Intervening with the Interventionist: Matching Interventions for Treatment Integrity to Stages of the Transtheoretical Model of Behavior Change

A Dissertation
SUBMITTED TO THE FACULTY OF
UNIVERSITY OF MINNESOTA
BY

Abbey C. Karich

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

Matthew K. Burns, Co-advisor
Theodore Christ, Co-advisor

December 2016

Acknowledgements

First, I want to thank the teachers who participated in this study and all educators within the public schools. Their dedication to the learning and emotional well-being of students on a daily basis is inspirational. Thank you special education assistants, principals, social workers, nurses, speech-language pathologists, librarians, occupational therapists, bus drivers, custodians, secretaries, interpreters, cultural and community liaisons, counselors, school psychologists and all other staff working within schools. Everyone in school communities should be paid more.

Thank you to the faculty at the University of Minnesota, especially those instructors and professors within Educational Psychology. Their knowledge, instruction, research and guidance gave me the necessary tools and competence to affect positive change for students. I am very proud to graduate from the School Psychology program at UMN—Twin Cities. Thank you to my advisor for the past six years, Dr. Matthew Burns, for teaching me about research and providing me with invaluable opportunities within graduate school. I especially appreciate your authentic support in the end with giving me the necessary and supportive nudges to complete this dissertation.

Many thanks to the faculty that agreed to serve on my dissertation committee. Thank you Dr. Theodore Christ for agreeing to be my co-advisor in the final stages of my degree—it is not without recognition that you took on yet another student and offered up your feedback. Thank you Dr. Jennifer McComas for serving as my dissertation chair and for all of your interest and valuable insight into my line of research and methodology. Thank you Dr. Steve Yussen for employing me as a teaching assistant for the majority of

my graduate career—your love of academia and the connections you make among fields is so appreciated. Thanks to Dr. Geoff Maruyama. Your class on social psychology and theory provided me with a fresh perspective on the context and interactions unique to schools. It truly challenged me to think about the problems schools face with a more action-oriented research approach.

There is no one that will ever understand the process of graduate school and attempting to obtain a doctoral degree better than your friends who experienced it alongside you. Thanks to my incredibly smart cohort of 2010—so many laughs along the way. And to those special graduate comrades who lent their perspectives, feedback, support and encouragement on so many occasions including Laura Potter, Katie Maki, Sandy Pulles, Lynn Edwards, and Anne Zaslofsky. A special thanks to my fidelity coders.

Thank you to my friends and family who did not always directly understand what I was studying, but always listened and made me feel smart when it was most needed. Thanks Brandon Lohstreter for sharing our life together for a large part of graduate school—you saw the back of my laptop more than my face for a solid four years. Much love to my brother Jesse Karich, for being an incredible friend and sibling. The greatest amount of gratitude goes to my parents, Stan and Celine Karich, who instilled a deep appreciation for education from my very early years. Your ever-present pride gave me a lifetime of confidence and an innate drive to give it my best.

Dedication

This thesis is dedicated to all of the students I have worked with as a teacher, researcher, and school psychologist. You have all taught me the truest meaning of resiliency, humor, grit and perspective that only children and teenagers with your unique experiences can. I feel lucky to have found a profession in which I can be held accountable to the honesty and vulnerability of kids every day.

Abstract

Within the implementation science literature, there is a well-established gap between research-based interventions and effective implementation. Changing the behavior of those responsible for carrying out new innovations within schools is necessary in order for interventions to be implemented with fidelity (Durlak & DuPre, 2008; Wickstrom, Jones, LaFleur, & Witt, 1998).

The current study applied an adapted transtheoretical model (TTM) of behavior change in an attempt to increase treatment integrity among resistant teachers. Interventionist level variables were situated within stages of TTM and possible strategies were identified to intervene with a teacher. Two multiple baseline designs were used to deliver matched interventions to three teachers, each working with three students. Treatment integrity on the intervention protocol and student outcomes on a mastery assessment were monitored each session. The study occurred over five weeks, resulting in 21 intervention days. Teachers were also interviewed after each phase of the study to identify common needs/barriers and aid in interpretation of single-case design data. Results were variable but offered promise for matching the adapted TTM stages to teachers in consultation. Consultation in general increased initial treatment integrity across all teachers and phases, although these effects did not seem to last. Implications for practice and theory, limitations, and future directions for research are discussed.

Table of Contents

List of Tables

List of Figures

CHAPTER 1

INTRODUCTION

There is a well-established gap between known and effective research-based interventions and the services received by people who could benefit from such interventions. The National Institute of Health projects it takes on average 17 years for 14% of original research to be integrated into practice (Balas, 1998), and the most effective evidence-based practices are estimated to reach only 1% of the children that could benefit (Ginexi & Hilton, 2006). With over 98,000 public schools employing six million teachers (NCES, 2013) spread across more than 14,000 school districts in the U.S. (U.S. Census Bureau, 2012), and educating over 53 million children (Fixsen, Blase, Naoom, & Wallace, 2009), it can be reasonably assumed that the implementation of research-based practices within K-12 schools experiences a similar lag.

Ineffective interventions are likely attributed to lapses in implementation procedures rather than the efficacy of the intervention itself (Gresham, 2009). Identifying practices with a solid research base is important but not sufficient because changing the behavior of those responsible for carrying out new innovations within schools is also necessary (Durlak & DuPre, 2008; Wickstrom, Jones, LaFleur, & Witt, 1998). Interventions must be implemented as planned for students to receive benefits (Hagermoser Sanetti & Kratochwill, 2014). Durlak and DuPre (2008) reviewed over 500 quantitative studies within the promotion and prevention literature and found strong empirical evidence linking the level of implementation to participant outcomes. In other words, effective interventions combined with effective implementation procedures leads to good outcomes.

Statement of the Problem

The implementation science literature examines how evidence-based programs or practices are put into practice. In a comprehensive review of the implementation literature, Greenhalgh et al. (2004) concluded that, "A striking finding of this extensive review was the tiny proportion of empirical studies that acknowledged, let alone explicitly set out to study, the complexities of spreading and sustaining innovation in service organizations" (p. 614). Following, Fixsen et al. (2005) and Blase, Fixsen, Naoom, & Wallace (2005) called for applied research to examine how to better understand service delivery processes and contextual factors that effect implementation. Although a plethora of evidence-based programs and practices exist, the study of how best to implement such practices is severely lacking.

Within schools that operate within a Multi-Tiered System of Support (MTSS), response to evidence-based interventions is the primary factor for determining varied levels of service and special education eligibility. Issues related to implementation procedures are central to a successful MTSS framework (Griffiths, Parson, Burns, VanDerHeyden & Tilly, 2007; Noell & Gansle, 2006). Historically, little emphasis has been placed on treatment integrity. Careful attention to procedures is rare among those implementing interventions within schools (Gresham, Gansle, Noell, Cohen, & Rosenblum, 1993). Some within the behavioral consultation research argue that treatment integrity is one of the most neglected (yet essential) variables (Gresham, 1989). This absence of treatment integrity from the literature is concerning because lower levels of treatment adherence leads to decreased student outcomes (Biggs, Vernberg, Twemlow, Fonagy, & Dill, 2008; Wilder, Atwell, & Wine, 2006). In addition, more recent research

has examined the qualitative aspects of implementation such as interventionist enthusiasm and competence and linked these variables to student outcomes as well (Goncy, Sutherland, Farrell, Sullivan, & Doyle, 2015; Hagermoser Sanetti & Fallon, 2011; Sutherland, McLeod, Conroy, Abrams, & Smith, 2014).

Study Purpose

This study responds to the lack of procedural fidelity by identifying the most malleable interventionist variables associated with treatment integrity and positioning those variables within a well-known behavior change model. The interventionist level variables are assigned to stages of the transtheoretical model of behavior change (TTM). Strategies that could likely lead to behavior change across the interventionist level variables are identified, with the careful acknowledgement that treatment integrity functions within a broad ecological system. In general, using TTM within school consultation has not been applied within an experimental study. Specifically, matching interventions to stages of change of teachers most resistant to using evidence-based practices has also not been examined. The adapted TTM offers a framework to use in schools that directly matches treatment integrity variables at the interventionist level to possible strategies to use in consultation.

Research Questions

The following research questions guided the study:

1. What are the effects on treatment integrity of individualizing interventions to stages of the TTM?
2. What are the effects on student outcomes of individualizing interventions to stages of the TTM?

3. What were the perceived needs among teachers who are resistant to change throughout the implementation process of student interventions?

Definitions

Behavioral Problem-Solving Consultation: Model of consultation that utilizes the problem-solving approach by assisting the consultee to define problems, apply psychological principles in the development of plans to solve problems, implement plans designed to achieve problem solutions, and evaluate goal attainment and plan effectiveness (Kratochwill, 2008; Kratochwill & Bergan, 1990).

Ecological Systems Theory: Theory explaining how influential variables are almost always positioned within a series of systems that interact and influence behavior. Individuals operate within a series of five environmental systems that influence human behavior (Bronfenbrenner, 1979).

Fidelity of Implementation: The determination of how well an intervention is implemented in comparison with the original program design during an efficacy and/or effectiveness study (Berman & McLaughlin, 1976).

Implementation: A specified set of activities designed to put into practice an activity or program of known dimensions (Fixsen, Naoom, Blase, Friedman, & Wallace, 2005).

Implementation Science: The systematic study of specified activities designed to put into practice activities or programs of known dimensions (National Implementation Research Network, 2016).

Transtheoretical Model of Behavior Change: A theory to understand the underlying structure of behavior change. Individuals attempt to modify behavior as they move through a series of six stages including precontemplation, contemplation, preparation,

action, maintenance, and termination (Prochaska & DiClemente, 1982). The adapted transtheoretical model of behavior change referenced in this study uses the original stages of change but positions interventionist-level variables within the stages and then proposes strategies that will likely influence those interventionist variables.

Treatment Integrity: The extent to which essential intervention components are delivered in a comprehensive and consistent manner by an interventionist trained to deliver the intervention (Sanetti & Kratochwill, 2009).

Delimitations

The following delimitations were placed on the study:

(a) Study participants were limited to three teachers that were most resistant to using evidence-based practices from one urban charter school in the Midwestern United States.

(b) All participants used the same student intervention protocol; however, some skills were more complicated depending on the teacher's assigned grade-level (single digit addition versus single-digit division with remainders).

(c) Interventions occurred during five weeks of the spring semester of one academic year.

(d) The original and proposed model used has not been directly applied to influencing treatment integrity within the school context.

Organization of the Dissertation

Four additional chapters are included in this dissertation. Chapter 2 provides an overview of the literature relevant to (a) treatment integrity, (b) ecological variables influencing treatment integrity, (c) transtheoretical model of behavior change, and (d)

behavioral consultation. Chapter 3 describes the methodology used in the current study. Participant characteristics, measures used for screening and monitoring progress, teacher and student interventions used, and data analysis are described in detail. Chapter 4 reports on the results of each research question and includes several tables and figures to aid in interpretation. Chapter 5 discusses the results of each research question within the context of current and previous research. A discussion about the implications for practice and theory, directions for future research, and limitations for the current study are included.

CHAPTER 2

LITERATURE REVIEW

Organization of Chapter

Chapter two provides an overview of the research on treatment integrity as it relates to the uptake of evidence-based practices in schools. This includes a review of ecological variables that are thought to influence treatment integrity, the transtheoretical model (TTM) of behavior change, and behavioral consultation in applied settings. Ecological variables identified as influential to treatment integrity extend across the external environment, organization, intervention, and interventionist. Factors specific to the interventionist are reviewed in depth and contextualized within an adapted model. Strategies designed to influence treatment integrity within each stage of TTM are described and the associated research is analyzed. Attempting to use this adapted model to work in consultation with teachers is the basis for the current study.

Ecological Variables Influencing Treatment Integrity

Treatment integrity is often used synonymously with treatment fidelity, fidelity of implementation, procedural fidelity, and implementation integrity, although there is not academic consensus on a clear definition (Sanetti & Kratochwill, 2009). Broadly, treatment integrity refers to the extent to which an intervention is implemented as intended (Century, Rudnick, & Freeman, 2010; Perepletchikova & Kazdin, 2005). A more detailed interpretation of the construct is the "extent to which essential intervention components are delivered in a comprehensive and consistent manner by an interventionist trained to deliver the intervention" (p. 448, Sanetti & Kratochwill, 2009). For more complex interventions with multiple components, two dimensions of treatment integrity

may be pertinent; content fidelity and process fidelity. Content fidelity refers to the delivery of specified steps within the intervention protocol, whereas process fidelity refers to the manner in which the intervention is delivered and aligns with the theory and goals underlying the research (Moncher & Prinze, 1991).

Although there is consensus that treatment integrity is an important aspect of delivering research-based interventions, appropriate procedural fidelity is often assumed rather than assessed (Dane & Schneider, 1998; Dusenbury, Brannigan, Falco & Hansen, 2003; McIntyre, Gresham, DiGennaro & Reed, 2007). When certified school psychologists were asked about treatment integrity within their schools, 56.2% reported it was an important consideration when evaluating interventions and 64.7% reported it was important when determining special education eligibility (Cochrane & Laux, 2008). When asked if treatment integrity was assessed within problem-solving teams (PSTs), 1.9% reported the team "Always" assesses integrity and 40.4% reported they "Sometimes" assess integrity. However, when PST records were reviewed, 67.3% included no documentation of treatment integrity, with team members citing reasons such as lack of time, lack of administrative support, and belief that integrity is not important (Cochrane & Laux, 2008). Assessing integrity within the context of school systems is neither prevalent nor consistent.

The number of factors (and operational definitions) associated with influencing implementation varies across the literature. Bosworth, Gingiss, Potthoff, & Roberts-Gray (1999) reviewed the implementation literature to guide the development of a model to assess the likelihood of successful implementation within an organization. Bosworth et al.'s search identified more than 300 variables that are associated with implementation,

whereas Durlak and DuPre's (2008) more recent review indicated there is at least 23 contextual factors that influence implementation. Multiple conceptual frameworks of treatment integrity have been developed and proposed, but there is not consistency and definitional clarity among researchers (Century & Cassata, 2014).

Many factors contribute to the magnitude of intervention effects, and a wide range of contextual factors influence treatment integrity (Kazdin, 2005; Century, Cassata, Freeman, & Rudnick, 2012; Fixsen, Naoom, Blasé, Friedman, & Wallace, 2005). The systems-contextual perspective from clinical psychology suggests that delivery of research-based treatments occurs within a system comprised of a variety of contextual variables (Mazzucchelli & Sanders, 2010). To successfully implement treatments with fidelity, factors such as therapist variables, organizational support, quality of training program, and client variables must be taken into account (Sanders & Turner, 2005). Moreover, Implementation is more successful when there is a closer fit between the requirements of a treatment and the organization's capabilities (Zazzali et al., 2008). The systems-contextual perspective is akin to the ecological systems theory cited, as a framework within the school psychology literature (Sheridan & Gutkin, 2000; Ysseldyke & Christenson, 2002; Burns, 2011), but applied more directly to treatment integrity. There are several factors that are associated with promoting or impeding fidelity of implementation, which have been organized into categories of external environment, organization, intervention, and interventionist. Figure 1 contextualizes the four levels of variables (external environment, organization, intervention, interventionist) within an ecological framework (adapted from Durlak & DuPre, 2008; Sanetti & Kratochwill, 2009; Century & Cassata, 2014).

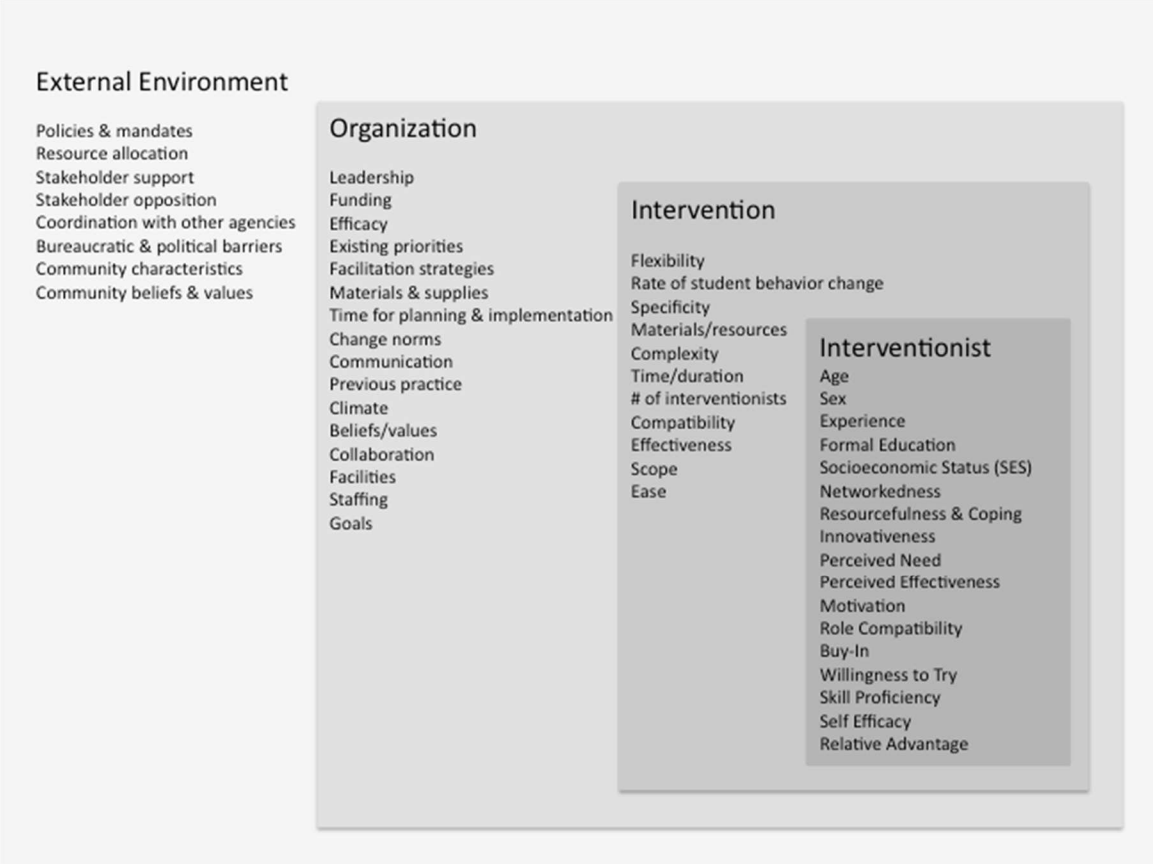


Figure 1. Factors that influence treatment integrity within schools are contextualized within an ecological systems framework. Adapted from Durlak & DuPre (2008), Sanetti & Kratochwill (2009), and Century & Cassata (2014).

The framework above includes specific variables that are thought to influence treatment integrity within each level, but there is no empirical evidence as to the extent to which variables across the ecological levels affect outcomes (Gresham, 2014), which makes it difficult to determine how to most quickly influence treatment fidelity (Long & Maynard, 2014). School practitioners are often not able to influence systems level variables such as leadership, organizational policies, and resources, but they can still significantly influence student outcomes (Sanetti & Kratochwill, 2009). Therefore, focusing on malleable interventionist level variables has potential for improved student

outcomes. Figure 2 indicates the likelihood that some variables are more malleable than others. It can be easily assumed that even though static variables are harder to change, they do influence the malleable variables and to a lesser extent, vice versa. For example, a teacher's years of education (static) could influence self-efficacy (malleable) and self-efficacy (malleable) could influence innovativeness (static), and so on. However, those variables that are more susceptible to change provide a better opportunity to intervene. Influencing treatment fidelity at the interventionist level requires individuals to make changes in their behavior. Behavior change is a process (Noell, 2008; Prochaska & Norcross, 2001), and is often difficult because suggested changes may be different from the interventionist's philosophical beliefs, prior training, and/or experience (Kratochwill & Shernoff, 2003).

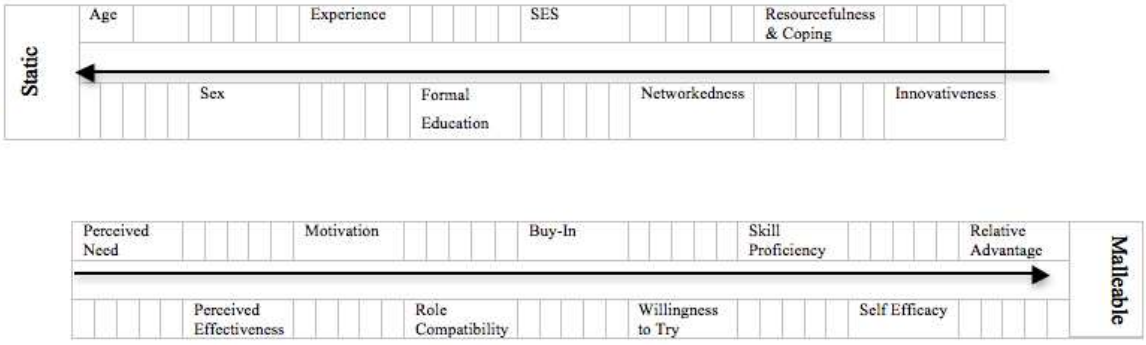


Figure 2. Interventionist level factors that influence treatment integrity within schools. Adapted from Sanetti & Kratochwill (2009) and Century & Cassata (2014).

Synthesis

There is little consensus in defining treatment integrity; however, it broadly refers to the extent to which an intervention is implemented as intended (Century, Rudnick, & Freeman, 2010; Perepletchikova & Kazdin, 2005). Some researchers emphasize the importance of *essential components* of the intervention being delivered as intended

(Sanetti & Kratochwill, 2009). Wide ranges of contextual factors influence treatment integrity (Kazdin, 2005; Century, Cassata, Freeman, & Rudnick, 2012; Fixsen, Naoom, Blasé, Friedman, & Wallace, 2005). Within educational literature, the ecological systems theory helps explain how influential variables are almost always positioned within a series of systems that interact and influence behavior (Bronfenbrenner, 1979; Sheridan & Gutkin, 2000; Ysseldyke & Christenson, 2002; Burns, 2011). Research has yet to identify the extent to which variables across the ecological levels within schools affect outcomes (Gresham, 2014) so it is challenging to quickly influence fidelity of implementation. Although it is difficult for consultants working within schools to change the external environment and organizational levels, they can still influence student outcomes by targeting intervention and/or interventionist level variables (Sanetti & Kratochwill, 2009). Those interventionist variables that are positioned as more malleable than others for the current study include perceived need, perceived effectiveness, motivation, role compatibility, buy-in, willingness to try, skill proficiency, self-efficacy, and relative advantage.

Transtheoretical Model (TTM)

The transtheoretical model (TTM; Prochaska & DiClemente, 1982) is a theory to understand the underlying structure of behavior change. Individuals attempt to modify behavior as they move through a series of six stages (precontemplation, contemplation, preparation, action, maintenance, termination). The processes of change (POC) are strategies to move from one stage of the model to the next, and include consciousness raising, environmental reevaluation, dramatic relief, self-reevaluation, self-liberation,

reinforcement management, helping relationships, counterconditioning, and stimulus sontrol (Prochaska, DiClemente, & Norcross, 1992).

TTM was first introduced within the field of psychotherapy. Prochaska and colleagues conducted a comparative analysis of smokers who were self-changers compared versus those in professional treatment programs, in which processes of change were identified (DiClemente & Prochaska, 1982). Across two consecutive studies, the authors found that behavior change happens in a series of stages and further identified processes of change that move an individual from one stage to the next (DiClemente & Prochaska, 1982; Prochaska & DiClemente, 1982). To assess the validity of TTM stages, researchers have largely focused on stage distributions for high-risk behaviors. For example, a series of studies found that approximately 40% of smokers in the United States fal in precontemplation, 40% in contemplation, and 20% in preparation (Velicer et al., 1995; Wewers, Stillman, Hartmann, & Shopland, 2003). The studies collected data from over 20,000 individuals from six different geographical regions across the country, and found that as education level increased, members of the precontemplation stage decreased. Procedures included random methods, convenience sampling, and stratified sampling. These stage distributions were compared to countries in which there are markedly less tobacco control campaigns such as Germany, where 70% of smokers were in precontemplation, and approximately 10% in preparation (Etter, Perneger, & Ronchi, 1997). Although the results provide some evidence for distinct TTM stages and their associated process of change, the researchers from each study used different methods for assigning participants to stages. Thus, the results should be interpreted with caution.

In an effort to confirm the validity of the stages of change, researchers have looked to a two-factor structure that includes pros and cons across over twelve different behaviors. Relationships were found between pros and cons of changing and progress across the stages (Prochaska, 1994). In a meta-analysis of 48 health behaviors across 120 data sets from 10 countries, the pros of changing increased by one standard deviation when progressing from precontemplation to action (Hall & Rossi, 2008). Early research also examined the relationship between aligned stages and the processes that people used within each stage. When examining outcomes for weight loss, the more clients progressed into action early in therapy, the more successful they were at losing weight. Although the stage of change score was a good predictor, the processes of change that clients used early in therapy were an even better predictor of weight loss (Prochaska, DiClemente, & Norcross, 1992). In one study, the 27 participants who remained in the precontemplation stage across all five rounds of data collection, all 10 processes remained stable over the two-year period of the study ($M = 50$, $SD = 10$). In early stages, people generally use cognitive, affective, and evaluative processes to move through the stages. In later stages, they apply commitments, conditioning, contingencies, controls, and support to progress through stages (Ruggiero, Redding, Rossi, & Prochaska, 1997).

Prochaska and colleagues conducted much of the research examining TTM theory. In addition to validating the theoretical foundations, there is also a diverse body of applied studies using TTM as an intervention. Using TTM to encourage smoking cessation has the largest body of empirical studies. It is nearly impossible to synthesize the research across all behaviors and fields, so focusing on smoking cessation may offer the most representative perspective of the literature at large. Dijkstra, DeVries, and

Roijackers (1999) targeted interventions to self-reported stages of smokers who were identified as resistant (precontemplators). Targeted strategies were more effective than control (*d*=1.2) but were also more effective than commonly used self-help guides (*d*=0.87). Results indicate effectiveness when measured by 'intent to change;' however, when measured by actual smoking cessation, outcomes were less impressive (*d*= 0.53 and *d*=0.08 respectively). Several studies also focus specifically on smoking cessation within the teenage population. Hollis et al. (2005) targeted a tobacco intervention to stages of change across smokers and nonsmokers and found effects for baseline smokers (*d*=0.71), providing evidence for using targeted TTM strategies during routine medical care. Several other studies provide support for using processes of change strategies to support smokers in quitting (Gehlert & Bollinger, 2006; Hall et al., 2006; Strecher et al., 1994).

Aside from looking at smoking cessation, researchers have targeted a variety of additional behaviors that are desired for behavior change across different settings. Diet (Beresford et al., 1997; Brug et al., 1998; Glanz et al., 1998; Horwath, 1999), exercise (Cardinal & Sachs, 1996; Bock et al., 1998), bullying prevention (Evers et al., 2007), and alcohol abuse (Carbonari & DiClemente, 2000) have all been targeted using TTM stage strategies and such interventions have been found effective. A common theme across targeted behaviors is that larger effects are found when targeting participants identified in earlier stages of TTM than those in later stages.

Although there is empirical evidence supporting TTM theory and the use of the model as an intervention, there are studies that do not produce favorable outcomes in support of TTM. When examining smoking cessation, Aveyard et al. (1999) found small effects of a decrease in overall prevalence of smoking (*d* = 0.06) after targeting

interventions to stages of change. The intervention included six sessions embedded within a health curriculum and data was collected 12 months after the students completed the health class. When comparing addiction variables to TTM variables, Farkas et al. (1996) found that number of cigarettes smoked and duration of prior attempts to quit (d = 0.70) better predicted cessation. A study later conducted by Herzog et al. (2000) found similar results with a composite variable combining cigarettes per day and quit duration better predicting cessation (d = 0.58), than TTM stage (d = 0.32).

There is some inconsistency within the literature about whether processes of change predict progress through the stages of change. Herzog et al. (1999) found that six processes of change did not predict stage progress when looking at twelve-month outcomes. In a second study, the processes of change did predict stage progress (Herzog et al., 2000), but the contemplation ladder was used to identify stages of change as opposed to the Stages of Change Questionnaire used in the 1999 study. Other studies provide evidence for using processes of change to influence stage progression (DiClemente et al., 199l; Velicer, Redding, Sun, & Prochaska, 2007). To explain such inconsistencies, Johnson et al.'s analysis (2008) posited that using all processes of change (versus a subset) better predicts outcomes.

Adapted TTM

Although TTM has been referenced in regards to fidelity of implementation (Long & Maynard, 2014), processes of change have not been directly applied via strategies designed to influence adult behavior in schools. Interventionist level factors identified in Figure 2 (Sanetti & Kratochwill, 2009; Century & Cassata, 2014) include malleable variables such as perceived need, perceived effectiveness, motivation, role

compatibility, buy-in, willingness to try, skill proficiency, self efficacy, and relative advantage. Table 1 situates the interventionist level variables and their associated change strategies within the transtheoretical model (TTM) of behavior change.

Table 1. *Interventionist-level variables are assigned to stages of the Transtheoretical Model (TTM). Strategies that may influence interventionist behavior and align with TTM processes of change are proposed.*

TTM Stage	TTM Processes of Change		Influencing School Interventionists	
	Process	Definitions/Strategies	Interventionist Variable	Definitions/Strategies
Precontemplation—Do not think problem exists.	Consciousness raising	Increasing information about self and problem	Perceived Need	Raise awareness of problem and associated risks
	Environmental reevaluation	Assessing how one's problem affects environment	Perceived Effectiveness	Provide information on trajectory of problem, how intervening impacts trajectory, and evidence on efficacy and effectiveness of intervention
	Dramatic relief	Experiencing and expressing feelings about one's problems and solutions		
Contemplation—Aware of problem but are not willing to change it yet.	Self-reevaluation	Assessing how one feels and thinks about oneself with respect to a problem	Motivation to Implement	Motivational interviewing techniques (elicit motivation—rather than impose, develop supportive relationship, focus on specific behaviors, discuss barriers, avoid confrontation)
			Perceptions of Role Compatibility	Social influence, pairing interventionists with practitioners they like and consider peers
Preparation—Developing plan of action and intends to act in immediate future.	Self-liberation	Choosing and commitment to act or belief in ability to change	Shared Decision-Making, Buy-in, Vision	partnership-based collaboration (share responsibility for planning and assessing fidelity)
			Willingness to Try Intervention	Test-drive interventions, increase intrinsic motivation

Action— Modifying behavior, experiences, and environment.	Reinforcement management	Rewarding one's self or being rewarded by others for making changes: contingency contracts, overt and covert reinforcement, self-reward	Skill Proficiency	Explicit instruction, multiple demonstrations of behavior, opportunities to practice, role playing, and provide generalization strategies
	Helping relationships	Being open and trusting about problems with someone who cares	Self Efficacy	Goal setting and performance feedback
	Counterconditioning Stimulus control	Substituting alternatives for problem behaviors Avoiding or countering stimuli that elicit problem behaviors		
Maintenance— Maintain behavior and reflect on positive gains.			Perceptions of Relative Advantage	Showing gains in fidelity and student outcome data
Termination— No temptation to relapse and demonstrate high self-efficacy.				

Synthesis. The transtheoretical model (TTM; Prochaska & DiClemente, 1982) is a well-established framework to move individuals through a series of six stages of behavior change. The model utilizes specific strategies, processes of change (POC), which are designed to facilitate progression through the stages (Prochaska, DiClemente, & Norcross, 1992). Although TTM was first studied and applied in the field of psychotherapy, the utility of it has since been applied to a multitude of behaviors and settings. Differences in study outcomes using TTM as an intervention strategy seem to be best explained by the varied screening measure used to identify stages of change, study time points at which participant outcomes are measured, unit of analysis within regression studies, and the stage at which participants are initially assigned. A common theme across behaviors studied was that larger effects are found when moving those identified in earlier stages of TTM than those in later stages. This indicates researchers have yet to understand how positive outcomes of TTM interventions can be maintained. In addition, when researchers compared TTM stage to a set of other predictors, the TTM stage was compared to a full set of other predictors with uneven units of analyses. Even taking the unit of analysis into account, many of the other variables found to be better predictors were not malleable and were not capable of being influenced through intervention. Within the literature examining adult behavior change in school, TTM has been referenced in regards to fidelity of implementation (Long & Maynard, 2014), but using TTM in intervention consultation has not been empirically studied.

Precontemplation

Within an article published by Prochaska, DiClemente, and Norcross (1992) describing the stages of change within the TTM model, the authors cite philosopher G.K. Chesterton to explain the precontemplation stage of behavior change, “it isn’t that they can’t see the solution, it’s that they can’t see the problem” (p. 1103). From a

psychotherapy perspective, precontemplators often seek therapy because of pressure to do so from others. They may wish to change but have no intention of actually changing (Prochaska, DiClemente, & Norcross, 1992). When applying this to treatment integrity within education, it may be important to identify a performance discrepancy and a subsequent evidence-based intervention to address that discrepancy. Influencing the perception of student need and perception of intervention effectiveness among practitioners in the precontemplation stage could plausibly lead to increased treatment integrity.

Perceived Need. One of many documented barriers to change is a failure to recognize the need for change (Greenberg & Baron, 2000). Those individuals that believe there is a need for change understand how the benefits outweigh the risks (McHorney, Zhang, Stump, Zhao, & Xiaoquan, 2012). Raising awareness has been suggested as a targeted strategy to increase the perception of need (Dozier et al., 2009; Lee & Hayter, 2014). Interventions that seek to raise awareness of a need will inherently challenge practitioners to consider the severity of risks associated with not intervening.

Although many researchers suggest building awareness around a problem to increase the perceived need to intervene, there is little to no specific suggestions on how to raise awareness; or well-designed studies to test whether certain strategies are effective. Measuring awareness as a dependent variable and testing whether certain interventions are effective has not been asked; but researchers have used logical strategies to increase awareness. For example, Lee & Hayter (2014) conducted a review of incidence and prevalence of adolescent health issues to identify health priorities among different countries. The World Health Organization (WHO) supports this approach and advocates for increasing knowledge and understanding of issues among health care workers to more successfully improve adolescent outcomes (World Health Organization,

2006). Attitude alone will likely not cause a change in behavior. In a meta-analysis, Kim and Hunter (1993) found that attitude and behavior are highly correlated ($d = 2.58$); however, a follow-up study found even greater effects with intent acting as a mediator between attitude-behavior ($d = 3.53$ for attitude-intent and $d = 2.86$ for intent-behavior). Therefore, changing attitudes about perceived needs is beneficial for those in the precontemplation stage, but influencing intent may be necessary before a behavior change is made.

Perceived Effectiveness. Treatments that are perceived to be more effective are likely to be implemented with higher treatment integrity (Witt & Elliott, 1985). The theoretical relationship between acceptability and perceived effectiveness has been discussed by many researchers (e.g. Kazdin, 1981; Witt & Elliott, 1985), and most claim that if individuals view a treatment and/or intervention as effective, they will more likely accept it and eventually use it appropriately (Von Brock & Elliott, 1987). Von Brock and Elliott (1987) found when a teacher viewed an intervention as less acceptable, they also rated it as less effective ($d = 2.58$). Although there is evidence to suggest a link between acceptability and perceived effectiveness, there is little support for the link between high acceptability/perceived effectiveness and increased treatment integrity.

Providing interventionists with research regarding efficacy (effect under optimal conditions) and effectiveness (effect in realistic environment) of an intervention is important (Persons & Siberschatz, 1998). Providing information about the evidence base for interventions may allay the temptation to drift and/or unnecessarily adapt intervention protocols (Persons & Silberschatz, 1998). To positively change an interventionist's perception of effectiveness, Bumbarger (2014) suggests 1) incorporating explicit training on the research base beyond empirical evidence (problem development, impact on trajectory, core causal mechanisms, underlying logic) and 2) checking for understanding

by asking training participants to explain the theory that supports the use of that specific intervention. Although the use of a logic model and/or explaining theory behind practice is loosely recommended, little empirical support is found for using underlying logic to influence interventionists' perspectives on effectiveness.

Synthesis. Individuals in the precontemplation stage may wish to change but have no intention of actually changing (Prochaska, DiClemente, & Norcross, 1992). Influencing perceived need and perceived effectiveness are introduced as strategies to move a school practitioner past the precontemplation stage but much of the research base provides support via theory and not empirical studies. When outcomes are measured, much of the research uses correlational analysis. There is a well-demonstrated link between attitude and behavior ($d = 2.58$), with intent moderating the two variables ($d = 3.53$ for attitude-intent and $d = 2.86$ for intent-behavior). Strong correlational evidence also exists for the link between acceptability and perceived effectiveness as well ($d = 2.58$). Results indicate consultants using TTM for an individual in the precontemplation stage should consider coupling increasing awareness of perceived need with influencing intent to change via perceived effectiveness.

Contemplation

According to the TTM model of behavior change, individuals in the contemplation stage are aware of a problem but are not willing to change yet (Prochaska, DiClemente, & Norcross, 1992). When applied within psychotherapy, an individual is classified as a contemplator if they intend to start changing their behavior within the next six months. The amount of time an individual stays in the contemplation stage depends on if the benefits outweigh the costs (Prochaska, DiClemente, & Norcross, 1992). Within the context of schools, practitioners may be aware there are positive student outcomes associated with intervening but have not yet decided if the time and effort to carry out an

intervention with integrity is justified. Intention is the best predictor of behavior change, so new behaviors are often the result of motivation (Godin & Kok, 1996).

Motivation to Implement. Within the field of therapy, a principle tenet of working with a client to change behavior is that motivation should be elicited from people, not imposed on them (Rollnick & Miller, 1995). Motivational interviewing (MI) is "a client-centered, directive method for enhancing motivation to change by exploring and resolving ambivalence" (Miller & Rollnick, 2002, p. 25). Motivation can be influenced through the MI process by changing ambivalence into intent. Instead of placing blame on client resistance and poor internal motivation that could ultimately enhance problems, client-centered approaches are used in MI to minimize resistance and increase motivation to change (Miller, 1983). Further, a consultant changes behavior by candidly discussing barriers that may interfere with implementation (Gueldner & Merrell, 2011). Specific strategies of MI include expressing empathy, avoiding non-constructive conversations, supporting the client to take charge of decisions, developing a discrepancy between current and wanted behaviors (Rollnick & Allison, 2004). The client should "maintain dignity, self-respect, and be heard and acknowledged" during the MI process (Rollnick & Allison, 2004, p. 111).

MI has been found to be an effective strategy to reduce maladaptive behaviors such as alcohol abuse, gambling and HIV risk behaviors as well as to increase adaptive behaviors such as exercise, diet, and medication adherence (Miller & Rose, 2009). Specific strategies such as expressing empathy ($d = 2.87$) have been found to effectively predict client outcomes up to six months later (Miller & Baca, 1983), compared to more confrontational approaches that have a long history of undesired outcomes (Miller, Hersen, Eisler, & Hemphill, 1973). Many researchers acknowledge the evidence base for using MI in schools is in its early stages but there is promise for using it to increase

treatment integrity (Frey et al., 2011; Reinke, Lewis-Palmer, & Merrell, 2008). In a meta-analysis, researchers found that the effect size was actually larger when MI was added to a second treatment (Burke et al., 2003). It is important to note that some consultants/clinicians are significantly more effective than others at delivering MI-based strategies (Project MATCH, 1998), thus consultant efficacy is an important factor if using MI as a strategy to increase the motivation of a school practitioner.

Perceptions of Role Compatibility. Role compatibility refers to how job expectations, responsibilities, personal definitions of role, and professional identity align with the requirements of implementing interventions (Bosworth, Gingiss, Pothoff, & Roberts-Cray, 1999). Because there is evidence that attitudes alone do not predict behavior (Wicker, 1969), social psychologists have studied intentions and social norms as additional determinants of behavior change (Olson & Zanna, 1993). Social influence is a change in belief, attitude, or behavior because of another person's actions (French & Raven, 1959). Within the social influence literature, compliance and conformity are two important constructs to consider. Deutsch and Gerard (1955) identify two types of conformity motivations (informational and normative). Informational conformity is the desire to accurately interpret reality and behave in accordance, whereas normative conformity is obtaining social approval.

Individuals are motivated to create and maintain relationships (Cialdini & Goldstein, 2004). Tharp and Wetzel (1969) first suggested that consultee behavior in schools might be controlled by social reinforcement (other than the consultant), such as colleagues and administration. They further suggested that fellow teachers should be recruited to promote adherence to treatment plans developed through consultation. More recently, researchers within the treatment integrity literature advocated for consultants to use social influence in persuading consultees to use evidence-based interventions

(Kaufman, Codding, Markus, Tryon, & Kyse, 2013). People often comply more frequently with those people they like (Cialdini & Trost, 1998), and Burger et al. (2001) found that individuals comply more with those people in which they share uncommon similarities ($d = 0.94$) versus common similarities ($d = 0.28$). Yet, a person will likely not compare themselves to someone they consider strikingly different. If another person's ability or opinion is too divergent from their own, then people may not make a comparison at all (Festinger, 1954). Thus, pairing an interventionist with a practitioner they like, have things in common with, and are considered at a similar ability level may lead to a higher chance of conformity. Of course, the paired practitioner must be invested in fidelity and ideally proficient at delivering the intervention(s) so as to provide appropriate direction and support.

Synthesis. Individuals in the contemplation stage are aware of a problem but are not willing to change yet (Prochaska, DiClemente, & Norcross, 1992). Increasing motivation by using motivational interviewing (MI) and creating more role compatibility could lead to increased integrity. Motivational interviewing has a long history of effective outcomes, and is used in schools by some consultants trained in the guiding principles of MI, but there is little empirical support for its use as an intervention with teachers (Frey et al., 2011; Reinke, Lewis-Palmer, & Merrell, 2008). MI is likely more influenced by the efficacy of the consultant than other adapted TTM strategies (Project MATCH, 1998). Within the consultation literature, there is support for using social influence to increase treatment outcomes, such as integrity with evidence-based interventions (Tharp & Wetzel, 1969; Kaufman, Codding, Markus, Tryon, & Kyse, 2013). There is support for using social influence as an intervention to target teenage behaviors; however, no studies were found that directly manipulated social influence strategies to influence interventionists within school environments.

Preparation

The preparation stage indicates an individual is currently developing a plan of action and intends to act upon their plan in the immediate future. When TTM is applied to changing addictive behaviors, the intention is usually to change behavior within one month (Prochaska, DiClemente, & Norcross, 1992), although the hope is that adult behavior change happens more rapidly in schools. Within the health promotion literature, examples of developing a plan include enrolling in health education classes, consulting a counselor, scheduling an appointment with their doctor, and purchasing self-help books. Within schools, strategies that promote self-realization and identify alternatives to addressing the problem could help to increase fidelity among practitioners.

Shared decision-making, buy-in, vision. Buy-in is a belief in the importance of an approach and can often impede desired outcomes if the level of buy-in among stakeholders is low (Anderson-Butcher, Lawson, Iachini, Bean, et al., 2010; Mellin & Weist, 2011). Teacher buy-in is a critical component to successful implementation, but the process of acceptance can be slow (Bryk & Schneider, 2003). Kelleher, Riley-Tillman, and Power (2008) outline a process for partnership-based collaboration that includes 1) identifying and defining targets, 2) considering evidence-based interventions and their feasibility, 3) adapting interventions to better fit a setting and/or student, 4) creating a schedule for implementation and data collection, 5) implementing the intervention, and 6) setting a schedule to meet and discuss progress and modifications. Many research-based interventions are not initially well received by practitioners, but by closely involving the interventionist in the implementation plan; it is hopeful that the practitioner will ultimately achieve greater buy-in.

There is a significant amount of empirical evidence for the use of collaborative consultation in schools. For example, Kelleher et al. (2008) compared collaborative

consultation to expert consultation in a multiple baseline design and found that treatment integrity noticeably increased across phases when collaborative approaches were used (*Mean NAP* =83.5%). Another study looked at increasing treatment integrity by varying teacher and consultant influence and found that consultant influence correlated positively with consultant dominance (*d*=1.46) but negatively with teacher dominance (*d*=-1.76) (Erchul, DuPaul, Grossom, Vile Junod, Jitendra, Mannella et al., 2007). When comparing collaborative consultation to other strategies identified within the adapted TTM, this strategy offers more direct evidence of effectiveness within schools and is directly tied to treatment integrity outcomes measures.

Willingness to try the Intervention. Collaborative consultation can help support greater treatment integrity among practitioners, but some interventionists may continue to resist consultation efforts (Wickstrom, Jones, LaFleur, & Witt, 1998). While working within the partnership-based model of collaboration, allowing interventionists to try several different interventions may increase treatment integrity, especially for those practitioners who demonstrate less commitment to fidelity during the planning stage. Self-determination theory (SDT; Deci & Ryan, 1985) provides some conceptual basis for why test driving interventions may work to increase levels of integrity. SDT purports that individuals who are provided with experiences in which autonomy, competence, and relatedness are more likely to be motivated and engaged. Motivation is heavily considered within the SDT framework. Intrinsic motivation is fostered when attempting to heighten autonomy, competence, and relatedness. In fact, a meta analysis of 128 studies found that positive feedback supports intrinsic motivation, whereas using tangible rewards significantly undermines it (Deci, Koestner, & Ryan, 1999). By allowing practitioners to test drive interventions, it is hopeful teachers will feel competent and autonomous when they begin to implement the chosen intervention.

Dart, Cook, Collins, Gresham, & Chenier (2012) used a "test-drive procedure," or brief experimental analysis of treatment acceptability, to increase fidelity of behavioral interventions across four teacher-student dyads. Teachers who were identified as "nonadherent" to the consultation process were provided with opportunities to try four different evidence-based interventions and rate the interventions on acceptability (scale of 1 through 5). A multiple-baseline design was used to determine if allowing teachers the opportunity to test drive interventions would increase treatment integrity and student academic engaged time. The authors found that the test-drive procedure was effective in increasing treatment integrity among all four teachers (*Mean NAP*=100%). Test-driving products has substantial evidence within the marketing and business market research. For those practitioners who do not initially seem invested in implementing interventions with fidelity, the test-drive procedure used by Dart et al. may offer an alternative approach during collaboration.

Synthesis. Individuals in the preparation stage are developing a plan of action and intend to act in the near future. Using collaborative-based consultation to increase buy-in and test drive interventions are proposed as strategies that align with the preparation stage. Both strategies yield positive effects, but perhaps more importantly is that research ties these interventions to actual gains in treatment integrity. Direct measurement of treatment integrity is rare in the literature so these interventions may offer the most promising strategies, as compared to other stages of the adapted model. In addition, the studies were implemented within school settings, providing more direct support for using them to increase interventions targeted to student needs. Because consultation research naturally lends itself to qualitative methodology, much of the studies in support of collaborative-based consultation and test driving interventions use single-case design.

Action

The action stage of TTM is the most noticeable in terms of overt behavioral change (Prochaska, DiClemente, & Norcross, 1992). At this point, an individual is modifying their behavior, experiences, and environment to address a problem. Within this stage, a person takes action to increase or decrease a behavior (depending on nature of the problem) to an acceptable criterion. The criterion is established so as to not count any behavior change as action, but only the magnitude of change that will lead to desired outcomes. For example, an interventionist must change enough so that student growth can be attributed to the practitioner's new behavior. Much time and energy is exerted to overcome obstacles and commit to change. Because these behaviors are most noticed by others, people also receive the most natural external reinforcement within this stage.

Skill proficiency. Historically, practitioners responsible for delivering instruction have received pertinent training as part of a half- or full-day workshop (Joyce & Showers, 1983), with little opportunities to practice skills and/or plan for using skills within the context of their school. Training models within schools should include an explanation of the underlying theory in support of a particular innovation, multiple demonstrations of an innovation, opportunities to practice while in the training, and follow-up coaching to facilitate skill development within the contextual setting (Joyce and Showers, 1990). Effective professional development provides teachers with opportunities to engage in active learning (Garet et al., 2001; Loucks-Horsley et al., 1998).

According to a Hattie (2009), professional development designed to influence teacher learning has seen large effects ($d = 0.90$); however, these learnings tend to have less of an effect on teacher behavior ($d = 0.60$), and even less of an effect on student learning ($d = 0.42$). Using specific evidence-based practices within teacher training such as modeling and providing opportunities to practice interventions will increase the

likelihood that teachers will implement interventions with fidelity. Sterling-Turner, Watson, Wildmon, Watkins, and Little (2001) directly examined whether training type (didactic, modeling, rehearsal/feedback) yielded significant differences on treatment integrity outcomes. They found that modeling (d = 1.23) and rehearsal feedback (d = 2.11) were more effective than didactic training, and rehearsal feedback was more effective than modeling (d = 1.17). Providing teachers with practice, modeling and rehearsal can support generalization as well (Perepletchikova, 2014). Many of the studies that directly compare direct versus indirect training methods utilize multiple-baseline designs; therefore, participants often practice the intervention within the indirect phase of the design before the direct training is provided.

Self Efficacy. Bandura (1996) defines self-efficacy as "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performance" (p. 391). If individuals perceive themselves as capable, they are more likely to perform new behaviors. In fact, self-efficacy has been identified as the dominant predictor (direct and indirect) of behavior (Bandura, 1997, 2004), with some projecting it predicts better even than past performance. When a person has high self-efficacy, they see snags as opportunities rather than threats. The stronger an individual's sense of self-efficacy, the greater likelihood that person will set higher behavioral goals, attain more favorable outcomes, achieve higher self-regulation, and persist when obstacles arise (Bandura, 2004). Teachers' sense of self-efficacy is positively related to student achievement and motivation (Tschannen-Moran, Hoy, & Hoy, 1998). Those practitioners with high self-efficacy are more "open to ideas and more willing to experiment with new methods to better meet the needs of their students" (Tschannen-Moran et al., 1998, p. 223).

Self-efficacy is often reported as one of the strongest predictors for teaching performance when compared to all other factors (Klassen & Tze, 2014). It has an impact on goal setting, commitment to action, outcome expectations, and perceptions of obstacles. There is theoretical and empirical support for using goal setting to increase performance across a variety of tasks and contexts (Locke & Latham, 1990; Mento, Steele, & Karren, 1987; Bandura, 1977). Further, self-efficacy and goal setting are positively correlated and explain unique variance in behavior (Lozano & Stephens, 2010). Lozano and Stephens examined three conditions of goal setting (participatory goal, assigned goal, no goal) and found that participants who were involved in goal setting reported significantly greater self-efficacy in achieving their goals compared to those who were assigned goals, with effect sizes ranging from .50 to .62. Performance feedback paired with goal setting can provide the necessary support to improve long-term implementation for both academic and behavioral interventions (d=0.63; Neubert, 1998; Alvero, Bucklin, & Austin, 2001; Balcazar, Hopkins, & Suarez, 1985; Noell et al., 1997).

Synthesis. According to Prochaska and colleagues (1992), individuals in the action stage modify their behavior, experiences and environment. The behavior is noticeable to the point where changes will likely result in a change in outcomes. Processes of change strategies in the original TTM model include reinforcement management, helping relationships, counterconditioning, and stimulus control. Skill proficiency and self efficacy are proposed as strategies to use within the adapted action stage. Educational research hosts a large body of studies that supports the effectiveness of increasing skill proficiency and self-efficacy (Klassen & Tze, 2014; Tschannen-Moran, Hoy, & Hoy, 1998). Using direct training approaches such as modeling, practice, goal setting and performance feedback are positively linked to treatment integrity. A wide variety of study designs, participants, target behaviors, and fields have studied the

effectiveness of such strategies and linked using the strategies to treatment integrity outcomes; however, links to participant outcomes is still lacking.

Maintenance

During the maintenance stage of TTM, individuals work to maintain behaviors and reflect on positive gains (Prochaska, DiClemente, & Norcross, 1992). Based on the literature surrounding addictive behaviors, those that have changed their behavior for over six months are considered to be in the maintenance stage. When measuring individual perceptions, people may communicate they need some additional support, or "boosts," to maintain changes they have made, however they are less tempted overall to revert back to past behavior. Self-efficacy continues to play a role during maintenance to give individuals confidence as they navigate different situations when relapses are more likely to occur (Prochaska & Prochaska, 2014; Bandura, 1982), or to determine effective adaptations when applied to the context of schools and interventions. The focus during this stage is to recognize benefits resulting from a successful behavior change. Strategies designed to highlight gains and associated benefits will likely encourage individuals to maintain behaviors.

Perceptions of Relative Advantage. Stokes and Baer (1977) advocate for shaping responses in the generalized setting by using naturally maintaining contingencies. Collecting data connects a practitioner to natural contingencies that may maintain behaviors, and analyzing outcome data will help educators determine when flexibility becomes non-adherence, or "drift." The data will also help alleviate potential beliefs that interventions do not work for a particular population or a specific setting. If data is showing student growth, a practitioner will likely attribute that growth to changes made in the services a student is receiving. An example is when a new teacher is provided with curriculum around communication techniques within preservice training and is then

receives a compliment on their communication during practicum (Scheeler, 2008). Communication is reinforced within the natural context (school) by natural contingencies (compliments from colleagues). Triple P (Positive Parenting Program), a well-known and effective program, encourages practitioners to collect data and share with participants to encourage continued involvement. The possibilities of how this has been applied across fields are endless.

Perceptions of relative advantage, when applied to treatment integrity, refer to an interventionist's belief that the intervention they are delivering is better than the previous practice (Bosworth, Gingiss, Potthoff, and Roberts-Gray, 1999). Goal setting and performance feedback are effective strategies to help school practitioners generalize skills learned during training, but reviewing gains in student outcome data could be a beneficial naturally occurring contingency (Burns et al., 2013). If systems are in place for regularly reviewing progress-monitoring data, those interventionists that may need a "boost" will get reinforcement that what they are doing is working. Implementing both system-processes and individualized support with analyzing data may prove especially valuable for reluctant practitioners who were identified as exhibiting low levels of fidelity. Some prior studies have examined to what degree different performance feedback methods effect treatment integrity. Kaufman, Codding, Markus, Tryon, and Kyse (2013) found both verbal feedback and written feedback produced favorable outcomes on treatment integrity; however, verbal feedback was more effective in creating immediate change and more quickly translated to student outcomes. A second study examined if verbal versus graphed feedback produced a difference in effect on treatment integrity, and found that graphed feedback was more effective (Zoder-Martell et al., 2013). These findings indicate that using graphs may be a strategy to save time and resources during consultation, but still place importance on treatment integrity and performance feedback.

Synthesis. Within the maintenance stage, individuals are working to maintain behaviors (Prochaska, DiClemente, & Norcross, 1992). No processes of change are included in the original model, except for the caveat that individuals are reflecting on positive gains. Within the adapted model, a proposed strategy is to increase perceptions of relative advantage by showing gains in fidelity and student outcomes. Using performance feedback to increase treatment integrity is a well-supported strategy (Codding et al., 2005; Mortenson & Witt, 1998). Most researchers have studied performance feedback using a combination of methods (verbal feedback, written feedback, graphed feedback, etc). Although many have incorporated graphs as an additional tool in performance feedback (e.g., Gilbertson, Witt, Singletary, & VanDerHeyden, 2007), most studies have not compared different feedback methods to analyze what components work best. However, some strategies, such as graphed feedback, may be more advantageous because they will save time and resources (Zoder-Martell et al., 2013).

Termination

Individuals in the termination stage of TTM experience no temptation to relapse and hold extremely high levels of self-efficacy. The new behavior has become automatic. If applicable to schools, little to no thought would be given to fidelity because the interventionist carries out a protocol automatically and adapts appropriately with ease in all situations. However, it is unlikely a school practitioner will reside in the termination stage. If working within a multi-tiered system of support (MTSS), students are moved frequently and instruction is often individualized. An intervention or method of delivery may work well for one student and be ineffective for another. It may work well within the context of school for the first half of the year and need to be adapted for the next. Therefore, a practitioner will likely adapt appropriately at times and inappropriately depending on the context, necessitating the need for external checks on fidelity.

Using Consultation in Applied Settings

Schools frequently use models of behavioral consultation to plan and deliver interventions for students. School-based consultation is an indirect service delivery model in which a consultant provides assistance to teachers (consultees) to help solve problems in their classrooms (Erchul & Sheridan, 2002). Using this indirect service delivery model is widely thought of as a practical and efficient method of delivering interventions (Kratochwill, 2008). Consultation is preventative in nature (Erchul & Sheridan, 2002); and although it can focus on solving current problems, a second intention is that a consultant is building capacity in a consultee so that they are able to handle and prevent similar situations in the future (Gutkin 1999; Zins, Kratochwill, & Elliott, 1993).
The consultation process is often viewed as dynamic in that every interaction between consultant and consultee is rarely predetermined (Sheridan, Salmon, Kratochwill, & Carrington Rotto, 1992). Instead, problem-solving models are used fluently throughout the process to address concerns as they arise such that a problem-solving approach to school-based consultation is an often-used alternative to expert-based models and direct intervention (Telzrow, McNamara, & Hollinger, 2000). Below I will discuss the effectiveness of school-based consultation, factors that enhance the effects of school-based consultation, and the potential relationship between school-based consultation and TTM.

Effectiveness of School-Based Consultation

The use of school-based behavioral consultation is prevalent; however, the research to support its effectiveness has not kept up with practice (Erchul & Sherdian, 2008; Zins et al., 1993). Historically, research in support of school consultation has been conducted as literature reviews and meta-analyses of school consultation outcome studies (i.e., Mannino & Shore, 1975; Gresham & Noell, 1993; Reddy, Barboza-Whitehead,

Files, & Rubel, 2000; Lewis & Newcomer, 2002). Positive consultation outcomes are often measured at the systems level by examining the number of reductions for referrals to special education (Ponti, Zins, & Graden, 1988). Cappella et al. (2012) found that a combination of training and consultation were more effective than training alone when implementing a research-based curriculum to increase positive interactions in the classroom. Outcome variables included student-teacher closeness (ES = 0.47), academic self-concept (ES = 0.31) and peer social experiences (ES = 0.31).

Volpe et al. (2009) compared two consultation methods (individualized academic interventions using data and feedback versus general consultant-teacher collaboration) and measured effects on treatment integrity and student academic outcomes. The participants in the individualized intervention demonstrated greater integrity for math (*M* = 87.3%) and reading (*M* = 86.6%) than the general consultation (*M* = 64.8% for math; *M* = 58.8% for reading); however, student outcomes and teacher treatment acceptability did not differ significantly between the two groups. Other researchers have also studied the effectiveness of consultation, and found positive effects when using consultation-based approached (Schulte, Osborne, and McKinney, 1990; Ruble, Dalrymple, & McGrew, 2010; Sheridan, Bovaird, Glover, Garbacz, Witte, & Kwon, 2012).

Factors that Enhance School-Based Consultation

Effective strategies in consultation include cultivating a relationship, assessment, problem identification, goal setting, strategy selection, strategy implementation, and evaluation (Brown, Pryzwansky, & Schulte, 2006; Kratochwill, Elliott, & Rotto, 1995). At all stages of working with a teacher, research suggests it is essential to maintain a positive relationship with the consultee (Kratochwill, Elliott, & Callan-Stoiber, 2002). During earlier stages of consultation, applying strategies that aim to develop rapport and build trust are encouraged (Frank & Kratochwill, 2008). The benefits of establishing this

positive relationship are historically well substantiated in the research (i.e., Martin, 1978). Several variables impact whether the problem solving process in consultation will be effective. Relationship quality, intervention acceptability, and intervention integrity moderate or mediate consultation outcomes (Erchul & Sheridan, 2014). By using indirect consultation, the goal is that time is saved, ecological variables are taken into account, multidisciplinary approaches are considered, and student outcomes are met (Erchul & Sheridan, 2014). Division 13 of The Society for Consulting Psychology (APA, 2002) published a recommendation of general competencies of a consultant which includes self-awareness, self-management, relationship development, assessment, action research, intervention, knowledge of theory, multicultural considerations, legal and industry issues, professional ethics and standards, and finally research methods and statistics. Although the APA recommendations are for psychologists at large, the competencies can be reasonably expected to improve consultation outcomes in school contexts.

School-Based Consultation and TTM

Consultation has historically been focused on the prevention of negative outcomes, whether it be mental illness (Caplan, 1970) or educational failure (Erchul & Young, 2014). The transtheoretical model has its origins within psychothereapy and preventing addictive pathologies from worsening. Within public health, levels of support include primary, secondary and tertiary prevention (Leavell & Clark, 1958), and later universal, selective and indicated prevention. Within schools, levels of support with a response to intervention (RtI) or multi-tiered systems of support (MTSS) framework are referred to as tiers 1, 2 and 3 (Burns, Deno & Jimerson, 2007). Although TTM has been widely applied in the public health literature, it has only been referenced in the school consultation literature. Further, the use of it to improve intervention outcomes has never

been directly studied. Because it has proven effective in addressing problems within other fields, the potential for its use within schools is promising.

Synthesis

Within a school-based behavioral consultation model, consultants help teachers solve problems through various problem-solving models (Erchul & Sheridan, 2014). Behavioral consultation within schools has a long history, with psychologists active as consultants as early as the 1960s (Alpert & Yammer, 1983; Sarason, 1971). Erchul and Sheridan (2014) describe the scientific research as moving slowly and "producing small yet noticeable changes over time" (p. 3). The research is largely in the form of literature reviews with few meta-analysis; however, most of these are dated. For example, the most recent comprehensive meta-analysis was conducted in 2000 (Reddy et al.), which is now 16 years old. Many strategies that are often used within the consultative model have been proven evidence-based (i.e. performance feedback); however, the number of studies directly manipulating variables of consultation is relatively scant. For those studies that directly compare consultation methods with control groups, more positive consultee outcomes when consultation methods are used are demonstrated. Although there are positive effects for using consultation (Cappella et al., 2012), the number of randomized controlled studies is relatively small. Among those randomized controlled studies that are commonly referenced, three of the publications used the same data set (DuPaul et al., 2006; Jitendra et al., 2007; Volpe, DuPaul, Jitendra, & Tresco, 2009), so although the results are informative, more experimental studies with varied samples are needed. In addition, continuing to compare aspects of consultation to one another to find what is most effective would offer considerable insight into what strategies practitioners should be using.

Summary and Research Questions

This study responds to the lack of procedural fidelity within schools by proposing a model of behavior change to use during consultation. The most malleable interventionist variables associated with treatment integrity were positioned within a well-known model (TTM) of behavior change. Strategies for each interventionist level variable were identified, with the careful acknowledgement that treatment integrity functions within a broad ecological system. The purpose of the study was to examine the validity of using stages of the TTM to identify appropriate supports for school interventionists.

The following questions guided the study:

Research question1: What were the effects on treatment integrity of individualizing interventions to stages of the TTM?

Research question 2: What were the effects on student outcomes of individualizing interventions to stages of the TTM?

Research question 3: What were the perceived needs among teachers who are resistant to change throughout the implementation process of student interventions?

CHAPTER 3

METHOD

Chapter three describes the methodology used for the current study. The first and second research questions asked about influencing treatment integrity and student outcomes, and were evaluated with two multiple baseline designs across teachers. The manipulated variable was the matched TTM strategy used with each teacher. The third research question asked about teacher needs, and was evaluated by coding three interviews conducted with each teacher after each phase (baseline – modeling, precontemplative, and matched intervention) of the study.

Setting and Participants

Data for the current study were collected during the spring term of 2015. Participants were selected from a pool of K-4 teachers at a K-8 public charter school in an urban district in the Midwest, with a total enrollment of 435 students (307 students were enrolled in grades K-4). The school split their students into two levels; elementary (K-4) and middle school (5-8). At the time of the study, the school primarily served middle-class and upper-class families, with 10% of students eligible for the federal Free/Reduced-Price Lunch (FRPL) program. Ninety percent of students were White (non Hispanic), 5.3% Asian/Pacific Islander, 2.1% Black (non Hispanic), 1.6% Hispanic, 0.7% Unclassified, and 0.2% American Indian/Alaskan Native. Students received universal (tier one) instruction in a German immersion setting, with a school goal of dual-language proficiency by eighth grade. All K-4 classroom teachers were proficient in two languages (German and English).

Criteria for Teacher Participation

At least three classroom teachers were needed for the study. Teachers were asked to participate based on three criteria, a) they were identified as demonstrating a high level

of resistance to implementing evidence-based interventions, b) their identified stage of change within TTM was distinct from the other two participants selected, and c) they had students within their classroom that would benefit from receiving a conceptual math intervention. Participants were qualified in a sequential manner. First, all K-4 educators were asked to complete a survey designed to identify their level of resistance. Second, those teachers that demonstrated the highest levels of resistance were further interviewed to determine the stage of change they most aligned with in the TTM. If teachers met the first two criteria, all students within their classroom were screened using the FASTBridge assessment system (Christ et al., 2015).

Final Three Teacher Participants

All K-4 classroom teachers (14 total) were asked to complete a survey assessing level of resistance. One teacher declined participation; while 13 teachers agreed to complete the survey. Of those 13 teachers, the three identified as most resistant were asked to participate further and allow the researcher to interview them. One of the three did not consent to further participation so the fourth most resistant teacher was asked to participate. Participants received a $100 Amazon gift card upon completion of the study. The final three participants were all licensed through the state department of education but had varied levels of background and experience. Additional information for the participants is shown in Table 2.

Table 2. *Characteristics of Final Three Teacher Participants*

	Sex	Race/Ethnicity	First Language	Grade Taught	Years of Teaching	Highest Degree Earned
Teacher 1	Female	White	English	K	1	Bachelor of Arts
Teacher 2	Male	White	English	2	16	Bachelor of Arts

						in Teaching
Teacher 3	Male	White	English	4	7	Bachelor of Science in Teaching

Students Receiving Interventions

Each teacher worked with three students from their classroom. Students were identified by a math screening measure described in more depth below. As noted above, teacher 1 taught kindergarten, teacher 2 taught second grade, and teacher 3 taught fourth grade. Their students were enrolled in those perspective grades. All students spoke English as their first language. Further information about each student is shown in Table 3.

Table 3. *Characteristics of Student Receiving Interventions*

	Grade	Sex	Race/Ethnicity	Special Education
Teacher 1				
Student A	K	Female	White	No
Student B	K	Female	White	No
Student C	K	Female	White	No
Teacher 2				
Student A	2	Male	White	No
Student B	2	Female	White	No
Student C	2	Female	White	No
Teacher 3				

Student A	4	Male	African American	Yes
Student B	4	Female	White	No
Student C	4	Female	White	No

Consultant

The school psychologist employed at the school agreed to function as the consultant. She was a white female who, at the time of the study, had been working at the school for 4 years, was a licensed psychologist (LP) through the state board, was a licensed school psychologist through the state department of education, had a Ph.D. in Educational Psychology, and had recently served as an adjunct professor in psychology teaching graduate-level courses related to learning, cognition, and behavior change. In addition to the school-contracted hours, she maintained a private clinical practice in which children, adolescents and families were her primary clients. Her experience included over 30 years of working in schools and clinics with children and adults within the United States and abroad.

Measures

Various measures were used for screening and to monitor progress of teachers and students. Both types of measures are described in more detail below.

Screening Measures

Survey of teacher resistance to intervention. All K-4 educators were asked to complete the Evidence-Based Practice Attitude Scale (EBPAS; Aarons, 2004) in order to determine individual level of resistance to implementing evidence-based interventions. Teachers were asked to rate questions along a scale from one (“Not at All”) to four (“To a Very Great Extent”). Response options included “Not at All,” “To a Slight Extent,” “To a Moderate Extent,” “To a Great Extent,” and “To a Very Great Extent.” Four

dimensions of attitudes toward the adoption of evidence-based practices are identified by EBPAS: 1) likelihood of adopting evidence-based practice if required (Requirements), 2) intuitive appeal of evidence-based practice (Appeal), 3) openness to new practices (Openness), and 4) perceived divergence of usual practice with research-based developed interventions (Divergence). For the current study, the EBPAS items were modified slightly to reflect teachers and students rather than therapists and clients. For example, wording such as "therapy/interventions" was shortened to "interventions" and "clinical experience was shortened to "experience." Table 4 outlines the items that comprise the EBPAS along with their associated dimension.

Table 4. *Evidence-Based Practice Attitude Scale (EBPAS) Items and Dimensions*

Item	Dimension
If you received training in an intervention that was new to you, how likely would you be to adopt it if it was required by administration?	Requirements
If you received training in an intervention that was new to you, how likely would you be to adopt it was required by your district?	Requirements
If you received training in an intervention that was new to you, how likely would you be to adopt it if it was required by your state department of education?	Requirements
If you received training in an intervention that was new to you, how likely would you be to adopt it if it was intuitively appealing?	Appeal
If you received training in an intervention that was new to you, how likely would you be to adopt it if it "made sense" to you?	Appeal
If you received training in an intervention that was new to you, how likely would you be to adopt it if it was being used by colleagues	Appeal

who were happy with it?	
If you received training in an intervention that was new to you, how likely would you be to adopt it if you felt you had enough training to use it correctly?	Appeal
I like to use new types of interventions with my students.	Openness
I am willing to try new types of interventions even if I have to follow a manual.	Openness
I am willing to use new and different types of interventions developed by researchers.	Openness
I would try a new intervention even if it were very different from what I am used to doing.	Openness
I know better than researchers how to instruct my students.	Divergence
Research based interventions are not practical.	Divergence
Experience is more important than using manualized interventions.	Divergence
I would not use manualized interventions.	Divergence

Note. Participants were asked to indicate the extent to which they agreed with each item.

The score for each subscale is created by computing a mean score for each set of items that load on a given scale; however, subscale 4 (Divergence) must be reverse scored. After the reverse scoring is complete, then a mean of the scale scores may be computed to yield the mean score for the total EBPAS. The lower the total EBPAS score, the more resistant a teacher is to implementing evidence-based interventions.

EBPAS has been shown to result in reliable data (alpha = 0.79) for determining attitudes toward the adoption of evidence-based practices (Aarons et al., 2011), and is generalizable to a variety of service provider contexts and settings (Aarons et al., 2010). Validity of the measure was supported by EBPAS score associations with mental health

clinic structure and policies (Aarons, 2004), culture and climate (Aarons & Sawitsky, 2006), and leadership (Aarons, 2006). When examining clinic structure and policies, predictor variables such as case management programs (versus outpatient programs), low bureaucracy programs, written practice rules, and wraparound programs accounted for 11.0% of the variance in EBPAS scores (Aarons, 2004). Culture and climate variables such as constructive organizational cultures and higher educational attainment accounted for 8.6% of the variance in EBPAS scores. In addition, constructive culture was significantly positively associated with the EBPAS (r = .198) scales (Aarons & Sawitsky, 2006). In regards to leadership, predictor variables such as transformational leadership and transactional leadership accounted for 13.4% of the variance in EBPAS scores (Aarons, 2006).

Criteria for determining what constitutes a high or low level of resistance are not yet published. However, national norms of the EBPAS are provided (Aarons et al, 2011) and include an overall EBPAS mean of 2.73 (*SD* = 0.49), Appeal mean of 2.91 (*SD* =0.68), Requirements mean of 2.41 (*SD* = 0.99), Openness mean of 2.76 (*SD* = 0.75), and Divergence mean of 1.25 (*SD* = 0.70).

Teacher readiness for change. Those teachers that demonstrated the most resistance on the EBPAS were asked to complete the Stages of Change Questionnaire (McConnaughy et al., 1983), which was developed to assess readiness for involvement in change at the start of psychological therapy. The data were used to help identify teacher alignment to stages of TTM. Previous research (McConnaughy et al, 1983) identified the following coefficient alphas for the original four scales: Precontemplation = .88, Contemplation = .88, Action = .89, and Maintenance = .88. A later study cross-validated the scales with a new clinical sample and found a replication of the same findings (McConnaughy, DiClemente, Prochaska, & Velicer, 1989). Adjacent stages in both

studies correlated more highly with each other than with any other stage. Validity of the Stages of Change Questionnaire has been studied across different fields. Predictive validity was examined in one study with excessive drinkers and their allocated stage of change (Heather, Rollnick, & Bell, 1993). Multiple regression analysis compared stages of change as a predictor of reduced alcohol consumption at a follow-up versus other possible predictor variables (level of alcohol dependence, previous counseling, intention to quit). Stage of change variable showed the highest correlation with drinking outcome, and accounted for 37% of the variance (Heather, Rollnick, & Bell, 1993). Because the questionnaire for the current study was used within the context of schools and in relation to the uptake of evidence-based practices, questions were re-worded to reflect this context. For example, within the Precontemplation stage, instead of "As far as I'm concerned, I don't have any problems that need changing," the item was reworded to "As far as I'm concerned, there are not students in my classroom that are in need of additional support."

Questions were worded so that participants provided an answer along a 5-point likert-type scale ranging from "Strongly Disagree" to "Strongly Agree." Response options included "Strongly Disagree," "Disagree," "Neutral," "Agree," and "Strongly Agree." For questions that were worded positively, "Strongly Disagree "was assigned the value of 1 while "Strongly Agree" was assigned the value of 5. For questions that were worded negatively ("As far as I know, there are not students in my class that are in need of additional math intervention"), "Strongly Disagree" was assigned the value of 5 while "Strongly Agree" was assigned the value of 1. Table 5 outlines the questions asked of participants and each item's corresponding classification for scoring (Positive or Negative).

Table 5. *Stages of Change Questionnaire*

Questionnaire Items	Scoring Classification
Precontemplation	
As far as I know, there are not students in my class that are in need of additional math intervention.	Negative
There is probably not an intervention that could help those students that are struggling in math.	Negative
Providing interventions for struggling students in addition to classroom instruction is worthwhile for students.	Positive
It is not the responsibility of the classroom teacher to provide supplemental interventions.	Negative
Contemplation	
If a student needs additional support, it should be the responsibility of the classroom teacher to deliver interventions.	Positive
There are some students in my classroom who need supplemental instruction beyond what they are receiving in the classroom.	Positive
It might be worthwhile to provide supplemental interventions to struggling students.	Positive
Students who are struggling should receive intervention support outside of the general education classroom.	Negative
Preparation	
I wish I knew how to help struggling students better.	Positive
I think I might be ready to learn more about evidence-based interventions.	Positive

I've been thinking that I want to try to provide supplemental interventions to students struggling in math.	Positive
I wish that my school had some more resources to help me figure out how to implement interventions with struggling students.	Positive
Action	
I have been learning more about evidence-based interventions to use with my struggling students.	Positive
Even though I'm not always successful at delivering interventions with my struggling students, I am trying.	Positive
I have started to work on delivering interventions but I would like more help.	Positive
I'm not sure if I am delivering interventions right.	Negative
Maintenance	
I've been successful at implementing interventions but I'm not sure I can keep it up.	Negative
I'm not following through implementing interventions as well as I had hoped.	Negative
I'm not sure if the students that are receiving interventions are benefiting.	Negative
I may need a boost right now to help me keep track with delivering interventions.	Positive

Stages of change within TTM were identified for each participant by asking the questions within Table 4 in sequential order, via an online Google Form. Within each stage, four questions were asked so each stage was assigned 20 points. If a participant

scored more than 15 points on any one stage, the next set (stage) of questions were asked. If a participant scored less than 15 points, it was assumed they were best aligned with that stage of TTM and would benefit from strategies designed to address those barriers to behavior change. Previous research on the Stage of Change Questionnaire determined assigned stages by assessing whether participants were "below average, about average, and above average" compared to other participants in the sample. Clear guidelines are not provided beyond this except for using "discernment" and clinical judgment (McConnaughy et al, 1983), thus the researcher specified a priori rules for the current study. Teacher 1 was assigned to the contemplation stage, teacher 2 was assigned to the preparation stage, and teacher 3 was assigned to the maintenance stage.

Student mathematics skills. All students in the final three teachers' classrooms were assessed using the FASTBridge Assessment System (Christ et al., 2015). Both earlyMath (grades K-1) and CBMMath (grades 1-6) were used to screen students across kindergarten and subsequently second/fourth grades. The earlyMath composite is comprised of numeral identification (alpha = .97), composing numbers (alpha = .82), and decomposing numbers (alpha = .80). Validity coefficients were moderate when correlated with broad outcome measures (i.e. Measures of Academic Progress, Group Mathematics Assessment and Diagnostic Evaluation), and provided preliminary evidence that earlyMath for the validity of the measure in assessing overall mathematics achievement (Christ et al., 2015).

Second (teacher 2) and fourth (teacher 3) grade classrooms were screened using CBMMath Process assessment. The Process assessment (versus Fluency assessment) allowed for the researcher to take into account the multiple steps needed to solve problems. Determining if a student was struggling with helped determine the appropriate intervention for the student. For second grade (teacher 2), problems on the general

outcome measure included multi-digit addition and subtraction with and without regrouping. For fourth grade (teacher 3), problems on the general outcome measure included multi-digit addition, subtraction, multiplication, and division. Moderate concurrent validity coefficients offer preliminary evidence of technical adequacy for the second and fourth grade CBMMath Process assessments (Christ et al., 2015). Those three students that scored the lowest on the screeners within each class were selected to receive math interventions.

Monitoring Teacher and Student Progress

Treatment integrity. Intervention integrity was assessed by coding 100% of the intervention sessions. The number of points (weighted steps) correctly completed in each session was divided by the total number of points outlined in the protocol. Some steps were assigned more weight depending on the emphasis of its importance within research. Steps that included immediate corrective feedback (Kulhavey, 1977; Hattie & Temperley, 2007), think-alouds and/or modeling (Berkeley, Mastropieri, Scruggs, 2011; Swanson, 1999), and scaffolding (Collins et al., 1989; Bransford, Brown, & Cocking, 2000) were assigned more weight than other steps within the checklist. Three treatment integrity scores were computed that included the intervention procedure, the mastery assessment procedure, and a rating of student engagement throughout the session; however, the intervention procedure was the only score analyzed. The researcher-developed treatment integrity checklist used in the current study is attached as Appendix A. A score was recorded for each of the three students with whom each teacher was working. Scores (points) were converted into percentages for interpreting results and the score was averaged for each teacher across the three separate intervention implementations (i.e., three students).

Treatment acceptability. The Intervention Rating Profile-15 (IRP-15; Witt & Elliot, 1985) is a 15-item questionnaire designed to assess the acceptability of an intervention. Questions were worded so that participants provided an answer along a 6-point scale ranging from "Strongly Disagree" to "Strongly Agree." Response options included "Strongly Disagree," "Disagree," "Disagree Slightly," "Slightly Agree," "Agree," and "Strongly Agree." Teacher participants completed the IRP-15 after each phase of the current study. Some items were modified to reflect academic needs versus behavioral problems. All 15 items were answered using a 6-point Likert scale, with 1 for Strongly Disagree and 6 for Strongly Agree. Previous research with the IRP-15 found a coefficient alpha of .98 (Witt & Martens, 1983). Refer to Appendix B to view the IRP-15.

Teacher interviews. When conducting research within consultation, certain questions cannot be answered with purely quantitative methods (Erchul & Sheridan, 2008). Instead, consultation research often calls for small-*n* designs and mixed methods, combining the strengths of empirically quantitative and qualitative approaches. In an effort to understand the setting and how the context and perceptions of participants contributed to the quantitative outcomes, the teachers were interviewed at three points during the study. The interviews were used to gain insight into teacher perceptions and needs throughout the implementation of interventions and screen for contextual factors that could be contributing to possible effects across phases. The same questions were asked each interview; however, conversations were dynamic and follow-up questions were naturally asked as the interviews unfolded to clarify participant responses and gain further insight. Interview questions are attached in Appendix C. Each interview took less than 15 minutes to complete. The first interview was conducted after phase one of the study ("action" TTM stage), the second interview was conducted after phase two (contra-

indicated TTM stage), and the third interview was conducted after phase three (targeted TTM stage).

Mathematics skill mastery assessment. The students' conceptual understandings were assessed using an individually-administered, untimed test adapted to represent the specific skills focused on during intervention (Buschman, 2003; Zaslofsky, 2015) in order to determine if the student had learned the skill that was taught. One mathematical problem was written at the top of a piece of paper; and students were asked to draw a visual representation of the problem on paper. For example, if a student is presented with 7-3, they are able to 1) draw 7 objects, 2) cross out 3 objects, and 3) circle the remaining number. The representation mimics how the problems were modeled and practiced in their intervention session. The way problems were represented depended on the mathematical skill; which could have included single-digit addition, single-digit subtraction, multi-digit addition with and without regrouping, multi-digit subtraction with and without regrouping, single-digit long division with and without remainders. As skills became more complex, the representations concurrently became more complex.

After students completed a representation of the problem (or an attempt), students were asked a series of questions designed to gain more insight into their understanding of the problem. Student responses were rated according to a rubric with the following criteria, (a) demonstrates strategic knowledge, (b) communicates and explains using mathematical vocabulary, (c) visually represents the problem, and (d) answers the problem correctly. Each criterion was scored with a three-point rubric based on Van de Walle, Karp, and Bay-Williams (2010). A score of 0 meant that the student demonstrated unsatisfactory knowledge of the item, a 1 meant partial demonstration of the item, a 2 indicated adequate understanding to accomplish the objective, and a 3 indicated full accomplishment of the item. The student representations and answers were

used to assign a score using this rubric with a total possible score of 12. The skill was considered mastered if the student earned a score of 11 or more on three consecutive assessments and the next skill was taught. An example of the CRA Mastery Assessment is attached as Appendix D and the CRA Mastery Rubric is attached as Appendix E. The data were averaged across the three students with whom each teacher worked.

Intervention Conditions

Student and teacher interventions are described below. The mathematics intervention delivered to students by teacher participants is explained, as are the various TTM strategies (baseline, precontemplative, and matched intervention) employed with each teacher.

Mathematics Intervention for Students

The study focused on mathematics in order to select an academic intervention with a well-established research base that could be delivered by the teacher participants from the start of the study. Each teacher delivered 1:1 interventions to three students within their classroom. The same intervention protocol was used across all teachers and students based on the Conceptual-Representational-Abstract (CRA) approach in which the student first solves the problem using manipulatives, then solves the problem using representations, and finally solves the problem using a traditional abstract/numerical model (Peterson, Mercer, & O'Shea, 1988). Within each of the three phases, the teacher was expected to follow a gradual release of learning (model-lead-test). An example of the CRA intervention protocol is provided (Appendix K) and highlights the skill of adding multi-digit numbers with regrouping. CRA demonstrates positive effects ($d = 0.38$), and is considered an effective intervention that targets conceptual understanding of mathematics (Hattie, 2009).

Teachers were provided with a resource outlining the continuum of possible skills. They were instructed to move to the next skill if a student demonstrated mastery on the CRA Mastery Assessment at the close of three consecutive intervention sessions. Teacher 1 focused on single-digit addition, Teacher 2 focused on multi-digit numbers with regrouping, and Teacher 3 focused on single-digit long division with remainders. Teachers were also provided with the skill sequence so that they understood the progression of skills and what could be taught next if a student mastered the present skill.

Implementation Interventions for Teachers

The three teachers each participated in three phases of intervention. First, each was shown the (CRA) intervention with modeling and feedback. Second, each received an intervention that aligned with the precontemplative phase as a contra-indication because the ratings on the Stages of Change Questionnaire did not fall within this phase. Finally, the third teacher intervention varied across teacher participants and included strategies that matched each teacher's targeted TTM stage. The interventions for each phase are described below.

Baseline – modeling. All three teachers first received modeling and guided practice on using the CRA intervention and assessment. Within the adapted TTM model, these strategies align with the Action stage (increasing skill proficiency and self-efficacy). Specifically, using explicit instruction, multiple demonstrations, and opportunities for practice are proposed as strategies to remove implementation barriers within this stage. The consultant distributed the intervention kit and associated materials to each participant. The CRA intervention script was read through once by the consultant with the participant following along. The consultant then modeled the intervention to the participant, using the intervention materials and teaching as if the participant was the student. The same procedure was used to explain and model the CRA Mastery

Assessment. After modeling, the participant then practiced the intervention on the consultant and the consultant provided feedback if appropriate. The participant also practiced scoring the CRA Mastery Assessment using a student example and the consultant provided feedback.

Precontemplative intervention. Because the Stages of Change Questionnaire did not indicate that any teacher's barriers fell within the Precontemplation stage, this stage was determined the contra-indicated stage for all participants. Within the adapted model, increasing perceived need and perceived effectiveness would decrease barriers to implementation within this stage. Strategies included raising an awareness of the problem and its associated risks (perceived need); and providing information on the trajectory of the problem, how intervening impacts trajectory, evidence on the efficacy and effectiveness of the intervention (perceived effectiveness).

The consultant reviewed the student screening data with each teacher. Assessment benchmarks and level of risk were used as teachers were asked to make note of the highest and lowest students in their classroom. The data for the three lowest students were reviewed in more detail. Individual student responses and accuracy on the screener were summarized but specific problems and error patterns were not analyzed during the second consultation. This part of the session was designed to address perceived need for a math intervention among the interventionists (teachers).

After the three lowest students were discussed, the consultant introduced information regarding the trajectory of the problem. To do this, the five strands of mathematical proficiency (National Council of Research, 2001) were reviewed. Figure 3 shows the graphical representation used with the teachers during the consultation session.

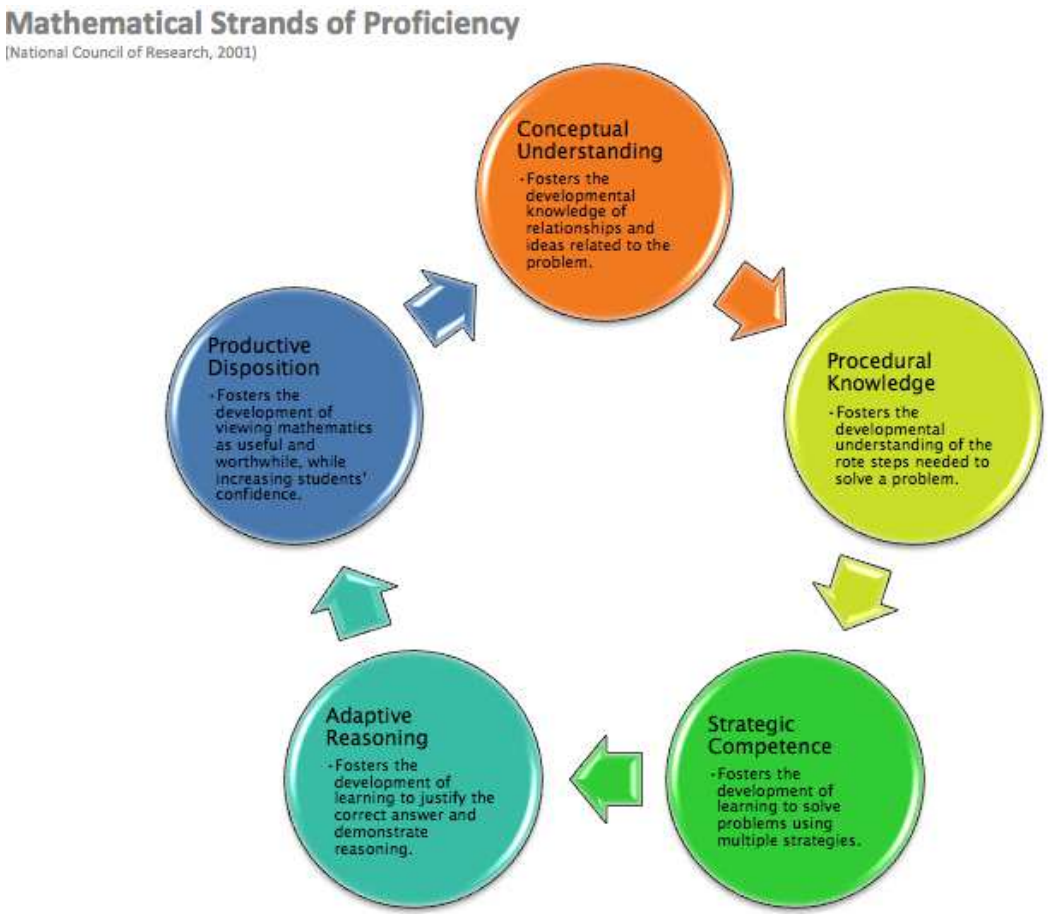


Figure 3. Representation of mathematical strands of proficiency.

The consultant highlighted that the five strands are interdependent and collectively contribute to the development of mathematical proficiency. The construct of proficiency in math is multi-dimensional, and teaching only one or two strands in isolation will not develop proficiency. In addition to providing the teacher with the representation and orally explaining the different strands, each teacher was also given a handout that summarized each strand's characteristics and benefits. To convey the importance of early intervention, the consultant touched on two points. One, because the progression of skills in math build upon one another, if students are missing skills, the gap in achievement becomes exponentially larger each year. And two, because the school tends to have a higher achievement level compared to state testing averages and thus high expectations, it was important to note that research indicates students who are not confident in math will

avoid taking more rigorous mathematics classes in high school (Boaler & Staples, 2008). Finally, the consultant shared evidence for effectiveness of the CRA intervention including an effect size ($d = 0.38$) from a mega-analysis (Hattie, 2009), and an explanation of what a mega-analysis is and how to interpret the effect size.

Intervention matched to TTM stage. The third phase of intervention differed across teacher participants and included strategies that matched each teacher's targeted TTM stage. Teacher 1 received strategies aligned with the Contemplation stage, Teacher 2 received strategies aligned with the Preparation stage, and Teacher 3 received strategies aligned with the Maintenance stage. Consultative strategies were designed to alleviate the barriers to change that were meaningful to the teacher, therefore ultimately increasing the fidelity of implementation. Because each session was markedly different, the procedures and strategies are explained separately.

Contemplative. According to the Stages of Change Questionnaire, Teacher 1 fell within the Contemplation stage. The assumption was they were aware of the problem but not necessarily willing to change their behavior. Motivational interviewing was used (Miller & Rollnick, 1991; Rollnick & Miller, 1995) to increase the teacher's motivation to change. The consultant used motivational interviewing techniques to guide the teacher in identifying barriers to implementation and possible courses of action to remediate barriers.

Preparation. According to the Stages of Change Questionnaire, Teacher 2 fell within the Preparation stage. The assumption was they were willing to act or implement interventions with fidelity but had not yet developed a working plan that would facilitate this change. Shared decision-making, increasing buy-in, and increasing willingness to try the intervention are the general interventionist variables associated with the adapted Preparation stage. Partnership-based collaboration and test-driving interventions were

used as strategies within the third consultation session. The test-driving strategy is designed to encourage teachers to briefly try different interventions that address a particular student need. After test-driving interventions, teachers rate how acceptable they find the intervention (Dart, Cook, Collins, Gresham, & Chenier, 2012). In the current study, the academic need identified for each student was increasing an overall understanding of multi-digit addition and subtraction with regrouping. The consultant focused on collaborating and revising elements of the specific CRA protocol rather than test-driving entirely new interventions. However, the same guidelines were followed in terms of trying different elements of the intervention protocol, assessing teacher acceptability, and continuing to implement parts of the CRA protocol that the teacher deemed acceptable.

Maintenance. According to the Stages of Change Questionnaire, Teacher 3 fell within the Maintenance stage. The assumption was that they were open to using evidence-based practices, have tried implementing such practices in the past, but may not be invested in the belief that this practice is truly making a positive difference for students. To increase perceptions of relative advantage within this adapted stage, the consultant reviewed positive gains in student outcomes and teacher implementation during the third consultation session. Previous research has demonstrated that consultation in conjunction with reviewing student data produces better achievement than consultation alone (Fuchs et al., 1992). Student growth was depicted in three graphs and the teacher was asked to comment on student progress.

Procedure

Teacher participants were asked to meet with a consultant, separate from the researcher, at three points during the study. The consultations were designed to include strategies that encompassed a particular TTM adapted stage. Each session focused on utilizing strategies

associated with the TTM. Although the researcher was not present during the consultation sessions, each meeting was audio recorded and reviewed to ensure expected procedures were followed.

Consultation 1

The first consultation session focused on modeling and practicing the CRA intervention and assessment. The teacher was first asked to rate their fidelity of implementation on a scale of 1 through 10. Their rating (if below 9) was the basis for establishing room for growth. At the end of the consultation session, materials were distributed and teachers were given the names of their three students that would receive intervention. Teachers were also encouraged to ask questions about the intervention procedure and materials; however, they were informed that concerns related to the study were directed toward the researcher. The researcher used a checklist (Appendix F) to review procedures with the consultant. The consultant also completed the checklist after the session.

Consultation 2

Precontemplation interventions served as the contra-indicated stage for all participants. The consultant reviewed the student screening data with each teacher. Assessment benchmarks and level of risk were used as teachers were asked to make note of the highest and lowest students in their classroom. The data for the three lowest students were reviewed in more detail. Individual student responses and accuracy on the screener were summarized but specific problems and error patterns were not analyzed during the second consultation. This part of the session was designed to address perceived need for a math intervention among the interventionists (teachers). The researcher used a checklist (Appendix G) to review procedures with the consultant. The consultant also completed the checklist after the session.

Consultation 3

The third consultation session differed across teacher participants and included strategies that matched each teacher's targeted TTM stage. Teacher 1 received strategies aligned with the Contemplation stage, Teacher 2 received strategies aligned with the Preparation stage, and Teacher 3 received strategies aligned with the Maintenance stage. Consultative strategies were designed to alleviate the barriers to change that were meaningful to the teacher, therefore ultimately increasing the fidelity of implementation.

Teacher 1 identified time and human resources as the primary barriers to implementing with fidelity. Together, the teacher and consultant arrived at a solution in which the teacher would meet with two students during unstructured playtime. During this time, it was possible to pull another support staff into her room to facilitate the other children. Following the motivational interviewing, the teacher was asked to rate their confidence that they could achieve fidelity of implementation given the new course of action. The consultant would not have closed the session until the teacher rated their confidence level at a 9 or above. A checklist (Appendix H) was used to review procedures with the consultant. The consultant also completed the checklist after the session.

Teacher 2 was asked to rate their level of confidence in implementing the intervention with 100% fidelity. Because the rating was low (which was known prior to the meeting based on the researcher monitoring treatment integrity), the teacher was asked to revise the intervention protocol with the consultant. The consultant asked the teacher how they could help make the protocol more manageable. The teacher and consultant collaborated and highlighted those steps that were both necessary to the effectiveness of the intervention and also important to the teacher. Steps that were not included in one of these categories were eliminated. In addition to the protocol, the teacher indicated that meeting separately with each student was time-consuming and not feasible at this point in the year. The teacher and consultant agreed that the teacher could meet in a small group

with all three students instead of 1:1 intervention. The teacher was informed that the researcher would follow-up with the teacher before their next student intervention session with an updated protocol. At the end of the session, the teacher was asked to rate their confidence level in regards to fidelity of implementation. A general checklist (Appendix I) was reviewed with the consultant prior to the session and also completed by the consultant after the session.

Teacher 3 was asked to review and analyze student data with the consultant. Because the intervention was delivered in a staggered manner across students, the teacher was able to view more data for student 1 (over students 2 and 3) and more data for student 2 (over student 3). Overall, students 1 and 2 made progress on the CRA Mastery Assessment and student 3's rate of growth was flat lined. After discussing the data with the consultant, the teacher noted that the first two students appeared to be benefitting from the intervention and the third student may need more time. Overall, the student data provided support for relative advantage of using the CRA intervention. Implementation fidelity data was not shown graphically to the teacher. Instead, full fidelity of implementation was defined and the teacher was asked to reflect on his or her own implementation from the start of the study until the third consultation session. Questions such as "Has your fidelity of implementation changed since you first started delivering the intervention?" and "If so, how?" were asked to encourage reflection on positive gains. A general checklist (Appendix J) was reviewed prior to the session and also completed after the session by the consultant.

Assessing Teacher Progress

Teacher progress was measured using multiple assessment tools at varied points during the study. Pre- and post-assessments included the Stages of Change Questionnaire (McConnaughy et al., 1983) and the Evidence-Based Practice Attitude Scale (Aarons,

2004). At the start of the study, these measures were used to screen participants. At the conclusion of the study, the Stages of Change Questionnaire was given to determine if a teacher had moved from one stage of the adapted model to another stage. The EBPAS was given to determine if the teacher's level of resistance to the uptake of evidence-based interventions had increased or decreased as result of their participation in the study.

To assess teacher progress throughout the study, the researcher met with each teacher prior to the second and third consultation, and again at the conclusion of the study. The consultation sessions indicated when a new phase was beginning. Teachers completed the Intervention Rating Profile-15 (IRP-15; Witt & Elliot, 1985) after phase 1, 2, and 3 of the study. This measure was administered to determine if teachers' level of intervention acceptability changed from one phase to the next. In addition to completing the IRP-15 at each meeting, the researcher also interviewed the participants. The interview questions were designed to assess needs related to implementation and monitor potential threats to internal validity. In addition to the meetings with the researcher, the primary outcome measured was the level of treatment integrity. The treatment integrity checklist (Appendix A) was identical across teachers and used to assess every student intervention session across all three phases of the study.

Experimental Design and Data Analyses

A multiple baseline design across teachers was used to compare the effects of introducing teacher consultation targeted to different stages of TTM on both treatment integrity and student outcomes. To determine if there was a demonstrable effect when the correctly matched teacher intervention (TTM consultation) was introduced, visual analysis was conducted. Four steps were followed throughout the study to determine a visual effect (Parsonson & Baer, 1978): (1) document predictable baseline pattern of date, (2) examine within-phase patterns, (3) compare data from each phase with adjacent

phase, and (4) determine if there are at least three demonstrations of effect at three different points in time. Six features were used to determine within- and between- phase data patterns: (1) level, (2) trend, (3) variability, (4) immediacy of effect, (5) overlap, and (6) consistency of data patterns across similar phases (Kratochwil et al., 2010). Change in level was determined by looking at the last data point in baseline and the first data point of the intervention phase. Creating trend lines within the baseline and intervention phases assessed change in trend. To assess change in variability, the fluctuation of data around the mean from baseline to intervention was analyzed. Immediacy of effect refers to the extent to which the level, trend, and variability of the last three data points in the baseline are different from the first three data points in the intervention phase.

In addition to visual analysis, a non-overlap of all pairs (NAP; Parker & Vannest, 2009) effect size was computed to assess percentage of non-overlapping data by determining the extent to which each data point in one phase overlaps with each data point in its adjacent phase. Each data point in the baseline phase A was compared to each data point in the intervention phase B to determine whether overlap occurred between phases. Each pair of data points that overlapped completely was assigned a value of '1', and each pair of data points that tied was assigned a value of '0.5'. NAP is specifically calculated by 1) adding the overlap sums, 2) subtracting from the total possible number of comparison pairs (i.e., the number of data points in phase A multiplied by the number of data points in phase B), and 3) dividing by the total possible number of comparison pairs. For example, a study with 6 baseline data points and 12 intervention data points has 72 total possible pairs. If one data point from the baseline overlaps with two data points and ties with one data point in the intervention phase, there are 2.5 total overlaps. Subtracting 2.5 from 72 is 69.5, and 69.5 divided by 72 is equal to 0.97; 0.97 is the NAP

value for this example. Parker and Vannest (2009) suggest NAP ranges to assess strength of effect: weak effects: 0-.65; medium effects: .66-.92; large or strong effects: .93-1.0.

Qualitative Interviews

The third research question was answered by analyzing teacher responses to interviews conducted at three points during the study. Interview data were organized into categories using the constant comparative method (Glaser & Strauss, 1967). As its name implies, the interview data were constantly compared from one teacher to another teacher and/or from one point in time in the study to another (Merriam 1998). These comparisons indicated tentative categories that were again continuously compared. The process is inherently intuitive in nature, but also systematically informed by the last research question. Some guidelines outlined by Merriam (1998) guided the category construction; categories should 1) reflect the purpose of the research, 2) be exhaustive, 3) be mutually exclusive, 4) be sensitizing (capture meaning), and 5) categories should be conceptually congruent. Post data-collection, the literature base on treatment integrity also informed the analysis in that findings were substantiated and category names were revised accordingly (Merriam 1998). Although the process of analyzing the data was complex, the method for physically storing and organizing the data was simple. Categories were constructed using tables within Microsoft Word; thus, categories and data were easily revised as data was received.

Treatment Integrity

The author coded all intervention videos to assess treatment integrity. Two graduate students within the Ph.D. program at the University of Minnesota coded 25% of the intervention videos for the study in order to establish reliability of the treatment fidelity coding. Agreement for treatment integrity was established by rating one video together, and then the raters coded the remaining studies individually. Although raters coded the

videos separately, they convened with the author to make adjustments in coding to minimize potential interobserver error throughout the coding process. For student outcomes, teachers used the rubric to assign scores to each CRA Mastery Assessment. The researcher scored all Mastery Assessments and compared scores. Percentage agreement was calculated as agreements divided by agreements plus disagreements multiplied by 100% for treatment integrity and student outcomes. Percentage agreement between the two raters was 96% for coding treatment integrity on the CRA intervention protocol; and 98% for coding student outcomes.

CHAPTER 4

RESULTS

Purpose and Research Questions

The purpose of chapter four is to answer the research questions using the data collected throughout the study. Each research question and its associated data are summarized. There is also data summarized that do not directly relate to the research questions but provide additional insights into teacher perspectives and attitudes. The research questions that guided the study are:

Research question 1: What were the effects on treatment integrity of individualizing interventions to stages of the TTM?

Research question 2: What were the effects on student outcomes of individualizing interventions to stages of the TTM?

Research question 3: What were the perceived needs among teachers who are resistant to change throughout the implementation process of student interventions?

Research Question 1 – Treatment Integrity

The first research question examined if matching stages of the transtheoretical model of behavior change (TTM) would result in increased treatment integrity. Figure 4 displays the data as a mean percentage (steps completed out of those steps attempted). If a teacher attempted a stage of the CRA intervention, those steps were included in the integrity score percentage. Intervention effects are seen for teacher 1, with clear changes in level, trend, and variability and immediacy of effect. Results for teacher 2 are difficult to interpret. Teacher 2's baseline scores from day 1 to day 7 continued to increase from 40% integrity to 90% integrity. Because the trend of data appeared to consistently increase but not level off, the researcher moved forward with the second phase of consultation. It is important to note that teacher 2 met with school administration and

union representatives to develop a corrective improvement plan on day 10. The plan addressed concerns related to general classroom management. Treatment integrity dropped substantially for teacher 2 on day 13. Because of researcher-concerns related to limited school days and addressing barriers to implementation, consultation 3 proceeded as planned. A change in level from the precontemplative stage to the matched intervention stage is noted; however, the trend line and variability do not support an effect due to the implementation of the matched intervention. For teacher 3, intervention effects are seen from baseline to phase 2 (precontemplative) and phase 3 (matched intervention). There is a clear change in level from precontemplative to matched intervention. The trend line for the precontemplative stage appears to average out from three data points that are higher to three data points that are lower, while the trend line generally increases for the matched intervention stage. It appears that teacher 2 and teacher 3 dropped in fidelity of implementation within one day of each other. There were no systemic reasons that the researcher noted that could explain this somewhat simultaneous drop. NAP from baseline to precontemplative stages are as follows: teacher 1: 100% (strong), teacher 2: 92.9% (strong) and teacher 3: 58.3% (weak). NAP from precontemplative stages to matched intervention stages are as follows: teacher 1: 92.5% (strong), teacher 2: 14.6% (weak), and teacher 3: 73.3% (medium). After each consultation session (regardless of TTM strategies employed), treatment integrity improved across teachers. Results do also indicate marginal support for the matched intervention in comparison to general consultation, when looking at immediacy of change and level but not necessarily NAP estimates.

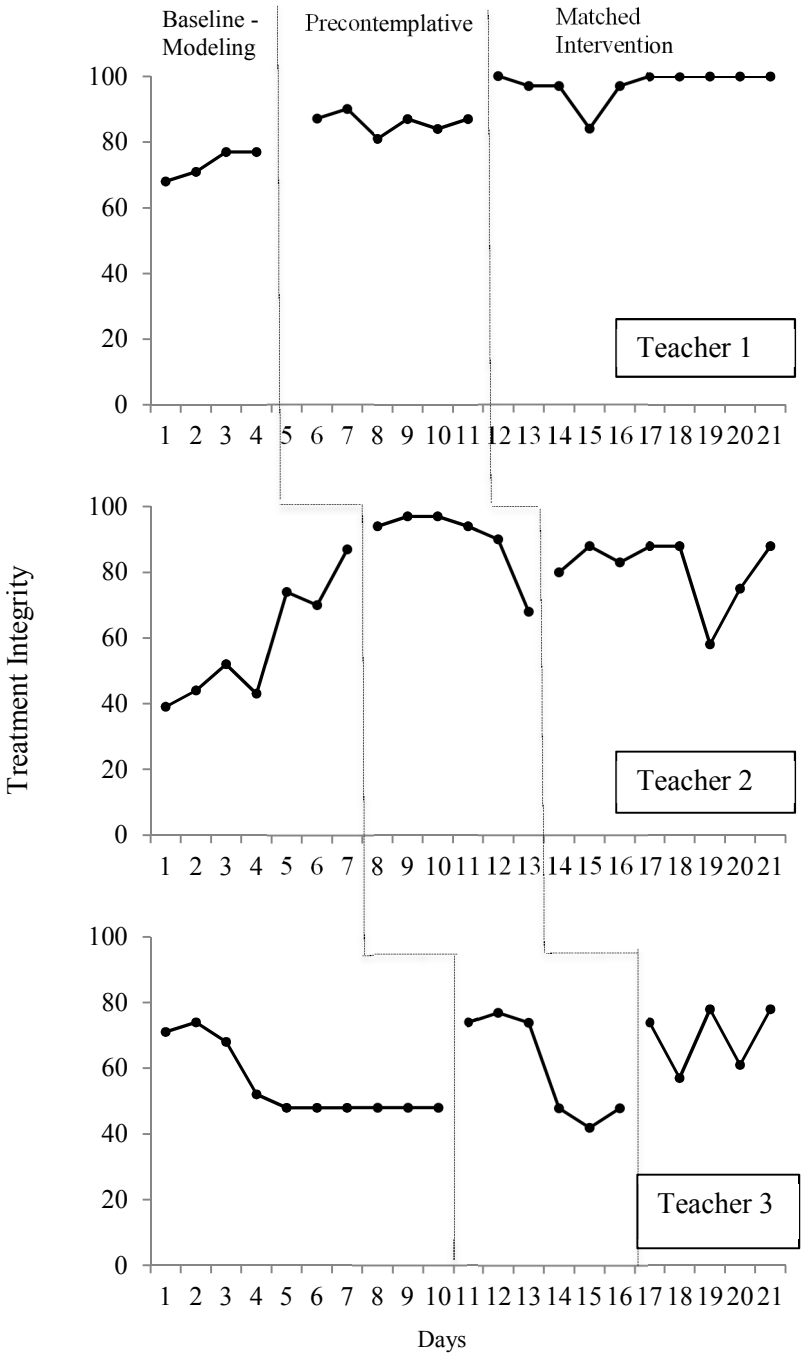


Figure 4. Mean percentage of steps completed out of those attempted (concrete-representational-abstract). The teachers began intervening with the first student on day 1, the second student on day 6, and the third student on day 13.

Pre- and Post- Summary Data

The potential changes in attitudes towards evidence-based practices (EBPAS), common beliefs aligned with stages of TTM (Stages of Change Questionnaire), and teacher acceptance (IRP-15) of the CRA intervention were monitored with pre- and post-intervention assessments. The data are not experimental in nature and should be seen as supplemental to the data provided above. A description of when data were collected and a description of the results are below.

Attitudes toward evidence-based practices. Prior to the study, the EBPAS was used to identify potential participants. At the completion of the study, the EBPAS was administered again to assess whether overall resistance to the uptake of evidence-based practices had changed over their five weeks of participation. A lower score on the EBPAS indicates more resistance. The results of the EBPAS for the 13 teachers screened at the start of the study are shown in Table 6.

Table 6. *Evidence-Based Practice Attitude Scale (EBPAS) Survey Results*

	Appeal	Requirements	Openness	Divergence	Total Score
	Mean = 2.64	*Mean* = 3.38	*Mean* = 2.69	*Mean* = 1.71	*Mean* = 2.73
	(*SD* = 1.13)	(*SD* = 0.52)	(*SD* = 0.57)	(*SD* = 1.53)	(*SD* = 0.48)
Teacher 1	1	3	2.25	1	2.31
Teacher 2	2	2.75	2	2.25	2.13
Teacher 3	1	3.75	2	0.75	2.25
Teacher 4	3	4	2.5	0.5	3.25
Teacher 5	4	3.75	3.5	0.25	3.75
Teacher 6	3.7	3.5	3.25	1.25	3.3
Teacher 7	4	4	3.75	6	3.56

Teacher 8	3	3.25	2.75	2.25	2.69
Teacher 9	2	4	2.75	1.75	2.75
Teacher 10	4	2.75	2.25	1	3
Teacher 11	2	2.75	2.5	2.5	2.06
Teacher 12	2	3	2.75	1	2.69

Note. Teacher 11 did not consent to further participation in the study. Teachers 1, 2, and 3 were the final teacher participants in the current study.

The results of the EBPAS for the three teacher participants pre- and post- study are shown in Table 7. The data are displayed across the four dimensions as well as the total score. On the Appeal dimension, all teacher scores increased (decreased in resistance). On the Requirements dimension, teacher 1 scored the same pre- and post-study, while teachers 2 and 3 decreased (increased in resistance). On the Openness dimension, teacher 2 scored the same on pre- and post- study, while teachers 1 and 3 increased slightly (decreased in resistance). On the Divergence dimension, teachers 1 and 3 increased (decreased in resistance), while teacher 2 increased (increased in resistance). Overall on the total EBPAS score, teachers 1 and 3 increased (decreased in overall resistance), while teacher 2 scored the same pre- and post- study. Teacher 1 demonstrated the largest growth on the EBPAS from pre- to post-study and also demonstrated the largest effect in treatment integrity.

Table 7. *Evidence Based Practice Attitude Scale pre- and post- study.*

	Appeal		Requirements		Openness		Divergence		Total Score	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Teacher 1	1	3.75	3	3	2.25	3	1	3	2.31	3.12
Teacher 2	2	2.75	2.75	2	2	2	2.25	1.75	2.13	2.13
Teacher 3	1	3	3.75	1	2	2.25	0.75	3	2.25	2.31

TTM stage. Teacher participants also completed the Stages of Change Questionnaire pre- and post- study. The Stages of Change Questionnaire was administered pre-study to identify which stage of TTM each participant aligned with best. Teachers were asked to complete the questionnaire again at the completion of the study. Teacher 7 moved from the contemplation stage to the action stage. Teacher 2 remained in the contemplation stage, although his score did increase by 1 point within that stage. Teacher remained in the maintenance stage, although his score did increase by 3 points within that stage.

Table 8. *Stages of Change Questionnaire pre- and post- study.*

	Teacher 1		Teacher 2		Teacher 3	
	Pre	Post	Pre	Post	Pre	Post
Precontemplation						
Contemplation	X					
Preparation			X	X		
Action		X				
Maintenance					X	X
Termination						

Intervention acceptability. After each stage of the study, teacher participants completed the Intervention Rating Profile (IRP-15; Witt & Elliot, 1985). IRP-15 scores increased for all teachers from post-baseline to the post-matched stage. Teacher 1 increased by 3 points from post-baseline to post-contra-indicated; and 5 points from post-contra-indicated to post-matched (8 points total). Teacher 2 increased by 6 points from post-baseline to post-contra-indicated; and 0 points from post-contra-indicated to post-matched (6 points total). Teacher 3 increased by 4 points from post-baseline to post-contra-indicated; and 8 points from post-contra-indicated to post-matched (12 points total). Table 9 shows teacher IRP-15 scores after each stage of the study and the overall sum increase.

Table 9. *Intervention Rating Profile across Stages of Consultation.*

	Post Baseline	Precontemplative (score increase)	Post Matched (score increase)	Sum Score Increase
Teacher 1	71	74	79	8
		(3)	(5)	
Teacher 2	63	69	69	6
		(6)	(0)	
Teacher 3	67	71	79	12
		(4)	(8)	

Research Question 2 – Student Progress

The second research question examined if individualizing stages of the transtheoretical model of behavior change (TTM) would result in accelerated student progress on the skill targeted by the intervention. Figure 5 shows student data (CRA Mastery Assessment) across teachers. Teachers began implementing interventions for their three students at the same time (student A = day 1, student B = day 6, student C = day 13). Because of confounding factors such as a change in targeted skill, the data should be analyzed more descriptively than experimentally.

Teacher 1. In general, students receiving intervention from Teacher 1 steadily increased in their skills throughout the study. When considering level, trend, variability, and immediacy of change, there does not appear to be an effect on student progress when moving from baseline to precontemplation; however, there is an immediate change in level from precontemplative to matched intervention. Student 1A moved from single-digit addition to single-digit subtraction on day 10. Student 1B moved from single-digit

addition to single-digit subtraction on day 15. Student 1C stayed at single-digit addition throughout the study. When student 1A and 1B moved from addition to subtraction, their CRA Mastery Assessment score decreased at first and then began to rise again. This fluctuation intuitively makes sense. Although the same CRA intervention protocol was used, the student skill targeted was new. Because the scores presented in Figure 5 are means of student scores, the impact on the overall trend of data is lessened but still a consideration. NAP from baseline to precontemplative stages is 81.3% (medium). NAP from precontemplative stages to matched intervention stage is 79.2% (medium).

Teacher 2. There was considerable variability in student outcomes for teacher 2. Student 2A moved to double-digit subtraction with regrouping on day 10, and was absent for a four-day stretch of school within the matched intervention stage. Student 2B moved from addition to subtraction on day 18. When considering level, trend, and variability, there does not appear to be an effect on student progress when moving from one stage of consultation to the next. There is an immediate and large change from baseline to the precontemplative stage; however, the data quickly drops down again. Teacher 2 often worked with only 1 or 2 students per day and alternated the days he was working with them. The researcher did not intervene with teacher 2 as this was a meaningful barrier identified for the matched intervention phase. NAP from baseline to precontemplative is 50% (weak) and from precontemplative to matched intervention stage is 77.5% (medium).

Teacher 3. The skill targeted for students 3A, 3B, and 3C remained as single-digit division for the entirety of the study. This decision was made because none of the students mastered the assessment in three consecutive days and the teacher advocated for this supplemental and targeted practice. There does appear to be a noticeable difference in level between baseline and the precontemplative stage in terms of level and immediacy

of change. There is an immediate increase in level from precontemplative to matched intervention; however, then the trend line in the matched stage is downward. This could be somewhat explained by the time of year being the second to last week of school; however, this was true for students of teachers 1 and 2 as well. NAP from baseline to precontemplative is 100% (strong) and from precontemplative to matched intervention stage is 80% (medium).

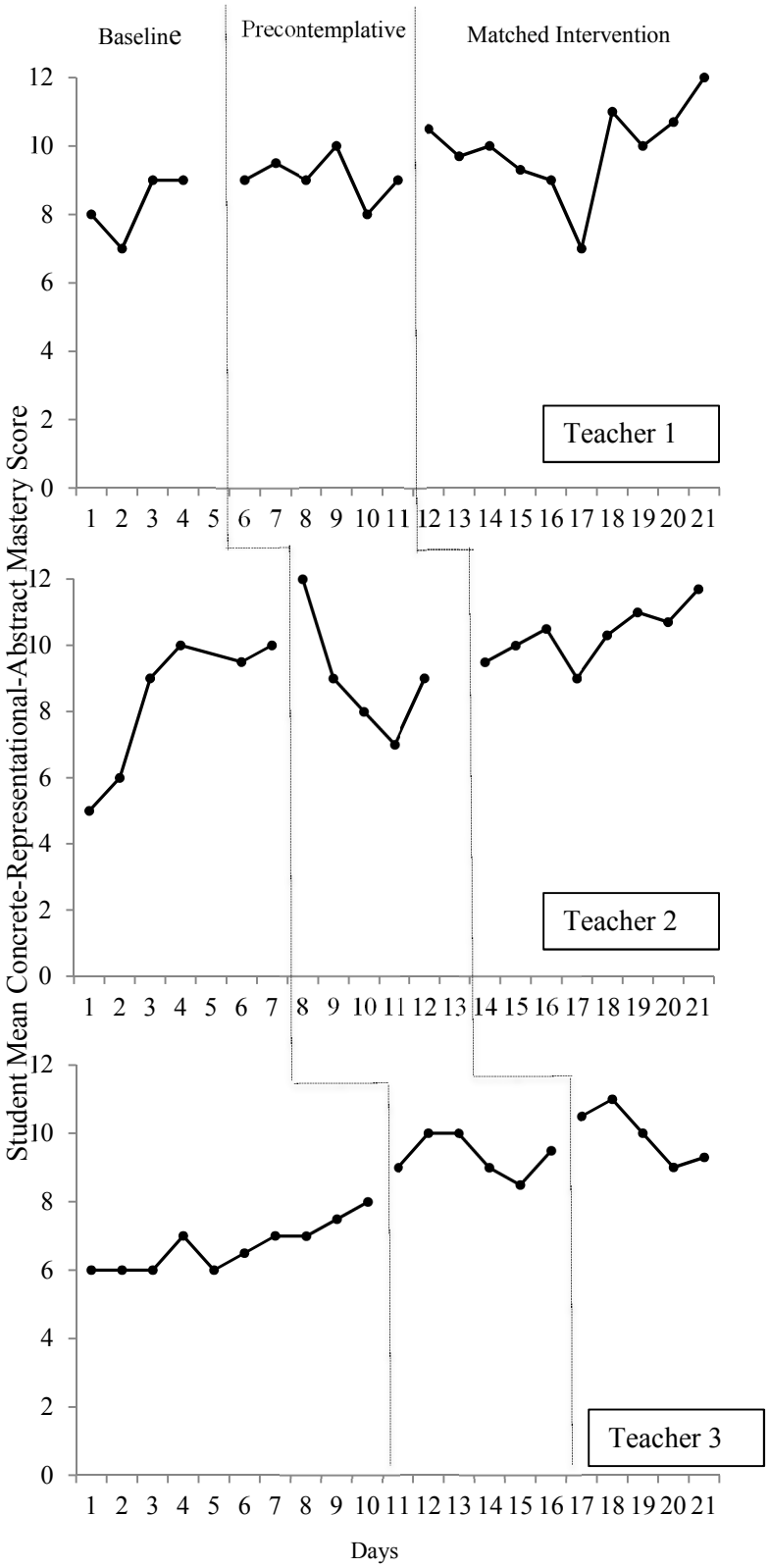


Figure 5. Student Mean Concrete-Representational-Abstract Mastery Assessment score across teachers.

Research Question 3 – Barriers and Needs

The third research question examined teacher perceptions throughout the study. Interview questions were designed to elicit perspectives on barriers and needs associated with intervention implementation. Teachers were interviewed after each phase of the study (3 interviews). The following data reflect themes in teacher responses and are organized according to barriers/needs already identified in the implementation science literature (Sanetti & Kratochwill, 2009; Century & Cassata, 2014). Interview data are specifically organized around the ecological framework introduced within the literature review, which includes four levels of contextualized variables (external environment, organization, intervention, interventionist).

External Environment

Resource allocation. A common theme across all teachers and interviews was in relation to resource allocation. Because the charter school board approves changes to the systematic way in which instruction is delivered to students, the concerns are summarized within external resource allocation. Within each interview, all teachers advocated for additional staff members that serve as content-specific interventionists that move across classrooms depending on student need. This need was identified in all interviews, but noticeably mentioned more frequently, with more emphasis, and more specific recommendations as additional students were added to the intervention sessions and the study continued. Teacher 1 commented,

"We need more staff members coming to teach specific lessons so that one person could focus on the whole class and the other person could implement interventions. It would be ideal if someone was helping within the class the whole day."

Teacher 2 shared,

"We should have teachers that float around and are specialists with specific skills so that they are teaching that skill to students in multiple grades that are missing it. They would not need an educational degree if the intervention was scripted. Unless there are other people in the room, I can't justify spending all of this additional time with only a couple of students."

Teacher 3 had a slightly different recommendation than teacher 2,

"I want to see the strongest teachers working with the kids that are struggling most. We could use additional people in the room to support the students that aren't receiving interventions. Doing it alone is too much of a challenge, especially when you have to help an entire classroom with diverse needs."

Organization

Time for planning and implementation. Time was indicated as a barrier many times throughout the interviews; however, it was often better summarized within resource allocation or duration of the intervention itself. During the last interview teachers 1 and 2 did note specific strategies that aligned more with organizational management of time. Teacher 1 commented during two interviews about how professional development time could be used more effectively, "We should be learning about interventions and how to implement them during our workshops," and "Professional development time could be used for planning our time and resources around implementing interventions." Teacher 2 suggested training that could target how to organize student groupings better, "I would like to learn more about how to organize instruction so that there was more student-lead learning so that teacher time could be freed up to deliver interventions."

Facilitation strategies. Several of the barriers that teachers noted throughout the study were in relation to how the organization could better facilitate implementation of interventions. Within the first interview, teacher 1 commented on the need for a school-

wide assessment to help teachers identify which students were missing pre-requisite skills, “We need to evaluate all students periodically to keep track of progress and see who might need support before they fall too far behind.” Teacher 2 shared similar thoughts,

“It would help if we had a 3-tiered system with standard instruction where some students would need re-teaching and you’d know that because of pre- and post-tests. Then, we could also have screening assessments in place to indicate where students were.”

Within the second and third interviews, all teachers advocated for the school to provide blocks of intervention time in the schedule in which teachers could meet with small groups. Teacher 1 further clarified, “I wish someone would sit down with me and help me develop a plan for fitting in interventions within the day or week. I need a couple more hours a day to do pull-out.” Teacher 3 mentioned workspace as a barrier in all three interviews, “The space in the classroom can be distracting for students but it can also be motivating to see how other students learn.”

Intervention

Duration. All teachers identified the time it took to deliver the CRA intervention as a barrier to implementation after the first phase of the study. Teacher 1 shared, “I don’t think they should be apart from their classmates for longer than 20 minutes,” teacher 2 commented, “Generally, we just don’t have enough time even though we would do this intervention in an ideal world. We can’t put more time in the day for this,” and teacher 3 shared, “The frequency of the intervention has helped but the length of the intervention has hindered, especially for those kids that go at a slower pace.” Teachers 1 and 2 did not mention the duration of the intervention again but teacher 3 further reported in his third interview, “My largest barrier is finding enough time to deliver the intervention to all the students separately.”

Materials. Teachers 1 and 3 agreed that the materials provided made delivering the CRA intervention easier. Teacher 1 commented, "I liked the green box. Everything was in there and ready to go. It is especially nice for a new teacher. This is what you need to do. Here are the supplies. Here is everything." Teacher 3 commented within the first and last interview about the materials, "We need these hands-on materials to support the struggling learners, especially in math," and later, "the full set of manipulatives for the intervention should be in every classroom."

Specificity. Teachers 2 and 3 commented on the specificity of the CRA intervention protocol during the second interview. Teacher 2 shared, " I was allowing students to develop their own ways of doing it like number lines, etc. What clicked is to give them an exact process, do this, do this, and do this and then I will arrive at the right answer." Teacher 3 reported, " The protocol was helpful. It put all of it into perspective and gave me a baseline to work from."

Interventionist

Because the focus of the study was on manipulating variables associated with the interventionist, the interviews rarely resulted in teachers identifying interventionist variables as barriers or needs. However, student variables such as ability and behavior were identified and are summarized below. Although the teachers attributed lack of growth to student-centered variables, it can be reasonably assumed that teacher experience and resourcefulness/coping could be a barrier to effectively managing student behavior and ability respectively.

Experience. Within the first interview, all teachers identified student behavior and/or motivation as a barrier to student growth. Teacher 1 commented, "I have many 'high fliers' in my class and so I focus on behavior rather than intervening with students. One student's behavior has been very disruptive the past month." Teacher 2 shared,

"Student motivation is low for some students. The clock is ticking until the end of the year. Many students probably have very little care for school since the beginning of the year and now it appears to be nonexistent." Teacher 3 also indicated behavioral concerns, "One of the biggest barriers to student success is student disposition about school. There are students who have walls up to avoid work, avoid challenge, and refuse to do work. I don't know where they learn it but it's hard to break as they get older." Teachers 1 and 2 shared similar views during their second interview. None of the teachers mentioned student behavior or motivation in the third interview.

Resourcefulness and coping. Teachers did not note student ability or skill as a barrier in the first interview; however, all teachers reported this was a barrier within the second and third interview. Teacher 1 commented, "They are still learning to count so they miscount a lot and the intervention takes longer." Teacher 2 reported, "There might be some students who don't respond and would be better facilitated in a different environment but for the most part, that is an extreme case." Teacher 2 also commented, "Some students have weak number sense and some students are not cognitively ready." Teacher 3 commented on student processing skills in both the second and third interview, "I'm getting different answers from one day to the next. It seems like they have cumulative processing issues. I get discouraged because one day, they remember how to multiply and the next day, they forget. It's easy to get frustrated or feel a sense of hopelessness."

CHAPTER 5

DISCUSSION

Organization of Chapter

Chapter five synthesizes the results of the current study. Each research question is discussed individually and the outcomes are explained within the context of previous research, practice, and theory. The chapter ends with a discussion regarding the limitations to the study and potential directions for future research.

Research Question 1: Effect of Matching on Treatment Integrity

Results varied across teachers; however, there did appear to be a small but positive effect for teachers 1 and 3 when the matched intervention was used in consultation. Data reflected that consultation in general, regardless of the adapted TTM strategies used, increased treatment integrity in the short term across all teachers. These results are consistent with prior research, where training and consultation alone shows increases in treatment integrity but then declines after three to five sessions of implementation (DiGennaro, Reed, & Codding, 2011; Joyce & Showers, 2002; Sterling-Turner, Watson, & Moore, 2002). But, following up with the consultee outside of consultation can reverse the common downward trend for treatment integrity (Noell et al., 2005). While the current study focused on the implementation of an academic intervention, the general effectiveness of the consultation process itself (regardless of strategies used) is supported by evidence across behavioral interventions (DiGennaro et al., 2007; Sanetti, Luiselli, & Handler, 2007) and whole class interventions (Sanetti, Fallon & Collier-Meek, 2013).

As indicated in the results section, outcomes for treatment integrity were measured as a mean percentage of steps completed out of those attempted. By measuring consultation effects in this manner, the complexity of the student skill was taken into

account. By doing this, the already-known effect of intervention complexity and time requirements (Lane, Bocian, MacMillan, & Gresham, 2004) was offset and the results were more readily compared. Teacher 1 targeted basic addition and attempted to implement the complete protocol across the course of the study. However, teachers 2 and 3 did not always reach later steps of the protocol because of the time it took to complete the protocol when more difficult skills were targeted (multi-digit addition/subtraction and single-digit long division). In addition to complexity considerations, the protocol was adjusted to reflect the partnership-based collaboration between teacher 2 and consultant during the matched intervention stage. Only those steps that were most important to implementation were required to reach 100% implementation for teacher 2 in the matched consultation.

It should be noted that although teacher 2's treatment integrity data did not indicate an effect, he did implement the intervention to all three students after matched consultation, as opposed to only delivering it to one or two students per day prior to the last consultation session. To the author's knowledge, no empirical studies exist that have explicitly used this method (emphasizing only those steps that are most important to implementation) to directly influence treatment integrity. Prior studies have examined treatment components that lead to greater student outcomes (e.g., Swanson, 1999), but treatment integrity was not discussed.

Contextual factors were carefully documented to help guide the study and analyze the data. The same systemic factors were mostly present across all teachers, with the exception of teacher 2. On day 10 of the study, he was asked to meet with administration for a corrective improvement plan due to universal classroom behavior management. As noted in the results, treatment integrity for teacher 2 dropped significantly on day 13 of implementation. Within interviews, teacher 2 briefly noted that additional adults were in

the room to help with specific students but did not share that he was placed on an improvement plan. Reasonably, this presented additional stress for teacher 2 and may have interfered with the internal validity of that particular data in comparison to teachers 1 and 3. Additional data including EBPAS, Stages of Change Questionnaire, and IRP-15 results may offer more *insight* into how this administrative intervention impacted teacher 2's performance.

The EBPAS provides some interesting results in relation to attitude changes to using evidence-based practices from pre- to post- study. As mentioned in the results section, all teachers increased on appeal of the intervention (more than one standard deviation). This significant increase indicated teachers thought the intervention made more sense, was more intuitively appealing, would be more accepted by colleagues, and the training was better. Although the appeal of the intervention increased, this did not translate to an overall increase on attitude for all teachers. Further, the requirements dimension either stayed the same or decreased for all teachers. This indicates that the requirements of the school may not have as much of an impact for those teachers that are already resistant. The validation studies for the EBPAS offers some additional insight in that organizational structure of openness and innovation to change were most important (along with higher education) when looking at overall acceptance of evidence-based practice within their sample. This is consistent with other research examining organizations that embrace and encourage acceptance of new innovations ultimately employ people that are more willing to adopt evidence-based practices (Aarons, Sommerfeld, & Walrath- Greene, 2009). Creating this culture of innovation within schools could be extremely beneficial for students. On the overall EBPAS score, teacher 1's ratings increased the most (more than one standard deviation), which corresponds to the most noticeable increase in treatment integrity across the study. Teacher 3's attitudes

increased but smaller than one standard deviation, while teacher 2's attitudes remained the same with some fluctuation on individual scales.

When examining if there was movement on the stages of change for participants, only teacher 1 progressed past a stage (moved from contemplation to action); however, teachers 2 and 3 did increase their scores. This is not surprising for teacher 2, given his performance in relation to treatment integrity and other measures. Teacher 3 remained in maintenance; however, this is not entirely surprising given his assigned stage at the start of the study. It is less likely that an individual will move out of maintenance. For example, in a study of former smokers, less than 20% had reached the criterion of no temptation to revert back to smoking (Snow, Prochaska, & Rossi, 1992). Considering the context of school and intervention implementation, it is unlikely that a teacher will ever move out of maintenance. Staying in maintenance may be the ultimate goal that consultants are striving for when working with teachers on treatment integrity. Interventions should be altered and adjusted to fit student need. Within the literature base, the termination stage has not received as much empirical exploration as other stages because of the factors mentioned above. The procedural choice to start all teachers with training and feedback (action stage) is worth discussion. The decision was made because teachers needed to learn the intervention and how to implement it before the baseline phase of the study. Prochaska and colleagues (1991) similarly found that individuals were often engaged in this stage at the start of consultation because by receiving initial help, they had in some ways engaged in action.

Results indicate that all teachers increased in their acceptance of the CRA intervention from pre- to post- study (IRP-15). Acceptance for teachers 1 and 3 increased the most from precontemplative stage to matched. Teacher 2 increased from baseline to precontemplative but made no increase from precontemplative to matched intervention.

Results indicate that as teachers become more familiar with interventions, they are more likely to accept them. Several researchers have examined what makes interventions more acceptable to teachers. Interventions that are simple rather than complex are more likely to be accepted (Reimers et al., 1987). There is also evidence that an intervention may be more acceptable when it is addressing a severe, rather than a mild problem (Witt, Moe, Gutkin, & Andrews, 1984). This may be due to the fact that teachers feel they are able to use their experience, training, and judgment to intervene with smaller problems but struggle with how to address more serious problems. Overall, teacher 3's scores on the IRP-15 increased the most across each stage. This does not necessarily translate to the treatment integrity outcomes, but it is interesting.

Research Question 2: Effect of Matching on Student Outcomes

Prior research found that lower levels of treatment integrity were often linked to poorer student outcomes (Biggs, Vernberg, Twemlow, Fonagy, & Dill, 2008; Wilder, Atwell, & Wine, 2006). The student outcome data are primarily discussed as it related to the treatment integrity outcomes. Across teachers, it is important to note that the variable did change to some extent because teachers may have moved to a different student skill if the first skill was mastered (i.e, moving from addition to subtraction). Therefore, data for the second research question should be interpreted more descriptively than experimentally. Student data generally continued to increase across the course of the study. For teacher 1, there was an increase in level from precontemplative to matched intervention; which coincides with an increase in treatment integrity. On day 17, the data decreases substantially for one data point but then increases quickly again. This does not reflect the treatment integrity data; however, the teacher did target a new skill for one of her students (moved from addition to subtraction) so this could explain some of the data. Teacher 2's student data noticeably increased in an immediate change in level from

baseline to precontemplative, which mimics the increase for treatment integrity. Again, administrative action was taken on day 10 for teacher 2 to address classroom behavior management. This likely had an impact on student outcomes as it did for treatment integrity. For teacher 3, there is an immediate change in level from each stage to the next; however, the data trend decreases in the matched intervention stage, which again coincides with treatment integrity.

More recently, researchers are examining whether qualitative aspects of implementation such as interventionist competency are associated with student outcomes and have found they are positively linked (Goncy, Sutherland, Farrell, Sullivan, & Doyle, 2015; Sutherland, McLeod, Conroy, Abrams, & Smith, 2014). Aspects of the qualitative relationship between the teacher and student were recorded; however, that data were not reported because the relationships across all teachers and students were positive across the majority of intervention sessions.

Research Question 3: Teacher Needs and Barriers

One of the prevalent themes identified in the interviews was additional access to more support staff and interventionists. It is interesting to note because teachers already had a second adult (intern) in the room for 4 out of 5 days of the school week. This is already more than most teachers have access to within their classrooms. It begs to ask how much support would be sufficient for teachers to feel they had the necessary human resources to implement interventions as intended and on a consistent basis. Teachers differed on their recommendations for who should be the extra support within the classroom, with two teachers indicating additional help to manage the classroom while another indicated specifically trained interventionists to deliver interventions as the teacher remained working with the classroom at large. While the obvious preference would be for licensed teachers to be delivering interventions, Burns and Gibbons (2012)

recommend utilizing non-instructional personnel such as tutors and volunteers outside the school to help deliver interventions if staffing licensed personnel is not feasible.

Although teacher training is heavily mentioned within the literature base, only one teacher indicated this was a barrier. Teacher 1 shared that staff should receive specific training on interventions during professional development. Teachers may not have focused on teacher training in this study because they were provided with instruction, modeling and practice within the first consultation session. Research does support teachers to have a more conceptual understanding of their teaching such as understanding common student mistakes and misunderstandings to that they can help students understand an alternative way of solving problems (Ma, 1999). Throughout the study, these elements of adjusting instruction were not addressed in any of the strategies aside from discussing trajectory of the problem within the precontemplative stage of consultation. Teachers 1, 2, and 3 indicated that the school could provide better organizational structures, such as structured data collection and shared planning time, that help facilitate the implementation of interventions.

All teachers indicated that the length of the intervention and time it took to deliver the intervention were barriers to implementation. This point is salient and provides support for the adherence versus adaptability/flexibility argument within the treatment integrity research. Whereas earlier conceptualization of treatment integrity focused on adherence, more recent research discusses how treatment integrity is more complex than simple adherence (Schulte, Easton, & Parker, 2009). To ensure integrity across different contexts, some researchers have advocated for accepting flexibility within fidelity (Hamilton, Kendall, Gosch, Furr, & Sood, 2008). For this reason, it is important to identify the most important aspects of an intervention so that teachers can adapt those nonessential elements as needed to take time and student characteristics into account

(Perepletchikova, 2014; Sanetti & Kratochwill, 2009; Durlak & DuPre, 2008; Century & Cassata, 2014). Shortening the required elements of the protocol was a strategy employed for teacher 2 within the matched intervention stage; however, it may have provided a beneficial effect for all teachers because they all indicated time as a barrier.

Within the three interviews, all teachers at some point noted student characteristics such as motivation, behavior, and innate ability as a barrier to student progress. While some researchers have found that teacher knowledge has a significant impact on student achievement (Metzler & Woessmann, 2012), the interview data indicate that the teachers with the most experience and training in specific math pedagogy implemented the intervention with less fidelity and attributed limited rate of progress to student characteristics rather than other factors. Teacher 1 had the least experience and training in math, yet delivered the intervention with the most fidelity and produced the greatest student outcomes. Aside from mentioning that some students were still learning how to count and there were some general behavioral concerns in her classroom that made consistent implementation harder, she attributed most of the results to organizational factors. Teachers 2 and 3 expressed more direct concerns about student characteristics such as lack of motivation and cognitive capacity for those receiving intervention.

Implications

Above was a summary of the study data and how they were contextualized within previous research. Below I will discuss the potential implications for practice and theory.

Implications for Practice

The results offer small but meaningful evidence that using strategies matched to stages of TTM can lead to small increases in treatment integrity among teachers. Although there is preliminary support for matching strategies of TTM within school, the

study offers further evidence that using in-person consultation within schools to increase treatment integrity is effective regardless of the TTM strategy used. The more teachers are held accountable to implementation through in-person consultation, the more likely they are to implement interventions with integrity. This is consistent with prior research on teacher training by Joyce and Showers (2002), in which when coaching was added to training, 95% of the teachers applied the skills in their classroom versus 5% without coaching. A second explanation of the results is that the strategies aligned with the precontemplative stage were effective across teachers. Providing teachers with information related to student need and trajectory of the problem could be an effective strategy to incorporate into all beginning consultation efforts when trying to influence treatment integrity.

Treatment integrity data were closely related to student outcomes across all teachers. As discussed in the literature review, assessing treatment integrity has been less emphasized in research (Gresham, Gansle, Noell, Cohen & Rosenblum, 1993; Gresham, 1989). Even less neglected is the relationship between treatment integrity and student outcomes. The current study provides more support that the two are tied and schools should take careful consideration of how they are encouraging and assessing treatment integrity. The current study supports that it does not appear to be enough to use evidence-based practices within schools; administration and staff must find ways to ensure those practices are being implemented as intended.

Self efficacy was a strategy identified within the action stage for the present study; however, it is important to note that self efficacy pervades all stages and is one of the strongest predictors of forming intentions (Schwarzer & Luszczynska, 2008), and ultimately predicts success in overall behavior change (Miller & Rollnick, 1991). It is touted as an important factor when attempting to influence variables such as motivation

to implement, perceptions of role compatibility, buy-in, willingness to try intervention, skill proficiency, and perceptions of relative advantage. Because it is influential across most stages, attempts to increase self-efficacy within schools would likely produce the largest behavior changes in the shortest amount of time.

Results on the pre- and post- measures offer practical considerations as well. For those teachers who are more resistant to using evidence-based practices, the policies and rules enforced by administration do not seem to have as much of an impact as increasing the acceptability and appeal of the intervention. Teacher 1 made the largest gains in response to consultation strategies. Similarly, teacher 2 made the least gains resistance and stage of TTM; and his data showed the least effect on treatment integrity and student outcomes. This data offers support that if consultants can decrease resistance to using evidence-based practices through the TTM strategies, treatment integrity and student outcomes will likely increase. Prior research has proposed that organizations that encourage their employees to embrace new innovations as part of their organizational culture will more likely systematically adopt evidence-based practices (Aarons, Sommerfeld, & Walrath- Greene, 2009). This offers additional support for schools to find ways to utilize the hiring process to employ people that are more open to innovation and implementing evidence-based interventions with fidelity.

Implications for Theory

The adapted TTM model proposed and manipulated within this paper is largely influenced by theoretical consideration within the social psychology literature. Preliminary results indicate promise for more directly targeting stages of TTM to more quickly influence student outcomes in intervention. Targeting stages of TTM has not been fully studied across the various fields that TTM is applied. It would be interesting to use the tenets of the current study and more directly study it in the original field in which

TTM was implemented (psychotherapy for addictive behaviors). In addition, it appears that the precontemplative stage was somewhat effective for all participants. This could be meaningful in that this may not be a stage that a consultant would want to bypass. Reviewing information related to this stage may be a beneficial first step if a consultee is experiencing lapses in their preferred behavior. Pairing this stage with another may lead the most effective and beneficial gains for the consultee. In addition, the participant originally assigned to the maintenance stage did move past it at study completion. This offers minimal, but additional, support for the already-established belief that individuals rarely move from the maintenance stage to termination stage.

Limitations

Although the results of present study offer many points of discussion surrounding theory and application, several limitations must be noted. The study is largely based on theory. The author proposed the adapted TTM model, including interventionist level variables and associated strategies, applied within this study. A mix of theory and empirical studies supports the logic behind the proposed strategies and connections to stages of TTM. However, prior research does not exist that directly links all of the strategies to the interventionist variables proposed. Because the current study examines the viability of using this adapted model, the methodology is complex and involves many moving parts. It is quite possible that the complicated methodology played a role in results of the study. Further, consultation was the vehicle in which the independent variable was delivered and this inherently creates more discretion and variability than other experimental designs.

In regards to the implementation of the interventions, some factors must be considered when comparing results across teachers and generalizing to other settings. First, teachers rarely are able to meet with students individually. Within the current study,

teachers met with three students to increase the number of behaviors that could be sampled. Teachers did not meet with all three students every day, and teacher 2 chose to meet with only one or two students for a portion of the study. In addition, teachers 1 and 2 switched to different skills for some of their students. The protocol was the same; however, the skill targeted differed across teachers as the skills became more complex and the amount of data per student varied based on teacher implementation. Again, it is important to emphasize that the second research question is best interpreted descriptively rather than experimentally.

The measures used within the current study required some adaptation and interpretation that was intentional and guided but less empirically tested than other common behavioral measures. For example, the Stages of Change Questionnaire (McConnaughy et al., 1983) required that the researcher created cut points for the stages of change, which was informed by past research on the assessment tool. Although the reliability evidence for the original Stages of Change Questionnaire is strong, more validity evidence could be stronger. There were also no official criteria published for the EBPAS (Aarons, 2004), although national means and standard deviations are published. Both of these measures were adapted for the current study to reflect the school context and consulting with teachers, as opposed to therapists and clients within the therapeutic field.

Because the study was limited to three teachers in one urban immersion school, findings are limited in their generalizabilty. Issues with generalizabilty and trustworthiness are common (Kvale, 1996; Maxwell, 1996). In an attempt to ensure accuracy of data, teachers recorded the intervention sessions. The recording devices did create some frustration for the teachers, as it was initially a challenge to sufficiently charge the computers to last throughout the day. Teachers also needed to correctly

position the computers so that the intervention components were captured but the student face was not shown. This was time-consuming at first. These effects did lessen considerably after 1 or 2 days of intervention. In regards to consultation, the consultant audio recorded all consultation sessions and reviewed a checklist prior to the sessions with the researcher and then completed the checklist after conducting the session with teachers. The researcher also listened to all consultation sessions to ensure that strategies were used as intended and described in the adapted TTM model; however, there was not a third outside rater than also listened to these consultation sessions.

Directions for Future Research

Within the adapted TTM, one or more strategies were utilized within each stage of the adapted TTM. Future theory and research could study whether the specific strategies lead to an increase in the identified interventionist variable. For example, examining if creating awareness of a student problem and its trajectory for those students struggling actually increases awareness for the teacher. Some strategies such as test-driving interventions have been found to increase treatment integrity (Dart et al., 2012); however, this intervention has not been specifically tied to willingness to try intervention before this study. Similarly, showing gains in fidelity and student outcomes has a natural connection to perceptions of relative advantage but has not been directly studied. A question to ask of theory and research is whether we can more quickly influence intervention outcomes by using a combination of strategies across the adapted TTM or if it is better to focus on one strategy at a time within school consultation.

Although the Stages of Change Questionnaire was used within the current study to identify stages of change for participants, this measure was originally developed for therapy and adapted for resistant teachers. It would be wise to further study the legitimacy of the measure when applied to the adapted TTM in schools. Specifically,

individual measures to identify if practitioners perceive a need, understand the problem and evidence for intervention effectiveness, are motivated to implement, perceive implementation fits within their school role, are willing to try the intervention, are proficient, are self-efficacious, and perceive the advantage of implementing a particular intervention with fidelity would be helpful in determining a strategy to intervene with that particular interventionist. By having valid tools such as these to use in consultation, affecting behavior change, treatment integrity, and student outcomes would likely happen more quickly because a goal for consultation would be identified through the simple yet informative measurement tools.

The field of implementation science is rising and moving from a passive approach to a more active approach in ensuring organizations are implementing programs with fidelity. In order to employ more teachers that embrace innovation, it may be wise for schools to take on the "core implementation components," or implementation drivers that is recommended by Fixsen et al. (2009) including staff selection, preservice and in service training, ongoing coaching and consultation, staff evaluation, decision support data systems, facilitative administrative support, and systems interventions. By taking the new organizational research within implementation science and applying it directly to schools, embracing innovations with fidelity will become part of organizational culture rather than a last thought.

Conclusion

Within the implementation science literature, there is a well-established gap between research-based interventions and effective implementation. Changing the behavior of those responsible for carrying out new innovations within schools is necessary in order for interventions to be implemented with fidelity (Durlak & DuPre, 2008; Wickstrom, Jones, LaFleur, & Witt, 1998). The current paper applied an adapted

transtheoretical model (TTM) of behavior change in an attempt to increase treatment integrity among resistant teachers. Interventionist level variables were situated within stages of TTM and possible strategies were identified to intervene with an interventionist. The goal of intervening with a reluctant teacher would be to move them across the continuum of change to more readily implement interventions with integrity on a consistent basis. By doing so, the hope is that student gains are subsequently made. Results were variable but offered promise for matching the adapted TTM stages to teachers in consultation. Consultation in general increased initial treatment integrity across all teachers and phases, although these effects did not seem to last.

References

Aarons, G. A. (2004). Mental health provider attitudes toward adoption of evidence-based practice: The Evidence-Based Practice Attitude Scale (EBPAS). *Mental health services research*, *6*, 61-74.

Aarons, G. A., Glisson, C., Hoagwood, K., Kelleher, K., Landsverk, J., & Cafri, G. (2010). Psychometric properties and US National norms of the Evidence-Based Practice Attitude Scale (EBPAS). *Psychological assessment*, *22*, 356.

Aarons, G. A., Hurlburt, M., & Horwitz, S. M. (2011). Advancing a conceptual model of evidence-based practice implementation in public service sectors. *Administration and Policy in Mental Health and Mental Health Services Research*, *38*, 4-23.

Aarons, G. A., & Sawitzky, A. C. (2006). Organizational culture and climate and mental health provider attitudes toward evidence-based practice. *Psychological Services*, *3*, 61.

Aarons, G. A., Sommerfeld, D. H., & Walrath-Greene, C. M. (2009). Evidence-based practice implementation: the impact of public versus private sector organization type on organizational support, provider attitudes, and adoption of evidence-based practice. *Implementation Science*, *4*, 1.

Anderson-Butcher, D., Lawson, H. A., Iachini, A., Flaspohler, P., Bean, J., & Wade-Mdivanian, R. (2010). Emergent evidence in support of a community collaboration model for school improvement. *Children & Schools*, *32*, 160-171. doi: 10.1093/cs/32.3.160

Alpert, J. L., & Yammer, M. D. (1983). Research in school consultation: A content analysis of selected journals. *Professional Psychology: Research and Practice*, *14*, 604.

Alvero, A. M., Bucklin, B. R., & Austin, J. (2001). An objective review of the effectiveness and essential characteristics of performance feedback in organizational settings (1985-1998). *Journal of Organizational Behavior Management*, *21*, 3-29.

Aveyard, P., Cheng, K. K., Almond, J., Sherratt, E., Lancashire, R., Lawrence, T., & Evans, O. (1999). Cluster randomised controlled trial of expert system based on the transtheoretical ("stages of change") model for smoking prevention and cessation in schools, 13, 948-953.

Balas, E. A., Boren, S. A., Hicks, L. L., Chonko, A. M., & Stephenson, K. (1998). Effect of linking practice data to published evidence: a randomized controlled trial of clinical direct reports. *Medical care*, *36*(1), 79-87.

Balas, E. A., & Boren, S. A. (2000). Managing clinical knowledge for health care improvement. *Yearbook of medical informatics*, 65-70.

Balcazar, F., Hopkins, B. L., & Suarez, Y. (1985). A critical, objective review of performance feedback. *Journal of Organizational Behavior Management*, *7*, 65-89.

Bandura, A. (1996). Ontological and epistemological terrains revisited. Journal of Behavior Therapy and Experimental Psychiatry, 27, 323-345.

Bandura, A. (1977). Social learning theory. 1977. *Englewood Cliffos, New Jersey*.

Bandura (1997). Self-efficacy: the exercise of control. New York: Freeman.

Bandura, A. (1982). Self-efficacy mechanism in human agency. *American psychologist*, *37*, 122.

Bandura, A. (2004). Health promotion by social cognitive means. *Health education & behavior*, *31*, 143-164.

Beresford, S. A., Curry, S. J., Kristal, A. R., Lazovich, D., Feng, Z., & Wagner, E. H. (1997). A dietary intervention in primary care practice: the Eating Patterns Study. *American journal of public health*, *87*, 610-616. doi: 10.2105/AJPH.87.4.610

Berkeley, S., Mastropieri, M. A., & Scruggs, T. E. (2011). Reading comprehension strategy instruction and attribution retraining for secondary students with learning and other mild disabilities. *Journal of Learning Disabilities*, *44*, 18-32.

Berman, P., & McLaughlin, M. W. (1976). Implementation of educational innovation. In *The educational forum, 40,* 345-370. Taylor & Francis Group.

Biggs, B. K., Vernberg, E. M., Twemlow, S. W., Fonagy, P., & Dill, E. J. (2008). Teacher adherence and its relation to teacher attitudes and student outcomes in an elementary school-based violence prevention program. *School Psychology Review*, *37*, 533.

Blase, K. A., Fixsen, D. L., Naoom, S. F., & Wallace, F. (2005). Operationalizing implementation: Strategies and methods. *Tampa, FL: University of South Florida, Louis de la Parte Florida Mental Health Institute*.

Boaler, J., & Staples, M. (2008). Creating mathematical futures through an equitable teaching approach: The case of Railside School. *Teachers College Record*, *110*.

Bock, B. C., Marcus, B. H., Rossi, J. S., & Redding, C. A. (1998). Motivational readiness for change: Diet, exercise, and smoking. *American Journal of Health Behavior*.

Bosworth, K., Gingiss, P. M., Potthoff, S., & Roberts-Gray, C. (1999). A Bayesian model to predict the success of the implementation of health and education innovations in school-centered programs. *Evaluation and Program Planning*, *22*, 1-11. doi:10.1016/S0149-7189(98)00035-4

Bronfenbrenner, U. (1979). The ecology of human development Cambridge. *MA: Harvard*.

Bumbarger, B. K. (2014). Understanding and promoting treatment integrity in prevention. In L.M. Hagermoser Sanetti & T.R. Kratochwill, Treatment Integrity: A Foundation for Evidence-Based Practice in Applied Psychology. Washington D.C.: American Psychological Association. doi: 10.1037/14275-001

Burke, B. L., Arkowitz, H., & Menchola, M. (2003). The efficacy of motivational interviewing: a meta-analysis of controlled clinical trials. *Journal of consulting and clinical psychology*, *71*, 843. http://dx.doi.org/10.1037/0022-006X.71.5.843

Burns, M. K. (2011). School psychology research: Combining ecological theory and prevention science. *School Psychology Review*, *40*, 132.

Burns, M. K., Egan, A. M., Kunkel, A. K., McComas, J., Peterson, M. M., Rahn, N. L., & Wilson, J. (2013). Training for Generalization and Maintenance in RtI Implementation: Front Loading for Sustainability. *Learning Disabilities Research & Practice*, *28*, 81-88.

Burns, M. K., Deno, S. L., & Jimerson, S. R. (2007). Toward a unified response-to-intervention model. In *Handbook of response to intervention*, 428-440. Springer US.

Burns, M. K., & Gibbons, K. (2012). School-based practice in action series. Implementing response-to-intervention in elementary and secondary schools: Procedures to assure scientific-based practices.

Burns, M. K., Peters, R., & Noell, G. H. (2008). Using performance feedback to enhance implementation fidelity of the problem-solving team process. *Journal of School Psychology*, *46*, 537-550.

Buschman, L. (2003). *Share and compare: A teacher's story about helping children become problem solvers in mathematics*. Reston, Va: National Council of Teachers of Mathematics.

Bransford, J. D., Brown, A. L., & Cocking, R. R. (2000). How people learn.

Brown, J. M. & Miller, W. R. (1993). Impact of motivational interviewing on participation and outcome in residential alcoholism treatment. Psychology of Addictive Behaviors, 7, 211–218.

Brown, D., Pryzwansky, W. B., & Schulte, A. C. (2006). Psychological consultation and collaboration.

Bryk, A. S., & Schneider, B. (2003). Trust in schools: A core resource for school reform. *Educational leadership*, *60*, 40-45.

Cappella, E., Hamre, B. K., Kim, H. Y., Henry, D. B., Frazier, S. L., Atkins, M. S., & Schoenwald, S. K. (2012). Teacher consultation and coaching within mental health practice: classroom and child effects in urban elementary schools. *Journal of consulting and clinical psychology*, *80*, 597. http://dx.doi.org/10.1037/a0027725

Caplan, G. (1970). *The theory and practice of mental health consultation.* New York: Basic Books.

Carbonari, J. P., & DiClemente, C. C. (2000). Using transtheoretical model profiles to differentiate levels of alcohol abstinence success. *Journal of consulting and clinical psychology*, *68*, 810.

Cardinal, B. J., & Sachs, M. L. (1996). Effects of mail-mediated, stage-matched exercise behavior change strategies on female adults' leisure-time exercise behavior. *The Journal of sports medicine and physical fitness*, *36*, 100-107. http://dx.doi.org/10.1037/0022-006X.68.5.810

Century, J., Cassata, A. (2014). Conceptual Foundations for Measuring the Implementation of Educational Innovations. In L.M. Hagermoser Sanetti & T.R. Kratochwill, Treatment Integrity: A Foundation for Evidence-Based Practice in

Applied Psychology (pp. 81-108). Washington D.C.: American Psychological Association. doi: 10.1037/14275-001

Century, J., Cassata, A., Freeman, C., & Rudnick, M. (2012). Measuring Implementation, Spread and Sustainability of Educational Innovations: Innovating for Coordinated Collaborative Research. American Educational Research Association.

Century, J., Rudnick, M., & Freeman, C. (2010). A framework for measuring fidelity of implementation: A foundation for shared language and accumulation of knowledge. *American Journal of Evaluation*, *31*, 199-218. doi: 10.1177/1098214010366173

Christ, T.J.(2015). Formative Assessment System for Teachers: Benchmarks and Norms for 2015–16, Minneapolis, MN: Author and FastBridge Learning, LLC.

Cialdini, R. B., & Goldstein, N. J. (2004). Social influence: Compliance and conformity. *Annual Review of Psychology*, *55*, 591-621. doi: 10.1146/annurev.psych.55.090902.142015

Cialdini, R. B., & Trost, M. R. (1998). Social influence: Social norms, conformity and compliance.

Cochrane, W. S., & Laux, J. M. (2008). A survey investigating school psychologists' measurement of treatment integrity in school-based interventions and their beliefs about its importance. *Psychology in the Schools*, *45*, 499-507. doi: 10.1002/pits.20319

Codding, R. S., Livanis, A., Pace, G. M., & Vaca, L. (2008). Using performance feedback to improve treatment integrity of classwide behavior plans: An investigation of observer reactivity. *Journal of applied behavior analysis*, *41*, 417-422.

Collins, A., Brown, J. S., & Holum, A. (1991). Cognitive apprenticeship: Making

thinking visible. *American educator*, *15*, 6-11.

Dane, A. V., & Schneider, B. H. (1998). Program integrity in primary and early secondary prevention: are implementation effects out of control? *Clinical psychology review*, *18*, 23-45. Doi:10.1016/S0272-7358(97)00043-3

Dart, E. H., Cook, C. R., Collins, T. A., Gresham, F. M., & Chenier, J. S. (2012). Test Driving Interventions to Increase Treatment Integrity and Student Outcomes. *School Psychology Review*, *41*.

Deci, E. L., Koestner, R., & Ryan, R. M. (1999). A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation. *Psychological bulletin*, *125*, 627. doi: 10.1037/0033-2909.125.6.627

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior.* New York: Plenum.

Deci, E. L., & Ryan, R. M. (1991). A motivational approach to self: Integration in personality. In R. Dienstbier (Ed.), *Nebraska Symposium on Motivation: Vol. 38. Perspectives on motivation* (pp. 237-288). Lincoln, NE: University of Nebraska Press.

Deutsch, M., & Gerard, H. B. (1955). A study of normative and informational social influences upon individual judgment. *The journal of abnormal and social psychology*, *51*, 629.

DiClemente, C. C., & Prochaska, J. O. (1982). Self-change and therapy change of smoking behavior: A comparison of processes of change in cessation and maintenance. *Addictive behaviors*, *7*, 133-142.doi: 10.1006/pmed.1998.0407

DiClemente, C. C., Prochaska, J. O., Fairhurst, S. K., Velicer, W. F., Velasquez, M. M., & Rossi, J. S. (1991). The process of smoking cessation: an analysis of precontemplation, contemplation, and preparation stages of change. *Journal of*

consulting and clinical psychology, *59*, 295.

DiGennaro, F. D., Martens, B. K., & Kleinmann, A. E. (2007). A comparison of performance feedback procedures on teachers' treatment implementation integrity and students' inappropriate behavior in special education classrooms. *Journal of applied Behavior analysis*, *40*, 447-461.

DiGennaro Reed, F. D., & Codding, R. S. (2011). Intervention integrity assessment. *Teaching and behavior support for children and adults with autism spectrum disorder: A practitioner's guide*, 38-47.

Dijkstra, A., De Vries, H., & Roijackers, J. (1999). Targeting smokers with low readiness to change with tailored and nontailored self-help materials. *Preventive medicine*, *28*, 203-211.

Dozier, A. M., Ossip, D. J., Diaz, S., Sierra-Torres, E., de Monegro, Z. Q., Armstrong, L., & McIntosh, S. (2009). Health care workers in the Dominican Republic: Self-perceived role in smoking cessation. *Evaluation & the health professions*, *32*, 144-164. doi: 10.1177/0163278709333152

DuPaul, G. J., Jitendra, A. K., Volpe, R. J., Tresco, K. E., Lutz, J. G., Junod, R. E. V., ... & Mannella, M. C. (2006). Consultation-based academic interventions for children with ADHD: Effects on reading and mathematics achievement. *Journal of Abnormal Child Psychology*, *34*, 633-646.

Durlak, J. A., & DuPre, E. P. (2008). Implementation matters: A review of research on the influence of implementation on program outcomes and the factors affecting implementation. *American journal of community psychology*, *41*, 327-350. doi: 10.1007/s10464-008-9165-0

Dusenbury, L., Brannigan, R., Falco, M., & Hansen, W. B. (2003). A review of research on fidelity of implementation: implications for drug abuse prevention in school settings. *Health Education Research*, *18*, 237-256. doi: 10.1093/her/18.2.237

Eccles, M. P., & Mittman, B. S. (2006). Welcome to implementation science. *Implementation Science*, *1*, 1. doi: 10.1186/1748-5908-1-1

Erchul, W. P., DuPaul, G. J., Grissom, P. F., Vile Junod, R. E., Jitendra, A. K., Mannella, M. C., & Volpe, R. J. (2007). Relationships Among Relational Communication Processes and Consultation Outcomes for Students With Attention Deficit Hyperactivity Disorder. *School Psychology Review*, *36*.

Erchul, W. P., & Sheridan, S. M. (2008). The state of scientific research in school consultation. *Handbook of research in school consultation*, 3-12.

Erchul, W. P., & Sheridan, S. M. (2014). *Handbook of research in school consultation*. Routledge.

Erchul, W. P., & Young, H. L. (2014). Best practices in school consultation. *Best practices in school psychology—6*, 449-460.

Eslea, M., & Smith, P. K. (1998). The long-term effectiveness of anti-bullying work in primary schools. *Educational Research*, *40*, 203-218. doi: 10.1080/0013188980400208

Etter, J. F., Perneger, T. V., & Ronchi, A. (1997). Distributions of smokers by stage: international comparison and association with smoking prevalence. *Preventive medicine*, *26*, 580-585.doi: 10.1006/pmed.1997.0179

Evers, K. E., Prochaska, J. O., Van Marter, D. F., Johnson, J. L., & Prochaska, J. M. (2007). Transtheoretical-based bullying prevention effectiveness trials in middle schools and high schools. *Educational Research*, *49*, 397-414.

Farkas, A. J., Pierce, J. P., Zhu, S. H., Rosbrook, B., Gilpin, E. A., Berry, C., & Kaplan, R. M. (1996). Addiction versus stages of change models in predicting smoking cessation. *Addiction*, *91*, 1271-1280.doi: 10.1046/j.1360-0443.1996.91912713.x

Festinger, L. (1954). A theory of social comparison processes. *Human relations*, *7*, 117-140.

Fixsen, D. L., Blase, K. A., Naoom, S. F., & Wallace, F. (2009). Core implementation components. *Research on social work practice*, *19*, 531-540.

Fixsen, D. L., Naoom, S. F., Blase, K. A., & Friedman, R. M. & Wallace, F.(2005). *Implementation research: A synthesis of the literature*. Tampa, FL: The National Implementation Research Network, Louis de la Parte Florida Mental Health Institute.

Frank, J. L., & Kratochwill, T. R. (2008). School-based problem-solving consultation. *Handbook of research in school consultation*, 13-30.

French, J.R. & Raven, B. (1959). The bases of social power. *Studies in social power*, 150-167.

Frey, A. J., Cloud, R. N., Lee, J., Small, J. W., Seeley, J. R., Feil, E. G., Walker, H.M. & Golly, A. (2011). The promise of motivational interviewing in school mental health. *School Mental Health*, *3*, 1-12. doi: 10.1007/s12310-010-9048-z

Fuchs, L. S., Fuchs, D., Hamlett, C. L., & Ferguson, C. (1992). Effects of expert system consultation within curriculum-based measurement, using a reading maze task. *Exceptional children*, *58*, 436-450.

Garet, M. S., Porter, A. C., Desimone, L., Birman, B. F., & Yoon, K. S. (2001). What makes professional development effective? Results from a national sample of teachers. *American educational research journal*, *38*, 915-945.

Gehlert,S.H. & Bollinger, S.E. (2006). Theories of health behavior. *Handbook of health social work*, 179-193.

Gilbertson, D., Witt, J. C., Singletary, L. L., & VanDerHeyden, A. (2007). Supporting teacher use of interventions: Effects of response dependent performance feedback on teacher implementation of a math intervention. *Journal of Behavioral Education*, *16*, 311-326. doi: 10.1007/s10864-007-9043-0

Ginexi, E. M., & Hilton, T. F. (2006). What's next for translation research?. *Evaluation & the Health Professions*, *29*, 334-347. doi: 10.1177/0163278706290409

Glanz, K., Patterson, R. E., Kristal, A. R., Feng, Z., Linnan, L., Heimendinger, J., & Hebert, J. R. (1998). Impact of work site health promotion on stages of dietary change: the Working Well Trial. *Health Education & Behavior*, *25*, 448-463.

Glaser, B. S., & Strauss, A. (1971). A.(1967). The discovery of grounded theory. *New york*.

Godin, G., & Kok, G. (1996). The theory of planned behavior: a review of its applications to health-related behaviors. *American journal of health promotion*, *11*, 87-98. doi: 10.4278/0890-1171-11.2.87

Goncy, E. A., Sutherland, K. S., Farrell, A. D., Sullivan, T. N., & Doyle, S. T. (2015). Measuring teacher implementation in delivery of a bullying prevention program: the impact of instructional and procedural adherence and competence on student responsiveness. *Prevention Science*, *16*, 440-450. Doi: 10.1007/s11121-014-0508-9

Greenberg, J., & Baron, R. A. (2000). Behavior in organizations, prentice Hall. *Englewood Cliffs, NJ*.

Greenhalgh, T., Robert, G., Macfarlane, F., Bate, P., & Kyriakidou, O. (2004). Diffusion

of innovations in service organizations: systematic review and recommendations. *Milbank Quarterly*, *82*, 581-629. Doi: 10.1111/j.0887-378X.2004.00325.x

Gresham, F. M. (1989). Assessment of treatment integrity in school consultation and prereferral intervention. *School psychology review*.

Gresham, F. M. (2009). Evolution of the Treatment Integrity Concept: Current Status and Future Directions. *School Psychology Review*, *38*, 533-540.

Gresham, F.M. (2014). Measuring and Analyzing Treatment Integrity Data in Research. In L.M. Hagermoser Sanetti & T.R. Kratochwill, Treatment Integrity: A Foundation for Evidence-Based Practice in Applied Psychology (pp. 109-130). Washington D.C.: American Psychological Association. doi: 10.1037/14275-001

Gresham, F. M., Gansle, K. A., & Noell, G. H. (1993). Treatment integrity in applied behavior analysis with children. *Journal of Applied Behavior Analysis*, *26*, 257-263. doi: 10.1901/jaba.1993.26-257

Griffiths, A. J., Parson, L. B., Burns, M. K., VanDerHeyden, A., & Tilly, W. D. (2007). *Response to intervention: Research for practice*. National Association of State Directors of Special Education (NASDSE).

Group, P. M. R. (1998). Matching patients with alcohol disorders to treatments: Clinical implications from Project MATCH. *Journal of Mental Health*, *7*, 589-602.

Gueldner, B., & Merrell, K. (2011). Evaluation of a social-emotional learning program in conjunction with the exploratory application of performance feedback incorporating motivational interviewing techniques. *Journal of Educational and Psychological Consultation*, *21*, 1-27. doi: 10.1080/10474412.2010.522876

Hagermoser Sanetti, L. M., & Fallon, L. M. (2011). Treatment integrity assessment: How estimates of adherence, quality, and exposure influence interpretation of implementation. *Journal of Educational and Psychological Consultation*, *21*, 209-

232. http://dx.doi.org/10.1080/10474412.2011.595163

Hagermoser Sanetti, L. M., & Kratochwill, T. R. (2014). Introduction: Treatment integrity in psychological research and practice. In L.M. Hagermoser Sanetti & T.R. Kratochwill, Treatment Integrity: A Foundation for Evidence-Based Practice in Applied Psychology. Washington D.C.: American Psychological Association. doi: 10.1037/14275-001

Hall, K. L., & Rossi, J. S. (2008). Meta-analytic examination of the strong and weak principles across 48 health behaviors. *Preventive medicine*, *46*, 266-274. http://dx.doi.org/10.1016/j.ypmed.2007.11.006

Hall, S. M., Tsoh, J. Y., Prochaska, J. J., Eisendrath, S., Rossi, J. S., Redding, C. A., ... & Gorecki, J. A. (2006). Treatment for cigarette smoking among depressed mental health outpatients: a randomized clinical trial. *American journal of public health*, *96*, 1808-1814.

Hamilton, J. D., Kendall, P. C., Gosch, E., Furr, J. M., & Sood, E. (2008). Flexibility within fidelity. *Journal of the American Academy of Child & Adolescent Psychiatry*, *47*, 987-993.

Hattie, J. A. C. (2009). Visible learning: A synthesis of 800+ meta-analyses on achievement. *Abingdon: Routledge*.

Hattie, J., & Timperley, H. (2007). The power of feedback. *Review of educational research*, *77*, 81-112.

Heather, N., Rollnick, S., & Bell, A. (1993). Predictive validity of the Readiness to Change Questionnaire. *Addiction*, *88*, 1667-1677.

Herzog, T. A., Abrams, D. B., Emmons, K. M., Linnan, L. A., & Shadel, W. G. (1999). Do processes of change predict smoking stage movements? A prospective analysis of the transtheoretical model. *Health Psychology*, *18*, 369.

Herzog, T. A., Abrams, D. B., Emmons, K. M., & Linnan, L. (2000). Predicting increases in readiness to quit smoking: A prospective analysis using the contemplation ladder. *Psychology and Health*, *15*, 369-381.

Hollis, J. F., Polen, M. R., Whitlock, E. P., Lichtenstein, E., Mullooly, J. P., Velicer, W. F., & Redding, C. A. (2005). Teen reach: outcomes from a randomized, controlled trial of a tobacco reduction program for teens seen in primary medical care. *Pediatrics*, *115*, 981-989.

Horwath, C. C. (1999). Applying the transtheoretical model to eating behaviour change: challenges and opportunities. *Nutrition Research Reviews*, *12*, 281-317. https://doi.org/10.1079/095442299108728965

Jitendra, A. K., Joyce, B., & Showers, B. (1982). Student achievement through staff development. New York: Longman.

DuPaul, G. J., Volpe, R. J., & Tresco, K. E. (2007). Consultation-based academic intervention for children with attention deficit hyperactivity disorder: School functioning outcomes. *School Psychology Review*, *36*, 217.

Johnson, S. S., Paiva, A. L., Cummins, C. O., Johnson, J. L., Dyment, S. J., Wright, J. A., ... & Sherman, K. (2008). Transtheoretical model-based multiple behavior intervention for weight management: effectiveness on a population basis. *Preventive medicine*, *46*, 238-246.

Joyce, B. (1990). *Changing School Culture through Staff Development: 1990 Yearbook of the Association for Supervision and Curriculum Development*. Publication Sales, Association for Supervision and Curriculum Development.

Joyce, B. R., & Showers, B. (1983). *Power in staff development through research on training*. Alexandria, VA: Association for Supervision and Curriculum Development.

Joyce, B. R., & Showers, B. (2002). *Student achievement through staff development*.

Kaufman, D., Codding, R. S., Markus, K. A., Tryon, G. S., & Kyse, E. N. (2013). Effects of verbal and written performance feedback on treatment adherence: Practical application of two delivery formats. *Journal of Educational and Psychological Consultation*, *23*, 264-299. http://dx.doi.org/10.1080/10474412.2013.845494

Kazdin, A. E. (1981). Acceptability of child treatment techniques: The influence of treatment efficacy and adverse side effects. *Behavior Therapy*, *12*, 493-506. doi: 10.1016/S0005-7894(81)80087-1

Kazdin, A. E. (2005). Treatment outcomes, common factors, and continued neglect of mechanisms of change. *Clinical Psychology: Science and Practice*, *12*, 184-188. doi: 10.1093/clipsy.bpi023

Kelleher, C., Riley-Tillman, T. C., & Power, T. J. (2008). An initial comparison of collaborative and expert-driven consultation on treatment integrity. *Journal of Educational and Psychological Consultation*, *18*, 294-324. doi: 10.1080/10474410802491040

Kim, M. S., & Hunter, J. E. (1993). Relationships Among Attitudes, Behavioral Intentions, and Behavior A Meta-Analysis of Past Research, Part 2. *Communication research*, *20*, 331-364. doi: 10.1177/009365093020003001

Klassen, R. M., & Tze, V. M. (2014). Teachers' self-efficacy, personality, and teaching effectiveness: A meta-analysis. *Educational Research Review*, *12*, 59-76. http://dx.doi.org/10.1016/j.edurev.2014.06.001

Kratochwill, T. R. (2008). Best practices in school-based problem-solving consultation: Applications in prevention and intervention systems. *Best practices in school psychology V*, 1673-1688.

Kratochwill, T. R., & Bergan, J. R. (1990). *Behavioral consultation in applied settings: An individual guide*. Springer Science & Business Media.

Kratochwill, T. R., Elliott, S. N., & Callan-Stoiber, K. (2002). Best practices in school-based problem-solving consultation. *Best practices in school psychology IV*, *1*, 583-608.

Kratochwill, T. R., Elliott, S. N., & Rotto, P. C. (1995). Best practices in school-based behavioral consultation. *Best practices in school psychology-III*, 519-537.

Kratochwill, T. R., Sheridan, S. M., Rotto, P. C., & Salmon, D. (1991). Preparation of school psychologists to serve as consultants for teachers of emotionally disturbed children. *School Psychology Review*.

Kratochwill, T. R., & Shernoff, E. S. (2003). Evidence-based practice: Promoting evidence-based interventions in school psychology. *School Psychology Quarterly*, *18*, 389. doi: 10.1521/scpq.18.4.389.27000

Kulhavy, R. W. (1977). Feedback in written instruction. *Review of educational research*, *47*, 211-232.

Lane, K. L., Bocian, K. M., MacMillan, D. L., & Gresham, F. M. (2004). Treatment integrity: An essential—but often forgotten—component of school-based interventions. *Preventing School Failure: Alternative Education for Children and Youth*, *48*, 36-43.

Leavell, H. R., & Clark, E. G. (1958). Preventive Medicine for the Doctor in his Community. An Epidemiologic Approach. *Preventive Medicine for the Doctor in his Community. An Epidemiologic Approach.*

Lee, R. L., & Hayter, M. (2014). The effect of a structured adolescent health summer programme: a quasi-experimental intervention. *International nursing review*. doi: 10.1111/inr.12081

Lewis, T. J., & Newcomer, L. L. (2002). Examining the efficacy of school-based consultation: Recommendations for improving outcomes. *Child & Family Behavior Therapy*, *24*, 165-181. http://dx.doi.org/10.1300/J019v24n01_11

Locke, E. A., & Latham, G. P. (1990). Work motivation and satisfaction: Light at the end of the tunnel. *Psychological science*, *1*, 240-246.

Long, A.C.J., Maynard, B.R. (2014). Treatment Integrity as Adult Behavior Change: A Review of Theoretical Models. In L.M. Hagermoser Sanetti & T.R. Kratochwill, Treatment Integrity: A Foundation for Evidence-Based Practice in Applied Psychology (pp. 55-77). Washington D.C.: American Psychological Association. doi: 10.1037/14275-001

Loucks-Horsley, S., Hewson, P., Love, N., & Stiles, K. (1998). Designing professional development for teachers of mathematics and science.

Lozano, B. E., & Stephens, R. S. (2010). Comparison of participatively set and assigned goals in the reduction of alcohol use. *Psychology of Addictive Behaviors*, *24*, 581.

Ma, L. (1999). *Knowing and teaching elementary mathematics: Teachers' understanding of fundamental mathematics in China and the United States*. Mahwah, NJ: Lawrence Erlbaum Associates.

Mannino, F. V., & Shore, M. F. (1975). The effects of consultation. *American Journal of Community Psychology*, *3*, 1-21.

Martin, R. (1978). Expert and referent power: A framework for understanding and maximizing consultation effectiveness. *Journal of School Psychology*, *16*, 49-55.

Mazzucchelli, T. G., & Sanders, M. R. (2010). Facilitating practitioner flexibility within an empirically supported intervention: Lessons from a system of parenting support. *Clinical Psychology: Science and Practice*, *17*, 238-252. doi: 10.1111/j.1468-2850.2010.01215.x

McConnaughy, E. A., DiClemente, C. C., Prochaska, J. O., & Velicer, W. F. (1989). Stages of change in psychotherapy: A follow-up report. *Psychotherapy: Theory, Research, Practice, Training*, *26*, 494.

McConnaughy, E. A., Prochaska, J. O., & Velicer, W. F. (1983). Study reports the development of a test de-signed to measure five stages of change: 1) Precontemplation, 2) Contemplation, 3) Decision making, 4) Action, and 5) Maintenance.

McHorney, C. A., Zhang, N. J., Stump, T., & Zhao, X. (2012). Structural equation modeling of the proximal–distal continuum of adherence drivers. *Patient preference and adherence*, *6*, 789. doi: 10.2147/PPA.S36535

McIntyre, L. L., Gresham, F. M., DiGennaro, F. D., & Reed, D. D. (2007). Treatment Integrity of School-Based Interventions with Children. *Journal of Applied Behavior Analysis*, *40*, 659-672. doi: 10.1901/jaba.2007.659-672

Mellin, E. A., & Weist, M. D. (2011). Exploring school mental health collaboration in an urban community: A social capital perspective. *School Mental Health*, *3*, 81-92. doi: 10.1007/s12310-011-9049-6

Mento, A. J., Steel, R. P., & Karren, R. J. (1987). A meta-analytic study of the effects of goal setting on task performance: 1966–1984. *Organizational Behavior and Human Decision Processes*, *39*, 52-83.

Merriam, S. B. (1998). *Qualitative research and case study applications in education. Revised and expanded from*. Jossey-Bass Publishers,

Metzler, J., & Woessmann, L. (2012). The impact of teacher subject knowledge on student achievement: Evidence from within-teacher within-student variation. *Journal of Development Economics*, *99*, 486-496.

Miller, W. R. (1983). Motivational interviewing with problem drinkers. *Behavioural Psychotherapy*, *11*, 147-172. doi: http://dx.doi.org/10.1017/S0141347300006583

Miller, W. R., & Baca, L. M. (1983). Two-year follow-up of bibliotherapy and therapist-directed controlled drinking training for problem drinkers. *Behavior Therapy*, *14*, 441-448. http://dx.doi.org/10.1016/S0005-7894(83)80107-5

Miller, P. M., Hersen, M., Eisler, R. M., & Hemphill, D. P. (1973). Electrical aversion therapy with alcoholics: An analogue study. *Behaviour Research and Therapy*, *11*, 491-497. doi: 10.1016/0005-7967(73)90108-3

Miller, W. R., & Rollnick, S. (2002). *Motivational interviewing: Preparing people for change* . Guilford press.

Miller, W. R., & Rose, G. S. (2009). Toward a theory of motivational interviewing. *American Psychologist*, *64*, 527. doi: 10.1037/a0016830

Miller, W. R., & Rollnick, S. (1991). *Motivational interviewing: Preparing people to change addictive behavior.* New York: Guilford Press.

Moncher, F. J., & Prinz, R. J. (1991). Treatment fidelity in outcome studies. *Clinical psychology review*, *11*, 247-266. doi: 10.1016/0272-7358(91)90103-2

Mortenson, B. P., & Witt, J. C. (1998). The use of weekly performance feedback to increase teacher implementation of a prereferral academic intervention. *School Psychology Review*.

National Association of State Directors of Special Education. (2008). *Response to intervention: Blueprints for implementation.* Alexandra, VA: Author.

Neubert, M. J. (1998). The value of feedback and goal setting over goal setting alone and potential moderators of this effect: A meta-analysis. *Human Performance*, *11*, 321-335.

Noell, G. H. (2008). Research examining the relationships among consultation process, treatment integrity, and outcomes. In W. P. Erchul & S. M. Sheridan (Eds.), Handbook of research in school consultation: Empirical foundations for the field (pp. 315-334). Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Noell, G. H., & Gansle, K. A. (2006). Assuring the form has substance: Treatment plan implementation as the foundation of assessing response to intervention. Assessment for Effective Intervention, 32, 32-39. doi: 10.1177/15345084060320010501

Noell, G. H., Gresham, F. M., & Gansle, K. A. (2002). Does treatment integrity matter? A preliminary investigation of instructional implementation and mathematics performance. *Journal of Behavioral Education*, *11*, 51-67. doi: 10.1023/A:1014385321849

Noell, G. H., Witt, J. C., Gilbertson, D. N., Ranier, D. D., & Freeland, J. T. (1997). Increasing teacher intervention implementation in general education settings through consultation and performance feedback. *School Psychology Quarterly*, *12*, 77.

Noell, G. H., Witt, J. C., Slider, N. J., Connell, J. E., Gatti, S. L., Williams, K. L., & Duhon, G. J. (2005). Treatment implementation following behavioral consultation in schools: A comparison of three follow-up strategies. *School Psychology Review*, *34*.

Olson, J. M., & Zanna, M. P. (1993). Attitudes and attitude change. *Annual review of psychology*, *44*, 117-154.

Parker, R. I., & Vannest, K. (2009). An improved effect size for single-case research: Nonoverlap of all pairs. *Behavior Therapy*, *40*, 357-367. http://dx.doi.org/10.1016/j.beth.2008.10.006

Parsonson, B. S., & Baer, D. M. (1978). The analysis and presentation of graphic data. *Single-subject research: Strategies for evaluating change*, 105-165.

Perepletchikova, F. (2014). Assessment of Treatment Integrity in Psychotherapy Research. In L.M. Hagermoser Sanetti & T.R. Kratochwill, Treatment Integrity: A Foundation for Evidence-Based Practice in Applied Psychology (pp. 131-157). Washington D.C.: American Psychological Association. doi: 10.1037/14275-001

Perepletchikova, F., & Kazdin, A. E. (2005). Treatment integrity and therapeutic change: Issues and research recommendations. *Clinical Psychology: Science and Practice*, *12*, 365-383. doi: 10.1093/clipsy.bpi045

Persons, J. B., & Silberschatz, G. (1998). Are results of randomized controlled trials useful to psychotherapists? *Journal of consulting and clinical psychology*, *66*, 126. doi: 10.1037/0022-006X.66.1.126

Peterson, S. K., Mercer, C. D., & O'Shea, L. (1988). Teaching learning disabled students place value using the concrete to abstract sequence. *Learning Disabilities Research*.

Peterson, L., Homer, A. L., & Wonderlich, S. A. (1982). The integrity of independent variables in behavior analysis, *Journal of Applaed Behavior Analysis, 15,* 477-492.

Ponti, C. R., Zins, J. E., & Graden, J. L. (1988). Implementing a consultation-based service delivery system to decrease referrals for special education: A case study of organizational considerations. *School Psychology Review*.

Prochaska, J. O. (1994). Strong and weak principles for progressing from precontemplation to action on the basis of twelve problem behaviors. *Health psychology*, *13*, 47. http://dx.doi.org/10.1037/0278-6133.13.1.47

Prochaska, J. M., & Prochaska, J. O. (2014). A Stage Approach to Enhancing Adherence to Treatment. *The Handbook of Behavioral Medicine*, 58-75.

Prochaska, J. O., & DiClemente, C. C. (1982). Transtheoretical therapy: Toward a more integrative model of change. *Psychotherapy: Theory, Research & Practice*, *19*, 276. doi: 10.1037/h0088437

Prochaska, J. O., DiClemente, C. C., & Norcross, J. C. (1992). In search of the structure of change. In *Self Change* (pp. 87-114). Springer New York.

Prochaska, J. O., & DiClemente, C. C. (1983). Self change processes, self efficacy and decisional balance across five stages of smoking cessation. *Progress in clinical and biological research*, *156*, 131-140.

Prochaska, J. O., & Norcross, J. C. (2001). Stages of change. *Psychotherapy: Theory, Research, Practice, Training*, *38*, 443. doi: 10.1037/0033-3204.38.4.443

Prochaska, J. O., & Velicer, W. F. (1997). The transtheoretical model of health behavior change. *American journal of health promotion*, *12*, 38-48. doi: http://dx.doi.org/10.4278/0890-1171-12.1.38

Reddy, L. A., Barboza-Whitehead, S., Files, T., & Rubel. (2000). Clinical focus of consultation outcome research with children and adolescents. *Special Services in the Schools*, *16*, 1-22. http://dx.doi.org/10.1300/J008v16n01_01

Reimers, T. M., Wacker, D. P., & Koeppl, G. (1987). Acceptability of behavioral interventions: A review of the literature. *School Psychology Review*.

Reinke, W. M., Lewis-Palmer, T., & Merrell, K. (2008). The classroom check-up: A classwide teacher consultation model for increasing praise and decreasing disruptive behavior. *School Psychology Review*, *37*, 315.

Rollnick, & Allison (2004). Motivational Interviewing. In N. Heather & T. Stockwell (Eds.). The essential handbook of treatment and prevention of alcohol problems (pp. 105-114). John Wiley & Sons.

Rollnick, S., & Miller, W. R. (1995). What is motivational interviewing? *Behavioural and cognitive Psychotherapy*, *23*, 325-334.

Ruble, L. A., Dalrymple, N. J., & McGrew, J. H. (2010). The effects of consultation on Individualized Education Program outcomes for young children with autism: The collaborative model for promoting competence and success. *Journal of Early Intervention*, *32*, 286-301.

Ruggiero, L., Redding, C. A., Rossi, J. S., & Prochaska, J. O. (1997). A stage-matched smoking cessation program for pregnant smokers. *American Journal of Health Promotion*, *12*, 31-33.

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American psychologist*, *55*, 68.

Sanetti, L. M. H., Fallon, L. M., & Collier-Meek, M. A. (2013). Performance feedback provided by school personnel to increase teachers' intervention implementation: An evaluation of effectiveness, procedural integrity, and feasibility. *Psychology in the Schools*, *50*, 134-150.

Sanetti, L. M. H., & Kratochwill, T. R. (2009). Toward Developing a Science of Treatment Integrity: Introduction to the Special Series. *School Psychology Review*, *38*.

Sanetti, L. M. H., Luiselli, J. K., & Handler, M. W. (2007). Effects of verbal and graphic performance feedback on behavior support plan implementation in a public

elementary school. *Behavior Modification*, *31*, 454-465.

Sanders, M. R., & Turner, K. M. (2005). Reflections on the challenges of effective dissemination of behavioural family intervention: Our experience with the Triple P–Positive Parenting Program. *Child and Adolescent Mental Health*, *10*, 158-169. doi: 10.1111/j.1475-3588.2005.00367.x

Sarason, S. B., Zitnay, G., & Grossman, F. K. (1971). *The creation of a community setting*, 1. Syracuse Univ Pr.

Scheeler, M. C. (2008). Generalizing effective teaching skills: The missing link in teacher preparation. *Journal of Behavioral Education*, *17*, 145-159.

Sheridan, S. M., Bovaird, J. A., Glover, T. A., Garbacz, S. A., & Witte, A. (2012). A randomized trial examining the effects of conjoint behavioral consultation and the mediating role of the parent-teacher relationship. *School Psychology Review*, *41*, 23.

Sheridan, S. M., Salmon, D., Kratochwill, T. R., & Carrington Rotto, P. J. (1992). A conceptual model for the expansion of behavioral consultation training. *Journal of Educational and Psychological Consultation*, *3*(3), 193-218.

Schulte, A. C., Easton, J. E., & Parker, J. (2009). Advances in Treatment Integrity Research: Multidisciplinary Perspectives on the Conceptualization, Measurement, and Enhancement of Treatment Integrity. *School Psychology Review*, *38*.

Schulte, A. C., Osborne, S. S., & McKinney, J. D. (1990). Academic outcomes for students with learning disabilities in consultation and resource programs. *Exceptional Children*.

Schwarzer, R., & Luszczynska, A. (2008). How to overcome health-compromising behaviors. *European Psychologist*, *13*, 141-151.

Sheridan, S. M., & Gutkin, T. B. (2000). The ecology of school psychology: Examining

and changing our paradigm fot the 21st Century. *School Psychology Review*.

Snow, M. G., Prochaska, J. O., & Rossi, J. S. (1992). Stages of change for smoking cessation among former problem drinkers: A cross-sectional analysis. *Journal of Substance Abuse*, *4*, 107-116.

Sterling-Turner, H. E., Watson, T. S., Wildmon, M., Watkins, C., & Little, E. (2001). Investigating the relationship between training type and treatment integrity. *School Psychology Quarterly*, *16*, 56.

Sterling-Turner, H. E., Watson, T. S., & Moore, J. W. (2002). The effects of direct training and treatment integrity on treatment outcomes in school consultation. *School Psychology Quarterly*, *17*, 47.

Stokes, T. F., & Baer, D. M. (1977). An implicit technology of generalization1. *Journal of applied behavior analysis*, *10*, 349-367. doi: 10.1901/jaba.1977.10-349

Strecher, V. J., Kreuter, M., Den Boer, D. J., Kobrin, S., Hospers, H. J., & Skinner, C. S. (1994). The effects of computer-tailored smoking cessation messages in family practice settings. *Journal of Family Practice*, *39*, 262-270.

Sutherland, K. S., McLeod, B. D., Conroy, M. A., Abrams, L. M., & Smith, M. M. (2014). Preliminary psychometric properties of the BEST in CLASS Adherence and Competence Scale. *Journal of Emotional and Behavioral Disorders*, *22*, 249-259.

Swanson, H. L. (1999). Instructional components that predict treatment outcomes for students with learning disabilities: Support for a combined strategy and direct instruction model. *Learning Disabilities Research & Practice*, *14*, 129-140.

Telzrow, C. F., McNamara, K., & Hollinger, C. L. (2000). Fidelity of problem-solving implementation and relationship to student performance. *School Psychology Review*, *29*, 443.

Tharp, R. G., & Wetzel, R. J. (1969). *Behavior modification in the natural environment*. Academic Press.

Tschannen-Moran, M., Hoy, A. W., & Hoy, W. K. (1998). Teacher efficacy: Its meaning and measure. *Review of educational research*, *68*, 202-248.

U.S. Census Bureau. (2012). *School Districts.* Retrieved April 23, 2014, from http://www.census.gov/did/www/schooldistricts/

U.S. Department of Education, National Center for Education Statistics. (2013). *Digest of Education Statistics* (NCES 2014-015). Retrieved from http://nces.ed.gov/pubs2014/2014015.pdf

Van de Walle, J. A., Karp, K. S., & Bay-Williams, J. M. (2010). *Elementary and middle school mathematics: Teaching developmentally* (7th ed.). Boston: Allyn & Bacon.

Velicer, W. F., Hughes, S. L., Fava, J. L., Prochaska, J. O., & DiClemente, C. C. (1995). An empirical typology of subjects within stage of change. *Addictive behaviors*, *20*, 299-320. Doi: 10.1016/0306-4603(94)00069-B

Velicer, W. F., Redding, C. A., Sun, X., & Prochaska, J. O. (2007). Demographic variables, smoking variables, and outcome across five studies. *Health Psychology*, *26*, 278.

Volpe, R. J., DuPaul, G. J., Jitendra, A. K., & Tresco, K. E. (2009). Consultation-based academic interventions for children with attention deficit hyperactivity disorder: effects on reading and mathematics outcomes at 1-year follow-up. *School Psychology Review*, *38*, 5.

Von Brock, M.B.,& Elliott, S.N. (1987). The influence of treatment effectiveness information on the acceptability of classroom interventions. *Journal of School Psychology, 25,* 131-144.

Werts, M. G., Lambert, M., & Carpenter, E. (2009). What special education directors say

about RTI. *Learning Disability Quarterly*, *32*, 245-254.

Wewers, M. E., Stillman, F. A., Hartman, A. M., & Shopland, D. R. (2003). Distribution of daily smokers by stage of change: Current Population Survey results. *Preventive medicine*, *36*, 710-720.

Wicker, A. W. (1969). Attitudes versus actions: The relationship of verbal and overt behavioral responses to attitude objects. *Journal of social issues*, *25*, 41-78.

Wickstrom, K. F., Jones, K. M., LaFleur, L. H., & Witt, J. C. (1998). An analysis of treatment integrity in school-based behavioral consultation. *School Psychology Quarterly*, *13*, 141. doi: 10.1037/h0088978

Wilder, D. A., Atwell, J., & Wine, B. (2006). The effects of varying levels of treatment integrity on child compliance during treatment with a three-step prompting procedure. *Journal of Applied Behavior Analysis*, *39*, 369-373. Doi: 10.1901/jaba.2006.144-05

Witt, J. C., & Elliott, S. N. (1985). *Acceptability of classroom intervention strategies* (Vol. 4, pp. 251-288). TR Kratochwill (Ed.), Advances in school psychology.

Witt, J. C., & Martens, B. K. (1983). Assessing the acceptability of behavioral interventions used in classrooms. *Psychology in the Schools*.

Witt, J. C., Moe, G., Gutkin, T. B., & Andrews, L. (1984). The effect of saying the same thing in different ways: The problem of language and jargon in school-based consultation. *Journal of School Psychology*, *22*, 361-367.

World Health Organization. (2006). The world health report: 2006: working together for health.

Ysseldyke, J. E., & Christenson, S. (2002). *Functional assessment of academic behavior: Creating successful learning environments*. Sopris West.

Zaslofsky, A. F. (2015). *Using Measures of Mathematics to Predict Response to*

Supplemental Intervention (Doctoral dissertation, University of Minnesota).

Zazzali, J. L., Sherbourne, C., Hoagwood, K. E., Greene, D., Bigley, M. F., & Sexton, T. L. (2008). The adoption and implementation of an evidence based practice in child and family mental health services organizations: a pilot study of functional family therapy in New York State. *Administration and Policy in Mental Health and Mental Health Services Research*, *35*, 38-49. doi: 10.1007/s10488-007-0145-8

Zins, J. E., Kratochwill, T. R., & Elliott, S. N. (1993). *Handbook of consultation services for children: Applications in educational and clinical settings*. Jossey-Bass.

Zoder-Martell, K., Dufrene, B., Sterling, H., Tingstrom, D., Blaze, J., Duncan, N., & Harpole, L. (2013). Effects of verbal and graphed feedback on treatment integrity. *Journal of Applied School Psychology*, *29*, 328-349. http://dx.doi.org/10.1080/15377903.2013.836776

Appendices

Appendix A.

CRA Treatment Integrity Checklist

Steps	Intervention Procedure	Yes (X)	Weight
	GENERAL		
1	Teacher effectively manages student behavior.		1
2	Teacher manages time effectively.		1
3	Teacher is prepared with intervention scripts, materials, and space needed for lesson.		1
4	Teacher sets the purpose and introduces the lesson (e.g. to solve multiplication problems)		1
5	Teacher models/leads a discussion of critical concepts or terms (e.g. multiplication, groups/sets, etc) salient to the lesson (less than 3 minutes)		1
6	Teacher continually monitors student work and thinking, providing corrective feedback using the *Error Correction Process* throughout lesson.		2
	CONCRETE		
7	Teacher distributes the manipulatives needed for the intervention (and introduces or reviews the names of the materials if necessary).		1
8	Teacher "thinks aloud" using formal math language when explaining problem solving process.		2
9	Teacher leads student through a problem (e.g. "we do")		2
10	Teacher provides student with problems to complete independently (e.g. "you do")—at least one problem *(more than one if the student clearly does not understand)*		2
11	Teacher provides additional examples or problems, as needed *(point is given here if student has clearly demonstrated they understand this stage)*		1
	REPRESENTATIONAL		
12	Teacher introduces the transition to the representational stage of the intervention.		1
13	Teacher "thinks aloud" using formal math language when explaining problem solving process.		2
14	Teacher leads student through a problem (e.g. "we do")		2
15	Teacher provides student with problems to complete independently (e.g. "you do")—at least one problem *(more than one if the student clearly does not understand)*		2
16	Teacher provides additional examples or problems, as needed *(point is given here if student has clearly demonstrated they understand this stage)*		1
	ABSTRACT		
17	Teacher introduces the transition to the abstract stage of the intervention.		1
18	Teacher "thinks aloud" using formal math language when explaining problem solving process.		2
19	Teacher leads students though a problem (e.g. "we do")		2
20	Teacher provides student with problems to complete independently (e.g. "you do")—at least one problem *(more than one if the student clearly does not understand)*		2
21	Teacher provides additional examples or problems, as needed *(point is given here if student has clearly demonstrated they understand this stage)*		1

		Total Points: _____ **/ 31**

Steps	Mastery Assessment Procedure	Yes (X)	Weight
22	Teacher introduces mastery assessment procedures and reads standardized directions.		2
23	Teacher records student responses verbatim on interview protocol.		1
24	Teacher uses CRA Mastery Assessment scoring rubric to score student work.		1
25	Teacher uses mastery criteria to determine whether students are ready to move onto to next skills (need to administer intervention at least 3 times)		1
26	Teacher enters student's CRA Mastery Assessment scores on Data Tracking Sheet.		1
		Total Points: _____ **/ 6**	

Engagement Key				
Engagement	Task Related Behavior o Responsive to teacher o Used eye contact o Spoke audibly o Asked lesson-related questions o Conversation focused on math concepts presented that day Physical Behavior o In intervention area o Posture that allows for easy viewing of instruction and manipulatives o Hands engaged with math materials			
	0-Never/Rarely	1-Sometimes	2-Often	3-Always

Appendix B.

Intervention Rating Profile (IRP-15)

Please rate the intervention along the following dimension. Please circle the number which best describes your agreement or disagreement with each statement.

		Strongly Disagree	*Disagree*	*Disagree Slightly*	*Slightly Agree*	*Agree*	*Strongly Agree*
1.	This would be an unacceptable intervention for a student struggling with math.	1	2	3	4	5	6
2.	Most teachers would find this intervention appropriate for addressing students struggling in math.	1	2	3	4	5	6
3.	This intervention should prove effective in improving a student's math skills.	1	2	3	4	5	6
4.	I would suggest this intervention to other teachers.	1	2	3	4	5	6
5.	The student's academic needs are severe enough to warrant use of this intervention.	1	2	3	4	5	6
6.	Most teachers would find this intervention suitable for students struggling in math.	1	2	3	4	5	6
7.	I would be willing to use this intervention in the classroom setting.	1	2	3	4	5	6
8.	This intervention would *not* result in negative side-effects for students.	1	2	3	4	5	6
9.	This intervention would be appropriate for a variety of students.	1	2	3	4	5	6
10.	This intervention is consistent with those I have used in the classroom setting.	1	2	3	4	5	6
11.	The intervention is a fair way to handle the academic struggles of my students.	1	2	3	4	5	6
12.	The intervention is reasonable for the academic needs of these students.	1	2	3	4	5	6
13.	I like the procedures used in this intervention.	1	2	3	4	5	6
14.	This intervention is a good way to handle these students' academic needs.	1	2	3	4	5	6

15.	Overall, this intervention would be beneficial for a student.	1	2	3	4	5	6

Appendix C.

Teacher Interview Questions

Barriers and Needs
Describe the ideal situation in which you could provide academic support to struggling students in your classroom.
Suppose you were asked to lead a school-wide initiative to develop a system for intervening with struggling learners. What would it look like? How would students be identified? Who would provide supports? What materials and/or curriculum would you use?
Some people say that students who do not respond to instruction provided in the classroom should be educated in another room or facility. What would you say to them?
From your perspective, what would make it easier for all teachers to provide interventions to students who are struggling?
Describe the biggest barrier to your student that are not meeting grade-level standards.
School Context
What school changes have been happening in the last week?
Has anything helped or hindered student progress in this area beyond the intervention you are providing?
CRA Intervention
What elements of this intervention do you like?
What elements of this intervention do you think are helpful to the student(s)?
What elements of this intervention would you change?
How do you feel about using the script as opposed to coming up with your own intervention?
Have you made modifications? If so, what?
What additional support would be helpful in implementing this intervention?

Appendix D.

CRA Mastery Assessment

CRA MASTERY ASSESSMENT
Single-Digit Long Division with Remainders
FORM 1

Represent the problem below.
Use the representation to solve the problem.

149 ÷ 8 = _____

Interview Protocol

Ask the students the following questions and write down their answer as close to verbatim as you can.

If needed, answers can be further prompted with the following follow-up questions: *Can you tell me a little bit more? Anything else to add?*

1. *How did you figure this problem out?*

2. *What do you mean and how did they help you solve the problem?*

3. *Tell me what you were thinking in your head when you were doing this.*

4. *How did you check your answer to see if it is correct.*

Appendix E.

CRA Mastery Rubric

	Strategic Knowledge	Communication and Explanation	Representation	Computation
0	No apparent strategy is attempted	Does not provide an explanation	No representation is attempted	No problem solution is attempted
1	Inappropriate or unidentifiable strategy is chosen	No mathematical terms or vocabulary are used	Representation is partial or inaccurate or does not match problem	Attempts a problem solution, but answer is incorrect
2	An identifiable strategy is chosen, but contains errors	Student attempts to use some mathematical terminology or vocabulary, but does not use the correct terms	Representation is *mostly* complete Representation includes *most* key features of the problem	Attempts a problem solution Major algorithmic or computation errors are made
3	An efficient and identifiable strategy is chosen with no errors	Student uses formal mathematical language to correctly articulate the relationship of the visual representation to the problem	Representation is complete and correct Representation includes *all* key features of the problem	Student reaches a correct problem solution No algorithmic or computation errors are present
			Total Score:	**_____ / 12**

Appendix F.

Consultation Checklist 1

Check	Action
	Start audio recorder
	Share agenda of the session: • review Conceptual-Representational-Abstract (CRA) protocol • model CRA protocol • review CRA Mastery Assessment • model CRA Mastery Assessment • distribute CRA Intervention Kit • Answer questions related to CRA and/or CRA Mastery Assessment Remind participants of the scope of consultative sessions. The sessions are purposefully structured. Any and all study design questions should be directed to the researcher. During this session, the consultant can only answer questions related to the intervention and/or assessment.
	Review the names of the three students who will receive this intervention and the order they will be added.
	Review the CRA Intervention Kit Contents
	Read through script 1x with teacher
	Consultant models intervention 1x
	Ask teacher if they have questions about the intervention protocol
	Model giving the CRA Mastery Assessment
	Review CRA Mastery Assessment Rubric & Data Tracking Sheet
	Teacher practices assigning a score to a student work sample. Remind teacher that they would then record the score on the Data Tracking Sheet.
	Review CRA Skill Progression Sheet
	Ask teacher if they have any questions about the CRA Mastery Assessment, Rubric, Data Tracking Sheet, and/or CRA Skill Progression Sheet
	If no questions or you answer them, distribute Intervention Kit to teacher
	Remind teachers they should start delivering the intervention to their first student tomorrow
	Stop audio recorder

Appendix G.

Consultation Checklist 2

Check	Action
	Start audio recorder
	Share agenda of the session • Review data from math screener • Discuss student need • Discuss intervention and its targeted skill
	Review class-wide data and identify lowest students FASTBridge LOGIN www.fastbridge.org Username: XX Password: XX <u>Teacher 1 (kindergarten)</u> ASSESSMENTS Composite NI-K (Number Identification) NS-K (Number Sequence) DC-K (Decomposing) DC-K (Composing) CRITERION Some Risk (!) vs. High Risk (!!) *Kindergarten Early Math Benchmark Criterions* TEACHER VIEWS DATA Highest students Lowest students
	Review intervention students' data INDIVIDUAL STUDENT DATA Student 1: XX (Composite = 36) Student 2: XX (Composite = 37)

	Student 3: XX (Composite = 42) REVIEW ELEMENTS OF DATA Accuracy Benchmark (Level of Risk) MISSED ITEMS (Do not focus on this)
	Discuss the trajectory of the problem REVIEW *Mathematical Strands of Proficiency (NRC, 2001)* • Five strands of mathematical proficiency identified by the National Research Council (2001) • These five strands are considered to be interdependent and collectively contribute to the development of mathematical proficiency. • Teaching only one or two of these strands in isolation cannot develop mathematical proficiency; rather the strands of mathematical proficiency should be viewed as multi-dimensional and can be used to help students be successful (NRC, 2001). • Cooperatively, these five strands reflect a body of research representing effective components to mathematics achievement. Why intervene early? • Progression of skills that build upon one another. Achievement gap increases exponentially each year. • Research indicates that students who are not confident in mathematics will avoid taking more rigorous mathematics classes in high school (NRC, 2001; Boaler, 2008).
	Discuss how intervention impacts trajectory CONCEPTUAL-REPRESENTATIONAL-ABSTRACT (CRA) • CRA contains the first four strands of mathematical proficiency—lacks productive disposition (Moran & Burns, 2015) • Only one other research-based math intervention within the empirical literature contains up to four strands (Cognitive Strategy Instruction)—combines cognitive processes (e.g., visualization) and meta-cognitive or self-regulation strategies

	(e.g., self-questioning) to help students to become proficient problem solvers and strategic learners through a specific sequence of steps to analyze problems (Montague & Dietz, 2009).
	Effectiveness of Intervention *d* = 0.38 (Hattie, 2009) Within educational contexts, an effect size of 0.25 or greater has practical significance (Slavin, 1990)
	Any Questions?
	Stop audio recorder

Appendix H.

Consultation Checklist 3 for Teacher 1

Check	Action
	Start audio recorder
	Desired behavior change 100% fidelity of implementation for all three students at least 4x/week (1:1 intervention) (1) Conceptual (2) Representational (3) Abstract (4) CRA Mastery Assessment
	Rating Scale *On a scale of 1 to 10, how important is it for you to achieve 100% fidelity of implementation with each student?* 1 2 3 4 5 6 7 8 9 10
	Spirit of MI is followed: • Motivation to change is elicited from teacher, and not imposed. • Teacher's task to articulate and resolve barriers to 100% implementation for all students, not the consultant's. • Direct persuasion is not used. • Consultation style is quiet and eliciting, rather than persuasive, confrontational, or argumentative. • Consultant elicits and clarifies within a teacher-centered, respectful atmosphere. • Readiness to change is not a teacher trait, but rather a product of interpersonal interaction. • Consultant/teacher relationship is more like a partnership than expert/recipient role.
	Specific strategies of MI are used: express empathy develop discrepancies provide feedback clarify goals roll with resistance support self-efficacy

	ask open-ended questions listen reflectively affirm summarize
	Rating Scale After understanding barriers and the teacher-identified course of action, use scale again to ask if they think they can now implement the core components with 100% fidelity. *On a scale of 1 to 10, how confident are you that you will achieve 100% fidelity of implementation for every student from this point forward?* 1 2 3 4 5 6 7 8 9 10 If 9 or 10, reiterate so it seems like you feel confident that you can implement it with 100% fidelity for every student with the resources you currently have. If it is low, ask teacher what it would take for them to move from a X to a 9 or 10.
	Review plan and thank teacher
	Stop audio recorder

Appendix I.

Consultation Checklist 3 for Teacher 2

Check	Action
	Start audio recorder
	How can we make the protocol easy enough to follow where you can obtain 100% fidelity? 100% fidelity of implementation DEFINED: (1) Introduce Objective (2) Conceptual (3) Representational (4) Abstract (5) CRA Mastery Assessment Rubric
	Rating Scale *On a scale of 1 to 10, how confident are you that you will achieve 100% fidelity of implementation for every student from this point forward?* 1 2 3 4 5 6 7 8 9 10
	Review Intervention Protocol What is ideal for you as a protocol?
	Review Next Steps Researcher will revise the subtraction protocol to reflect changes to the addition protocol and distribute to teacher tomorrow to use in place of the current protocol.
	Rating Scale *On a scale of 1 to 10, how confident are you that you will achieve 100% fidelity of implementation for every student from this point forward?* 1 2 3 4 5 6 7 8 9 10 If 9 or 10, reiterate so it seems like you feel confident that you can implement it with 100% fidelity with at least 2 of your students. If it is low, ask teacher what it would take for them to move from a X to a 9 or 10 (in terms of revisions to the protocol)
	Thank teacher
	Stop audio recorder

Appendix J.
Consultation Checklist 3 for Teacher 3

Check	Action
	Start audio recorder
	Student Data (Progress Monitoring) • Review CRA Mastery Assessment & Rubric templates • Review student graphs ("CRA Mastery Assessment Data") • *4* components of mastery scores (3 points each), *1* total score (12 points) • Y-axis (components), X-axis (# points earned on rubric) • Sessions are in different colors on bar graph • No dates assigned. Sessions are identified by the *order* of administration (dates not identified). • Review Student 1/Student 2/Student 3 data • After looking at the graph, ask teacher about their thoughts on student progress. • *Anecdotally, have you noticed student growth?* • *If so, can you describe how?*
	Fidelity of Implementation Data • Define full fidelity of implementation for teacher (100%): • *Each step is followed within the same session* • Session objective is shared • Concrete ("we do" example; "I do" student completes problem) • Representational ("we do" example; "I do" student completes problem) • Abstract ("we do" example; "I do" student completes problem)—can reflect classroom instruction rather than what is presented in the protocol • CRA Mastery Assessment administered • Ask about their perspective on fidelity of implementation: o *Has your fidelity of implementation changed since you first started delivering the intervention?* o *If so, how?* If you were to rate yourself on fidelity of implementation, what percentage of implementation would you estimate you are at now? 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
	Thank teacher
	Stop audio recorder

Appendix K.

Example CRA Intervention Protocol

Adding Multi-Digit Numbers with Regrouping

MN State Standard: 3.1.2.1: Add and subtract multi-digit numbers using efficient and generalization procedures based on knowledge of place including standard algorithms.

Objective: Students will be able to add multi-digit numbers that require regrouping.

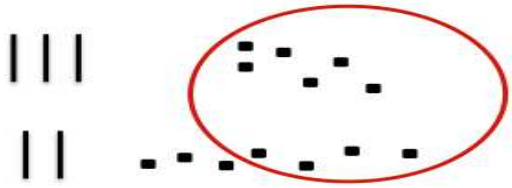
Vocabulary: place value, addition, units, rods, flats, ones, tens, hundreds (It is preferable to use "units" instead of ones; it allows you to communicate clearly. You may have to be sure that students understand that other teachers may use the word "ones.")

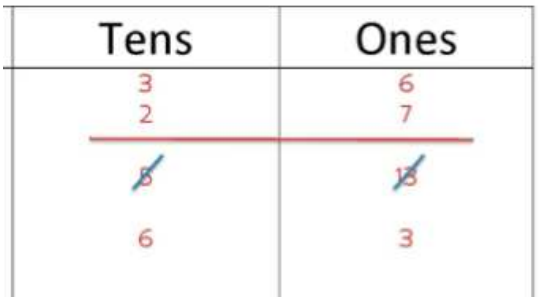
Materials: Base-10 blocks, white board, dry erase markers, place value chart

Key: *Italics* = speaking (teacher or student), **Bold** = teacher is doing something

Teacher Says and Does:	**Student Should Do:**
Today, we are going to be adding multi-digit numbers with something called regrouping. *Before we start, let's review an addition problem that does not involve regrouping.* **Give the student a problem to solve that does not require regrouping on his or her white board.**	Student solves addition problem on their white board.
CONCRETE *I'm going to build 36 using these blocks. Can you build 27 using these blocks.* **Write 36 + 27 = ____ on the white board and ask the student to add the units together.** **Let the student explore how to come to the correct solution.** *How many units do we have when we add them all together?*	The student shows 27 with two rods and seven units. *S*tudents show 1 rod and 3 units.

Could I represent 13 in another way? *So we are exchanging ten units for 1 rod. That is called regrouping. Now instead of 13 units, I have 1 rod and 3 units.* *I have 5 rods over here, so how many rods do I have in total?* *How many units do I have total after regrouping?* *After regrouping, I have a total of 6 rods and 3 units, so 36 plus 27 must be equal to 63.* **Complete number sentence to read 36 + 27 = 63**. *Why is important or helpful to regroup?* **Show the student that without regrouping, you may think the answer is 513 (five hundred thirteen), when in fact it is 5 rods and 13 units (63).** *Let's do another one this same way.* **Write 52 + 19 = _____ on white board.** *Why is it helpful to add our units first when determining the answer?* NOTE: Do not worry if students do not seem to grasp this part yet (adding right to left). **Do more problems, eventually they will regroup more than once:** 33 + 47 = _____ 45 + 66 = _____ 89 + 24 = _____ 22 + 39 = _____ 44 + 57 = _____	Student builds 52 and 19, combines them, regroups, and determines answer. *Because then if we need to regroup, we don't have to recount the rods if we have added another one to it.* *S*tudent builds the numbers, combines them, regroups, and determines answers.
REPRESENTATIONAL *Now, we are going to represent these with drawings.*	

<u>Modeling:</u> **Write 36 + 27 = ____ and create a representation.** **Your white board should look like this:** **After re**  **36 + 27 = 63** **Representing the two numbers, write 36 + 27 = _____, circle the units that can be regrouped. Count the remaining units and write down the 3 for the answer of the units, and then count the rods, including the circle and write down the 6 in the tens place to get the answer of 63.** **<u>Student-Led Practice:</u>** **Have the student draw the remaining problems that were built in the concrete—one at a time, so they can verbalize how they are finding the answer.** 33 + 47 = _____ 45 + 66 = _____ 89 + 24 = _____ 22 + 39 = _____ 44 + 57 = _____	Student draws the numbers, circles any that need to be regrouped, and explains how to determine the answer.
ABSTRACT **<u>Modeling:</u>** **Show on the Place Value Chart how to add 36 + 27 = _____.** We are still NOT moving to the traditional method. **Your Place Value Chart should look like this:** *First, I add the ones, or units. 6 ones plus 7 ones equals 13, so I write 13 here.* **Point to**	

answer in the ones column. *Next, I add the tens. 3 tens plus 2 tens equals 5 tens, so I write 5 here.* **Point to the answer in the tens column.** *Now, I can regroup the 13 ones into 1 ten and 3 ones. I will write the new amount in each column like this.* **Cross out 13 and write 3; cross out 5 and write 6.** **Your Place Value Chart should look like this:**  *I can see that I have 6 tens and 3 ones, which is 63. 36 + 27 = 63.* **<u>Student-Led Practice</u>** **Take out the Place Value Chart and have the student demonstrate (using the method above), the remaining problems that were completed in the concrete and representational portions. Also add in problems that do not need regrouping and go back and forth between each.** 33 + 47 = _____ 45 + 66 = _____ 89 + 24 = _____ 22 + 39 = _____ 44 + 57 = _____	Student solves the problems, showing the regrouping.
CRA MASTERY ASSESSMENT **Administer the CRA Mastery Assessment "Adding multi-digits with regrouping."** **If it is the first time you completed this**	

lesson, then give students Form 1. **If you have completed this lesson for a second time, then administer Form 2.** **If you have completed this lesson for a third time, then administer Form 3.** **If the student has not demonstrated mastery after three intervention sessions, go back to Form 1.**	