic illness. Based on these existing studies and this logic, the study proposes the following hypotheses:

H2a.   Individuals who are exposed to the short-term benefits of exercise will rate a higher perceived value of exercise compared to individuals who are exposed to the long-term benefits of exercise.

H2b.   Individuals who are exposed to the short-term exercise benefits will report higher perceived exercise benefits compared to those in the long-term benefit framing group.

H2c.   Individuals who view the short-term exercise benefits will report more favorable exercise intentions for the near future.

While all of these previous studies and theoretical frameworks provide a foundation for examining the target audience's reception of exercise messages, this study will primarily apply construal level theory to understand the effects of source and message on exercise messages targeted toward college-aged women. Based on this entire collection of existing literature, as well as the previously discussed hypotheses about message source and message frame, this study wonders how the two independent variables might interact to create differences in individuals'

reported attitudes and intentions toward exercise. In order to answer the big question that

inspired this research—"*Who* can most effectively communicate the benefits of exercise to

young women, and *how* can they do it most effectively?"—this research study must consider not

only the effects of each individual independent variable, but also how the two independent

variables interact to create a greater effect. Therefore, this research study asks the following

research question:

RQ1.   How does message source interact with message frame to have the greatest effect

on individuals' perceived value of exercise, perceived benefit of exercise, and

exercise intentions?

Methods

Design and Participants

The study employed a 3 (message source: corporate vs. government vs. influencer) x 2

(message framing: short-term benefits vs. long-term benefits of exercise) factorial experiment

design to test the hypotheses and research question. Each participant was randomly assigned to

one of six conditions, and the participants' attitudes and intentions toward exercise were

measured following message exposure. In this study, attitudes were operationalized into two

dependent variables—perceived value and perceived benefit—to create a total of three dependent

variables: perceived value, perceived benefit, and exercise intentions. In addition to the

dependent variables, the study also measured participants' existing exercise behaviors as well as

their evaluations of the message source and content.

Participants were recruited from the University of Minnesota Hubbard School of

Journalism and Mass Communication subject pool through the school's web-based SONA

research recruitment system. Participants were all undergraduate students at the University of

Minnesota Twin Cities who self-identify as female. A total of 122 participants agreed to be part

of the study, and the final cleaned sample included 111 participants. Respondents were all

between the ages of 18 and 24 with an average age of 20 years. Of the respondents, 12 were

first-year students, 39 were second-year students, 37 were third-year students, 19 were

fourth-year students, and 3 were fifth-year students or beyond. In terms of ethnicity, 96 reported

as White/Caucasian, 4 reported as African American, 7 reported as Hispanic, 12 reported as

Asian, and 1 reported as Native American. The students represented a vast array of majors. The

most commonly reported major was journalism or communications, but the sample included

students from a variety of majors including engineering, accounting, sociology, and sport

management.

Stimuli Development

The study used one stimulus material: a fictional Instagram post that manipulated the

source type as well as the message framing. Six different informational Instagram posts were

designed to show various combinations of short-term and long-term framing with three different

types of source: a fictional corporation called Nolan Holdings, a fictional government agency

called the Bureau of Physical Activity and Health, and a fictional lifestyle influencer named Jess

Eden. Each post was accompanied by a short description of the fictional source—the name and

industry of the corporation, the name and purpose of the government agency, and the name and

credentials of the influencer. This description implicitly stated the type of each source by

including one of the following statements with the source name and source type in bold: "Nolan

Holdings is a multinational corporation," "The Bureau of Physical Activity and Health (BPAH)

is a division of the U.S. Centers for Disease Control (CDC)," or "Jess Eden is a 24-year-old lifestyle influencer." For example, the following description preceded the message from the corporate source:

> "**Nolan Holdings** is a **multinational corporation** headquartered in the U.S. that has ownership of several companies spanning the retail, hospitality, and food service industries. One of Nolan Holdings' corporate social responsibility efforts involves educating the public about the health benefits of physical activity and empowering them to make healthy choices."

The posts all included one of two infographics created for the experiment, featuring facts from the U.S. Centers for Disease Control about either the short-term or long-term benefits of physical exercise. This information came from the CDC's web page titled "Facts about Physical Activity" (CDC, 2018). In addition to the infographics, the posts all included the same caption as follows (with pronoun differences depending on source type): "Regular physical activity is one of the most important things you can do for your health. We're working with @CDCgov to help YOU get moving and get healthy! Visit the link in our bio for more information." Other minor aspects of the posts, including profile photo and number of likes on the post, were constant across the six stimuli.

Figure 1. An example of the short-term framed message from the corporate source (left) and the long-term framed message from the government source (right). See appendix for all stimuli materials.
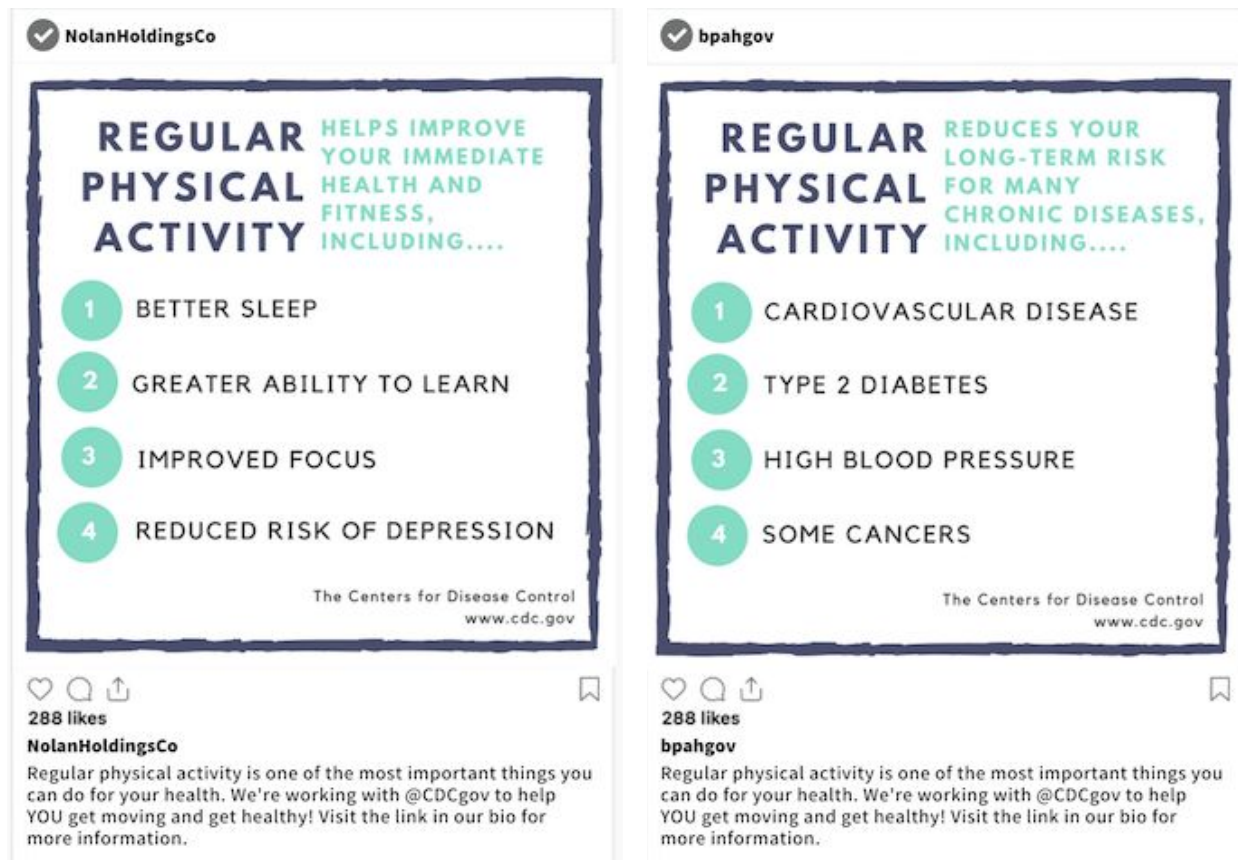
Procedures

The survey began with a consent form as well as a screening question to ensure that the experiment only included participants who self-identified as female. Following these preliminary questions, participants were first asked a series of questions to assess their existing lifestyle and exercise behaviors. This section asked participants to rate the extent to which they lead a healthy lifestyle, exercise, do some aerobic activity, and do some strength training. Participants were also asked about their exercise habits, including indicating how many times in the past week they had engaged in at least 30 minutes of physical activity. The participants were then shown one of the

six randomly assigned stimuli materials, starting with the short description of the source and then the Instagram post itself. The source description and the Instagram post were on separate pages in an attempt to direct participants' attention and ensure that they read the source description before viewing the image. After message exposure, participants across all six conditions were then asked a series of questions to check the manipulation and evaluate the message source and content. This message evaluation section was followed by a section of questions to measure the dependent variables: respondents' attitudes toward exercise and their intentions toward exercise. Participants were asked a series of demographic questions, including age, race, academic year, and major. Finally, the questionnaire concluded with the following debriefing note: "Please note that the Instagram post you read is not real and the message source is not an actual entity. However, all of the facts included in the infographic are true and came from the U.S. Centers for Disease Control."

Measurement

Manipulation check. After exposure to the stimulus material, participants were asked a handful of questions to verify that the manipulation was successful. This section began with a question to check the manipulation of the message source, followed by two questions to check the manipulation of the message frame. Participants were first asked to categorize the message source given the following choices: Corporate source, Government source, or Influencer source. Participants were then asked to categorize the benefits of exercise that they just read on a seven-point scale with end points as short-term (long-term) and immediate (distant).

Exercise attitudes. In this study, exercise attitudes were operationalized into two measurable dependent variables: perceived value of exercise and perceived benefit of exercise.

Both of these attitude measures were presented using seven-point semantic differential scales. First, to measure the perceived value of exercise, participants were asked to rate the extent to which they believed that exercise is a good (bad) use of time, exercise is an excellent (poor) habit, and exercise is necessary (unnecessary) to living a healthy lifestyle. These measures produced a Cronbach's Alpha score of .72, indicating reliability in their combined measure of perceived exercise value. Next, to measure the perceived overall benefit of exercise, participants were asked to rate the extent ("Not at all" to "Very much") they believe that exercise can benefit their short-term health, long-term health, physical health, and mental health. These measures of perceived exercise benefit produced a Cronbach's Alpha score of .77, indicating reliability in their combined measure. These scales combined to produce a measure of participants' attitudes toward exercise following message exposure.

Exercise intentions. As the third dependent variable, participants' exercise intentions were operationalized as exercise priority and exercise intent. These were measured using two questions. First, a seven-point semantic differential scale asked participants to rate whether exercise is a priority (not a priority) for them. Participants were then asked how many times in the next week they intended to exercise (defined as at least 30 minutes of physical activity). The second question, measuring exercise intent, acted as the primary measure of participants' exercise intentions, while the first question acted as a supplementary measure of participants' prioritization of exercise activities.

Control measures. Based on the idea that people who exercise frequently versus infrequently might interpret exercise messages differently, this study measured existing exercise behavior to statistically control any unintended effects. Prior to exposure to the messages,

participants of the study were asked to indicate how many times in the past week they have

exercised. These responses were used as a control variable, and the significant difference in

source effects on perceived exercise benefit ($p = .03$) becomes even more significant ($p = .01$)

when controlling for existing behavior. This influence on the dependent variables confirms the

importance of controlling for participants' existing exercise behavior

Results

Manipulation Check

The results of a t-test showed that there was a significant effect of manipulation of

message frame. A t-test of the first manipulation check question, which asked participants to

evaluate the exercise benefits they just read on a scale from 1 (short-term) to 7 (long-term),

produced a significantly successful manipulation, $t(111) = -2.85$, $p < .05$. Overall, participants

who were shown the long-term benefit infographic produced a higher mean rating ($M = 5.72$, $SD

= 1.24$) than participants shown the short-term benefit infographic ($M = 5.03$, $SD = 1.32$). Thus,

the manipulation of message frame was successful.

Figure 2. Descriptive analysis of variables (n=111).

Effects			Attitudes		Intentions	
			Perceived Value	*Perceived Benefit*	*Exercise Priority*	*Exercise Intent*
Source Type	Message Frame	*n=*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*
Government	Short-Term	19	6.39 (0.52)	6.33 (0.60)	4.95 (1.18)	3.11 (1.20)
	Long-Term	19	6.53 (0.68)	6.75 (0.39)	5.21 (1.69)	3.32 (1.20)
	Total	38	6.46 (0.60)	6.54 (0.54)	5.08 (1.44)	3.21 (1.19)
Corporate	Short-Term	18	6.32 (0.54)	6.24 (0.60)	4.61 (1.79)	2.83 (1.72)
	Long-Term	18	6.20 (0.81)	6.10 (0.85)	4.89 (1.53)	3.17 (1.62)
	Total	36	6.26 (0.68)	6.17 (0.72)	4.75 (1.65)	3.00 (1.66)
Influencer	Short-Term	19	6.25 (0.77)	6.07 (0.72)	4.47 (1.74)	2.89 (1.45)
	Long-Term	18	6.32 (0.75)	6.31 (0.67)	5.22 (1.44)	3.61 (1.09)
	Total	37	6.28 (0.75)	6.19 (0.70)	4.84 (1.62)	3.24 (1.32)
Total	Short-Term	56	6.32 (0.62)	6.21 (0.64)	4.68 (1.57)	2.95 (1.44)
	Long-Term	55	6.35 (0.74)	6.39 (0.70)	5.11 (1.54)	3.36 (1.31)
	Total	111	6.33 (0.68)	6.30 (0.68)	4.89 (1.56)	3.15 (1.39)

Note: Measures are based on a 7-point scale.

Main Effects of Message Source

Hypothesis H1a: Perceived Value

H1a predicted that participants in the government source condition would have higher

perceived value of exercise compared to participants in the corporate or influencer source

conditions. A one-way ANOVA test found that there were no statistically significant differences

in perceived value due to the manipulation of message source, $F(2, 108) = 0.95$, $p = 0.39$ (see

Figure 3). This value was measured using three questions. When asked whether they believe

exercise is a good use of time, participants exposed to the government message indicated a

higher perceived value ($M = 6.46$, $SD = 0.60$) compared to those exposed to the corporate

message ($M = 6.26$, $SD = 0.68$) or the influencer message ($M = 6.25$, $SD = 0.77$). In the second

question, when asked to rate exercise as a bad or good habit, participants exposed to the

government message indicated a higher perceived value ($M = 6.70$, $SD = 0.53$) compared to

those exposed to the corporate message ($M = 6.50$, $SD = 0.70$) or the influencer message ($M =$

6.60, $SD = 0.79$). In the third question, when asked whether they believe exercise is necessary to

living a healthy lifestyle, participants exposed to the government message indicated a higher

perceived value ($M = 6.29$, $SD = 0.87$) compared to those exposed to the corporate message ($M =$

5.94, $SD = 0.98$) or the influencer message ($M = 5.86$, $SD = 1.13$). When combining these value

measures, the group exposed to the government message indicated a higher overall perceived

value ($M = 6.46$, $SD = 0.60$) compared to the groups exposed to the corporate message ($M =$

6.26, $SD = 0.68$) or the influencer message ($M = 6.25$, $SD = 0.77$). The relative similarity

between these mean values, however, suggests that regardless of the source of the message they

were exposed to, participants generally believe exercise to be of high value. However, once

again, the one-way ANOVA test found no statistically significant effect of message source on

perceived exercise value. Therefore, hypothesis H1a was not supported.

Figure 3. *Univariate analysis of covariance for the effect of source type on perceived value of exercise with mean scores and standard deviations for each condition.*

| Dependent Variables | Source Type | | | | | | F | df | p |
| | Government (n=38) | | Corporate (n=36) | | Influencer (n=37) | | | | |
	M	SD	M	SD	M	SD			
Perceived Value	6.46	0.60	6.26	0.68	6.25	0.77	0.95	2	0.39
Good use of time	6.39	0.97	6.31	0.86	6.38	0.79			
Good habit	6.70	0.53	6.50	0.70	6.60	0.64			
Necessary to living a healthy lifestyle	6.29	0.87	5.94	0.98	5.86	1.13			

Note: Measures are based on a 7-point scale.

Hypothesis H1b: Perceived Benefit

Similar to H1a, H1b predicted that participants in the government source condition would have higher perceived benefit of exercise compared to participants in the corporate or influencer source conditions. A one-way ANOVA test found statistically significant main effects of source type on perceived benefit, $F(2, 108) = 3.84$, $p = 0.03$ (see Figure 4). Perceived benefit was measured using a four-part scale asking participants to rate the extent to which they believe that exercise can benefit their short-term health, long-term health, physical health, and mental health. Overall, participants believed exercise to have a greater value on long-term health ($M = 6.68$, $SD = 0.59$) compared to short-term health ($M = 5.77$, $SD = 1.18$) and physical health ($M = 6.62$, $SD = 0.60$) compared to mental health ($M = 6.13$, $SD = 1.01$). When combined, these four questions produced an overall high value of perceived benefit of exercise ($M = 6.30$, $SD = 0.68$). Participants exposed to the government message indicated a higher perceived benefit of exercise on short-term health ($M = 6.11$, $SD = 1.09$) compared to those exposed to the corporate message

(M = 5.61, SD = 1.18) or the influencer message (M = 5.57, SD = 1.21). Participants exposed to

the government message also indicated a higher perceived benefit of exercise on long-term

health (M = 6.87, SD = 0.41) compared to those exposed to the corporate message (M = 6.58, SD

= 0.73) or the influencer message (M = 6.59, SD = 0.55). In the third question, participants

exposed to the government message again indicated a higher perceived benefit of exercise on

physical health (M = 6.79, SD = 0.47) compared to those exposed to the corporate message (M =

6.53, SD = 0.61) or the influencer message (M = 6.54, SD = 0.69). Finally, participants exposed

to the government message indicated a higher perceived benefit of exercise on mental health (M

= 6.39, SD = 0.86) compared to those exposed to the corporate message (M = 5.94, SD = 1.17) or

the influencer message (M = 6.03, SD = 0.96). When these four measures are combined,

participants exposed to the government message indicated a higher overall perceived benefit of

exercise (M = 6.54, SD = 0.54) compared to those exposed to the corporate message (M = 6.17,

SD = 0.72) or the influencer message (M = 6.18, SD = 0.70). This source effect on perceived

benefit was determined to be statistically significant by the one-way ANOVA test. Therefore,

hypothesis H1b was supported.

Figure 4. Univariate analysis of covariance for the effect of source type on perceived benefit of exercise with mean scores and standard deviations for each condition.

	Source Type											
	Government (n=38)		Corporate (n=36)		Influencer (n=37)		Total (n=111)					
Dependent Variables	M	SD	M	SD	M	SD	M	SD	F	df	p
Perceived Benefit	6.54	0.54	6.17	0.72	6.18	0.70	6.30	0.68	3.84	2	0.03
Short-term health	6.11	1.09	5.61	1.18	5.57	1.21	5.77	1.18			
Long-term health	6.87	0.41	6.58	0.73	6.59	0.55	6.68	0.59			
Physical health	6.79	0.47	6.53	0.61	6.54	0.69	6.62	0.60			
Mental health	6.39	0.86	5.94	1.17	6.03	0.96	6.13	1.01			

Note: Measures are based on a 7-point scale.

Hypothesis H1c: Intention

H1c predicted that participants in the government source condition would have higher exercise intentions compared to participants in the corporate or influencer source conditions. A one-way ANOVA test found that there were no statistically significant differences in exercise intentions due to the manipulation of message source, $F(2, 108) = 0.38$, $p = 0.69$ (see Figure 5). When asked to rate the extent to which exercise is a priority for them, participants exposed to the government message indicated higher exercise priorities ($M = 5.08$, $SD = 1.44$) compared to participants exposed to the corporate message ($M = 4.75$, $SD = 1.65$) or the influencer message ($M = 4.84$, $SD = 1.56$). However, when asked how many times in the next week they intended to exercise, participants exposed to the influencer message indicated a higher level of exercise intent ($M = 3.27$, $SD = 1.31$) compared to participants exposed to the government message ($M = 3.21$, $SD = 1.19$) or the corporate message ($M = 3.00$, $SD = 1.66$). Regardless of this difference,

the ANOVA test showed no statistically significant effect of message source on either measure

of exercise intention. Therefore, hypothesis H1c was not supported.

Figure 5. Univariate analysis of covariance for the effect of source type on exercise intentions with mean scores and standard deviations for each condition.

	Source Type								
	Government (n=38)		Corporate (n=36)		Influencer (n=37)				
Dependent Variables	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*	*df*	*p*
Exercise priority	5.08	1.44	4.75	1.65	4.84	1.56	0.44	2	0.65
Exercise Intent	3.21	1.19	3.00	1.66	3.27	1.31	0.38	2	0.69

Note: Measures of exercise priority are based on a 7-point scale. To measure exercise intent, participants were asked how many times in the next week they intended to engage in exercise with options ranging from 0 to 5+.

Main Effects of Message Framing

Hypothesis H2a: Perceived Value

H2a predicted that participants in the short-term message frame condition would have

higher perceived value of exercise compared to participants in the long-term message frame

condition. A *t*-test showed that the short-term condition (*M* = 6.32, *SD* = 0.61) and the long-term

condition (*M* = 6.35, *SD* = 0.74) did not differ significantly in their perceived value of exercise,

$t(109) = -0.28$, *p* = 0.78 (see Figure 6). When asked whether they believe exercise is a good use

of time, participants exposed to the short-term benefit message indicated a higher perceived

value (*M* = 6.38, *SD* = 0.73) compared to the participants exposed to the long-term benefit

message (*M* = 6.35, *SD* = 1.00). In the second question, when asked to rate exercise as a bad or

good habit, participants exposed to the long-term benefit message indicated a higher perceived

value (*M* = 6.70, *SD* = 0.62) compared to the participants exposed to the short-term benefit

message ($M = 6.60$, $SD = 0.63$). In the third question, when asked whether they believe exercise is necessary to living a healthy lifestyle, participants exposed to the long-term benefit message indicated a higher perceived value ($M = 6.05$, $SD = 1.04$) compared to the participants exposed to the short-term benefit message ($M = 6.02$, $SD = 0.98$). These three questions together show a higher perceived value among participants who were exposed to the long-term benefit message ($M = 6.35$, $SD = 0.74$) compared to participants who were exposed to the short-term benefit message ($M = 6.32$, $SD = 0.61$). Once again, however, the t-test of these results found no statistically significant effect of message frame on participants' perceived exercise value. Therefore, hypothesis H2a was not supported.

Figure 6. Independent samples t-test for the effect of message frame on perceived value of exercise with mean scores and standard deviations for each condition.

	Message Frame						
	Short-Term (n=56)		Long-Term (n=55)				
Dependent Variables	*M*	*SD*	*M*	*SD*	*t*	*df*	*p*
Perceived Value	6.32	0.61	6.35	0.74	-0.28	109	0.78
Good use of time	6.38	0.73	6.35	1.00			
Good habit	6.60	0.63	6.70	0.62			
Necessary to living a healthy lifestyle	6.02	0.98	6.05	1.04			

Note: Measures are based on a 7-point scale.

Hypothesis H2b: Perceived Benefit

Similarly, H2b predicted that participants in the short-term message frame condition would have higher perceived benefit of exercise compared to participants in the long-term message frame condition. A t-test showed that the short-term condition ($M = 6.21$, $SD = 0.64$)

and the long-term condition ($M = 6.39$, $SD = 0.70$) did not differ significantly in their perceived value of exercise, $t(109) = -1.42$, $p = 0.16$ (see Figure 7). Perceived benefit was measured using a four-part scale asking participants to rate the extent to which they believe that exercise can benefit their short-term health, long-term health, physical health, and mental health. Participants exposed to the long-term benefit message indicated a higher perceived benefit of exercise on short-term health ($M = 5.91$, $SD = 1.09$) compared to those exposed to the short-term benefit message message ($M = 5.63$, $SD = 1.24$). Participants exposed to the long-term benefit message also indicated a higher perceived benefit of exercise on long-term health ($M = 5.91$, $SD = 1.09$) compared to those exposed to the short-term benefit message ($M = 6.66$, $SD = 0.55$). In the third question, participants exposed to the long-term benefit message again indicated a higher perceived benefit of exercise on physical health ($M = 6.69$, $SD = 0.57$) compared to those exposed to the short-term benefit message ($M = 6.55$, $SD = 0.63$). Finally, participants exposed to the long-term benefit message indicated a higher perceived benefit of exercise on mental health ($M = 6.25$, $SD = 1.09$) compared to those exposed to the short-term benefit message ($M = 6.00$, $SD = 0.91$). Although the group of participants exposed to the long-term benefit message consistently indicated a higher overall perceived benefit of exercise, the t-test of these results found no statistically significant effect of message frame on participants' perceived exercise benefit. Therefore, hypothesis H2b was not supported.

Figure 7. Univariate analysis of covariance for the effect of message frame on perceived benefit of exercise with mean scores and standard deviations for each condition.

	Message Frame						
	Short-Term (n=56)		Long-Term (n=55)				
Dependent Variables	M	SD	M	SD	t	df	p
Perceived Benefit	6.21	0.64	6.39	0.70	-1.42	109	0.16
Short-term health	5.63	1.24	5.91	1.09			
Long-term health	6.66	0.55	6.71	0.63			
Physical health	6.55	0.63	6.69	0.57			
Mental health	6.00	0.91	6.25	1.09			

Note: Measures are based on a 7-point scale.

Hypothesis H2c: Intention

H2c predicted that participants exposed to the short-term benefit condition would have higher exercise intentions compared to participants exposed to the long-term benefit condition. A *t*-test showed that the short-term condition ($M = 2.96$, $SD = 1.44$) and the long-term condition ($M = 3.36$, $SD = 1.31$) did not differ significantly in their exercise intentions, $t(109) = -1.53$, $p = 0.13$ (see Figure 8). When asked to rate the extent to which exercise is a priority for them, participants exposed to the long-term benefit message indicated higher exercise priorities ($M = 5.11$, $SD = 1.54$) compared to participants exposed to the short-term benefit message ($M = 4.68$, $SD = 1.57$). When asked how many times in the next week they intended to exercise, participants exposed to the long-term benefit message indicated higher exercise priorities ($M = 3.36$, $SD = 1.31$) compared to the participants exposed to the short-term benefit message ($M = 2.96$, $SD = 1.44$).

Regardless of this difference, the *t*-test showed no statistically significant effect of message source on either measure of exercise intention. Therefore, hypothesis H2c was not supported.

Figure 8. Univariate analysis of covariance for the effect of message frame on exercise intentions with mean scores and standard deviations for each condition.

| | Message Frame | | | | | | |
| | Short-Term (n=56) | | Long-Term (n=55) | | | | |
Dependent Variables	*M*	*SD*	*M*	*SD*	*F*	*df*	*p*
Exercise priority	4.68	1.57	5.11	1.54	0.22	109	0.15
Exercise intent	2.96	1.44	3.36	1.31	0.05	109	0.13

Note: Measures of exercise priority are based on a 7-point scale. To measure exercise intent, participants were asked how many times in the next week they intended to engage in exercise with options ranging from 0 to 5+.

Interaction Effects

Research Question 1 wondered whether message source and message framing would interact to create a most effective combination for influencing participants' exercise attitudes and intentions. However, the ANOVA test of between-subject effects found no significant interaction effects between message source and message frame (see Figure 9). Thus, this study cannot suggest any combination of source type and message framing that would interact to have a significant effect on participants' exercise attitudes and intentions.

Figure 9. Test of between-subjects effects showing no significant interaction effects between the manipulation of message source and message frame.

Source	Dependent variable		*F*	*df*	*p*
Message Source & Message Frame Interaction	Attitude	Perceived Value	0.26	2	0.77
		Perceived Benefit	1.71	2	0.19
	Intention	Exercise Priority	0.13	2	0.88
		Exercise Intent	0.42	2	0.66

Discussion

This study examines the effects of source and message in exercise messages targeted at college-aged women. Specifically, this study looks at the effects that different types of sources (corporation, government agency, or social media influencer) and different temporal frames (short-term versus long-term gain-framed messages) have on individuals' attitudes and intentions toward physical activity. The findings of this study reveal insights about how female college students interpret and evaluate exercise messages and their sources. These insights can help parties in the areas of health communication or social marketing concerned with public health and physical fitness understand the most effective approach to improving the exercise attitudes and intentions of college-aged women.

Summary of Major Findings

First, the most significant finding from this study was a major effect of message source on participants' perceived benefit of exercise. Specifically, results found that the government source had a greater influence on perceived benefits of exercise compared to the corporate or influencer sources. We also observed that the government source group produced the highest

value out of the three source groups for the questions that asked how valuable they believed

exercise to be and how much of a priority exercise was for them. While this observation is not

statistically significant, our observation of the government source's significant effect on

perceived exercise benefit is consistent with existing research (Haley & Wilkinson, 1994;

Hammond, 1987) that suggests that government and nonprofit sources are viewed as more

credible than for-profit sources. While this study did not specifically ask participants to evaluate

the message source based on its credibility, our measures of perceived expertise and

trustworthiness can act as similar indicators. If we relate these measures to credibility, they

contradict Jones et al.'s (2003) findings that when promoting physical activity to college

students, source credibility plays a role in improving exercise intentions but not attitudes or

behaviors. However, our findings somewhat align with Arora et al.'s (2006) conclusion that

source credibility affects an individual's attitudes toward exercise as well as their likelihood of

engaging in physical activity.

While the study found no statistically significant difference in perceived value or exercise

intentions based on message source, we observed that the corporation group consistently

produced the lowest values for all measures of exercise attitude and exercise intention compared

to the other source groups. While not statistically significant, these observations are consistent

with existing research that suggests that information from a corporate source is perceived as less

believable than information from the government (Lirtzman & Shuv-Ami, 1986). While this

study failed to find a significant effect of the corporate source type on exercise attitudes or

intentions, it raises questions about how corporations' perceived believability might change in the

context of health communication and social marketing. Perhaps corporations are seen as less

credible, qualified, or genuine compared to government or nonprofit sources when it comes to health messaging. This would suggest that corporations might not be the most effective allies for social marketing efforts involving health communication. However, it is important to consider the different reasons a corporation might engage in health communication. While a corporation might not be the most effective source in a social marketing context, a message about physical activity as part of a corporate social responsibility campaign might be processed differently by audiences and could be more effective in changing those audience members' attitudes and intentions. The lack of significant effect found in this study presents these opportunities for future study.

These findings related to message source suggest that health messages from government sources are more influential than social media influencer or corporate sources. Although younger audiences are typically the target market for influencer marketing strategies, the findings from this study indicate that this does not necessarily mean that young audiences are more receptive to messages from influencer sources. Rather, our findings suggest that even these younger audiences are most receptive to health information from government sources. In particular, the government source's significant effect on perceived benefit—including the content of the messages—underscores government sources' ability to effectively communicate facts to the audience. This is useful when considering the different approaches to or motives for health communication. While further research is needed to determine whether social media influencers are more persuasive or engaging when sharing narrative content, this study suggests that a government agency might be the most effective source if the goal is communicating concrete facts.

While the framing manipulation did not produce any significant results, this study did present several observable findings related to message framing that reflect existing literature or reveal opportunities for future study. First, the long-term benefit message produced slightly higher values for all of the dependent variable measures for attitudes and intentions. This contradicts research involving exchange theory (Donovan, 2011) and construal level theory (Young, 2015; Segar et al., 2011), which suggest that temporal distance could act as a barrier to attitude change and that short-term benefits would have a greater influence on attitudes and intentions. While our findings for these measures are not significant, they show an opposite relationship to the one suggested by these theories. Perhaps this suggests a generational difference in information processing based on psychological distance, since this study applied these theories to college-aged women. Perhaps women at this transitional stage of young adulthood are in fact adopting a more long-term perspective when it comes to their behaviors. Regardless, this inconsistency is interesting considering that our hypothesis—that short-term benefits would be more effective than long-term benefits—was the hypothesis most grounded in existing literature.

Additionally, we observed that regardless of the message they were exposed to, participants believed exercise to have a greater value on long-term health than short-term health. While the goal of this study was not to evaluate participants' understanding of the long- and short-term benefits of exercise, this observation could present an opportunity to increase exercise engagement if we look at these results in the context of exchange theory (Donovan, 2011) and construal level theory (Young, 2015). These theories suggest that individuals are more likely to engage in a behavior when they believe it will benefit them in the short-term. If an agency were

able to increase individuals' awareness of the short-term benefits of physical fitness, those individuals might perceive more immediate benefits from exercise and view the expense of time and effort as worthwhile.

Theoretical and Practical Implications

This study connects several theories and areas of research that have not previously been explored. First, this study adds to the small body of literature exploring the effects of source type, and this is the first study to examine the effects of source type in the context of exercise messages. The significance of the government source's effect on perceived benefits suggests that different types of sources do affect audience members' message processing differently. This presents an opportunity to expand on existing literature and explore differences between other types of sources, like nonprofit or peer sources. It also presents an opportunity for future research to look at the effects of source type on other dependent variables related to health communication.

Additionally, this research draws a connection between the fields of social marketing and health communication and the emerging trend of social media influencers to identify an opportunity to reach younger audiences. This relatively new category of public figure does not necessarily have the perceived credibility that audience members might identify in a government source, but individuals might evaluate influencers as more relatable or trustworthy. Further, these influencers' sizeable online following present an opportunity to narrowly target large groups—for example, female college students—with health-related messages. Although this study did not produce any significant results related to influencers as a source, the research lays

the groundwork for future study on this connection between social media influencers and the

field of health communication.

Finally, this study is the first to look specifically at exercise messages targeted at the

population of female college students. This population presents an opportunity for health

communication aimed at behavior change, as bringing about behavior change in early adulthood

would have greater effects on lifelong health than trying to bring about these changes during

midlife. Additionally, these college-aged women are often living on their own for the first time

and experiencing greater independence and agency, particularly when it comes to their own

health. Making young women feel this sense of agency over their health could be a key to

increasing exercise participation, and encouraging physical activity during this stage of young

adulthood could have implications on an individual level as well as a population level.

Limitations and Suggestions for Future Study

The two biggest limitations of this study were restrictions on time and sample size. While

data collection for this study was constrained to a short period of time (14 days), a longitudinal

study would have been more effective in actually measuring the messages' effects on individuals'

exercise behaviors rather than simply their intentions, as intentions are not an accurate predictor

of behavior. Ideally, this study would have had a longitudinal component that checked in with

participants one week after message exposure and one month after message exposure to measure

their weekly exercise habits. Additionally, a larger sample size would have given this study more

power in allowing patterns to emerge. A larger sample size would also allow for the existence of

a control group to measure the effect of any sort of message exposure versus no exposure at all.

If this study were to be replicated, we would allow more time for data collection in order to increase the sample size and add a longitudinal component to the study.

Future research that examines exercise messages targeted at college-aged women could expand on this study's research questions and examine other variables beyond those of this study. One weakness of this study is that it should have asked participants to evaluate the message source in terms of its credibility rather than just expertise and trustworthiness. Future research could test whether different types of sources—government, corporate, influencer, or even nonprofit or peer—are more or less persuasive based on perceived credibility or relatability. Future studies could also examine the effects of information source, not just message source, in health messaging. While the social media posts in this study came from different fictional sources, all of the information in the social media posts came from the Centers for Disease Control. Asking participants to evaluate messages with facts from a government agency, a health nonprofit, or a healthcare company might reveal interesting differences in the way individuals perceive credibility, expertise, or trustworthiness.

Another weakness of this study is that it did not control for other factors that might influence individuals' exercise attitudes, exercise intentions, and their processing of exercise messages. It should be noted is that because all of the respondents of this study are university students, the sample is not necessarily representative of all college-aged women. Women in this age group who are not pursuing a college education might process messages differently and might have different attitudes and intentions toward exercise. Further, in addition to existing exercise behavior, researchers could control for other factors that commonly affect young women—and their health, in particular—such as body dysmorphia or eating disorders. Future

research could also control for factors that commonly affect college students, like mental health conditions, stress, insomnia, food insecurity, or financial instability. Because the population group made up of postsecondary students is so diverse, there are many opportunities to explore factors that affect students' exercise habits, attitudes, and intentions, as well as their processing of exercise messages.

Future research could also expand on this study's inquiries about the potential power of social media influencers as a social marketing or health communication tool. Because this is a recent trend and existing literature on this topic is still scarce, there is immense opportunity for researchers to explore this topic. One could expand on this study's exploration of how young women evaluate social media influencers in terms of expertise and trustworthiness to look at other attributes like relatability, credibility, or likeability. One could also apply the research conducted by Gray et al. (2011) to study the effects of narrative versus statistical messages from influencer sources compared to organizational sources like corporations, nonprofits, or government agencies. These are a handful of the endless opportunities to explore the possibilities of social media influencers as an agent in social marketing campaigns.

Conclusion

In conclusion, this study gives insight into the effects of message source and message frame in female college students' processing of exercise messages. Through an experiment involving 111 University of Minnesota Twin Cities undergraduate students who self-identify as female, this research found that source type had a significant effect on the perceived benefits of exercise. We also observed that while government sources have the greatest effect on measures of attitude and intention, corporate sources have the least effect. Additionally, this study

observed that participants who saw messages communicating long-term benefits of exercise had slightly more favorable attitudes and intentions toward exercise than messages communicating short-term benefits of exercise. Although these observations are not statistically significant, they expand on existing literature on source effects, exchange theory, prospect theory, and construal level theory and apply these findings in the context of health communication targeted toward college-aged women. This study lays the foundation for future research exploring interactions between source type, message framing, and other factors in the context of health communication and social marketing. Finally, this research opens the door to explore the opportunity available to health communicators and social marketers to target young women through new media platforms like social media influencers in order to improve individual and public health.

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Appendix A

Government x Short-Term Message and Source Description

"The Bureau of Physical Activity and Health (BPAH) is a **division of the U.S. Centers for Disease Control** (CDC) with the mission to help U.S. citizens of all ages to live active, healthy lifestyles. The BPAH aims to educate the public about the health benefits of physical activity and empower them to make healthy choices."

Appendix B

Government x Long-Term Message and Source Description

"The Bureau of Physical Activity and Health (BPAH) is a **division of the U.S. Centers for Disease Control** (CDC) with the mission to help U.S. citizens of all ages to live active, healthy lifestyles. The BPAH aims to educate the public about the health benefits of physical activity and empower them to make healthy choices."

Appendix C

Corporate x Short-Term Message and Source Description

"**Nolan Holdings** is a **multinational corporation** headquartered in the U.S. that has ownership

of several companies spanning the retail, hospitality, and food service industries. One of Nolan

Holdings' corporate social responsibility efforts involves educating the public about the health

benefits of physical activity and empowering them to make healthy choices."

Appendix D

Corporate x Long-Term Message and Source Description

"**Nolan Holdings** is a **multinational corporation** headquartered in the U.S. that has ownership of several companies spanning the retail, hospitality, and food service industries. One of Nolan Holdings' corporate social responsibility efforts involves educating the public about the health benefits of physical activity and empowering them to make healthy choices."

Appendix E

Influencer x Short-Term Message and Source Description

"**Jess Eden** is a 24-year-old **lifestyle influencer** who has built a sizeable Instagram following in recent years. In addition to her content related to fashion, travel, and photography, Jess is an advocate for the health benefits of physical activity and seeks to empower her followers to make healthy choices."

Appendix F

Influencer x Long-Term Message and Source Description

"**Jess Eden** is a 24-year-old **lifestyle influencer** who has built a sizeable Instagram following in recent years. In addition to her content related to fashion, travel, and photography, Jess is an advocate for the health benefits of physical activity and seeks to empower her followers to make healthy choices."