Advancing a better understanding of influences on relational health: A prevention science approach

by

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Abstract

One of the strongest predictors of optimal health, well-being, and life satisfaction is having stable and supportive relationships (Pinker, 2014). Yet as evidenced by high rates of relationship dissolution, maintaining healthy and stable romantic relationships can be difficult (Rodrigues, Hall, & Fincham, 2005). Thus, there has been a significant amount of focus on predictors of successful romantic relationships. This two-study dissertation takes a prevention science approach to focus on advancing empirical research focused on individuals' and couples' relationship health and the design of psychoeducational programs. Both basic and applied research questions were explored.

The first study sought to investigate the effects of a newly developed couple relationship education curriculum, *ELEVATE: Taking Your Relationship to the Next Level.* It addressed several critical gaps in the CRE evaluation literature (e.g., the assessment of the effects of a specific curriculum, the use of multiple time points, the use of a large group of diverse participants and comparisons, a focus on several key individual and contextual moderators of change, and the assessment of a wider range of outcomes). The first study compares change over six months between participants (N = 184) and non-participants (N = 116) using propensity score adjustments and multi-level growth curve modeling. We found partial support for the effectiveness of *ELEVATE* in five of the nine target outcomes related to program content and individual and couple functioning over a six month period (*intimate knowledge of partner, connection to sources of support, conflict management strategies, couple quality, and depressive symptoms*). These findings provide initial support to move *ELEVATE* towards an emerging

evidence-based program. A prevention science framework suggests universal interventions may have differential effects on individuals, depending on the level of risk. Thus we also explored variations in outcomes based on several demographic characteristics. Income moderated the change in two of the nine outcomes, such that those with higher levels of income experienced greater change in *developing a couple identity* and *connection to sources of support*. Family harmony moderated change in five of the nine outcomes (*intentionality, developing a couple identity, caring behaviors, couple quality, and depressive symptoms*), indicating those experiencing more stressful family contexts at baseline experience a greater amount of change. Additionally, relationship length moderated the amount of change in two of the nine outcomes (*conflict management skills and overall relationship quality*); specifically, those in more established relationships experienced greater change. Our study contributes to efforts to assess the efficacy of a specific curriculum offered to a diverse population through community-based programming and efforts considering the effects of CRE programming beyond the "average" experience. Overall, this type of nuanced approach to CRE evaluation helps to inform practitioners, researchers, and curriculum developers and provides information relevant to the development of best practices for CRE in diverse communities.

The second study serves to advance the empirical research on predictors of relationship quality by examining the role of trait mindfulness in combination with well-established empirical links including, the negative influence of stress and the positive influence of positive relationship behaviors on relationship quality. In a sample of 157 women and 124 men in romantic relationships, multi-group structural equation models were fit to test a conceptual model built on the extant literature, the vulnerability-stress-adaptation model, and family stress theory. Specifically, the conceptual model assessed predictors of relationship quality by examining the

role of trait mindfulness and exploring its influence directly and indirectly, through stress and positive behaviors. The results of the current study indicate a robust connection between trait mindfulness and relationship quality for women in our study and a trend towards an established link for men, while considering the independent influence of stress and positive behaviors. Positive relationship behaviors appear to be the most potent predictor of relationship quality for both men and women in our sample. For men, this link is direct; however, for women, the most potent predictive pathway is from stress to positive relationship behaviors to relationship quality. Overall, the study provides evidence that mindfulness can be considered a unique predictor of relationship quality, particularly for women; however, actual behaviors in relationships remain a key factor in predicting relationship quality for both men and women and may not necessarily stem from higher trait mindfulness. It appears warranted to suggest an emphasis on all three areas of skill development in interventions in order to enhance a romantic relationship, particularly for women.

Historically, prevention scientists have focused on public health issues; however, there has been a movement in prevention science research to focus on issues related to human development and family life. This movement has highlighted the need to assess psychoeducational programs from a prevention science framework and utilize basic science to guide the development and refinement of curricula and programs. Continued efforts to integrate multiple areas of research relevant to individual and family functioning and broaden the definition of health and well-being to include relational and social dimensions is necessary. Finally, moving the research focused on successful and healthy romantic relationships forward in a collaborative and clarifying way is central to the refinement of programs that can promote resiliency for diverse couples and families.

Acknowledgements

"Life is always at some turning point." – Irwin Edman

Turning points are times in life that redirect you, move you forward, and change your way of living. When I look back over my short life and think about my turning points, one stands out far and away as the greatest turning point in my life. I remember the day- November 10th, 2004- because it was my 17th birthday and the day I signed my letter of intent to attend Auburn University. That day and that decision changed my trajectory more than I could ever imagine.

I was only able to make that decision because of loving, supportive, and extremely generous parents. I want to thank my parents for giving me every opportunity, making just about anything possible, believing in me, cheering me on and never letting me give up. I am quite certain my decision to move across the country at age 17, skipping a full scholarship, and not having a guaranteed spot in my choice major was concerning to them. But from since I can remember they have had unwavering belief and trust in me and my abilities. Thank you from the very bottom of my heart for being examples of hard-work and generosity and for loving me unconditionally. I also want to thank my sister, Jeanette, who if all else fails, has always made me laugh and reminded me that we aren't crazy, everyone else is!

Because of the decision to attend Auburn, I met my partner for life- Tyler. My husband among many other things, is selfless, thoughtful, and hard-working. When Tyler made the Olympic team in 2012 I received a sweet text message from someone who means a great deal to us. He said, "Congratulations! Behind every great man is a great woman!" Well, I said, "Thank you! But, I believe BESIDE every great man is a great woman!" And I still believe this today.

Tyler, we stand beside each other in our endeavors, pushing and pulling each other along to be successful, generous, and God-fearing individuals. Thank you for being by my side during this extremely arduous experience. You make me a better person, and having you as a partner clearly highlights the importance of my work to improve families' lives because I feel the value of a loving support network. Marrying you was another one of my biggest turning points, because in addition to you I got brothers and a little sister! Your family brings me joy, and I appreciate all their love and support.

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Now, we stand at another turning point as I finish my graduate school journey and this dissertation. I am emotional and exhausted as this chapter closes, but I feel proud of the work we have done and excited for the journey to come. I feel strengthened by my relationships and support network and guided by the love of Jesus Christ to go into the world and support families.

Table of Contents

Abstract……ii

Acknowledgements……..v

List of Tables……...x

List of Figures…….xi

Chapter 1 – General Introduction……1

Chapter 2 – ELEVATE: Taking Your Relationship to the Next Level……...9

Introduction……..9

Method……...19

Results……30

Discussion……..35

Chapter 3 – Exploring the link between mindfulness and relationship quality: The influence of stress and positive behaviors……..61

Introduction……61

Method……...75

Results……80

Discussion……..85

Chapter 4 – General Discussion……...103

References……108

List of Tables

Study 1

Table 1……...49

Table 2……...50

Table 3……...51

Table 4……...52

Table 5……...53

Table 6……...54

Table 7……...55

Table 8……...56

Table 9……...57

Table 10…….58

Table 11…….59

Table 12…….60

Study 2

Table 1……...97

Table 2……...98

Table 3……...99

Table 4…….100

List of Figures

Study 2

Figure 1…….96

Figure 2……101

Figure 3……102

I. General Introduction

One of the strongest predictors of optimal health, well-being, and life satisfaction is having strong and supportive relationships (Pinker, 2014). Yet as evidenced by high rates of relationship dissolution, maintaining healthy and stable romantic relationships can be difficult (Rodrigues, Hall, & Fincham, 2005). Thus, over the past several decades there has been a significant amount of research focused on predictors of happy, healthy, and stable romantic relationships (Fincham & Beach, 2010). The studies in this two-study dissertation focus on advancing psychoeducational programs and empirical research focused on individuals' and couples' relationship health. Both basic and applied research questions were explored.

Although there is diversity in what works for couples, there are several themes or core predictors that stand out in the literature as important aspects of successful relationships. There is also growing evidence for the potency of a specific element, trait mindfulness, and the link to enhanced self-care and relational skills and quality. The first study centers on the efficacy of a new couples education program built explicitly on a research-informed model of seven core predictors of couple quality. While some of the core components related to dyadic processes (e.g., conflict management) are contained in other previously evaluated couple relationship education programs, the new curriculum also focuses on self-care skills and their importance for the use of effective relationship skills. The program includes the discussion of and instruction in situational mindfulness practice. This novel element of couples education is based on the growing link between social science and health behavior science and the evidence emerging on the benefits of mindfulness practice. The second study is a basic science inquiry

that advances the study of the association between mindfulness and relationship quality. A model built on theory and empirical evidence were tested to explore the relative salience of trait mindfulness and the pathways to relationship quality.

Prevention Science Framework

A prevention science framework (Coie et al., 1993) informs the approach of the studies and the development of research questions. In general, the goal of prevention science is to understand what can prevent or change undesirable outcomes, such as relationship dissatisfaction or dissolution. The framework emphasizes understanding risk and protective factors related to outcomes of interest and assumes that strengthening protective factors, such as skills and behaviors related to healthy romantic relationships, will result in positive outcome trajectories. Thus, prevention programs aim to enhance protective factors and often emphasize the reinforcement or acquisition of specific behavioral and cognitive skills that support coping in challenging situations. Programs can target an at-risk population (i.e., secondary or tertiary prevention) or a broad population (i.e., primary prevention; Starfield, 1996). High-quality prevention programs utilize basic research to inform the design of programs by incorporating content focused on factors shown to be related to the desired outcome of interest. Prevention science research also frames basic research questions that center on the comparative impact of predictors and the exploration of processes. This type of inquiry can inform practitioners on new or priority factors of influence in effecting desirable change.

Prevention Science in Couple and Relationship Education (CRE)

The National Extension Relationship and Marriage Education Network (NERMEN) is a group of faculty at land-grant institutions focused on developing resources for researchers and practitioners involved in couples education (Futris & Adler-Baeder, 2013). Land-grant

institutions carry an explicit mission for community engagement and the active bridging of research and practice. Because a large number of couples education programs exist and are being developed, the NERMEN determined a need for a guide or model with which practitioners could critically assess curriculum content for its research base. Over the course of several years the NERMEN core members conducted a thematic coding of the extant literature on predictors of romantic relationship quality and stability. Using a deductive process, they determined seven core predictive factors that influence marital quality and that are malleable rather than static, and therefore, could be influenced by an educational program. Each of the core principles is strengths-based, meaning the skills presented in CRE programs are intended to build upon each participant's resources and motivation to change. The core principles are also process-oriented because the development and maintenance of healthy and stable relationship skills are dynamic and evolve over time. The resulting National Extension Relationship and Marriage Education Model (NERMEM) was published in 2015 and explains the research evidence for focusing couples education on the following seven core principles and skills: 1) self-care skills, 2) intentionality in prioritizing the relationship, 3) skills for developing intimate knowledge of partner, 4) caring, affectionate behaviors, 5) skills for sharing meaningful time and developing a friendship with one's partner, 6) skills for managing conflict, and 7) skills for developing connections with support systems.

Research on a broad range of CRE curricula finds small to moderate effects for the enhancement of relationship skills and quality (Hawkins, Blanchard, Baldwin, & Fawcett, 2008; Hawkins & Ooms, 2012; Markman & Rhoades, 2012). Few studies, however, have assessed a specific curriculum and surprisingly, little attention is given to specific curriculum content and its research base for inclusion. Scholars have noted that a new generation of CRE research is

needed that will focus on details and variations in program design and implementation, as well as variations in outcomes (Wadsworth & Markman, 2012).

A new CRE curriculum, entitled *ELEVATE*, specifically maps each of the NERMEM core principles to one of seven educational modules that guide acquiring awareness and skills related to these concepts to support relationship quality and stability. It is considered comprehensive in its inclusiveness of all core components in the NERMEM (Futris et al., 2015). In addition, the survey used for the *ELEVATE* evaluation directly assessed baseline and change in each of the seven core skill areas. This effort used recommended practices of program development and explicitly implemented internal consistency between empirical research, program content, and measurement and assessment of effectiveness (Doherty & Anderson, 2004). Previous studies of CRE do not provide this clear and comprehensive link.

The study used data from the initial program development phase that tested the curriculum through a formative evaluation. A formative or demonstration evaluation is focused more on the feasibility of delivering the program content in a community-based setting and gathering initial evidence of receptivity and effectiveness, whereas summative evaluations are focused on program effectiveness after the program is more well-established (Doherty & Anderson, 2004; Hawkins, Carroll, Doherty, & Willoughby, 2004). Study 1 represents the next critical step in documenting program efficacy (Wadsworth & Markman, 2012) by using the available data from the formative evaluation, securing a comparison group, and utilizing more advanced statistical methods, (e.g., propensity score matching), to conduct analyses that answer questions related to program effects for the participants. Study 1 explored questions related to comparative change over time between the participants and non-participants, as well as examine moderating effects of individual and couple characteristics that may influence the effects of

ELEVATE. This effort is a "real world" empirical endeavor that can provide the rationale for moving the study of the *ELEVATE* curriculum to a random control trial (RCT) design (Doherty & Anderson, 2004). A quasi-experimental design can make use of existing data and offer insights into final program adjustments prior to the implementation of a true experimental design study (i.e., RCT). Sequencing these steps is a valuable approach to developing evidence-based programs that can be offered for replication (Royse, Thyer, Padgett, & Logan, 2001).

The Emerging Research on Stress and Mindfulness and Relationship Quality

The developers of NERMEM cast a wide net in considering predictors of relationship quality and acknowledged the emerging literature linking the biophysical effects of stress to relationship functioning (Birditt, Antonucci, & Tighe, 2012; Randall & Bodenmann, 2009) and relationship quality (Bodenmann, Ledermann, & Bradbury, 2007; Story & Bradbury, 2004). Using a prevention science approach includes the assumption that stressful contexts can impede the use of positive relationship skills or behaviors due to higher rates of reactivity and lower rates of skillful responsiveness while experiencing stress (Kabat-Zinn, 1990). In other words, if a CRE program focuses solely on conflict management and communication skills, it may not be as effective, since poor stress management and lack of emotion regulation skills may render positive learned behaviors inaccessible (Kabat-Zinn, 1990). In the study of stress and its effects, a specific form of stress management that incorporates mindfulness practice has emerged as a key skill for promoting physical, mental, and relational health (Brown, Ryan, & Creswell, 2007).

Mindfulness is a personal tendency or trait of being attuned to and aware of the present moment. Living a mindful lifestyle means to intentionally, nonjudgmentally, and empathically be present in each experience and interaction (Brown & Ryan, 2003; Kabat-Zinn, 1990). Research indicates that the cultivation of this trait can occur through dedicated, situational mindful

practices that may include awareness of breath, mindful movement, and focused activities, such as mindful eating (Kabat-Zinn, 1990; Kabat-Zinn, 2015). These skills can be taught effectively in an educational setting (Cullen, 2011; Schonert-Reichl & Roeser, 2016).

The pervasiveness of mindfulness research has been growing at an astonishing rate since the turn of the 21st century. In 2000, just 12 academic journal articles were published with the term "mindfulness" in the title, but in 2015 there were 674 (American Mindfulness Research Association, 2016). The study of mindfulness and its benefits is found primarily in medical and health behavior journals (Shigaki, Glass, & Schopp, 2006). Increasingly, studies also have explored the use of mindfulness in psychological and mental health therapy services (Davidson & Dimidjian, 2015). A small subsample of the growing research related to mindfulness considers the influence of mindfulness on relationship functioning and quality (Kozlowski, 2013). *ELEVATE*, as a recently developed program, is the only published CRE curriculum that makes explicit use of this literature and includes the teaching of mindfulness skills.

Family stress theory (Boss, 2002) informs a primary prevention approach by assuming stress is inevitable and unavoidable for individuals and couples. Consistent with the prevention science approach, family stress theory also assumes that the potential adverse effects of stress on family functioning can be buffered by protective factors that alter the perception of stress, as well as the experience of stress. One of the most consistent findings of mindfulness research is that individuals reporting higher levels of mindfulness report lower levels of stress (Brown & Ryan, 2003; Davis & Hayes, 2011; Kabat-Zinn, 1990; Sedlmeier et al., 2012). Research also indicates a direct positive link between the level of mindfulness and engaging in more positive relationship behaviors (e.g., empathy, perspective-taking, etc.; Kozlowski, 2013). Further, several studies document the direct positive association between mindfulness and relationship quality (Barnes,

Brown, Krusemark, Campbell, & Rogge, 2007; Burpee & Langer, 2005). A recent meta-analysis of 12 studies reported a small, but statistically significant effect size for the association between mindfulness and relationship quality (*Fisher's z = .28;* McGill, Adler-Baeder, & Rodriguez, 2016).

The plan for Study 2 emerged from the recognition that links from predictors to couple quality tend to be studied in isolation, and this is particularly true for the emerging research on mindfulness and relationship quality. While the evidence indicates the salience of trait mindfulness for relationship quality and thus has been included in the most recent CRE program content, no research has tested its *relative* salience in comparison to the direct links between stress and relationship quality and positive behaviors and relationship quality. These latter two associations have been validated through decades of research, including meta-analytic studies (e.g., Karney & Bradbury, 1995; Le, Dove, Agnew, Korn, & Mutso, 2010). A model testing the additive effects of positive behaviors, reported stress level, and trait mindfulness will reveal either the unique contributions or the redundancy of these factors. Further, testing a model that examines the mediated pathways between mindfulness and relationship quality (i.e., the mediating role of stress and positive relationship behaviors on the association between mindfulness and relationship quality) moves the empirical research a step forward and can serve to inform program developers and practitioners about the processes involved.

The Current Dissertation

Taken together, the two studies focus on understanding influences of relationship health. The work is guided by a prevention science framework and utilized assumptions from the vulnerability-stress-adaptation model and family stress theory. Study 1 adds to the CRE evaluation literature and represents "second generation" questions related to a specific, newly

developed curriculum clearly grounded in the most recent empirical studies of couple quality predictors. Use of a nonparticipant group statistically rendered comparable adds to the evidence of the program's effectiveness in promoting desirable changes. Additionally, due to the diverse populations now accessing CRE, compared to more homogenous samples in earlier CRE evaluation studies, this study explored modifiers of program effects. Tests of moderation can reveal information on relative effectiveness of the program. Because the *ELEVATE* program is unique in its inclusion of an emphasis on the bio-physiological effects of stress and skills-training in mindfulness, Study 2 focused on the role of mindfulness in predicting relationship quality. This study pulled together several well-established empirical links into a conceptual model and considered the interrelationships among mindfulness, stress, positive behaviors, and relationship quality in a diverse sample of adults. The studies are an example of complementary basic and applied research. Results inform both research and practice and serve to enhance the understanding and promotion of healthy romantic relationships.

II. Study 1 – ELEVATE: Taking Your Relationship to the Next Level

Couple relationship education (CRE) curricula have been implemented over the past several decades, with many studies showing that a wide range of curricula have benefitted couples by enhancing relationship skills that are associated with healthy relationships (Hawkins, Blanchard, Baldwin, & Fawcett, 2008; Hawkins & Ooms, 2012; Markman & Rhoades, 2012). These include prosocial behaviors, such as communication and conflict management skills (Gottman & Silver, 1999; Reardon-Anderson, Stagner, Macomber, & Murray, 2005), as well as commitment and forgiveness (Fincham, Stanley, & Beach, 2007). In addition to enhancing indicators of relationship health, studies indicate CRE curricula can improve relationship quality or satisfaction (Adler-Baeder, Bradford, Skuban, Lucier-Greer, Ketring, & Smith, 2010; Hawkins et al., 2008) and have been associated with preventing relationship dissolution and distress (Carroll & Doherty, 2003; Stanley, Allen, Markman, Rhoades, & Prentice, 2010; Stanley et al., 2014).

Although the literature provides ample support for short-term CRE effectiveness for the "average" participant, many researchers have encouraged studies of specific curricula and variations in outcomes based on participant characteristics (Lucier-Greer, Adler-Baeder, Harcourt, & Gregson, 2014; Markman & Rhoades, 2012; Wadsworth & Markman, 2012). Also, few studies use larger, more diverse samples that incorporate a comparison group in a longitudinal design. Therefore, this study examined short-term longitudinal effects of a specific CRE curriculum using a large, diverse sample of participants and comparisons. Additionally, to understand effects for subpopulations of participants, the current study assessed income, family

harmony, and relationship length as possible moderators of change.

Evidence-Based Couple and Relationship Education Curricula

It is essential that curricula be "research-based;" that is, curricula are informed by an accumulation of previous research, and integrate relevant and up to date information for participants. In other words, the content provided in a research-based curriculum is grounded in sound research evidence, and program topics and design are linked to desired outcomes. Even if the curricula is research-based it may or may not be "evidence-based," which involves empirically testing the efficacy of its implementation (Puddy & Wilkins, 2011). An important next step for research-based curricula is to move toward becoming evidence-based (Markman & Rhoades, 2012). The National Registry of Evidence-based Programs and Practices (NREPP) suggests specific guidelines and qualifications for curricula to be considered "evidence-based." These include evidence of positive behavioral outcomes that have been demonstrated in at least one published experimental or quasi-experimental design study. Further, the curriculum must have produced at least one positive outcome related to mental health or substance use and the curriculum must be ready for use by the public (SAMHSA's NREPP website, 2015).

Presently, there are only six couple relationship education curricula that are considered evidence-based per the NREPP, which is largely due to the limited program-specific CRE evaluation studies (Markman & Rhoades, 2012). One of the most researched CRE curricula, *Prevention and Relationship Enhancement Program* (*PREP*), was established as evidence-based for broad audiences following the publication of multiple efficacy studies (e.g., Halford, Sanders, & Behrens, 2001; Markman, Renick, Floyd, Stanley, & Clements, 1993; Stanley et al., 2010). The *Family Wellness: Survival Skills for Healthy Families* (Creighton & Doub, 2000) curriculum is also for general audiences, while the remaining four evidence-based curricula were developed

for specific subpopulations (e.g., new parents, expecting parents, separated couples, or parents in a non-romantic relationship). There are, however, a substantial number of CRE curricula being used across the country (see Markman & Rhoades, 2012). Practitioners will benefit from a broader array of evidence-based programs, particularly those focused on general populations, such as the curriculum of focus in this study. In addition to the need for expanding the research on curriculum-specific CRE evaluation, there are other notable areas in CRE research in need of further development.

Addressing Gaps in Couple and Relationship Education Research

A recent summary of CRE research suggests expansion in study design and the exploration of more complex questions (Markman & Rhoades, 2012). Several recommended areas of growth include utilizing follow-up data, use of a comparison group, attention to the diversity of participants, and exploration of individual outcomes related to couple relationship functioning (Markman & Rhoades, 2012; Wadsworth & Markman, 2012).

The majority of CRE evaluation studies include only immediate post-program outcomes and importantly, do not include examinations over time for diverse populations of CRE participants. Collecting multiple timepoints allows for the use of more advanced methods, such as growth curve analyses which can assess maintained, delayed, or nonlinear effects of relationship education, if they exist (Markman & Rhoades, 2012). The lack of longitudinal data is a major problem because the goals of prevention programs are focused on long-term improvements. Results of maintained, delayed, or reduced program effects can inform practice by highlighting the possible need for booster sessions (Bodenmann, Pihet, Shantinath, Cina, & Widmer, 2006; Braukhaus, Hahlweg, Kroeger, Groth, & Fehm-Wolfsdorf, 2003). CRE research assessing longitudinal trajectories finds mixed results. Some noted a decrease in the strength of

effects at later time points in samples of higher-resource participants (e.g., Bodenmann et al., 2006; Laurenceau, Stanley, Olmos-Gallo, Baucom, & Markman, 2004; Shapiro & Gottman, 2005), while others found enduring positive effects after participation for higher-resource populations (e.g., Markman, Floyd, Stanley, & Storaasli, 1988; Schilling, Baucom, Burnett, Allen, & Ragland, 2003; Schulz, Cowan, & Cowan, 2006). Studies of low-resource populations are also mixed. Specifically, one study of low-income nonmarried parents found limited effects over time (Wood, Moore, Clarkwest, Killewald, & Monahan, 2012), whereas another study of low-income married couples demonstrated some positive effects over time (Lundquist et al., 2014). The mixed results may be due to differences in curricula content and design or other factors. Perhaps, the field is better served by focusing on individual CRE program experiences and outcomes, rather than assuming CRE program experiences are equal and can be directly compared.

In addition to the limited longitudinal evaluations of CRE, the few studies focused on specific CRE curricula predominantly utilized homogenous samples of high-functioning participants. Through recent CRE demonstration programs funded by the federal government (Administration for Children and Families, 2005), there is evidence suggesting that vulnerable, ethnically diverse, and/or economically diverse individuals and couples are attending CRE programs (Blanchard, Hawkins, Baldwin, & Fawcett, 2009; DeMaria, 2005; Halford, O'Donnell, Lizzio, & Wilson, 2006). In fact, there has been an increase in published studies of CRE with diverse populations of participants. For example, a meta-analysis focused solely on studies of low-income participants ($k = 10$) indicated small effects ($d = .19 - .25$) for relationship quality, commitment, and stability, and communication skills for the average participant (Hawkins & Fackrell, 2010). Furthermore, this heterogeneity affords the opportunity to explore the efficacy

of specific curricula for more diverse samples.

The increased diversity of CRE participants also provides the prospect for process evaluations that consider moderating effects of characteristics and context that may influence CRE effects. Current offerings through CRE demonstration programs encourage an "all-come" approach (Adler-Baeder et al., 2010), resulting in variations in economic vulnerability, family harmony, and relationship length, among other variables. Several recent studies have discovered enhanced CRE effects for socio-demographically vulnerable (e.g., low-income) CRE participants (Adler-Baeder et al., 2010; Amato, 2014) and relationally vulnerable individuals and couples (Bradford et al., 2014; McGill et al., in press; Quirk, Strokoff, Owen, France, & Bergen, 2014). Only one study of relationally distressed couples assessed the effects of a specific curriculum (Lucier-Greer, et al., 2014). It is possible that the enhanced improvements for vulnerable couples are due to ceiling effects in higher-functioning couples, if vulnerability or risk results in significantly lower baseline levels of the outcomes. Because this previous work suggests that higher levels of demographic or couple relationship vulnerability are related to enhanced effects of CRE, we can also expect that broader assessments of family stress and vulnerability may moderate program effects, though these types of measures were not included in previous moderation tests.

Perhaps because many previous studies focused on premarital couples, there also is limited knowledge about the influence relationship length has on the effects of CRE. Relationship length should be considered since previous research assessing longitudinal trajectories of relationship functioning demonstrated that relationship behaviors and quality can vary over time (Kamp Dush, Taylor, & Kroeger, 2008; Umberson, Williams, Powers, Chen, & Campbell, 2005). Considering relationship length may provide information on "teachable

moments" when couples may be more open to the curriculum experience, resulting in greater impact.

Another area warranting expansion in CRE research is the assessment of other potential outcomes related to couple functioning. Understandably, the majority of CRE studies focus on relational outcomes such as communication skills, conflict management skills, and relationship satisfaction (Hawkins, Blanchard, Baldwin, & Fawcett, 2008; Markman & Rhoades, 2012); yet, there are other outcomes related to couple functioning that may be influenced by CRE. A small and growing body of CRE literature citing an ecological systems perspective (Bronfenbrenner & Morris, 1998) finds CRE program effects in domains beyond the couple relationship (e.g., individual, parenting, or family functioning; Adler-Baeder et al., 2010; Adler-Baeder et al., 2013; Braithwaite & Fincham, 2011; Cowan, Cowan, Pruett, Pruett, & Gillette, 2014; Dion & Hershey, 2010; Halford, Petch, & Creedy, 2010; Lucier-Greer, Adler-Baeder, Ketring, Harcourt, & Smith, 2012; McGill et al., in press). Continuing this exploration of multiple outcomes and outcome domains serves to provide a more complete picture of CRE influences and can inform examinations of processes of change (Hawkins & Ooms, 2010).

In sum, evidence suggests the effectiveness of CRE for the "average" participant; however, there are several limitations to previous work that represent opportunities for expanding the CRE research literature. These include (1) the assessment of the effects of a specific curriculum, (2) the use of multiple time points, (3) the use of a large group of diverse participants and comparisons, (4) a focus on several key individual and contextual moderators of change, and (5) the assessment of a wider range of outcomes. The present study addresses these recommended areas of growth in the context of a particular CRE curriculum, *ELEVATE*. Because it is a publicly available curriculum, examining its effectiveness has implications for the

provision of easily-accessible evidence-based CRE curricula while addressing the gaps in the CRE evaluation study literature.

ELEVATE

ELEVATE: Taking Your Relationship to the Next Level (Futris et al., 2015) is a newly available and free curriculum developed through a collaboration of faculty, students, and community partners. In-person training is optional, and the website provides free resources, including a facilitator implementation guide, scripted facilitator notes, and training videos to help prepare facilitators to teach *ELEVATE*. It is a research-based CRE curriculum that is intended for broad, general audiences. The curriculum was explicitly built on the National Extension Relationship and Marriage Education Model (NERMEM; Futris & Adler-Baeder, 2013). NERMEM works as a guide for selecting or developing research-based content to be included in CRE. The model was derived from a thematic coding of research on predictors of marital quality and stability and consists of seven core principles or skills for healthy couple relationships. Each *ELEVATE* module represents one of the seven NERMEM components: Care for Self, Choose, Know, Care, Share, Manage, and Connect. Each core component, however, was renamed to develop the *ELEVATE* acronym: Empower Yourself (Care for Self), Lay the Foundation (Choose), Enlighten (Know), Value (Care), Attach (Share), Tame (Manage), and Engage (Connect).

One particular content area that is less emphasized in previous CRE curricula is stress management and emotion regulation skills, though they are integrally important to being able to utilize and engage in learned behavior skills and for caring for oneself (Kabat-Zinn, 1990). Thus, the *ELEVATE* developers sought out related literature on practical skills for decreasing stress, managing emotions, and increasing well-being. The *ELEVATE* curriculum introduces

participants to some basic stress reduction techniques through brief mindful practices. The addition of mindful practices is innovative and is based on the growing evidence linking mindfulness to positive physical, mental, and relational health outcomes (Grossman, Niemann, Schmidt, & Walach, 2004; McGill, Adler-Baeder, & Rodriguez, 2016).

The curriculum begins with an introduction to the mind-body connection by specifically describing how physiology is linked to interactions with others. Then, the curriculum concentrates on the seven core behaviors associated with marital quality and stability identified in the NERMEM (Futris & Adler-Baeder, 2013). The second module, *Empower*, expands on the NERMEM core principle of *Care for Self*. In this section, facilitators focus on the reciprocal nature of overall individual wellness and relational health and cover information on physical, spiritual, sexual, emotional, and social health, in addition to ways to recognize and manage stress. It is in this module that mindfulness skills are emphasized and practiced. The third module, *Lay the Foundation*, focuses on the *Choose* principle and emphasizes skills for demonstrating intentionality and effort in prioritizing the relationship. The fourth module, *Enlighten*, features the *Know* principle and focuses on the development of skills for developing and maintaining understanding and intimate knowledge between partners. The fifth module, *Value*, centers on the *Care* principle and emphasizes skills for demonstrating kindness, respect, and positivity. The sixth module, *Attach*, focuses on the NERMEM concept of *Share* and features skills for building and maintaining a friendship between partners and fostering a shared couple identity. The seventh module, *Tame*, focuses on the principle of *Manage* and features training in strategies for conflict management that incorporate skills for regulating emotions and managing stress. The eighth module, *Engage*, emphasizes the *Connect* principle and centers on teaching strategies for engaging in social support and building community.

Theoretical Assumptions

Though NERMEM is based on empirical knowledge and theoretical frameworks, notably, much of CRE research is atheoretical (Markman & Rhoades, 2012; Wadsworth & Markman, 2012). Therefore, efforts to explain theory-guided content and evaluation design serves to expand the CRE research literature. In addition to the specific reference to the empirical research base for curriculum content, the authors of *ELEVATE* note the use of a theoretical framework that incorporates assumptions from multiple, related theories including ecological and systems theories, social exchange theory, and social learning theory (see Futris & Adler-Baeder, 2013 for a detailed description). Their framework offers insight into understanding interactions amongst the cognitive, behavioral, and emotional variables involved in couples' experiences and trajectories which are targeted in the *ELEVATE* content.

For our test of the effectiveness of the *ELEVATE* curriculum, a prevention science framework is a useful guide (Coie et al., 1993). In general, the goal of prevention programs is to prevent or change undesirable trajectories leading to adverse outcomes, such as relationship dissatisfaction or dissolution. The prevention science framework emphasizes risk factors and protective factors related to the outcome of interest and assumes that strengthening protective factors will result in positive outcome trajectories. Experience in the *ELEVATE* curriculum and its application of the NERMEM core principles related to healthy, stable couple relationships can be conceptualized as an effort to enhance several key protective factors (i.e., conflict management skills, stress management skills, caring behaviors, etc.), thus mitigating the effects of risks that may exist (Rolf, Masten, Cichetti, Neuchterlein, & Weintraub, 1990).

Often, prevention science studies focus on psychopathology and specific high-risk subpopulations in addition to focused interventions and treatments; however, in the seminal

description of this approach, Coie and colleagues (1993) note the assumption that universal interventions can be utilized in a general population if the program is known to have potential benefits and no adverse effects. So far, this is the case for CRE evaluation research. Prevention science also suggests universal interventions may have differential effects on individuals, depending on the level of risk. The suggestion is to utilize analyses that consider participant characteristics to refine empirical knowledge of prevention program effects and to inform program refinement.

The prevention science framework also considers assumptions from developmental theories, suggesting that developmental stage of the individual or the family relationship may influence program efficacy. Marriage research that uses a developmental lens suggests a general trend for declining satisfaction and stability over time (Karney & Bradbury, 1995; Markman et al., 1988; Spanier, Lewis, & Cole, 1975), indicating longer-term relationships may be more vulnerable and may benefit more from intervention. There are, however, also documented fluctuations in relationship quality for couples (Kamp Dush et al., 2008; Umberson et al., 2005), suggesting the influence of relationship length on CRE outcomes remains a testable question. Overall, the prevention science framework provides a heuristic for expecting positive effects of *ELEVATE* participation and guides questions in the current study related to influences on individual outcomes.

Current Study

The current study used a quasi-experimental design to evaluate a new CRE program, *ELEVATE*, to test its effectiveness for a diverse population of participants. Specifically, the study assessed participants' change over a six-month period in fundamental areas related to healthy relationships, in addition to measures of relationship quality and depressive symptoms.

Moreover, the study focused on theoretically and empirically informed potential moderators of change, (i.e., income, family harmony, and relationship length). Specifically, we expected:

Hypothesis 1: *ELEVATE* participants will experience sustained improvements in skills related to the seven NERMEM core skills (Care for Self, Choose, Share, Know, Connect, Manage, and Care), Couple Quality, and Depressive Symptoms compared to those who did not participate in the program.

Hypothesis 2: Among *ELEVATE* participants, economically vulnerable couples will experience greater change in target outcomes.

Hypothesis 3: Among *ELEVATE* participants, those with lower levels of family harmony will experience greater change over time.

Because there is no empirical or theoretical basis for stating a specific hypothesis, we explored whether relationship length alters the amount of change in target outcomes among *ELEVATE* participants (RQ1).

Method

Participants

The sample of program participants and comparisons was comprised of 300 individuals (128 couples and 44 individuals) who completed baseline assessments. The sample consists of 184 individuals (61%) (n = 82 couples; 20 individuals) who attended the *ELEVATE* class; and 116 individuals (39%) (n = 46 couples; 24 individuals) who did not participate in *ELEVATE* and served as comparisons. Eighty percent of respondents completed surveys approximately 6-8 weeks after baseline, and 70% of respondents completed follow-up surveys approximately six months later. Of those who completed the second wave of data collection, 79% completed the final wave of data. The sample was racially and economically diverse; however the participant

and comparison groups differed on several key demographic indicators and baseline levels of outcomes. Table 1 describes the descriptive demographic statistics for both participant and comparison groups.

The comparison sample was not obtained by randomized sampling methods because the participant data are from a "demonstration project" focused on the feasibility of CRE implementation for diverse audiences, rather than an efficacy study. Efforts, however, were made to recruit the comparison group through the same outlets that were used to recruit for participation in *ELEVATE*. Independent *t*-tests were conducted for continuous variables and crosstabs with chi-squares were performed for categorical variables to test for differences at intake between participant and comparison groups. Comparison respondents were more likely to be European-American (81% of comparison individuals compared to 45% of participant individuals; $\chi 2 = 47.72$, $p < .001$) and have a higher income ($M_{comp} = 5.27$ [$40,000-$74,999]; $M_{part} = 4.29$ [$25,000-$39,999]; $t = 5.24$, $p < .001$). Participant and comparison respondents did not differ on gender ($\chi 2 = 2.09$, $p = .148$), marital status ($\chi 2 = 2.86$, $p = .239$), age ($t = -.479$, $p = .632$), education level ($t = .203$, $p = .840$), or relationship length ($t = .983$, $p = .326$).

The participant and comparison groups statistically differed on baseline levels for all but one outcome of interest described below, Care for Self. Specifically, the comparison respondents were approximately a half a point higher on baseline reports of Choose, Share, Know, Connect, and Care and approximately one point higher on baseline reports of Couple Quality compared to participant respondents, suggesting better functioning in these areas for the comparison group. Alternatively, participant respondents were approximately 1 point higher on reports of Manage compared to comparison respondents. Table 2 provides independent *t*-test results for differences between groups and descriptive statistics related to outcome measures by participant and

comparison group.

Finally, to test differences between those who completed Time 2 surveys and/or those who completed Time 3 surveys and those who did not, independent *t*-tests were conducted for continuous variables and crosstabs with chi-squares were conducted for categorical variables. Results indicate there were no significant differences between those who completed surveys at Time 2 and/or at Time 3 and those who did not complete surveys at those time points.

Procedure

Participants were recruited to attend the *ELEVATE* classes; all interested individuals were allowed to participate per guidelines of the demonstration project. Participants in the comparison group were separately recruited through similar means. Recruitment outlets included flyers passed out and posted in several community locations (e.g., doctor's offices, coffee shops, community bulletin boards), e-mails to several large organizations in the area (e.g., university, hospital), partnerships with community organizations (e.g., daycares, health clinics, therapy offices), newspaper and magazine ads, and word of mouth. The CRE classes were facilitated by trained male/female teams and implemented in a retreat format. Attendees participated Friday evening and all day Saturday, receiving the 8-module 8-hour curriculum as designed. At baseline (Time 1), before program start, couples completed surveys that included questions about their demographics, relationship history, and information relevant to the individual, couple, and family domains. Approximately six weeks later (Time 2) and then again six months later (Time 3), participants completed follow-up surveys. Comparison respondents completed a baseline survey, a second survey six weeks after (Time 2), and a final survey six months after the baseline survey (Time 3).

Measures

Demographics. *Age* was included as a continuous variable based on the respondents' reports of age in years. *Gender* was included as a dummy-coded variable with female individuals coded as "1," and individuals identifying as male, coded as "0." *Ethnicity* was included as a dummy-coded variable with European-American individuals coded as "1," and individuals reporting other ethnicities (including African-American, Asian-American, Hispanic or Latino, etc.) coded as "0." *Marital status* was included as a dummy-coded variable because married and committed couples are qualitatively different (Kamp Dush & Amato, 2005); therefore, married couples were coded as "1," and those in committed relationships were coded as "0." *Income* was assessed as an interval variable using the respondents' reports of annual household income. *Educational attainment* was assessed as an interval variable using respondents' reports of highest level of education (1= less than high school; 2= completed high school/GED; 3= some college; 4= technical/vocational degree; 5= associate's degree; 6 = graduated with 4-year college degree; 7= post-college degree).

Outcome Measures. Many of the measures in the current study, specifically the measures related to NERMEM core skills, were developed for the curriculum to provide internal consistency from the NERMEM model, to the *ELEVATE* program content, to measurement of effectiveness. The scales focused on NERMEM core skills and principles are in development and combine items from existing measures assessing conceptually similar constructs and items created by the curriculum authors. In addition to assessing measures that directly tap the seven core skills of focus in the *ELEVATE* curriculum, assessments of couple quality and depressive symptoms were included. The NERMEM suggests that enhancements in the seven key areas of couple functioning should be related to couple quality and individual well-being.

Care for Self. Eight items were used to assess attending to one's overall well-being.

Items from the Individual Empowerment scale (Adler-Baeder et al., 2010) and items developed specifically for the survey and derived from program content were utilized. Items included, "I have the power to manage the challenges in my life," "I recognize my strengths," and "I have quiet time for myself every day." Respondents reported on a 7 point Likert-scale (1 = very strongly disagree to 7 = very strongly agree). In the current sample, alpha coefficients at each time point (α = .78; .80; .81) indicated adequate to good reliability. A mean score was calculated and higher scores indicate higher levels of empowerment and greater use of self-care behaviors.

Choose. Six items were used to assess the level of intentionality and commitment in the relationship. Three items from the measure were taken from Stanley and Markman's (1992) commitment scale, and three were developed specifically for the survey and were related to program content. Items included, "My relationship with my partner is more important to me than almost anything else in my life" and "I always think about how my choices could affect my relationship." Respondents reported on a 7 point Likert-scale (1 = very strongly disagree to 7 = very strongly agree). In the current sample, alpha coefficients at each time point (α = .83; .86; .84) indicated good reliability. One item was recoded, a mean score was calculated, and higher scores indicate greater commitment to and intentionality in the relationship.

Share. Five items were used to assess the level of meaningful time spent together. Two items were taken from the Dyadic Adjustment Scale (Busby, Christensen, Crane, & Larson, 1995), and the other three were developed specifically for the survey, derived from program content. Items included, "In the past month how often would you say the following events occurred between you and your partner: have stimulating exchange of ideas," or "talk with each other about our day." Respondents reported on a 7 point Likert-scale (1 = never to 7 = more often than once a day). In the current sample, alpha coefficients at each time point (α = .89; .91;

.91) indicated high reliability. A mean score was calculated, and higher scores indicate more "sharing" or meaningful time spent together.

Know. Four items from the Sound Marital House Questionnaire (Gottman & Silver, 1999) were used to assess the level of intimate knowledge individuals have about their partner. Items included, "I know my partner's current life stresses," or "I know my partner pretty well." Respondents reported on a 7 point Likert-scale (1 = very strongly disagree to 7 = very strongly agree). In the current sample, alpha coefficients at each time point (α = .89; .92; .90) indicated high reliability. A mean score was calculated, and higher scores indicate more intimate knowledge about their partner.

Connect. Four items from Stanley and Markman's (2007) Couple Social Integration measure were used to assess the level of couples' connection and engagement with family, friends, and community. Items included, "Many of our friends are friends of both of us," or "As a couple, we try to help others in need." Respondents reported on a 7 point Likert-scale (1 = very strongly disagree to 7 = very strongly agree). In the current sample, alpha coefficients at each time point (α = .81; .84; .82) indicated good reliability. A mean score was calculated, and higher scores indicate more engagement as a couple to external supports.

Manage. Eight survey items were used to assess skills for managing conflictual and distressful situations. Items were combined from the Interpersonal Competence Scale (Buhrmester, Furman, Wittenberg, & Reis, 1988), Negative Interactions scale (Stanley, Markman, & Whitton, 2002), and the Communication Patterns Questionnaire (Christensen & Sullaway, 1984). Items included, "I am able to see my partner's point of view and really understand it, even if I don't agree," or "I blame, accuse, or criticize my partner." Respondents reported on a 7 point Likert-scale (1 = very strongly disagree to 7 = very strongly agree). In the

current sample, alpha coefficients at each time point (α = .69; .72; .72) indicated adequate reliability. Four items were recoded, and a mean score was calculated with higher scores indicating the use of healthier conflict management skills.

Care. Five items were used to assess the demonstration of positive behaviors toward partner. Items were combined from Huston & Vangelisti's (1991) Positive Interactions scale and the Interpersonal Competence Scale (Buhrmester, Furman, Wittenberg, & Reis, 1988). Items included, "On average, how often in the past month did you Share emotions, feelings, or problems with your partner," or "Initiate physical affection with your partner." Respondents reported on a 7 point Likert-scale (1 = never to 7 = more often than once a day." In the current sample, alpha coefficients at each time point (α = .85; .87; .88) indicated good reliability. A mean score was calculated, and higher scores indicate the use of more positive, caring behaviors.

Couple Quality. Three items from the Quality of Marriage Index (QMI; Norton, 1983) were used to assess participants' reports of relationship quality. Previous psychometric analyses informed item reduction in the measure of couple quality (Adler-Baeder et al., 2010). Items were, "We have a good marriage/relationship," "Our relationship is strong," and "My relationship makes me happy." Participants responded on a seven-point scale (1 = very strongly disagree to 7 = very strongly agree). In the current sample, alpha coefficients at each time point (α = .96; .97; .96) indicated excellent reliability. A mean score was calculated, and higher scores indicate higher ratings of relationship quality.

Depressive Symptoms. Reports of depressive symptoms were measured using three items from the Center for Epidemiological Studies-Depression Scale (CES-D; Radloff, 1977). Previous psychometric analyses informed item reduction in the measure of depressive symptoms (Bradford et al., 2014). Respondents reported on a four-point Likert scale, from 0 (*None*) to 3

(*3+ times*) to the following questions: "In the past week, I felt sad that I could not shake off the blues even with the help of my family and friends," "I felt sad," and "I felt depressed." In the current sample, alpha coefficients at each time point (α = .67; .68; .74) indicated acceptable reliability. A mean score was calculated, and higher scores indicate higher levels of depressive symptoms.

Moderators. Hypotheses 2 and 3 and RQ1 propose the amount of change experienced by participants may be different based on individual and couple characteristics. Therefore, income, family harmony, and relationship length were assessed as moderators.

Income. Income was used to assess economic vulnerability. It was treated as an interval variable using the respondents' reports of annual household income (1 = less than $7,000; 2 = $7,000-13,999; 3 = $14,000-24,999; 4 = $25,000 -39,999; 5 = $40,000-74,999; 6 = $75,000-99,999; and 7 = more than $100,000).

Family Harmony. Family harmony was assessed using three items from Banker and Gaertner's (1998) Family Harmony Scale. The items were: "Generally, there is a feeling of contentment in my house," "Overall, there are more happy feelings than unhappy feelings in my home," and "There are many disagreements in my house." Respondents answered on a 7-point Likert scale, from 1 (*very strongly disagree*) to 7 (*very strongly agree*). Baseline alpha coefficients (α = .82) indicated good reliability. One item was recoded and a mean score was calculated with higher scores indicating higher levels of family harmony.

Relationship Length. Participants responded to the question "How long have you been in your couple/romantic relationship?" to assess the length of the relationship. The variable was reported in years and included as a continuous variable. A difference score was calculated between each partner's report to understand how large and how often there were discrepancies

due to a need to clarify the question since the start date of the relationship is open to interpretation (i.e., at the beginning of the dating or engagement or marriage).

There were discrepancies in answers for approximately one-third (32%) of respondents, and the largest difference was five years. In the case of discrepancies, the mean of the two answers was used for each couple since both are likely accurate, depending upon their interpretation. Because there is no precedence in previous research for calculating couple level report of relationship length, we used the mean in order to incorporate both partners' perspective on relationship length..

Analytic Strategy

Propensity score analysis. Because the inclusion of a comparison group was central to the current study, we used propensity scores to statistical control for group differences before conducting further analyses. Propensity scores statistically adjust for the likelihood of belonging to each group, thus eliminating or minimizing the bias associated with basic variables related to group status (Heckman, 1997; Caliendo & Kopeinig, 2008) and are commonly used in research attempting to determine causal inferences even though the study was not a true experiment (Rosenbaum & Rubin, 1983). This is a superior method compared to including key variables as covariates to control for their contribution to the variance in the outcome, and it can more accurately predict the impact of a program (Graham & Kurlaender, 2011). Although propensity scores can be used to adjust for difference between program participant and comparison groups in studies lacking random assignment, the use of propensity score analysis is based on the assumption that the two groups are being balanced on all possible variables related to the likelihood of participation and the outcomes (Rosenbaum & Rubin, 1983). Because the likelihood of perfectly modeling this true propensity is low, some hidden bias is still likely

present in obtained estimates of the program effects.

Typically, the program group is assigned a 1 for easier interpretation, but the dummy code assignment in propensity score analyses influences the matching procedure. Whichever group is coded as 1 is the group that retains more individuals in the matching and estimation procedure. Because the sample in the current study had fewer comparison individuals, we chose to code them as 1 to retain as many respondents as possible. The program group variable was altered based on conventional coding for the multilevel models (see below) for ease of interpretation.

For this study, demographic indicators (e.g., race, gender, educational attainment, etc.) and indicators of relationship functioning (e.g., relationship commitment, positivity, negativity, etc.) that are statistically different based on group membership were used to balance the two groups. The model must be respecified until the balance is achieved among at least five blocks. This is done through an iterative process in which the obtained propensity scores are divided into blocks, ordered from low to high, and the covariates included in the model are then evaluated for balance across participant and comparison groups within each propensity score block (see Harder, Stuart, & Anthony, 2010). The propensity score blocks are used in further analyses to adjust for group membership resulting in more comparable groups.

Multilevel regression models (MLM). The data used in the current study came from individuals in couple relationships and individuals whose partner was also in the dataset; meaning, the data are hierarchical in nature. When couples are included in basic regression analyses, the likelihood of Type 1 error is increased because each observation is treated as independent instead of interrelated. Basic regression analyses also do not partition the unique variance contributed by each dyad, and consequently, report unreliable estimates. Therefore, to

investigate hypothesis 1, SPSS Version 22 was used to assess the influence of participating in *ELEVATE* across time and couples. A series of 3-level longitudinal models were conducted to assess the growth trajectories (time; level 1) of participants and nonparticipants (individual; level 2) while considering the nesting of individuals within dyads (couple; level 3).

First, an unconditional means model (Model 1) without any individual or dyadic characteristics was fit to test the amount of variation that exists at the within-person level and the between-person level. Then, an unconditional growth model was fit (Model 2) to test the amount of variation across people and time (Peugh, 2010). Both models provided information to calculate intra-class correlations (ICC) to describe the proportion of the outcome that is due to differences between individuals and across time. An ICC establishes whether multilevel modeling is necessary; that is, a higher ICC indicates a greater proportion of the variance in outcomes exists due to the shared variance within dyads. An ICC of .10 or less suggests a small amount of the variance is related to between-dyad variance, and therefore would not necessarily require the use of multi-level modeling (Lee, 2010).

A three-level model (Model 3) capturing repeated measures, individual variation, and couple variation (Atkins, 2005) was fit. Level 1 included the repeated measures for a given individual in a given couple which was modeled by an individual intercept, slope, and error term. Level 2 included the individual intercepts and slopes which were modeled by individual averages within couples. Finally, Level 3 contained the average couple intercepts and slopes which were modeled by overall averages and variance that captures couple variability. This model included the propensity scores and the test group variable. The test group variable was incorporated as a level-3 predictor, as both individuals in the couple either participated in or did not participate in *ELEVATE*.

Moderation. SPSS Version 22 was used to address research hypotheses 2 and 3 and research question 1, which are related to moderators of *ELEVATE* effects. Specifically, multi-level modeling was utilized using the *ELEVATE* participant group only. Income, family harmony, and relationship length were centered at their group or grand mean, which is the mean calculated at the individual level for level-2 variables and the mean calculated at the couple level for level-3 variables. Using the group or grand mean enables each parameter to be understood as the estimated average outcome when all other predictors in the models are at their average or zero (Raudenbush & Bryk, 2002). Income and relationship length were used as a level-3 predictor, whereas family harmony was used as a level-2 predictor because it is an individual's assessment of their family functioning. An interaction term of income, family harmony, or relationship duration and the slope was separately entered into a series of longitudinal multi-level models to assess whether there were differing trajectories of change depending upon the level of the moderating variable. Post hoc analyses were conducted to understand the specifics of significant interactions.

Results

Preliminary Analyses

Descriptive data. Descriptive statistics for participant and comparison groups' outcome measures are presented in Tables 3 and 4. Before testing the models, variables were analyzed for normal distribution of data. In small samples values of skewness and kurtosis between -2 and +2 are considered acceptable to assess normal univariate distributions (George & Mallery, 2010). Using this guideline, it was determined that the variables, except for Connect (T2), Care (T2), Couple Quality (T2), and Depressive Symptoms (T2) in the comparison group, are normally distributed. Because data transformations can alter the fundamental nature of the data and

because the leptokurtosis variables are only in one group and at one time point the variables were not transformed (Osborne, 2002). Additionally, before fitting models, correlations between predictors and outcomes were conducted and are presented in Table 5. The results of the bivariate correlations suggest several significant linear relationships amongst covariates, possible moderators, and outcomes. Of note, relationship length was only significantly correlated with two outcomes (Share and Care) at baseline; however, it was included as a moderator in later analyses, as it may be associated with change in the outcomes of interest.

Propensity score estimation. Age, gender, ethnicity, education level, income, and relationship status were demographic characteristics included in the propensity score model. Positivity and negativity in the relationship were used as relationship indicators in the propensity score estimation. The propensity score model was redefined until a balance between the participant and non-participant group was achieved. These variables achieved balance in the estimation of the propensity score in five blocks (See Table 6) based on the range of the propensity score. The use of propensity score estimation decreased the sample size to 283 individuals. Although participants may have attended *ELEVATE* with a partner and all participants and non-participants in the sample are in a couple relationship, the propensity score estimation procedures resulted in some individuals not having a partner in the analytic sample used to test program effects.

Unconditional means model. We expected that shared experiences of dyads influence individual change across time in each of the study outcomes. To test this expectation, we fit unconditional means models and calculated the intra-class correlations (ICC), which indicated the proportion of total variation in each outcome that can be attributed to repeated measures, within dyads, and across dyads variation. The conventional threshold for practical variations is

.10 (Singer, 1998). The ICCs, which are presented in Table 7, exceed this threshold and indicate multilevel modeling is appropriate. Specifically, there was a large amount of variation in outcomes within individuals across time (level 1; ranging from .27 to .50), within dyads (level 2; ranging from .09 to .61), and across dyads (level 3; ranging from .33 to .35).

Unconditional growth model. Next, unconditional growth models were fit to assess whether there was a significant change in the outcome of interest in both the comparison and participant groups. Time was measured in months (0 for Time 1, 1.5 for Time 2, and 6 for Time 3), yet because our goal was to examine the effects of *ELEVATE* the time variable for the growth models was centered at the third wave of data collection. The overall growth process that was modeled remains unchanged, yet the intercept in our models represent study participants' mean scores at six months post the baseline survey. The results are presented in Table 8 and indicate there were significant change for both groups over time in Care for Self (B = .03; p < .001), Manage (B = .02; p < .001), Care (B = .02; p < .001), and Couple Quality (B = .02; p < .05). There was no significant change evident in the unconditional growth models for Choose, Share, Know, Connect, and Depressive Symptoms; however, non-significant change may be due to the sample of both participant and comparison respondents included in the model. Including the test group variable provides information for assessing if there are differences in change based on participation in *ELEVATE*.

Testing Program Effects

To address Hypothesis 1 that *ELEVATE* participants will experience sustained improvements in the seven NERMEM core skills, Couple Quality, and Depressive Symptoms compared to those who did not participate in *ELEVATE*, propensity score values were entered into a three-level model that estimated the overall effect of the group while accounting for

nesting of individuals within dyads. Dummy variables for the propensity score blocks were included in each model, in addition to the group variable. Demographic variables included in the propensity score estimation were not included in the multi-level model as controls because propensity scores remove the bias, background covariates would have on the outcome, in addition to the likelihood of group membership (d'Agostino, 1998). An interaction term of group (*ELEVATE* participant or comparison respondent) by time was entered to test whether change over time differs by group. Results from the multilevel models (See Table 9) provided some support for Hypothesis 1. Results indicated a desired program effect for four out of the nine outcomes including: Know (B = .04; p < .05), Connect (B = .03; p < .05), Manage (B = .03; p < .05), and Couple Quality (B = .04; p < .05). Results indicated a trend towards significance for program effect on Depressive Symptoms (B = -.03; p < .10). There were no program effects for four of the nine outcomes including: Care for Self (B = -.01; p = ns), Choose (B = .02; p = ns), Share (B = .01; p = ns), and Care (B = .01; p = ns).

Tests of Moderation

Income. To address hypothesis 2 that income would moderate the change in targeted outcomes over time, a series of three-level models were fit for *ELEVATE* participants only. An interaction term between income and time (rate of change) was entered in each model to test whether change over time differed by income level. Results (See Table 10) indicated income moderated the change in two of the nine outcomes including: Share (B = .02; p < .01) and Connect (B = .01; p < .05), controlling for everything in the model. Results indicated the moderating effect of income was trending towards significance for change in three of the nine outcomes including: Choose (B = .01; p < .10), Know (B = .01; p < .10), and Care (B = .02; p < .10). Post hoc analyses indicate the hypothesis that economically vulnerable participants would

experience greater change was not supported. In fact, those with a higher level of income experienced a greater amount of change in Share and Connect. Controlling for everything in the model, there was no moderating effect of income for change in four of the nine outcomes including: Care for Self (B = .00; p = ns), Manage (B = .00; p = ns), Couple Quality (B = .01; p = ns), and Depressive Symptoms (B = -.01; p = ns).

Family harmony. To address hypothesis 3 that levels of family harmony would moderate the change in targeted outcomes over time, another series of three-level models were fit for ELEVATE participants only. An interaction term between family harmony and time (rate of change) was entered in each model to test whether change over time differed by level of family harmony. Controlling for everything in the model, results (See Table 11) indicated family harmony moderated the change in five of the nine outcomes including: Choose (B = -.03; p < .05), Share (B = -.04; p < .01), Care (B = -.03; p < .05), Couple Quality (B = -.06; p < .001), and Depressive Symptoms (B = .03; p < .01). Results indicated the moderating effect of family harmony was trending towards significance for change in Connect (B = -.02; p < .10). Post hoc analyses indicated the hypothesis that participants reporting lower levels of family harmony would experience greater change was supported. Specifically, those reporting lower levels of family harmony experience greater improvements in Choose, Share, Care, Couple Quality, and Depressive Symptoms. Controlling for everything in the model, there was no moderating effect of family harmony for change in three of the nine outcomes including: Care for Self (B = .00; p = ns), Know (B = -.01; p = ns), and Manage (B = .00; p = ns).

Relationship length. Finally, to address research question 1 related to the moderating effect of relationship length on change in outcomes after ELEVATE participation, a series of three-level models were fit for ELEVATE participants only. An interaction term between

relationship length and time (rate of change) was entered in each model to test whether change over time differed by length of the relationship. Controlling for everything in the model, results (See Table 12) indicated relationship length moderated the change in two of the nine outcomes including: Manage (B = .00; p < .05), and Couple Quality (B = .00; p < .05). Results also indicated the moderating effect of relationship length was trending towards significance for change in Care (B = .00; p < .10). Post hoc analyses indicate that those in longer-term relationships experienced greater improvements in Manage and Couple Quality. Controlling for everything in the model, there was no moderating effect of relationship length for change in six of the nine outcomes including: Care for Self (B = .00; p = ns), Choose (B = .00; p = ns), Share (B = .00; p = ns), Know (B = .00; p = ns), Connect (B = .00; p = ns), and Depressive Symptoms (B = .00; p = ns).

Discussion

The current study investigated the effects of a specific curriculum, *ELEVATE: Taking Your Relationship to the Next Level*, and addressed several critical gaps in the literature focused on evaluating CRE programs. Utilizing a comparison group and statistical analyses to account for group membership, the results suggest support for the effectiveness of *ELEVATE* in four (*intimate knowledge between partners, engaging in social support, engaging in positive conflict management skills, overall relationship quality*) of the nine outcomes included in the current study over a six-month period. These findings provide evidence to consider *ELEVATE* a promising evidence-based program (SAMHSA's NREPP website, 2015). Specifically, SAMHSA suggests that "promising evidence-based programs provide sufficient evidence of a favorable effect on positive behavior outcomes in at least one published experimental or quasi-experimental study." Further investigation is warranted, particularly the next step in program

evaluation that uses more rigorous comparison methods, including randomized control trials.

The current study also addressed the diversity within the sample by assessing moderators of change in the participant group, expecting that those more economically and relationally vulnerable participants may show enhanced benefits. We also investigated influence of relationship length on change after program participation; however, we did not suggest vulnerability expectations since prior research on the link between relationship quality and length is mixed. Assessing moderators of program changes extends assessments for the average participant. Supported by a prevention science approach (Coie et al., 1993), testing for moderation of program effects allows researchers and practitioners to understand variations in outcomes based on participant characteristics to refine knowledge about and implementation of the curriculum. Income moderated the change in two of the nine outcomes, such that those with higher levels of income experienced a greater change in developing a couple identity, and engaging in social support. Results supported the moderating role of family harmony in five (*intentionality, developing a couple identity, demonstrating kindness, respect, and positivity, overall relationship quality, and depressive symptoms*) of the nine outcomes, indicating those experiencing stressful family contexts report a greater amount of change. Additionally, relationship length moderated the amount of change in engaging in two of the nine outcomes (*positive conflict management skills and overall relationship quality*); specifically, those in more established relationships experienced greater change. The findings of the current study are expanded upon and contextualized in the extant literature in the following sections. Future directions and implications are discussed throughout.

Program Effects

We utilized a prevention science approach to test ELEVATE's effectiveness because the

goal of prevention programs is to enhance protective factors that can lead to positive outcome trajectories. We find evidence to suggest participants strengthen their skills in several key relationship skills that have been linked to long-term relationship quality. The improvement in these relationship protective factors can mitigate the possible risk of relationship dissolution (Rolf, Masten, Cichetti, Neuchterlein, & Weintraub, 1990). Furthermore, although prevention scientists tend to focus on specific high-risk groups, Coie and colleagues (1993) emphasize universal interventions such as *ELEVATE* can be implemented if no adverse effects are evident and the results of this study do not indicate any detrimental effects to participants.

In fact, most CRE evaluation studies assess program effects across the different curriculum, neglecting the variability due to the curriculum. One previous study assessed differences in outcomes based on curriculum, and found that the curriculum *Black Marriage Education* resulted in a greater number of positive outcomes for men compared to two other curricula (Gregson et al., 2012), which highlights the benefit of focusing on curriculum-specific effects. *ELEVATE* was developed using research-based content and best practices for curriculum development and implementation. It explicitly utilizes the core components of the National Extension Relationship and Marriage Education Model (NERMEM; Futris & Adler-Baeder, 2013) to address essential and malleable predictors of relationship quality and introduces stress management skills, specifically brief mindful practices, as a means for managing emotions and engaging in learned behaviors. This approach is new for couple and relationship education programs, though the integration of stress management techniques in therapy settings has occurred over several decades (Cotton, 1990). To test the effectiveness of *ELEVATE*, we assessed changes in skills related to the curriculum's core content over six months.

A noted strength of the current study is the inclusion of a comparison group to support

the establishment of effectiveness. This study was conducted in the context of a federally-funded "demonstration program" focused on offering CRE in communities. Because the program required the inclusion of all willing participants, we used a quasi-experimental approach, in which we recruited comparison respondents via the same outlets as those who were recruited for program participation, for an initial test of comparative trajectories of change. This method is a "real world" effort to move beyond a one-sample repeated measures assessment of outcomes following program participation.

The groups were demographically quite similar, except in regards to race and income; however, the participant and comparison groups differed on all baseline reports of the outcomes, except for one (caring for oneself). This indicates selection bias, in that those in greater need were more likely to volunteer to participate in a community education program. To address differences that exist between groups, controls are typically used; however, in this study, we used propensity score estimation to control for group membership (i.e. program or comparison group). The propensity score matching procedure decreased the number of individuals in the program group and rendered the program group more comparable to the comparison group, strengthening the study's conclusions. The results of this study provide initial indication that over a six-month period a diverse group of participants in *ELEVATE* reported increases above and beyond those of a comparison group in their intimate knowledge of their partner, their engagement in social support and building community, their use of conflict management strategies, and their overall relationship quality. There was also a trend towards decreases in depressive symptomology for the participant group versus the comparison group. As noted previously, it may be that the participant group had more room for change, or conversely, the comparison group had a ceiling effect, given their scores were higher. These findings provide

support for the movement of *ELEVATE* from a "research-based" curriculum to an "evidence-based curriculum." The National Registry of Evidence-based Programs and Practices (NREPP) considers a program for "evidence-based" status if positive behavioral change, including at least one mental health outcome, is demonstrated in at least one published experimental or quasi-experimental design study. The trend towards significant decreases in depressive symptoms provides preliminary support for improvements in mental health (SAMHSA's NREPP website, 2015); however, more definitive evidence for improvements in mental health are still needed.

Taken together, the current study provides support for the continued implementation and evaluation of *ELEVATE* for a diverse population of couples. Currently, only three of the six CRE curricula listed in the NREPP have focused on implementation with diverse couples. Providing practitioners with options of emerging and evidence-based programs found effective with diverse populations can benefit educators, as well as participants. Our approach is a step forward in addressing the need to use comparison groups in studies of CRE with diverse populations; however, there is still a need for more rigorous comparison methods that utilize randomized control assignment, to validate the efficacy of the curriculum. Further, because several scholars (Blanchard et al., 2009; DeMaria, 2005; Halford et al., 2006) indicate these programs are reaching who they were most intended for and because the initial evidence supports the positive influence of *ELEVATE*, a movement towards the test of efficacy is a next logical step.

Addressing Areas of Improvement in CRE Evaluation Research

In addition to assessing the effects of *ELEVATE,* our study concentrated on addressing several areas of improvement for CRE evaluation including the focus on specific curricula and the inclusion of a comparison group, as described above. We also addressed the need to assess trajectories of change, outcomes beyond the couple relationship domain, and the diversity of the

participant sample. We encourage other CRE evaluation researchers to continue to move the field forward in these ways.

The current study's inclusion of short-term follow-up data addressed the need in the CRE evaluation field to assess the longitudinal effects of program participation. As the goal of prevention programs is to support improvements over an extended period (Coie et al., 1993), it is essential to investigate program effects beyond the immediate post-program assessment. As noted, we found that over a six-month period of time, there were improvements in several outcomes including improved *intimate knowledge of their partner, engagement in social support and building community, use of positive conflict management skills,* and *their overall relationship quality* compared to a non-participant group. These are critical areas of impact. Research indicates that couples who use skills for maintaining emotional intimacy by understanding their partner's world tend to experience higher-quality, more stable couple relationships (Pollman & Finkenauer, 2009). Also, those who make efforts to embed themselves in a supportive network are better able to thrive as a couple in the context of stress (Amato, Booth, Johnson, & Rodgers, 2007). Further, models of predicting relationship quality (Karney & Bradbury, 1994) find that use of positive behaviors and reduction of negative behaviors in couple relationships is highly predictive of relationship quality and stability. Indications are that the modules that address these topics are successful in effecting change. Although significant positive changes were not found for every module topic related to a key predictor of relationship quality, it appears that change in these predictors was sufficient for enhancing the perception of couple relationship quality, the ultimate target outcome for CRE.

We did not find expected improvements in *caring for self, intentionality, developing a couple identity,* and *caring behaviors* immediately post-program and over time. Further

investigation indicates there was room to improve in these four key areas. Additionally, the unconditional growth models that did not consider the difference of change between groups indicate there was a significant change in *caring for self* and *caring behaviors* across both groups. This suggests all study respondents changed in these two areas over time. It may also be that benefits develop at a later time-point. For example in an evaluation study of an online relationship education program (RELATE; Larson, Vatter, Galbraith, Holman, & Stahmann, 2007), results indicated participants had no initial change followed by a marked improvement over time in relationship satisfaction. We encourage future work that includes longer-term evaluations. It may also be that these are areas of impact that require different strategies or added focus in programs. An advantage of our evaluation design is that we match a measure to the content of each module. This allows for a clearer iterative assessment of program content and design. Results suggest that it may be helpful to reassess several of the modules and consider whether adjustments can be made to: 1) better explain information related to self-care, intentional behaviors, developing a couple identity, and using caring behaviors, 2) provide more skills practice in these areas, and/or 3) increase the amount of time spent on these topics.

The current study also addressed the need to assess outcomes beyond the couple relationship based on an ecological systems perspective (Bronfenbrenner & Morris, 1998) that assumes improvements in one domain will likely be related to improvements in other domains. A growing body of CRE literature finds initial support for this notion and has uncovered evidence that participation in CRE is associated with improvements in individual functioning (e.g., depressive symptoms, anxiety, individual empowerment; Adler-Baeder et al., 2010; Bradford et al., 2014; Braithwaite & Fincham, 2011). Though changes in the individual domain may result from spillover from the couple domain, we also expect changes for the individual due to

ELEVATE's inclusion of a specific emphasis on self-care and stress management through brief mindful practices. However, the current study found no sustained program effects for caring for self, and only a trend towards significant sustained decreases in depressive symptoms. As noted, ELEVATE is one of the first to emphasize self-care and mindfulness-based stress reduction strategies. The stress management emphasis may be directly related to reductions in depressive symptoms; however, it seems there is not enough emphasis on self-care for this population of participants. In the ELEVATE curriculum, stress reduction skills practice sessions are very brief (1-2 minutes), so we encourage program designers to consider the value of additional emphasis on self-care and stress reduction strategies and ensure that CRE participants are linked to other therapeutic services as well, especially to enhance the reduction in depressive symptoms. Scholars have encouraged more effort to combine educational and therapeutic interventions for families (Myers-Walls, Ballard, Darling, & Myers-Bowman, 2011).

Finally, the current study addressed some elements of the diversity of the participant sample to understand the effectiveness of *ELEVATE* for participant subpopulations. The call for attention to diversity in program effectiveness is emphasized in summaries of the CRE literature (Markman & Rhoades, 2012; Wadsworth & Markman, 2012), as well as the prevention science framework (Coie et al., 1993). Questions about moderation and variation in outcomes allow researchers to uncover positive or negative effects beyond the experience of the "average" participant. For example, some previous work indicates more socio-demographically vulnerable (Adler-Baeder et al., 2010; Amato, 2014) and relationally vulnerable (McGill et al., in press; Quirk et al., 2014) participants experience greater change in several outcome domains after program participation. These findings may be due to ceiling effects in higher-functioning individuals, meaning those who are not as vulnerable may have higher start points that may limit

their growth or improvements. Thus, benefits observed for the more vulnerable populations may be owing more to the fact that they had room to report growth, as evidenced by previous studies that show differing reports at baseline for vulnerable and less vulnerable participants (Adler-Baeder et al., 2010; Quirk et al., 2014). With this in mind, we detail below the results of moderation tests that explored the experiences of participant subpopulations.

Considering the Diversity of CRE Participants

Although *ELEVATE* was implemented with a broad audience, we followed the suggestion of prevention scientists to assess variations in outcomes based on level of risk or developmental stage. First, the current study assessed income as a moderator of program effects. As previous findings indicate, lower-income participants experience more change in relationship quality (Amato, 2014; Adler-Baeder et al., 2010), we hypothesized that those who are more economically vulnerable would experience a greater amount of change after program participation. For the majority of the outcomes, there were no differences based on income; however, for two outcomes the results of this study are counter to our hypothesis and the previous research. Specifically, those reporting a higher income experienced a greater magnitude of change in *ability to build a couple identity* and *engage in social support and building community*. To try to understand this better, we explored whether the lower vs. higher income participants differed at program start on these measures and found no significant differences. As such, we can situate these findings within the context of the overall findings and previous work.

Indications are that all participants, on average, enhanced their *ability to connect with outside sources of support*; however, higher-income demonstrated a greater shift than lower-income participants. It may be that higher-resource families are more self-reliant (Christens & Speer, 2011) and the emphasis in the curriculum on considering the value of help-seeking

behaviors and offering suggestions for community resources may be especially helpful for higher-income families who may not be aware of these resources and their value to them as a couple. Although lower income participants also improved in this area, it appears that they remain comparatively more reluctant to connect with sources of community resources and supports. The finding that higher-income participants showed greater change in *developing a couple identity* reveals a subgroup effect masked by the overall finding that participants as a group did not show change, compared to non-participants, in this area. Lower-resource individuals may benefit from added emphasis on the topic of developing a couple identity through shared experiences. Future evaluations can include qualitative investigations to explore reasons for differential program effects based on income.

In addition to income, we also assessed family harmony as a possible moderator of program effects. As with a growing number of studies (Blanchard et al., 2009; DeMaria, 2005; Halford et al., 2006), the current study emphasized that distressed participants are attending relationship education programs, and in some cases are being helped to a greater degree. Previous studies have highlighted the greater magnitude of improvements for those who are relationally vulnerable or those who are at risk for divorce or separation (McGill et al., in press; Quirk et al., 2014). To our knowledge, there are no CRE evaluation studies that consider broader familial stress or vulnerability at baseline as a moderator of program effectiveness. We hypothesized greater benefit for those reporting lower family harmony (i.e., conversely, higher family stress) at program start. The findings of our study indicate added benefit for those in more distressed families in changes in *intentionality and prioritizing the relationship, building a shared couple identity, caring behaviors, overall couple quality, and reports of depressive symptoms*, thereby lending support to our hypothesis. These results highlight the value of

exploring moderating effects since the overall assessment found no significant change in measures of *intentionality, developing a couple identity,* and *use of caring behaviors* for the participant group compared to nonparticipants. It appears that more distressed participants are positively influenced by program content in these areas.

We do acknowledge that further investigation of these results revealed that those with higher levels of family harmony reported higher start points on these measures; thus, we acknowledge greater change for the lower family harmony participants may be owing to the slightly enhanced ability to demonstrate change on the measure. Still, we may consider that these skills and practices may be especially helpful for participants in higher conflict families, as indicated by added benefit in reported perception of *relationship quality* and *reports of depressive symptoms* compared to participants in less distressed families. That is, the overall results indicated program effects for the participant group in reports of couple quality, with a trending effect on depressive symptoms. It appears that these positive shifts found for the group of participants are pronounced for participants in more distressed families. In our study, we assessed these simultaneously and encourage future efforts to model processes of change among outcomes as has been done in a handful of previous studies of CRE (e.g., Rauer et al., 2014). Cascade models using multiple time-points would be the most informative for research and practice.

Finally, we addressed the variability in relationship length as a possible moderator of program effects. To our knowledge, there has been no research in CRE on the effect relationship length has on program effects. Research on the effects of relationship therapy have historically found mixed results for the influence of relationship length (Atkins et al., 2005; Hahlweg, Revenstorf, & Schindler, 1984; Jacobson, Follette, & Pagel, 1986); however, the majority of

recent research indicates couples together longer show greater improvements compared to those in the early stages of their relationship (Baucom, Atkins, Rowe, Doss, & Christensen, 2015; Lebow, Chambers, Christensen, & Johnson, 2012). These scholars suggest longer-term couples have a greater understanding of the fluctuations of relationships and recognize things can get better. For the majority of the outcomes there were no differences based on relationship length. Moderation of effects was found for enhancements in *ability to positively manage conflict* and *overall relationship quality*. Indications are that all participants, on average, demonstrated positive changes on these measures; however, those in longer-term relationships demonstrated a greater shift than those in shorter-term relationships.

Empirical evidence suggests a negative association between relationship quality and frequency of conflict and relationship length (Kamp-Dush et al., 2008; Karney & Bradbury, 1995); however, we explored differences in baseline reports of conflict management strategies and overall relationship quality based on length of relationship in our sample and found no differences. We also examined in post-hoc analyses whther these differences are owing to age or presences of children, both of which are likely correlated with relationship length. We found no moderating effect of age or presence of children on changes in these two outcomes over time. Considering these two demographic characteristics together may be an important next step.

The basic research focused on conflict in relationships can inform our interpretation. The frequency of conflict is higher in longer-term relationships (Karney & Bradbury, 1995), so it may be that those in longer-term relationships have more opportunity to practice the conflict management skills learned in *ELEVATE* and thus reported comparatively greater change in use of conflict management strategies and relationship quality. Assessing frequency of conflict would allow a test of this assumption. Furthermore, the greater change in overall relationship

quality may be due to the improvements in conflict management skills; however, we can only report these as concurrent changes and encourage continued exploration of the interrelationships among changes over time. The test of the influence of relationship length on change patterns of CRE participants was a novel element of this CRE evaluation. Results warrant consideration of relationship length variation in future research as this information can provide practical information about recruitment into programs. The results of this study indicate recruitment efforts can continue to emphasize a broad range of couples, including those in more established relationships.

Limitations

The current study serves to address some critical gaps in the CRE evaluation literature, though certain limitations should be considered. The present study utilized a comparison sample to establish initial program effectiveness; however, it did not use a randomized control design. While the groups were demographically similar and propensity scores and matching procedures rendered the participant group more comparable with the non-participant group, all selection bias associated with group membership may not be accounted for in the analyses. Because we have some initial evidence of *ELEVATE*'s effectiveness, we suggest a wait-list randomized control assignment design for future studies of *ELEVATE*, or a treatment level design in which varying types of CRE are offered (Halford, Petch, & Creedy, 2010; Halford & Wilson, 2009).

Next, the survey item assessing relationship length was somewhat ambiguous, and we recommend more specification for this variable. The current question states, "How long have you been in your couple/romantic relationship?" which can lead to disparate reports between partners. This occurred in 32% of our sample, resulting in the use of averaging of couple responses. Altering the prompt to read, "How long have you been in your romantic relationship

(including the time spent dating for those who are married)?" may elicit more accurate and congruent answers from respondents.

Also, the attrition over time (30%), while typical in a community-based study, suggests that the results better represent those who remained in the study over time. Considerable effort was made to retain study participants (e.g., multiple emails, an ample amount of time to complete surveys); however, we encourage future efforts that utilize more successful retention efforts that may include greater incentives and methods for tracking participants who may be more mobile. Relatedly, the inclusion of follow-up data in the current study enhances our ability to describe program effects; however, six months is still a relatively short amount of time. Longer follow-up is needed to evaluate maintained, delayed, or declining benefits of CRE.

We note that several of the outcome measures at baseline are moderately to highly correlated (r = .42-.69). This multi-collinearity can result in an overestimation of the number of positive outcomes since there may be some conceptual overlap in the constructs. Finally, we acknowledge that respondents completed self-report surveys, meaning measures represent their perceptions of their skills and behaviors. Using observational and multi-informant methods in the future can enhance the validity of the measurement and the conclusions of the study.

Conclusions

Our prevention science approach (Coie et al., 1993) contributes to efforts to assess the efficacy of a particular curriculum offered to a diverse population through community-based programming and efforts considering the effects of CRE programming beyond the "average" experience. We encourage the continuation of prevention science types of CRE evaluation questions in an effort to improve relationship protective factors and minimize the risk of relationship dissolution. We examined program effects for an easily accessible CRE curriculum,

ELEVATE, and find initial evidence of its effectiveness in promoting greater change for participants compared to non-participants in crucial areas directly related to several of the program modules, as well as overall couple relationship quality. This paves the way for future tests of program efficacy of *ELEVATE*. There was not demonstrated growth in self-care behaviors, intentionality, efforts to develop a couple identity, or the use of caring behaviors for the participant compared to the nonparticipant group; however, there were benefits in these areas for participants in less harmonious family contexts. As informing program improvement is the emphasis of prevention science work we feel it appears prudent to reconsider the content and methods in the related modules for adjustments that may result in greater change for all participants in these areas. Our findings of greater change in some areas for those in more distressed families provides assurance for practitioners that they can feel confident in *ELEVATE*'s ability to support distressed families, although certainly, there should be continued efforts to connect more distressed individuals and families with additional family supports in the community. A prevention science approach assumes differing levels of program effects based on individual characteristics, so the current study addressed three possible moderators that represent one aspect of socio-demographic, familial, and relational variability. Our hope is this investigation sparks an exploration of other possible influences of change. We also encourage the exploration of processes of change among outcomes over time that also consider differing trajectories of change based on participant characteristics. Overall, this type of nuanced approach to CRE evaluation serves to inform practitioners, researchers, and curriculum developers and provides information relevant to the development of best practices for CRE in diverse communities.

Table 1

Demographic Descriptive Statistics for Participant and Comparison Samples.

	Participant (*N* = 184)		Comparison (*N* = 116)	
Variable	*M* (*SD*)	N (%)	*M* (*SD*)	*N* (%)
Age	36.10 (13.01)		35.42 (11.28)	
Gender				
Female		98 (53%)		71 (61%)
Male		86 (47%)		45 (39%)
Marital Status				
Committed		59 (32%)		31 (24%)
Relationship				
Married		125 (68%)		85 (73%)
Ethnicity				
European-American		83 (45%)		93 (81%)
African-American		63 (34%)		17 (14%)
Asian-American		14 (8%)		2 (2%)
Other		24 (13%)		4 (3%)
Education Level				
HS or less		13 (7%)		7 (6%)
Some college		33 (18%)		18 (15%)
2-year degree		20 (11%)		10 (9%)
4-year degree		52 (28%)		58 (50%)
Post-college		66 (36%)		24 (20%)
Income				
Less than $24,999		68 (37%)		14 (12%)
$25,000-$39,999		22 (12%)		16 (14%)
$40,000-$74,999		54 (29%)		36 (31%)
More than $75,000		40 (22%)		50 (43%)
Relationship Length (Years)	9.38 (10.70)		10.59 (9.92)	

Table 2
Descriptive Statistics for Outcome Variables at Baseline

Variable	*N*	*M* (*SD*)	Min	Max	Skewness	Kurtosis	*t*
Care for Self	184 **116**	4.70 (.81) **4.69 (.98)**	1.75 **1.25**	6.50 **6.50**	-.46 **-1.13**	.59 **2.26**	-.84
Choose	184 **116**	5.63 (.92) **6.04 (.80)**	2.50 **3.17**	7.00 **7.00**	-.73 **-1.07**	.37 **1.17**	4.01***
Share	184 **116**	4.87 (1.30) **5.48 (.99)**	1.40 **2.20**	7.00 **7.00**	-.36 **-.54**	-.33 **-.12**	4.46***
Know	184 **116**	5.57 (1.02) **6.01 (.86)**	1.00 **3.50**	7.00 **7.00**	-1.01 **-.66**	1.85 **-.27**	3.95***
Connect	184 **116**	5.36 (1.04) **5.83 (1.05)**	1.50 **2.50**	7.00 **7.00**	-.50 **-1.01**	.77 **.56**	3.88***
Manage	184 **114**	4.96 (.76) **3.92 (.44)**	3.00 **2.88**	6.75 **5.13**	.05 **-.91**	-.44 **.30**	4.23***
Care	184 **116**	5.17 (1.33) **5.66 (.99)**	2.00 **2.80**	7.00 **7.00**	-.54 **-.74**	-.77 **-.05**	3.47**
Couple Quality	184 **116**	5.36 (1.24) **6.20 (1.04)**	1.00 **3.00**	7.00 **7.00**	-.67 **-1.25**	.69 **.64**	6.17***
Depressive Symptoms	184 **115**	.95 (.82) **.72 (.66)**	.00 **.00**	3.00 **3.00**	.88 **1.09**	.05 **1.09**	-2.59*

NOTE: Comparison group statistics are in bold
***$p < .001$, **$p < .01$, *$p < .05$

Table 3

Descriptive Statistics for Outcome Variables in the Participant Sample

Variable	*N*	*M* (SD)	Min	Max	Skewness	Kurtosis
Care for Self (T1)	184	4.73(.80)	1.75	6.50	-.38	.26
Care for Self (T2)	121	4.94(.85)	1.88	6.50	-.52	.43
Care for Self (T3)	101	4.83(.85)	1.00	6.50	-1.09	.44
Choose (T1)	183	5.63(.93)	2.50	7.00	-.77	.44
Choose (T2)	147	5.67(.89)	2.83	7.00	-.47	-.04
Choose (T3)	101	5.68(.86)	2.80	7.00	-.49	-.01
Share (T1)	183	4.83(1.27)	1.40	7.00	-.37	-.17
Share (T2)	147	5.00 (1.28)	1.00	7.00	-.56	-.08
Share (T3)	101	5.73(.90)	1.00	7.00	-.48	-.01
Know (T1)	184	5.58(1.04)	1.00	7.00	-1.11	2.06
Know (T2)	147	5.67(.87)	4.00	7.00	-.27	-.56
Know (T3)	101	5.73(.90)	4.00	7.00	-.23	-.88
Connect (T1)	184	5.38(1.06)	2.00	7.00	-.58	.84
Connect (T2)	146	5.45(.99)	2.75	7.00	-.23	-.43
Connect (T3)	100	5.38(.97)	3.00	7.00	-.18	-.84
Manage (T1)	183	4.97(.76)	3.00	6.75	.04	-.34
Manage (T2)	183	5.12(.95)	1.00	7.00	-.62	1.40
Manage (T3)	100	5.24(.71)	4.00	7.00	.05	-.36
Care (T1)	183	5.17(1.32)	2.00	7.00	-.53	-.76
Care (T2)	147	5.35(1.28)	1.00	7.00	-.86	.37
Care (T3)	100	5.25(1.38)	2.00	7.00	-.82	-.12
Couple Quality (T1)	183	5.34(1.24)	1.00	7.00	-.70	.82
Couple Quality (T2)	146	5.47(1.22)	2.00	7.00	-.54	-.31
Couple Quality (T3)	100	5.51(1.19)	2.00	7.00	-.73	.51
Dep Symptoms (T1)	184	.97(.81)	.00	3.00	.87	.05
Dep Symptoms (T2)	146	.89(.75)	.00	3.00	.72	.02
Dep Symptoms (T3)	101	.91(.78)	.00	3.00	.80	-.04

Note: Dep Symptoms = Depressive Symptoms

Table 4

Descriptive Statistics for Outcome Variables in the Comparison Sample

Variable	*N*	*M* (SD)	Min	Max	Skewness	Kurtosis
Care for Self (T1)	115	4.67(.98)	1.25	6.50	-1.16	2.28
Care for Self (T2)	108	4.83(.88)	1.75	6.50	-.21	.37
Care for Self (T3)	106	4.91 (.82)	2.38	7.00	-.31	.58
Choose (T1)	115	6.07(.77)	3.17	7.00	-1.00	1.00
Choose (T2)	108	6.12(.79)	4.00	7.00	-.96	.09
Choose (T3)	106	6.05(.78)	3.80	7.00	-.80	-.09
Share (T1)	115	5.49(.99)	2.20	7.00	-.57	-.03
Share (T2)	108	5.68(1.05)	2.60	7.00	-.79	.04
Share (T3)	106	5.47(1.05)	2.60	7.00	-.48	-.31
Know (T1)	115	6.03(.86)	4.00	7.00	-.70	-.18
Know (T2)	107	5.98(.99)	3.00	7.00	-1.30	1.91
Know (T3)	106	6.03(.83)	3.00	7.00	-.86	.68
Connect (T1)	115	5.85(1.03)	3.00	7.00	-.88	.25
Connect (T2)	107	5.82(1.06)	1.00	7.00	-1.86	5.22
Connect (T3)	106	5.75(1.03)	1.75	7.00	-1.04	1.29
Manage (T1)	115	5.34(.79)	3.50	7.00	-.10	-.48
Manage (T2)	116	5.39(.88)	3.00	7.00	-.40	.20
Manage (T3)	106	5.33(.88)	3.00	7.00	-.40	.20
Care (T1)	115	5.70(.95)	2.80	7.00	-.77	.12
Care (T2)	107	5.79(1.11)	1.00	7.00	-1.44	2.86
Care (T3)	106	5.78(1.04)	3.00	7.00	-.78	-.36
Couple Quality (T1)	115	6.24(.99)	3.00	7.00	-1.26	.77
Couple Quality (T2)	107	6.36(1.09)	1.00	7.00	-2.41	7.10
Couple Quality (T3)	106	6.16(1.06)	3.00	7.00	-1.17	.40
Dep Symptoms (T1)	114	.69(.65)	.00	3.00	1.21	1.59
Dep Symptoms (T2)	108	.71(.68)	.00	3.00	1.41	2.00
Dep Symptoms (T3)	106	.80(.83)	.00	3.00	1.31	1.15

Note: Dep Symptoms = Depressive Symptoms

Table 5

Correlations among Covariates and Outcomes.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Age	1.00																	
2. Gen	-.07	1.00																
3. Rac	.12*	.03	1.00															
4. MS	.37*	-.07	-.01	1.00														
5. Edu	.06	.02	.00	.15*	1.00													
6. Inc	.41*	-.01	.31*	.41*	.19*	1.00												
7. FH	-.14*	.04	.09	-.04	.03	-.02	1.00											
8. RL	.78*	-.03	.11	.45*	-.04	.38*	-.04	1.00										
9. TG	.06	-.08	-.34*	-.07	.02	-.29*	-.35*	-.06	1.00									
10. CfS1	.01	.01	.12*	-.02	.11	.00	.26*	.05	.04	1.00								
11. Ch1	-.17*	.06	.08	-.05	-.03	-.03	.58*	-.06	-.24*	.21*	1.00							
12. Sh1	-.26*	.07	.07	-.15*	.00	-.10	.62*	-.14*	-.26*	.19*	.55*	1.00						
13. Kn1	-.18*	-.03	.12*	.03	.01	-.04	.43*	-.05	-.22*	.14*	.48*	.43*	1.00					
14. Cn1	-.12	.02	.24*	.05	-.04	-.02	.49*	.03	-.21*	.22*	.53*	.39*	.53*	1.00				
15. Ma1	-.13*	-.06	.02	-.14*	.06	-.07	.56*	-.08	-.23*	.33*	.49*	.40*	.37*	.34*	1.00			
16. Cr1	-.32*	.01	.15*	-.16*	.01	-.08	.52*	-.27*	-.22	.18*	.54*	.69*	.37*	.38*	.42*	1.00		
17. CQ1	-.21*	-.02	.18*	.18*	.06	-.02	.81*	-.10	-.36	.19*	.68*	.69*	.50*	.58*	.54*	.64*	1.00	
18. Dp1	-.01	-.06	-.04	-.04	.00	-.07	-.42*	-.10	.18	-.31*	-.25*	-.20*	-.19*	-.23*	-.28*	-.13*	-.30*	1.00

*$p < .05$; *Note*: Gen = Gender; Rac = Race; MS = Marital Status; Edu = Education Level; Inc = Income; FH = Family Harmony; RL = Relationship Length; TG = Test Group; CfS1 = Care for Self Time 1; Ch1 = Choose Time 1; Sh1 = Share Time 1; Kn1 = Know Time 1; Cn1 = Connect Time 1; Ma1 = Manage Time 1; Cr1= Care Time 1; CQ1 = Couple Quality Time 1; Dp1 = Depressive Symptoms Time 1

Table 6

*Results from Propensity Score Analysis (*N =286)

Variable	Coefficient	SE	*z*	*p*
Gender	-.44	.30	-1.46	.143
Marital Status	-.17	.37	-.44	.656
Race	-1.22	.33	-3.65	.000***
Age	.04	.01	2.62	.009**
Education	.22	.10	2.26	.024*
Income	-.55	.13	-4.40	.000***
Relationship Negativity	.31	.09	3.56	.000***
Relationship Positivity	-.32	.12	-2.68	.007**

Note: Estimates reflect the influence of variables on propensity to be in the participant group compared to the non-participant group.

***$p < .001$, **$p < .01$, *$p < .05$

Table 7

Unconditional Means Models for Each Outcome Across Participant and Comparison Respondents

	Care for Self	Choose	Share	Know	Connect	Manage	Care	Couple Quality	Dep Symptoms
Fixed Effects									
Intercept	4.02*** (.02)	5.83*** (.05)	5.14*** (.07)	5.79*** (.05)	5.58*** (.05)	5.18*** (.04)	5.44*** (.07)	5.75*** (.06)	.85*** (.04)
Variance									
σ^2_{ε}	.34	.27	.46	.39	.30	.23	.42	.48	.29
σ^2_{0jk}	.13	.24	.56	.20	.41	.26	.61	.52	.09
σ^2_{00k}	.25	.25	.51	.29	.36	.24	.51	.49	.20
Intraclass Correlations									
Level 1	.47	.35	.30	.44	.28	.31	.27	.32	.50
Level 2	.18	.32	.37	.23	.38	.36	.40	.35	.16
Level 3	.35	.33	.33	.33	.34	.33	.33	.33	.34
Model Fit Statistics									
-2LL	1687.44	1668.32	2136.84	1868.57	1834.98	1659.23	2098.97	2131.62	1589.36

*** $p < .001$

Note: -2LL = -2 Log Likelihood; Dep Symptoms = Depressive Symptoms

Table 8

Unconditional Growth Models for Each Outcome Across Participant and Comparison Respondents

	Care for Self	Choose	Share	Know	Connect	Manage	Care	Couple Quality	Dep Symptoms
Fixed Effects									
Intercept	4.90*** (.05)	5.86*** (.05)	5.18*** (.07)	5.83*** (.05)	5.59*** (.05)	5.25*** (.05)	5.49*** (.07)	5.81*** (.07)	.84*** (.04)
Time	.03*** (.01)	.01 (.01)	.01 (.01)	.01 (.01)	.00 (.01)	.02*** (.01)	.02* (.01)	.02* (.01)	.00 (.01)
Variance									
σ^2_{ε}	.27	.23	.42	.31	.24	.20	.39	.42	.27
σ^2_{0ij}	.21	.48	.69	.48	.75	.28	.71	.62	.17
σ^2_{1ij}	.00	.00	.00	.01	.01	.00	.00	.00	.00
σ^2_{00j}	.13	.00	.33	.00	.00	.17	.32	.31	.11
σ^2_{10j}	.00	.00	.00	.00	.00	.00	.00	.00	.00
Model Fit Statistics									
-2LL	1671.87	1659.58	2137.05	1852.91	1823.02	1653.35	2096.84	2129.30	1589.36

* $p < .05$; ** $p < .01$; *** $p < .001$

Note: -2LL = -2 Log Likelihood; Dep Symptoms = Depressive Symptoms

Table 9

Multi-level Models Including Propensity Scores Adjustments and Test Group Differences

	Care for Self	Choose	Share	Know	Connect	Manage	Care	Couple Quality	Dep Symptoms
Fixed Effects									
Intercept	5.25*** (.13)	6.49*** (.13)	6.09*** (.19)	6.24*** (.15)	6.26*** (.17)	5.66*** (.14)	6.29*** (.19)	6.80*** (.17)	.66*** (.12)
Time	.04** (.01)	.00 (.01)	.00 (.01)	.00 (.01)	-.01 (.01)	.00 (.01)	.01 (.01)	.00 (.01)	.01 (.01)
Test Grp	.19 (.11)	.09 (.11)	-.17 (.16)	.07 (.12)	.19 (.14)	.05 (.11)	.07 (.16)	-.06 (.14)	-.08 (.10)
Time* Test Grp	-.01 (.02)	.02 (.02)	.01 (02)	.04* (.02)	.03* (.02)	.04** (.01)	.01 (.02)	.04* (.02)	-.03+ (.02)
Block 2	-.36* (.16)	-.26 (.16)	-.50* (.24)	-.04 (.18)	-.31 (.21)	-.27 (.17)	-.37 (.24)	-.35 (.21)	-.02 (.15)
Block 3	-.43* (.16)	-.61*** (.16)	-.66** (.24)	-.39* (.18)	-.74*** (.21)	-.37* (.18)	-.62* (.24)	-.68** (.22)	.12 (.15)
Block 4	-.60*** (.16)	-.78*** (.17)	-1.02*** (.25)	-.58** (.19)	-.87*** (.21)	-.50** (.18)	-.92*** (.24)	-1.20*** (.22)	.39* (.15)
Block 5	-.57** (.16)	-1.08*** (.17)	-1.18*** (.25)	-.71*** (.19)	-1.19*** (.21)	-.63*** (.18)	-1.40*** (.24)	-1.53*** (.22)	.33* (.15)
Variance									
σ^2_{ε}	.27	.24	.43	.32	.25	.22	.39	.45	.29
σ^2_{0ij}	.19	.35	.57	.42	.62	.24	.56	.40	.13
σ^2_{1ij}	.00	.00	.00	.01	.01	.00	.00	.00	.00
σ^2_{00j}	.12	.00	.30	.00	.00	.22	.28	.24	.13
σ^2_{10j}	.00	.00	.00	.00	.00	.00	.00	.00	.00
Model Fit Statistics									
-2LL	1578.19	1501.69	1986.78	1727.07	1679.64	1529.38	1929.07	1926.32	1490.89

Blocks 2-4 represent ranges of propensity scores.

+ $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

Note: -2LL = -2 Log Likelihood; Dep Symptoms = Depressive Symptoms; Test Grp = Test Group

Table 10

Multi-level Models Including the Moderating Effect of Income for Program Participants

	Care for Self	Choose	Share	Know	Connect	Manage	Care	Couple Quality	Dep Symptoms
Fixed Effects									
Intercept	4.55*** (.26)	5.87*** (.29)	5.06*** (.43)	5.84*** (.29)	5.67*** (.32)	5.13*** (.27)	5.79*** (.40)	5.68*** (.38)	1.24*** (.25)
Time	.04 (.03)	-.03 (.03)	-.09* (.04)	-.03 (.04)	-.04 (.03)	.02 (.03)	-.04 (.04)	-.01 (.04)	.03 (.03)
Inc	-.04 (.04)	.08+ (.05)	.07 (.07)	-.01 (.04)	.01 (.05)	-.04 (.04)	.11+ (.06)	.00 (.06)	-.04 (.04)
Time*Inc	.00 (.00)	.01+ (.01)	.02** (.01)	.01+ (.01)	.01* (.01)	.00 (.01)	.02+ (.01)	.01 (.01)	-.01 (.01)
Age	.00 (.00)	-.01 (.01)	-.01+ (.01)	-.01* (.01)	-.01 (.01)	.01 (.01)	-.03*** (.01)	-.01+ (.01)	.00 (.00)
Gender	.09 (.11)	.04 (.12)	.19 (.18)	.06 (.12)	.02 (.14)	-.08 (.11)	.16 (.17)	-.05 (.15)	-.03 (.10)
Race	.08 (.11)	.04 (.12)	-.09 (.18)	.30* (.12)	.41** (.14)	-.06 (12)	.35* (.18)	.27+ (.16)	.05 (.11)
Marital Status	.02 (.13)	-.04 (.14)	-.28 (.21)	.09 (.14)	.26 (.16)	-.23 (.14)	-.24 (.21)	-.15 (.19)	.08 (.12)
Education	.05 (.03)	-.05 (.04)	.04 (.05)	.01 (.04)	-.04 (.04)	.04 (.03)	.01 (.05)	.07 (.05)	-.02 (.03)
Variance									
σ^2_{ε}	.31	.04	.59	.35	.26	.24	.44	.56	.32
σ^2_{0ij}	.33	.07	1.05	.18	.61	.45	.68	.47	.12
σ^2_{1ij}	.00	.00	.00	.00	.00	.00	.00	.00	.00
σ^2_{00j}	.00	.00	.00	.19	.00	.00	.33	.28	.15
σ^2_{10j}	.00	.00	.00	.01	.00	.00	.00	.00	.00
Model Fit Statistics									
-2LL	842.66	967.85	1226.10	1023.06	971.42	918.89	1171.07	1195.27	906.64

+ $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

Note: -2LL = -2 Log Likelihood; Dep Symptoms = Depressive Symptoms; Inc = Income

Table 11

Multi-level Models Including the Moderating Effect of Family Harmony for Program Participants

	Care for Self	Choose	Share	Know	Connect	Manage	Care	Couple Quality	Dep Symptoms
Fixed Effects									
Intercept	3.19*** (.36)	4.47*** (.35)	3.06*** (.53)	4.66*** (.40)	4.38*** (.41)	3.11*** (.32)	4.03*** (.55)	3.15*** (.42)	1.62*** (.35)
Time	.01 (.05)	.15** (.05)	.21** (.07)	.09 (.06)	.11* (.05)	.04 (.04)	.16* (.07)	.32*** (.07)	-.16** (.05)
FH	.25 (.05)	.28** (.05)	.42*** (.08)	.22*** (.06)	.25*** (.06)	.37*** (.05)	.36*** (.08)	.47*** (.06)	-.10+ (.05)
Time*FH	.00 (.01)	-.03* (.01)	-.04** (.01)	-.01 (.01)	-.02+ (.01)	.00 (.01)	-.03* (.01)	-.06*** (.01)	.03** (.01)
Age	.00 (.00)	.00 (.00)	-.01 (.01)	-.01+ (.00)	-.01+ (.00)	.01* (.00)	-.02** (.01)	-.01* (.00)	-.01 (.00)
Gender	.09 (.10)	.05 (.10)	.19 (.15)	.09 (.11)	.03 (.12)	-.07 (.09)	.14 (.16)	-.05 (.11)	-.04 (.09)
Race	.06 (.10)	.04 (.10)	-.14 (.15)	.24* (.11)	.36** (.12)	-.12 (.09)	.35* (.16)	.20+ (.11)	.07 (.10)
Marital Status	.02 (.12)	.09 (.11)	-.14 (.17)	.13 (.13)	.31* (.14)	-.19+ (.11)	-.04 (.19)	.00 (.13)	.04 (.11)
Education	.04 (.03)	-.05 (.03)	.02 (.04)	.00 (.03)	-.05 (.04)	.02 (.03)	.01 (.05)	.05 (.03)	-.01 (.03)
Variance									
σ^2_{ε}	.30	.30	.59	.36	.25	.24	.50	.55	.33
σ^2_{0ij}	.26	.14	.29	.13	.29	.11	.82	.03	.10
σ^2_{1ij}	.00	.00	.00	.00	.00	.00	.00	.00	.00
σ^2_{00j}	.00	.10	.36	.16	.16	.14	.00	.24	.13
σ^2_{10j}	.00	.00	.00	.01	.00	.00	.00	.00	.00
Model Fit Statistics									
-2LL	819.39	923.07	1171.64	1012.37	955.70	861.38	1154.60	1057.14	886.96

+ $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

Note: -2LL = -2 Log Likelihood; Dep Symptoms = Depressive Symptoms; FH = Family Harmony

Table 12

Multi-level Models Including the Moderating Effect of Relationship Length for Program Participants

	Care for Self	Choose	Share	Know	Connect	Manage	Care	Couple Quality	Dep Symptoms
Fixed Effects									
Intercept	4.58*** (.26)	6.07*** (.29)	5.54*** (.43)	6.05*** (.28)	6.05*** (.32)	5.13*** (.27)	5.93*** (.41)	5.79*** (.37)	1.00*** (.24)
Time	.03* (.02)	.01 (.02)	.00 (.02)	.01 (.02)	.01 (.02)	.02+ (.01)	.00 (.02)	.01 (.02)	-.01 (.02)
RL	.00 (.01)	.02 (.01)	.02 (.01)	.03** (.01)	.03** (.01)	.01 (.01)	.01 (.01)	.02+ (.01)	-.01 (.01)
Time*RL	.00 (.00)	.00 (.00)	.00 (.00)	.00 (.00)	.00 (.00)	.00* (.00)	.00+ (.00)	.00* (.00)	.00 (.00)
Age	.00 (.01)	-.01 (.01)	-.03* (.01)	-.02** (.01)	-.03** (.01)	.00 (.01)	-.03* (.01)	-.02* (.01)	.00 (.01)
Gender	.08 (.11)	.05 (.12)	.17 (.18)	.09 (.12)	.03 (.13)	-.08 (.11)	.14 (.17)	-.06 (.16)	-.02 (.10)
Race	.08 (.11)	.05 (.12)	-.07 (.18)	.27* (.12)	.37** (.14)	-.10 (.12)	.37* (.18)	.26+ (.16)	.04 (.10)
Marital Status	-.04 (.13)	-.02 (.15)	-.30 (.22)	.01 (.14)	.14 (.16)	-.30* (.14)	-.14 (.21)	-.20 (.19)	.12 (.12)
Education	.04 (.03)	-.03 (.04)	.05 (.05)	.03 (.04)	-.02 (.04)	.04 (.03)	.03 (.05)	.08+ (.05)	-.02 (.03)
Variance									
σ^2_{ε}	.31	.30	.61	.30	.20	.24	.46	.55	.32
σ^2_{0ij}	.34	.43	1.05	.21	.61	.45	.71	.48	.11
σ^2_{1ij}	.00	.00	.00	.00	.01	.00	.00	.00	.00
σ^2_{00j}	.00	.00	.00	.17	.00	.00	.35	.28	.15
σ^2_{10j}	.00	.00	.00	.01	.00	.00	.00	.00	.00
Model Fit Statistics									
-2LL	839.40	955.80	1222.99	977.41	922.13	913.17	1177.21	1179.70	902.70

+ $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

Note: -2LL = -2 Log Likelihood; Dep Symptoms = Depressive Symptoms; RL = Relationship Length

III. Study 2 – Exploring the Link between Mindfulness and Relationship Quality: The Influence of Stress and Positive Behaviors

Over the past several decades there has been a great deal of research focused on the interrelationships of stress, positive relationship behaviors, and relationship quality. Direct links between stress, including financial, work, and more general stress, and romantic relationship quality are established (Bodenmann, 2000; Karney & Bradbury, 1995; Ledermann, Bodenmann, Rudaz, & Bradbury, 2010; Neff & Karney, 2004). In addition, other extensive work indicates positive relationship behaviors are directly associated with higher ratings of relationship quality (Canary, Stafford, & Semic, 2002; Ogolsky & Bowers, 2013), and in fact, may be one of the most potent predictors of relationship functioning (Dainton, 2000). There is also considerable evidence of a mediational relationship that demonstrates stress negatively influences positive relationship behaviors, which in turn predict reports of lower relationship quality (Bodenmann, 2000; Randall & Bodenmann, 2009; Story & Bradbury, 2004).

Relevant to the study of stress and relationships is an interesting and emerging literature that documents positive links between mindfulness and ratings of relationship quality (Kozlowski, 2013; McGill, Adler-Baeder, & Rodriguez, 2016), lower levels of stress (Brown & Ryan, 2003; Davis & Hayes, 2011; Kabat-Zinn, 1990; Sedlmeier et al., 2012), and more positive relationship behaviors (Kabat-Zinn, 1990; Kristeller & Johnson, 2005; Wachs & Cordova, 2007). Unfortunately, the majority of the research assessing these linkages examines them separately and has failed to consider the inter-relationships and mechanisms of influences. Therefore, the current study combines areas of study to assess the links between stress, positive behaviors,

mindfulness, and relationship quality utilizing a conceptual framework derived from the extant literature (See Figure 1) and supported by the vulnerability-stress-adaptation model (Karney & Bradbury, 1995) and family stress theory (Boss, 2002). The test of the full model informs couples research and practice by exploring the comparative potency or importance of predictors and the strength of the direct and indirect pathways.

Linkages between Stress, Positive Behaviors, and Relationship Quality

In a seminal paper on predictors of marital quality Karney and Bradbury (1995) developed the vulnerability-stress-adaptation (VSA) model of relationships, which considers the behaviors within the dyad (i.e. adaptive processes) that may influence marital quality and stability, and how these behaviors are shaped both directly and indirectly by an individual's personal characteristics (i.e., enduring vulnerabilities) and experiences (i.e. stress). This model frames the exploration in the current study of the links among stress, positive couple behaviors, trait mindfulness, and relationship quality and shares assumptions articulated in explanations of family stress theory (FST; Boss, 2002). FST similarly suggests that the degree to which families are influenced by stress depends on the positive resources or skills individuals possess. Although individuals' stress leads to disruptions in couple dynamics that can place extra strain on relationships, those who possess positive resources can likely overcome or buffer the negative effects of stress. Stressors may be related to the external context (i.e., environmental factors) and/or the internal family environment and can be objectively described (e.g., job change, having a handicapped child). Uniquely, FST suggests that the types of stressors and individual *perception of stressors* should be considered, rather than solely objective assessments of stress events, meaning that an individual's appraisal of a stressful context defines the stressful experience and influences the outcome.

Perception of stress can depend on a broad range of factors, especially when considering diverse individuals and couples (LaRossa & Reitzes, 1993). Specifically, perception of stress differs by several socio-demographic and personal characteristics (e.g., gender, educational attainment, childhood trauma, etc.) in the context of similar stressful contexts including, disease, parenting special-needs children, divorce, etc. (Bodenmann et al., 2007; Harwood, Wilson, & Sontrop, 2011; McConachie, 2016; Olff, Langeland, Draijer, & Gersons, 2007). For example, the experience of losing a child tends to be perceived as more stressful by women, compared to men.

A crucial aspect of the family stress theory central to the current study is the consideration that coping behaviors and traits of individuals, particularly cognitive appraisals of stressful contexts, may influence reports of stress levels and relational dynamics and outcomes (McCubbin, 1979). Coping behaviors are defined as actions to deal with or withdraw from a threat and cognitive mechanisms to reduce emotional reactiveness (Lazarus, 1966). Generally, in stressful environments, individuals and couples default to more maladaptive coping behaviors that can create greater strain on the couple, yet adaptive and positive behaviors can lead to resilience and positively influence the couple (Boss, 2002). Additionally, the same types of stress can be experienced differently depending on factors that influence the perception of stress and factors that intervene. These ideas lend support for the use of self-reports of stress levels, characteristics, dyadic interactions, and ratings of relationship quality. The current study explicates a model built from existing research and theory and tests pathways simultaneously to better understand additive (or unique) versus redundant (or overlapping) effects of predictors of relationship quality and the role of a newly emphasized personal characteristic, trait mindfulness, that may serve as a protective factor for relationship quality. The following presents the basis for each path in the model involving stress, positive behaviors, and relationship quality and the

research questions inherent in the model. In the following section, we explicate the linkages that involve trait mindfulness and their research basis.

Path A in Conceptual Model: The Link between Stress and Relationship Quality. The evidence is clear that stress is detrimental to romantic relationships (Story & Bradbury, 2004); it influences ratings of positive relationship interactions and satisfaction (Bodenmann, 2000; Bodenmann, Ledermann, & Bradbury, 2007; Karney & Bradbury, 1995; Ledermann et al., 2010; Neff & Karney, 2004) and rates of marriage and divorce (Cohan & Cole, 2002). Acute stressors, such as major life events (e.g., unemployment or death of a loved one) and transitions (e.g. transition to parenthood or caregiving for parents) can negatively influence relationship functioning and satisfaction (Randall & Bodenmann, 2009). Chronic stressors such as depression or family discord (i.e., conflict or instability in the home) also have adverse effects on relationships (Fellows, Chiu, Hill, & Hawkins, 2015; Whisman, Uebelacker, & Weinstock, 2004) and are more predictive of relationship dissatisfaction than acute stressors (Bodenmann et al., 2007). Generally, acute stressors affect daily fluctuations in reports of relationship satisfaction, whereas chronic stressors influence reports of relationship satisfaction at baseline. According to the VSA model (Karney & Bradbury, 1995), enduring vulnerabilities resulting from chronic stress may affect the likelihood of increased reactivity to acute stressors (Karney, Story, & Bradbury, 2005). Thus, it is likely that individuals who perceive a high level of stress may be experiencing both chronic and acute stressors. The model, therefore, depicts a negative link between perception of stress and relationship quality to represent this robust link.

Path B in Conceptual Model: The Link between Positive Behaviors and Relationship Quality. Other research focuses on the role of positive relationship behaviors and their direct connection to romantic relationship quality (Fincham & Beach, 2010; Karney &

Bradbury, 1995; Rogge, Bradbury, Hahlweg, Engl, & Thurmaier, 2006). Positive relationship behaviors, which are marked by kindness, understanding, and respect for and toward one's partner, are one of the most potent predictors of relationship satisfaction and commitment (Canary et al., 2002; Dainton, 2000). Scholars suggest positive behaviors are used to protect and improve the romantic relationship (Stafford, Dainton, & Haas, 2000). Most recently, a meta-analysis of 35 studies (Ogolsky & Bowers, 2013) found positive associations between positive relationship behaviors (e.g., positivity, openness, assurances, social connectedness, and task sharing) and satisfaction (r = .30 - .52), commitment, (r = .30 - .58), love (r = .41 - .57), and liking (r = .41 - .55), suggesting positive behaviors in relationships are integral to overall relationship quality.

Path C in Conceptual Model: The Link between Stress and Positive Behaviors.

Although the direct influence of perceived stress on relationship quality is well-documented, considerable work supports the mediation of this link by positive relationship behaviors, whereby more stress is predictive of fewer caring and supportive interactions and more negative behaviors (e.g., Birditt, Antonucci, & Tighe, 2012; Mitchell, Eby, & Lorys, 2015; Randall & Bodenmann, 2009; Schulz, Cowan, Cowan, & Brennan, 2004; Williamson, Karney, & Bradbury, 2013). For example, research demonstrates that perceived stress related to economic strain increases the use of hostile and negative behaviors in relationships (Conger et al., 1990; Gudmunson, Beutler, Israelsen, McCoy, & Hill, 2007). More general perceived stress is linked to a decrease in the use of overt affection and responsiveness, and less time spent together (Bodenmann & Cina, 2006; Huston, Caughlin, Houts, Mith, & George, 2001). Not only does the literature provide considerable evidence for the negative relationship between perceived stress stemming from a wide range of sources and positive relationship behaviors, it also provides

evidence of the mediational influence.

Mediational studies validate the influence of stress on relationship quality through a reduction in positive behaviors and increases in hostile or negative behaviors. More specifically, research finds the link between stress and relationship quality to be mediated by decreases in the time spent together and lower quality communication (see summary in Randall & Bodenmann, 2009). Historically, practice has reflected the empirical findings supporting the link between positive behaviors and relationship quality and emphasized teaching positive behavioral skills for couple relationships (e.g., Hawkins, Carroll, Doherty, & Willoughby, 2004). Increasingly, however, more attention has been paid in couple interventions on recognition of and responses to stress for its direct and indirect influence on relationship quality (FFCA Policy Brief, 2015). As such, practitioners are looking for empirical evidence that provides information on factors influencing the perception of stress and individual practices and characteristics that influence relationship quality (Halford, Markman, Kline, & Stanley, 2003).

Mindfulness, Stress, Positive Behaviors, and Relationship Quality

In recent years, there has been an exponential increase in the number of studies, predominantly found in the medical, health behavior, and therapy literature, related to trait mindfulness, mindfulness practice and the influence on health and well-being (Davidson & Dimidjian, 2015; Shigaki, Glass, & Schopp, 2006). In 2000, just 12 academic journal articles were published with the term “mindfulness” in the title; in 2015 there were 674 (American Mindfulness Research Association, 2016). Subsequently, popular media has highlighted findings and raised the visibility of this work (Barker, 2014). The majority of the research on mindfulness focuses on mindfulness practice and individual outcomes with evidence indicating benefits for physical health (e.g., fibromyalgia, coronary artery diseases; Grossman, Niemann, & Schmidt,

2004), mental health (e.g., anxiety, depression; Grossman et al., 2004), and relevant for the current study, the ability to deal with stressors (Kabat-Zinn, 1990). Also, a small but growing literature on mindfulness documents the connection between mindfulness and couple relationship outcomes (Kozlowski, 2013; McGill, Adler-Baeder, & Rodriguez, 2016).

The generally accepted definition of mindfulness is an open attention to and awareness of the present moment; in other words, mindfulness is both the practice and quality of being intentionally and nonjudgmentally aware and attuned to the present moment (Brown & Ryan, 2003; Kabat-Zinn, 1990). While the concept and practice of mindfulness have roots in Eastern religious philosophy, the overarching principles and behaviors of mindfulness have been taught in secular educational settings (Cullen, 2011). The concept of mindfulness is treated in research and practice both as a practical skill (state mindfulness) and as a characteristic or quality (trait mindfulness). State mindfulness is situational and typically involves and is measured by the use of timed meditational events or contemplative practices. Trait mindfulness is conceptualized as a characteristic or disposition relating to a pattern of high levels of present moment awareness in daily living. Assumptions are that regular mindfulness activities, setting aside periods of time for mindfulness "practices" involving awareness of breath, mindful movement, and mantra meditations, leads to trait mindfulness (Brantley & Millstine, 2008); therefore, the focus in most studies of mindfulness is the assessment of trait mindfulness or consistency of patterns of present moment awareness (Tanay & Bernstein, 2013).

Path D in Conceptual Model: The Link between Mindfulness and Stress. A substantial amount of evidence indicates that individuals reporting higher levels of or increases in levels of mindfulness report lower levels of perceived stress (e.g., Brown & Ryan, 2003; Davis & Hayes, 2011; Kabat-Zinn, 1990; Sedlmeier et al., 2012). The majority of this evidence

is based on intervention studies in which individuals are taught mindfulness-based stress reduction strategies and then assessed on a variety of indicators of health and well-being including perceptions of stress. A meta-analysis of 163 studies from 1970-2011 evaluating both clinical and non-clinical samples found a larger effect for mindful meditation on stress ($|r| = .35$) compared to other forms of meditation (e.g., transcendental meditation; Sedlmeier et al., 2012). The majority of this intervention research stems from tests of the 8-week Mindfulness-Based Stress Reduction program (MBSR; Kabat-Zinn, 1990). This program was developed based on the principles of mindful living and has been implemented in various contexts (e.g. hospitals and therapy offices) and with different populations (e.g. clinical, normative, and incarcerated). A recent meta-analysis of 10 intervention studies of MBSR conducted from 1997-2008 compared the Cohen's *d* effect size of measures of stress for those who participated in the program and those who did not. Findings indicated healthy people participating in the program reported less perceived stress than those who did not participate ($t = 21.01$; Chiesa & Serretti, 2009).

Other evaluation studies of MBSR using randomized control assignment has found MBSR to be efficacious in decreasing reported stress and symptoms of medical conditions for medical professionals (e.g., Davidson et al., 2003; Shapiro, Astin, Bishop, & Cordova, 2005). These types of efficacy trials have also been conducted in clinical populations. For example, results of a study utilizing a sample of 90 cancer patients (53 MBSR participant and 37 comparison individuals) indicate a broad range of improvements for participants including lower rates of mood disturbance, anxiety, anger, and stress compared to the comparison group. The participant group also reported fewer cardiopulmonary, gastrointestinal, and depressive symptoms after program completion compared to those who were wait-listed (Speca, Carlson, Goodey, & Angen, 2000). Taken together, it appears that learning and practicing mindfulness

can have a favorable influence on the perception of stress, health, and well-being.

Though there is a wealth of evidence indicating the positive influence mindfulness has on stress and health outcomes, we recognize there is some recent criticism indicating the results of mindfulness-based therapy trials are overstated, and may not occur in "real-world" practice (Coronado-Montoya et al., 2016). These critics suggest there are publication biases associated with the proportion of positive results reported in publications and negative results not included in publications. The investigators could not specifically determine the degree to which reporting bias plays a role in the high rate of positive results associated with mindfulness-based stress reduction program trials and recommend several ways to address publication bias. Specifically, investigators who conduct evaluations of mindfulness-based programs can register their trials with enough information to verify published outcomes match the pre-specified outcomes, journal editors and reviewers can compare a priori outcomes to published outcomes as part of the review process, and researchers can conduct trials with larger adequate sample sizes.

Other critics (Davidson & Dimidjian, 2015) suggest the randomized control trials of MBSR or similar mindfulness-based programs do not meet the gold-standard of rigorous control or comparison conditions including the exclusion of the double-blind process in which the participant and implementer do not know who is receiving the program. Regarding the notion of publication bias, we acknowledge this may be the case; however, it can be offered as a critique of all intervention studies since studies with null findings or negative findings are more challenging to publish – or are not submitted for publication. Similarly, we find the critique that "double blind" studies have not been conducted to be an issue for all intervention and evaluation research since "blinding" a person to program participation seems an unrealistic task. We consider these critiques as a call to move cautiously forward with assumptions about the

effectiveness of mindfulness practices in promoting individual and relational well-being. Lack of published negative results does not negate the positive results of MBSR documented, and our judgment is that there is sufficient evidence of positive influence to support considering the role of mindfulness in stress reduction. Thus, the model depicts an expected negative link between mindfulness and stress.

Path E in the Conceptual Model: The Link between Mindfulness and Relationship Quality. In addition to the mindfulness research focused on individual outcomes there is a growing literature focused on the influence mindfulness has on couple relationships. A number of basic science studies of mindfulness and romantic relationships have focused solely on the direct connection between level of mindfulness and assessments of relationship quality or satisfaction. For example, Burpee and Langer (2005) assessed the relationship between mindfulness and relationship satisfaction in a sample of married individuals ranging in age from 25 to 74 and discovered mindfulness predicted relationship satisfaction more than perceived similarity within the couple. Barnes and colleagues (2007) replicated the finding that higher levels of trait mindfulness predicted higher relationship satisfaction and, in addition, assessed the influence of trait mindfulness on relationship stress and responses to conflict. However, they did not consider the interrelationships among these variables. A recent meta-analysis of 12 studies validates the association between level of mindfulness and relationship satisfaction, finding a small positive link (Fisher's z = .28; McGill et al., 2016).

Path F in Conceptual Model: The Link between Mindfulness and Positive Relationship Behaviors. Mindfulness centers on awareness of the present moment to act skillfully, rather that reactively in a range of situations (Kabat-Zinn, 1990). Therefore it is not surprising there is some evidence that being a mindful individual is related to the use of more

positive relationship behaviors; thus, positive relationship behaviors are likely the mediator of the link between mindfulness and relationship quality. Kozlowski (2013) provides a summary of the small, but growing literature (e.g. approximately 20 journal articles) of the positive link between mindfulness and use of positive relationship skills. Specifically, a higher level of mindfulness is associated with greater use of empathy (Block-Lerner, Adair, Plumb, Rhatigan, & Orsillo, 2007; Shapiro, Schwartz, & Bonner, 1998), perspective taking (Wachs & Cordova, 2007), and engaging in less negative reactivity during conflict (Baer, 2003; Barnes, Brown, Krusemark, Campbell, & Rogge, 2007). Barnes and colleagues (2007) found higher state mindfulness is related to lower rates of verbal aggression, conflict, and negativity. In one study, participating in a short loving-kindness meditation (i.e., a meditation focused on positive feelings for self and others) was linked to greater social connectedness with others (Hutcherson, Seppala, & Gross, 2008). Another study found enhanced connection and acceptance in interpersonal relationships when using more general forms of mindful meditation (e.g., awareness of breath; Block-Lerner et al., 2007). Overall, the growing evidence suggests individuals who employ mindful practices and who are more mindful tend to engage in less negative relationship behaviors and more positive relationship behaviors.

The literature exploring the mindfulness and relationship quality link is ripe for expansion. This new area of social science research has found evidence that mindfulness is related to relationship quality, yet explorations of factors involved in the process have rarely been conducted (Karremans, Schellekens, & Kappen, 2015). There is a considerable amount of research indicating mindfulness is related to lower levels of stress (Path D in our model) and several recent studies show that mindfulness is linked to more positive interpersonal behaviors (Path F in our model). No studies have specifically tested these as meditational pathways to

relationship quality.

Family stress theory (Boss, 2002) and the vulnerability-stress-adaptation model (Karney & Bradbury, 1995) inform the current study by framing the consideration that those who are more mindful may perceive less stress and report greater use of positive behaviors than those who are more reactive and less attentively aware (Baer, 2003; Barnes et al., 2007; Kabat-Zinn, 1990). Importantly, a clear next step for this conceptual model representing links validated in distinct empirical studies is to consider these linkages together in an empirical model that tests the comparative strengths of the paths depicted in Figure 1. Uncovering the relative salience of each predictor can inform researchers and practitioners about the most essential aspects of relationship quality.

Differences by Gender

In advancing the study of predictors of relationship quality, we also explore the role of gender in the conceptual model. It is likely that processes involved in predicting relationship quality differ for men and women (Brunell et al., 2010; Galliher, Welsh, Rostosky, & Kawaguchi, 2004). In a seminal paper, Bernard (1972) proposed that there are two sides to every marriage—"his" marriage and "her" marriage—suggesting that men and women experience relationships and assess the dynamics and quality of a relationship in distinct ways. This gender distinction is consistent with another assumption of family stress theory, which suggests characteristics of individuals influence their stress experience and their perceptions and outcomes. Similarly, the vulnerability-stress-adaptation model proposes a single variable can influence each in the dyad differently (Karney & Bradbury, 1995). Research continues to support Bernard's report of differing views of the same relationship (Kalmijn & Poortman, 2006; Williams & Umberson, 2004) and evidence indicates this may be especially magnified during

stressful experiences. In general, the link between stress and relational outcomes may be stronger for women than men. Women report significantly higher rates of chronic stress and daily stressors than men (Matud, 2004). Even during a shared stressful condition, such as the loss of a child, women tend to report lower ratings of marital quality compared to men (Oliver, 1999).

There is also evidence to suggest that adaptive processes may differ by gender. The Relational-Cultural Theory, derived from Symbolic Interactionism and developed by feminist scholar Jean Baker Miller, emphasizes that women in particular develop within relationships and interactions with others. The theory focuses on how contextual obstacles may impede women's ability to maintain healthy and satisfying relationships (Comstock et al., 2008). As noted, women's relational dynamics and skills may be more influenced by stressful contexts (Hall, Barden, & Conley, 2014), whereas men may be better able to compartmentalize stress and distinguish individual stressors from relational contexts (Schnittger & Bird, 1990; Taniguchi & Shupe, 2014). This suggests the influence of stress on relationship quality directly and indirectly through positive behaviors may be different for men and women.

While there is some suggestion in the relationship functioning and stress literature suggesting variation based on gender, little of the mindfulness research has considered and assessed gender differences. Only two studies assessing mindfulness and relationship functioning considered gender and found no significant differences (Barnes et al., 2007; Saavedra, Chapman, Rogge, 2010). Because so little research exists, gender differences remain a testable question in studies of mindfulness and relationship functioning.

The Current Study

To summarize, the current study combines several areas of well-developed research on stress and positive behaviors as predictors of couple relationship quality and infuses the

consideration of a newly developing area of research on mindfulness and its influence on the individual and the individual's couple relationship. This effort can serve to inform the empirical literature on couple dynamics as well as provide new information for practitioners on the role of mindfulness in relationship functioning. This may serve to inform adjustments to or validation of current couples education program content and targeted outcomes.

The current study tests the hypothesized model that considers associations between each of the variables, accounting for all else in the model. Specifically, we assume that stress will be negatively related to relationship quality (path A), positive behaviors will be positively related to relationship quality (path B), and mindfulness will be positively related to relationship quality (path E). It is also assumed that stress will be negatively related to positive behaviors (path C), the level of mindfulness will be negatively related to stress (path D), and the level of mindfulness will be positively related to positive behaviors (path F). Tests of these paths include the exploration of the comparative strength of the three direct paths (research question 1) and the comparative strength of direct and indirect paths (research question 2). Also, we explore whether and how this conceptual model differs for men and women (research question 3).

Method

Participants and Procedures

The sample is comprised of 281 individuals (117 couples; 47 individuals); women comprised 56% of the sample. Because the data used in the current study come predominantly from individuals in couple relationships and whose partner was also in the dataset, there is dependence in the data. When couples are included in basic regression analyses the likelihood of Type 1 error is increased because each observation is treated as independent instead of interrelated. To account for shared variance among couples, separate models for men and women

were fit simultaneously.

The sample is diverse in race, marital status, and income. Female participants ranged in age from 19 to 76 (M = 35.33, SD = 11.64), whereas male participants ranged in age from 20 to 79 (M = 37.20, SD = 12.56). The majority of female (73%) and male (80%) participants were married, while the remainder of the sample reported being in a committed relationship. Female participants were mostly European-American (64%); however, a little over a quarter were African-American (26%); and the remaining 10% were Asian-American or "Other." Similarly, male participants were also mostly European-American (62%); a little over a quarter were African-American (27%);; and the remaining 11% were Asian-American or "Other." There was a broad diversity of income for both women and men. Of the female participants, 25% reported a household income of less than $24,999, and 30% reported a household income of more than $75,000. Similarly, 21% of the male participants reported a household income of less than $24,999, and 35% reported a household income of more than $75,000. The descriptive statistics for women and men are presented in Table 1.

The current study is a secondary data analysis of an existing dataset that was originally collected to examine the effectiveness of a relationship education program. Community educators recruited participants across a southeastern state and separately, individuals were recruited to complete surveys and not participate in a relationship education, but to rather serve as comparison respondents. Respondents completed an initial baseline survey before program participation and a post-program survey after program completion. For the current study, both groups were utilized because only initial baseline surveys were utilized. An Institutional Review Board at an accredited institution regulates the protection of participants; therefore, signed informed consent letters were obtained before participants responded to surveys. The survey

included questions related to demographic information, individual and relational skills, and individual, relationship, and family functioning.

Measures

Table 2 provides descriptive statistics for all measures by gender. Previous psychometric analyses of data from the full scales informed item reduction in the predictor and outcome measures used in the current surveys and these reduced scales have been utilized in previously published studies (e.g., Adler-Baeder et al., 2010; Bradford et al., 2014).

Predictor Measures.

Trait Mindfulness. Five items from the Mindfulness Attention Awareness Scale (MAAS; Brown & Ryan, 2003) were used to assess participants' level of global attention or awareness in the moment. Example items include, "It seems I'm 'running on automatic' without much awareness of what I'm doing," and "I could be experiencing some emotion and not be conscious of it until sometime later." Possible responses ranged from 1 (*almost never*) to 6 (*almost always*). Alpha coefficients were $\alpha = .87$ and $\alpha = .83$ for men and women, respectively, indicating good reliability. For easier interpretability, the items were reverse coded so that higher scores indicate higher levels of trait mindfulness.

Positive Behaviors. Four items from Huston and Vangelisti's (1991) Positive Interactions Scale were used to assess participants' positive behaviors toward their partner. Example items include, "On average, how often in the past month did you say 'I love you' to your spouse/significant other" or "Initiate physical affection (ex: kiss, hug) with your spouse/significant other." *Z*-scores were calculated for each item because of changes in the response range from year to year. The Likert scale ranged from "never" to "more often than once a day." The initial range was from 1 to 5. The scores were changed to a range of 1 to 7 for 33%

of the sample. Alpha coefficients for the scales were $\alpha = .77$ and $\alpha = .81$ for men and women, respectively, indicating adequate to good reliability. Higher scores indicate greater use of positive behaviors.

Perception of Stress. A global item was used to assess *perception of stress*: "For the past month, how would you rate your overall level of stress, on a scale from 1 to 7?" Higher scores indicate higher stress levels. Several studies have suggested single-item questions are highly correlated to multi-item measures and note a one-item rating scale can be advantageous (e.g., Forthofer, Markman, Cox, Stanley & Kessler, 1996; Funk & Rogge, 2007; Scarpello & Campbell, 1983).

Outcome Measure.

Relationship Quality. Three items from the Quality of Marriage Index (QMI; Norton, 1983) were used to assess participants' reports of relationship quality. Items included, "We have a good marriage/relationship," "Our relationship is strong," and "My relationship makes me happy." Participants responded on a seven-point scale ranging from 1 (*very strongly disagree*) to 7 (*very strongly agree*). Alpha coefficients were $\alpha = .96$ for both men and women indicating excellent reliability. Higher scores indicate higher ratings of relationship quality.

Control Variables. Covariates including age, race, and income were included in each model as they have been shown to influence ratings of relationship quality. For example, in general, African-Americans report lower marital quality compared to European-Americans (Bulanda & Brown, 2007). Similarly, lower-income individuals tend to report lower ratings of marriage quality and are at greater risk for marital instability (Karney & Bradbury, 1995). Additionally, Twenge (2001) has discovered typical gender differences in marital outcomes may become muted across the lifespan, suggesting the influence of age is important to consider in a

multi-group analysis based on gender.

Race was dichotomously coded; specifically, *non-European Americans* (African American, Asian American, Hispanic or Latino, etc.) were coded as "0" and *European Americans* were coded as "1." Income was assessed as a continuous variable using the respondents' reported of annual household income. Finally, age in years, as reported by participants at baseline, was used as a continuous variable.

Analytic Strategy

Structural equation modeling (SEM) has several strengths including having the ability to validate latent constructs based on several items or indicators. SEM can incorporate the use of latent constructs, as well as observed variables, to test whether and how the variables of interest are related. SEM also accounts for the random error due to measurement (Francis, 1988) and uses full information maximum likelihood (FIML), which enables the use of all available information from the data to limit the deletion of cases due to missing values. Using SEM allows for more accurate parameter estimates based on the available data compared to regression models.

Amos 22 was used to test a series of structural equation models with one observed variable (perception of stress) and three latent constructs, using individual scale items as indicators. The first model tested the direct effects of stress, positive behaviors, and mindfulness on relationship quality (RQ1). Next, another model was fit to test the indirect paths of positive behaviors as a mediator of the stress and relationship quality link, stress as a mediator of the mindfulness and relationship quality link, and positive behaviors as a mediator of the mindfulness and relationship quality link (RQ2). A multi-group structural equation modeling approach was used to account for dependence in the data and to assess differences between men

and women. In other words, each model was fit for men and women simultaneously and then models for RQ1 and RQ2 were compared (RQ3; see description below).

Goodness-of-fit indices assess the consistencies and differences between the data and the model (Kenny, 2014). For the current study, multiple goodness-of-fit indices were used including the chi-square test of model fit, comparative fit index (CFI), and the root mean square error of approximation (RMSEA). The chi-square test of model fit is most commonly utilized, and a large chi-square value indicates the model does not fit well (Kenny, 2014). The chi-square statistic can be influenced by sample size (i.e., it is almost always significant with large sample sizes). The CFI is an incremental measure of model fit, with values .95 or higher, .90-.95, and .90 or lower indicating good, acceptable, and poor fit respectively (Hu & Bentler, 1999). The RMSEA is also a more general goodness of fit index, with a value of .01, .05, and .08 indicating excellent, good, and acceptable fit respectively. Additionally, a non-significant *p* value (i.e., $p > .05$) for the RMSEA value suggests the model fits the data (MacCallum, Browne, & Sugawara, 1996).

To evaluate gender differences in how stress, positive behaviors, and mindfulness influence relationship quality, the models for men and women were compared- one with free parameters and one with parameters fixed across groups. Delta chi-square tests were used to reveal whether the models differ significantly. Delta chi-square values were calculated by obtaining the difference in the chi-square value and the difference in the degrees of freedom. Then, the chi-square table was checked to assess if the delta chi-square value was greater than the critical chi-square value. A constrained model or pathway would be noted as significantly different if the chi-square value was significant. If the value is non-significant, the model or pathway would not be significantly different and would be considered equal.

Results

Preliminary Analyses

The initial descriptive statistics, including the means and standard deviations, for each of the measures, were computed and are presented in Table 2. Before testing the models, variables were analyzed for normal distribution of data. In small samples values of skewness and kurtosis between -2 and +2 are considered acceptable (George & Mallery, 2010). Using this guideline, it was determined that for both men and women each variable was normally distributed and did not require transformation.

Descriptive statistics were also examined to determine whether responses and demographic characteristics significantly differed based on gender. Independent-sample *t*-tests (for continuous variables) and chi-square independence tests (for categorical variables) were conducted to assess differences between men and women on demographic characteristics. Results indicate demographic variables including age, race, and income level do not differ based on gender. Additionally, independent-sample *t*-tests were conducted to compare mean level differences by gender for each variable of interest and results indicate that men and women in the sample did not significantly differ on reports of levels of stress, use of positive behaviors, mindfulness, or reports of relationship quality.

Finally, bivariate correlations between key study variables and covariates were estimated for men and women separately (See Table 3). The correlations indicate some significant associations among important variables, although mindfulness was not significantly correlated with stress, positive behaviors, or relationship quality. Because correlations only consider the bivariate relationship of constructs, it may be that considering mindfulness in conjunction with other predictors and mediators of relationship quality would result in a significant indirect

association (Pearl, 2009).

Research Question 1- The Direct Effects of Stress, Positive Relationship Behaviors, and Mindfulness on Relationship Quality

The first research question focused on the comparative strength of the three direct paths from stress to relationship quality, positive behaviors to relationship quality, and mindfulness to relationship quality. Models for men and women were fit simultaneously to account for dependency in the data and to test for differences in pathways by gender. Goodness of fit indices demonstrate the direct path models fit the data well (χ^2 (199) = 262.526, $p < .001$; CFI = .969; RMSEA = .034, $p = .995$).

Women. On average, considering everything in the model, stress is significantly negatively related to relationship quality for women ($\beta = -.112$, $p = .031$), such that lower levels of stress are associated with higher ratings of relationship quality. In addition, positive behaviors ($\beta = .613$, $p < .001$) and mindfulness ($\beta = .222$, $p = .004$) are significantly and positively related to relationship quality such that higher rates of positive behaviors and higher levels of mindfulness are associated with higher ratings of relationship quality for women, controlling for everything else in the model. The predictors account for 41% of the variance in women's reported relationship quality. Based on the standardized coefficients, positive behaviors are a more potent predictor of relationship quality for the women in our sample compared to the level of mindfulness or stress level; however, all predictors uniquely predict variance in women's reported relationship quality.

Men. Controlling for everything else in the model, stress is, on average, significantly and negatively related to relationship quality ($\beta = -.113$, $p = .031$) for men, such that higher rates of stress are associated with lower ratings of relationship quality. Additionally, positive behaviors

significantly and positively are related to relationship quality (β = .578 $p < .001$) for men, controlling for everything else in the model. There was a trend towards a positive link between mindfulness and relationship quality for men (β = .172, $p = .055$) controlling for everything in the model. The predictors account for 41.5% of the variance in men's relationship quality. Based on the standardized coefficients, positive behaviors are the more potent predictor of relationship quality for men compared to stress and level of mindfulness.

Gender Differences. Research Question 3 focused on exploring whether and how the models differed significantly for men and women; therefore, the models for men and women were compared by constraining the models to be equal and conducting a delta chi-square test to assess discrepancies between the constrained model and the freely estimated model. The difference in chi-square was not significant ($\Delta\chi^2$ (3) = 1.11, critical $\chi^2 = 7.82$, p = ns) indicating there are no gender differences. Thus path-by-path analyses were not conducted (Muthén & Muthén, 2004).

Research Question 2- Testing the Full Model Assessing the Interrelationships of Stress, Positive Relationship Behaviors, and Mindfulness on Relationship Quality

The second research question tested the full empirical model that includes the indirect paths (stress to relationship quality through positive behaviors, and mindfulness to relationship quality through stress and positive behaviors). Models for men and women were fit simultaneously to account for dependency in the data and to test for differences in pathways by gender. The full models fit the data well (χ^2 (186) = 271.088, $p < .001$; CFI = .959; RMSEA = .040, $p = .938$). Table 4 includes the coefficients for the direct and indirect effects.

Women. Controlling for everything else in the model, the link between stress and relationship quality is fully mediated by use of positive behaviors. That is, the direct link

between stress and relationship quality is no longer significant (β = -.057, *p* = .414) when the path from stress to positive behaviors is included in the model. For women, lower stress significantly predicts greater use of positive behaviors (β = -.220, *p* = .015) and greater use of positive behaviors predicts higher relationship quality (β = .577, *p* < .001). Using the Monte Carlo product of the coefficient method of testing indirect effects (Preacher & Selig, 2012), results indicate this indirect effect (β = -.127) is statistically significant (lower CI = -.224; upper CI = -.033). For women, the direct positive link between mindfulness and relationship quality remains significant (β = .233, *p* = .003); however, women's level of mindfulness is not related to lower stress (β = -.050, *p* = .566) or greater use of positive behaviors (β = -.020, *p* = .665). Neither the mediating effect of stress (β = .003; lower CI = -.017; upper CI = .019) and positive behaviors (β = -.023; lower CI = -.163; upper CI = .029) on the link between mindfulness and relationship quality are significant for women. The predictors account for 41.9% of the variance in women's relationship quality. Based on the standardized coefficients, the direct effect of positive behaviors is a more potent predictor of relationship quality for women compared to the direct effect of level of mindfulness and the indirect effect of stress through positive behaviors.

Men. The results of the test of the full model for men indicate there are no mediated relationships. Controlling for everything else in the model, the direct negative link between stress and relationship quality (β = -.133, *p* = .093) shows a trend toward significance, and the direct link between stress and positive behaviors (β = -.130, *p* = .208) is not significant. The mediating effect of positive behavior on the link between stress and relationship quality is not significant (β = -.079; lower CI = -.178; upper CI = .031). Furthermore, controlling for everything in the model, the direct positive link between use of positive behaviors and relationship quality remains significant for men (β = .611, *p* < .001). Men's level of mindfulness is not directly related to

relationship quality (β = .126, *p* = .157), stress (β = .001, *p* = .990), or positive behaviors (β = -.162, *p* = .133) controlling for everything in the model. Neither the mediating effect of stress (β = .000; lower CI = -.296; upper CI = .039) and positive behaviors (β = -.099; lower CI = -.036; upper CI = .028) on the link between mindfulness and relationship quality are significant. The predictors account for 41.7% of the variance in men's relationship quality. Based on the standardized coefficients, the direct effect of use of positive behaviors is the only significant predictor of relationship quality for men in the full model.

Gender Differences. Research Question 3 focused on exploring whether and how the models differed for men and women; therefore, the full models for men and women were compared by constraining the paths in the models to be equal and conducting a delta chi-square test to assess discrepancies between the constrained model and the freely estimated model. The difference in chi-square was not significant ($\Delta\chi^2$ (6) = 2.54, critical χ^2 = 12.59, *p* = ns) indicating there are no statistically significant gender differences in the model paths. Because the models did not significantly differ, the delta chi-square tests were not conducted on a path-by-path basis (Muthén & Muthén, 2004).

Discussion

Decades of research have focused on the negative influence stress has on relationship functioning and quality (Bodenmann, 2000; Bodenmann et al., 2007; Karney & Bradbury, 1995; Neff & Karney, 2004) and the benefits of positive behaviors on relationship quality and satisfaction (Canary et al., 2002; Dainton, 2000; Fincham & Beach, 2010; Karney & Bradbury, 1995). A new, but growing area of research considers the connection between mindfulness and relational factors (Kozlowski, 2013; McGill et al., 2016) and suggests that mindfulness is positively linked to positive relationship dynamics and reports of relationship quality.

Collectively, this work provides practitioners with a list of topics for intervention, but little understanding of the interrelationships among stress, positive behaviors, mindfulness, and relationship quality. This study serves to advance the empirical research on predictors of relationship quality by examining the role of trait mindfulness and exploring its influence directly and indirectly, through stress and positive behaviors, on relationship quality. Findings of the current study indicate a robust connection between trait mindfulness and relationship quality for women in our study and a trend towards a link for men while considering the independent influence of stress and positive behaviors. Thus, this study helps researchers and practitioners better understand the comparative salience of mindfulness in relation to stress and positive behaviors as predictors of relationship quality. In line with previous studies, over several decades (Canary, Stafford, & Semic, 2002; Dainton, 2000; Fincham & Beach, 2010; Karney & Bradbury, 1995), positive behaviors appear to be the most potent predictor of relationship quality for both men and women in our sample. For men, this link is direct; however, for women, the most robust predictive pathway is from stress through positive relationship behaviors to relationship quality.

The current study also considered gender differences in pathways to relationship quality, yet found no statistical evidence for differences between men and women's models. This is likely due to lack of statistical power (Aguinis, Beaty, Boik, & Pierce, 2005) since the "stories" in the test of the full models for men and women are somewhat different. Further exploration of gender differences with larger, diverse samples is warranted. Overall, the study provides evidence that trait mindfulness can be considered a unique predictor of relationship quality, particularly for women; however, actual behaviors in relationships remain a crucial factor in predicting relationship quality for both men and women. We situate our findings in the context of the extant literature and the guiding theoretical framework and explicate recommendations for

future research and practice.

Considering the Relative Contribution of Mindfulness to Relationship Quality

Previous research that considered multiple predictors of relationship quality found that the most salient predictor for both men and women is the use of positive relationship behaviors (e.g., Karney & Bradbury, 1995; Dainton, 2000; Fincham & Beach, 2010). Family stress theorists (Boss, 2002) and those who utilize the vulnerability-stress adaptation model (Karney & Bradbury, 1995) as a framework for studying romantic relationships describe positive relationship behaviors as "adaptive processes," because using this skill supports romantic relationships in the context of stress. In our model, we also considered the influence of mindfulness directly on relationship quality. Our results support and extend the results of a recent meta-analysis that found a small effect (Fisher's $z = .28$) for the association between mindfulness and relationship quality (McGill et al., 2016). For both men and women, the findings of the direct effects model support an additive model that indicates reported stress, use of positive behaviors, and trait mindfulness all account uniquely for variance in reported relationship quality. While we also explored the interrelationships among these variables, it is worthwhile to first consider this result and its implications. Accounting for the redundancy (i.e., shared variance) among the three predictors, we have information that each influences relationship quality, although the link between mindfulness and relationship quality, accounting for stress and positive behaviors, only trends towards significance for men. Still, the results validate that use of positive behaviors as the primary predictor of relationship quality and also that assessing and promoting stress reduction and trait mindfulness are warranted in research and practice.

Our study includes the novel consideration that either or both stress and mindfulness

influence the use of positive behaviors. For women, the greater use of positive relationship behaviors was influenced by the perception of lower stress; however, the expected link between greater mindfulness and greater use of positive relationship behaviors was not validated. Indirect paths for men were even less evident. Positive relationship behaviors were directly linked to relationship quality but were not associated with the level of reported stress or level of trait mindfulness. The stronger link between stress and positive relationship behaviors for women is assumed in relational-cultural theory (Comstock et al., 2008) which suggests women place a more central focus on relationships. Furthermore, it suggests the greater likelihood that stressful contexts manifest in more concrete behaviors in women's relationships compared to men's.

Previous research focused on indirect paths between mindfulness and relationship quality assessed these linkages in small samples of married couples. These studies found evidence for mediation suggesting the link between mindfulness and relationship quality is influenced by safe and secure spousal attachment and the ability to identify and communicate emotions (Jones et al., 2011; Wachs & Cordova, 2007). Our study, which used a sample of married and unmarried couples, did not find support for mediational effects in the link between mindfulness and relationship quality; however, it may be that unmeasured mediators exist, and there may be differences between married and unmarried couples. We suggest exploring other possible mediators including, improved reactivity to conflict and ability to disclose emotions, which have been linked to mindfulness (Barnes et al., 2007; Wachs & Cordova, 2007). Also, there may be differences in how this model functions for married and unmarried couples because these types of relationships are qualitatively different (Kamp Dush & Amato, 2005).

The lack of evidence of an association between mindfulness and positive relationship behaviors is somewhat inconsistent with previous research that found more mindful individuals

were also more empathic (Block-Lerner et al., 2007) and more likely to use perspective-taking in relationships (Wachs & Cordova, 2007). Presumably, these cognitions are related to the use of more overt positive behaviors. This finding that mindfulness and positive behaviors were not related may be a characteristic of this sample, or it may have to do with the broad measurement of trait mindfulness. The items in our measure tap the tendency to be focused and not distracted during daily living. It is thought that practices in mindfulness lead to this sort of mindfulness trait; however, it may also be that a person can be more "present" in daily living and not necessarily utilize mindfulness practices, which include "other-oriented" practices that incorporate empathy and non-judgement. This aspect of mindfulness practice seems more logically linked to other-oriented positive behaviors.

Other measures of mindfulness tap several dimensions of mindfulness practice (nonreactivity to inner experience, observing, acting with awareness, describing or labeling feelings or emotions, and nonjudging of experiences; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006) and also a general trait dimension. These subscales are correlated, yet distinct, indicating someone could have a tendency to be "present" and mindful in everyday living, but not have a high level of mindfulness about others – and vice versa – a person could be more distractible and still be empathic and other-oriented in their relational behaviors. Our model would benefit from a multi-dimensional measurement of mindfulness to explore these possible distinctive links with relationship dynamics and outcomes.

In addition, our measure of trait mindfulness was not linked to lower levels of stress for men and women in our sample, as hypothesized. Much of the research on mindfulness and stress is in the program evaluation literature, which may mean the *change in* mindfulness is associated with lower levels of stress, not just mindfulness in and of itself. In addition, it may be that other

elements present in mindfulness-based stress reduction programs are more responsible for the stress reduction documented than the development of trait mindfulness. These programs explicitly include a focus on noticing, normalizing, and actively releasing stressful feelings. Similarly, the link between mindfulness and use of positive relationship behaviors (i.e., overt behaviors including saying "I love you" and initiating physical touch) is likely more evident in the context of an intervention. While most mindfulness programs, including MBSR, promote individual practice in staying in the present moment and reducing distractibility, the programs also contain specific lessons and practices in other-oriented skill development (e.g., loving-kindness practices) and promote their use (Kabat-Zinn, 1990). In other words, this link between trait mindfulness and use of positive behaviors may not be naturally occurring without more specific and explicit skills training in the use of mindfulness principles applied to relationship dynamics.

Overall, theory, basic science, and intervention research are served best when we include measures of mindfulness that assess different facets and specific practices of mindfulness to understand what type of mindfulness is most influential for stress, positive relationship behaviors, and relationship quality. As previously noted, Baer and colleagues (2006) developed the Five Facet Mindfulness Questionnaire (FFMQ) that taps several different elements and practices of mindfulness such as, non-reactivity to inner experience, observing, acting with awareness, describing or labeling feelings or emotions, and nonjudging of experiences. Similarly, Tanay and Bernstein (2013) developed the State Mindfulness Scale (SMS) to specifically assess awareness, sensitivity, and attention in the context of a contemplative mindful practice. These scholars suggest future studies take this type of nuanced approach to assessing mindfulness to better inform research on mindfulness, and we echo this call.

Results of the current study can serve to inform practitioners, although our suggestions are offered with caution as these results are very preliminary. The tests of the direct and indirect models using concurrent measures of stress, trait mindfulness, and positive behaviors to predict relationship quality represent a small step forward in understanding the relevance of trait mindfulness for relationships. It appears warranted to suggest an emphasis on all three areas of skill development in interventions to enhance a romantic relationship, particularly for women, and to not necessarily expect that enhancing trait mindfulness will result in the use of more positive behaviors and less stress. Teaching and promoting the use of positive behaviors continue to be important for influencing assessments of relationship quality. Therefore, programs can continue to emphasize the development of caring behaviors towards one's partner and encourage the reduction of negative behaviors and use of positive conflict management strategies. The finding that stress negatively influences positive relationship behaviors, in particular for women, highlights the need for programs to focus on helping individuals recognize stress symptoms and find ways to manage feelings of stress to promote higher relationship quality. It is likely that stress reduction is accomplished through various means and practice benefits from continuous efforts to identify influences on perceptions of stress.

Although the current level of trait mindfulness was not related to lower base levels of stress in this study, it may be that, as shown in previous intervention studies, the practice of mindful meditation may decrease stress, and in turn improve relationship dynamics and quality. Based on program content review, we believe that these mindfulness-based interventions resulted in reduced stress symptoms and better health because they teach basic mindful awareness and explicitly encourage the use of this present-moment awareness to recognize and process stress symptoms. Both elements are likely necessary.

Similarly, programs focused on enhancing couple relationship quality that incorporate mindfulness practice will possibly be more effective if they include an explicit focus on the links among mindfulness, stress, and relational dynamics and utilize mindful practices that incorporate awareness of partner feelings and needs. Previously, Carson, Carson, Gil, and Baucom (2004) developed a "mindfulness-based relationship enhancement" program that used an educational format to teach mindfulness-based stress reduction practices in addition to the traditional skills taught in relationship education programs. The program positively influenced several crucial outcomes including couples' level of relationship satisfaction, closeness, and acceptance of one another, and individuals' level of optimism, spirituality, and relaxation. Gambrel and Piercy (2015a, 2015b) also developed a mindfulness-based relationship education program specifically for couples expecting their first child, and found evidence of program effectiveness in relationship satisfaction, mindfulness, and negative affect for men only; women experienced no significant participant effects. Both studies utilized extremely small samples of non-distressed married couples; however, these initial studies provide some support to continue this line of work and continue to offer couple relationship education that incorporates practices in mindfulness. It would be interesting to see whether this added emphasis on mindfulness would result in comparatively more effective relationship outcomes than couples education programs that do not include this element. The results of our direct effects model suggest that this may be the case.

Limitations

Though the findings from this study inform the extant literature on relationship functioning and mindfulness, there are some limitations to consider. In the current study we used a measure of perception of stress; however, others (Karney & Bradbury, 1995) suggest assessing

sources of stress including acute and chronic stressors that objectively tap the stress experience. Using different measures of stress could provide information on what types of stress are most influential in positive relationship behaviors and relationship quality. Similarly, and as noted previously, more complex measures of mindfulness that distinguish specific practices and types of mindfulness would be useful. Our measure of mindfulness was limited to items related to focus and distractibility in daily living as indicators of a tendency of "trait" mindfulness. Another limitation of the current study is the relatively small sample size. While our sample is quite diverse compared to other studies of relationship quality, particularly those including a measure of mindfulness, larger samples are advantageous because they tend to be more representative of the population, and do not limit the accuracy of parameter estimates. Additionally, observed gender differences in the full model might be substantiated with a larger sample. Study participants responded to self-report surveys, meaning measures represent their perceptions of stress, positive behaviors, mindfulness, and relationship quality. Using observational and multi-informant methods in the future can enhance validity and improve the conclusions of the study. In addition to addressing these limitations in future research, more work is needed to enhance our understanding of the role of mindfulness in relationship outcomes.

Future Directions

The current study was an initial effort to aggregate literature focused on several key predictors of relationship quality for men and women, and included an emphasis on the role of mindfulness relative to the influence of stress and positive behaviors in predicting relationship quality. In our analyses, we accounted for the dependence within couples by simultaneously testing the model for men and women separately; however, an important next step is a focus on the theoretical assumptions from the bioecological- systems framework (Bronfenbrenner &

Morris, 1998) suggest individuals do not function in isolation, rather they are influenced by others and operate individually in the context of relationships. We encourage future tests of the model with empirical consideration and assessment of cross-dyad effects. For example, positive relationship behaviors were the most potent predictor of self-reported relationship quality for men and women; however, since positive behaviors are other-oriented we can expect influences on partner's report of relationship quality as well. Utilizing actor-partner interdependence models will advance our understanding of the influence of both self and partner's reports of stress, positive behaviors, and mindfulness for self and partners' reports of relationship quality. In addition, including assessments of both individual health and well-being (self and partner), along with relational health and well-being would extend previous intervention studies that demonstrate benefits of participation in mindfulness-based stress reduction programs on indicators of individual health. Importantly, future assessments should include longitudinal designs as suggested by the vulnerability-stress-adaptation model (Karney & Bradbury, 1995). Continuing to connect the social and behavioral sciences serves to broaden the definition of health and well-being to include social dimensions.

Considering the intersectionality of social address variables can also inform the literature on mindfulness and romantic relationships, as very little has been done in social science research on mindfulness to assess differences based on individual characteristics (Karremans et al., 2015). In the current study, we included three covariates (age, race, and income) and found that race, controlling for everything else in the model, significantly predicted relationship quality. We suggest more nuanced tests of this model that consider variations in processes based on individual characteristics and combinations of characteristics.

In addition, there is a need to more fully develop a prevention science literature on

mindfulness-based CRE. To date, only four published studies of mindfulness-based relationship education programs exist (Carson, Carson, Gill, & Baucom, 2004; Carson, Carson, Gil, & Baucom, 2007; Gambrel & Piercy, 2015a; 2015b). These studies focus on two separate programs, each developed independently. Overall, the initial tests of these programs using small, homogeneous samples, suggest a positive impact on the couple relationship in addition to improving individual functioning; however, there are several areas for expansion. First, the assessment of mindfulness-based couples relationship education curricula offered to larger, more diverse populations of couples is needed. Similar to the study of basic research models, we also encourage the collection of longitudinal data across several time points to assess declining, delayed, or maintained effects in larger samples of more socio-demographically diverse participants and comparative effects to "general" couple relationship education. We also suggest the study of variation in outcome trajectories based on participant characteristics and type of CRE curriculum.

Further, some scholars assert that enhancing mindful awareness can be accomplished through other contemplative practices in which individuals focus on noticing their physical and mental activity, such as gardening, coloring, and listening to music (Greenberg & Harris, 2012; Greenberg & Metra, 2015). Current mindfulness-based stress reduction programs seem to "privilege" meditation and other practices originating in Eastern religious practices. Future research is encouraged that would explore alternative intervention strategies that result in enhanced trait mindfulness.

Conclusions

The current study contributes to the growing dialogue on the influence mindfulness has on romantic relationships. Although there is evidence that mindfulness is connected to

relationship quality, there is a need to enhance our measurement strategies and investigate further the processes that may explain why this link exists in order to inform practice and the refinement of models of relationship well-being. This study augments this effort by providing support for the direct link between trait mindfulness and relationship quality, particularly for women. Results do not suggest that mindfulness is a panacea for promoting relationship strength; rather, it appears to uniquely predict variance in relationship quality, accounting for levels of stress and use of positive relationship behaviors. Stress and use of positive relationships also are uniquely and significantly related to relationship quality for women. For men, use of positive behaviors is most closely related to reported relationship quality. Thus, it is likely that in interventions it is as much about the dyadic skills training, empathy development, and stress reduction skills being taught that predict positive outcomes, as it is about teaching and promoting mindful awareness. Further, it is likely that these skills individually and together (e.g., using mindful attentiveness when managing stress; using mindful attentiveness when using positive relational behaviors) produce the best outcomes. The current study helped to inform program design by validating the relative contributions of stress, mindfulness, and positive behaviors in predicting relationship quality. We encourage continued efforts to integrate study findings that isolate predictors of relationship quality and continue the exploration of interrelationships and relative importance among predictors so that both research and practice are better informed on pathways to achieving optimal relational health.

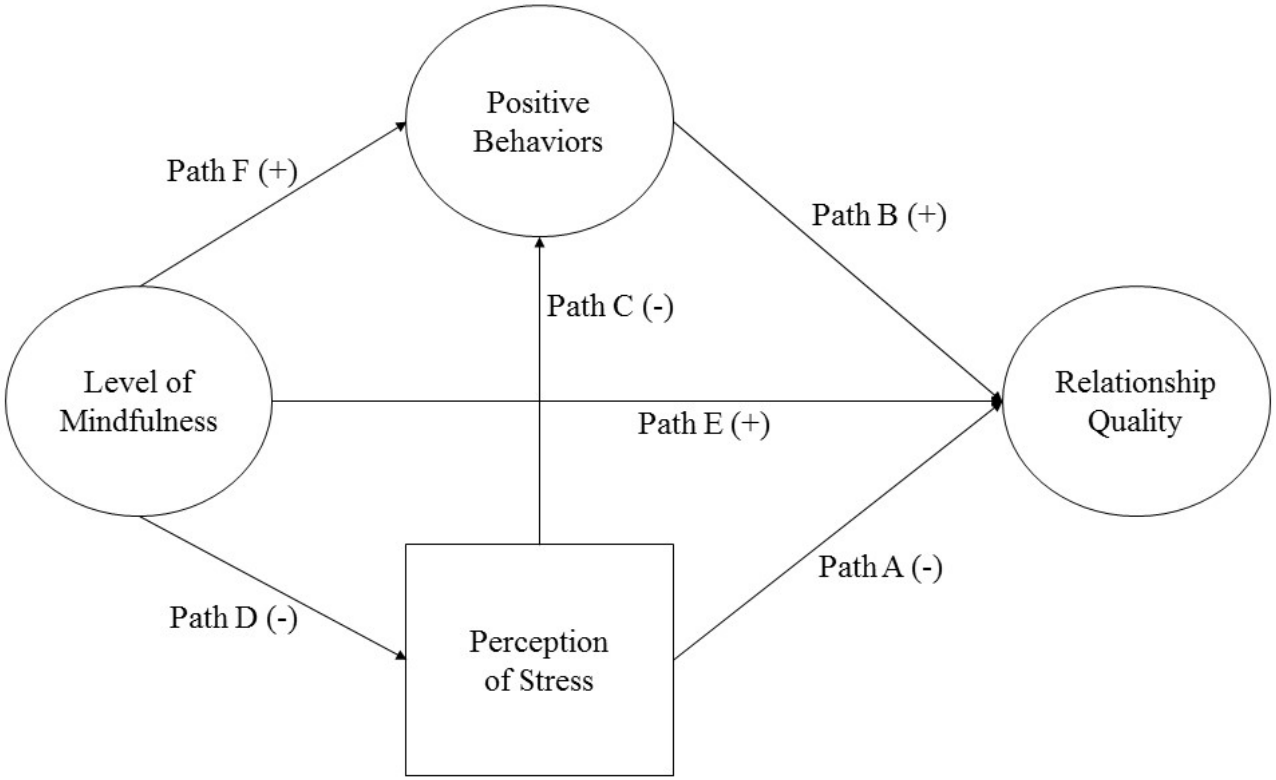

Figure 1. The conceptual model based on empirical links, the vulnerability-stress-adaptation model, and family stress theory.

Table 1

Demographic Descriptive Statistics by Gender

	Women (N = 157)		Men (N = 124)	
Variable	*M* (*SD*)	N (%)	*M* (*SD*)	*N* (%)
Age	35.33 (11.64)		37.20 (12.56)	
Marital Status				
Committed		42 (27%)		25 (20%)
Married		115 (73%)		99 (80%)
Ethnicity				
European-American		98 (64%)		75 (62%)
African-American		41 (26%)		33 (27%)
Asian-American		7 (5%)		9 (8%)
Other		7 (5%)		4 (3%)
Income				
Less than $24,999		36 (25%)		25 (21%)
$25,000-$39,999		19 (13%)		22 (19%)
$40,000-$74,999		48 (32%)		30 (25%)
More than $75,000		45 (30%)		42 (35%)

Table 2

Descriptive Statistics for Key Study Variables by Gender

	Women (N = 157)					Men (N =124)				
Variable	*M* (*SD*)	Min	Max	Skewness	Kurtosis	M (SD)	Min	Max	Skewness	Kurtosis
Stress	4.38 (1.43)	1.00	7.00	-.17	-.14	3.96 (1.38)	2.00	7.00	-.10	-.14
Mindfulness	3.36 (1.13)	1.00	6.00	-.07	-.59	3.21 (1.20)	1.00	5.80	.04	-.92
Positive Behaviors (z)	-.08 (.79)	-2.05	1.17	-.37	-.88	.06 (.74)	-1.85	1.17	-.46	-.61
Relationship Quality	5.89 (1.25)	1.00	7.00	-1.16	.98	6.01 (1.19)	2.00	7.00	-1.25	1.15

Table 3

Correlations among Key Study Variables and Demographic Covariates for Women and Men

	1	2	3	4	5	6	7
1. Relationship Quality	1.00	**-.211****	**.522****	**.045**	**-.055**	**-.131**	**.041**
2. Stress	-.203**	1.00	**-.098**	**.018**	**-.025**	**-.016**	**-.098**
3. Positive Behaviors (z)	.522**	-.196*	1.00	**-.088**	**-.181**	**-.218***	**.129**
4. Mindfulness	.136	-.018	-.053	1.00	**-.097**	**.072**	**-.206***
5. Age	-.204*	-.150	-.348**	.014	1.00	**.349****	**.009**
6. Income	.023	-.035	-.119	.261**	.192*	1.00	**-.340****
7. Race	.088	-.161*	.082	-.124	-.032	-.233**	1.00

Note: Correlations for men are in bold; $p < .05$*; $p < .01$**

Table 4

Results of the Full Model by Gender

	Women (N = 157) β (SE)	Men (N = 124) β (SE)
Direct		
Stress > RQ	-.057 (.059)	-.133+ (.070)
Positive Behaviors > RQ	.577*** (.181)	.611*** (.205)
Mindfulness > RQ	.233** (.073)	.162 (.086)
Stress > Positive Behaviors	-.220* (.040)	-.130 (.049)
Mindfulness > Stress	-.050 (.096)	.001 (.106)
Mindfulness > Positive Behaviors	-.020 (.046)	-.162 (.057)
Indirect		
Stress > Positive Behaviors > RQ	-.27***	-.079
Mindfulness > Stress > RQ	.003	.000
Mindfulness > Positive Behaviors > RQ	-.023	-.099

$p < .10$+; $p < .05$*; $p < .01$**; $p < .001$***

Note: RQ = Relationship Quality

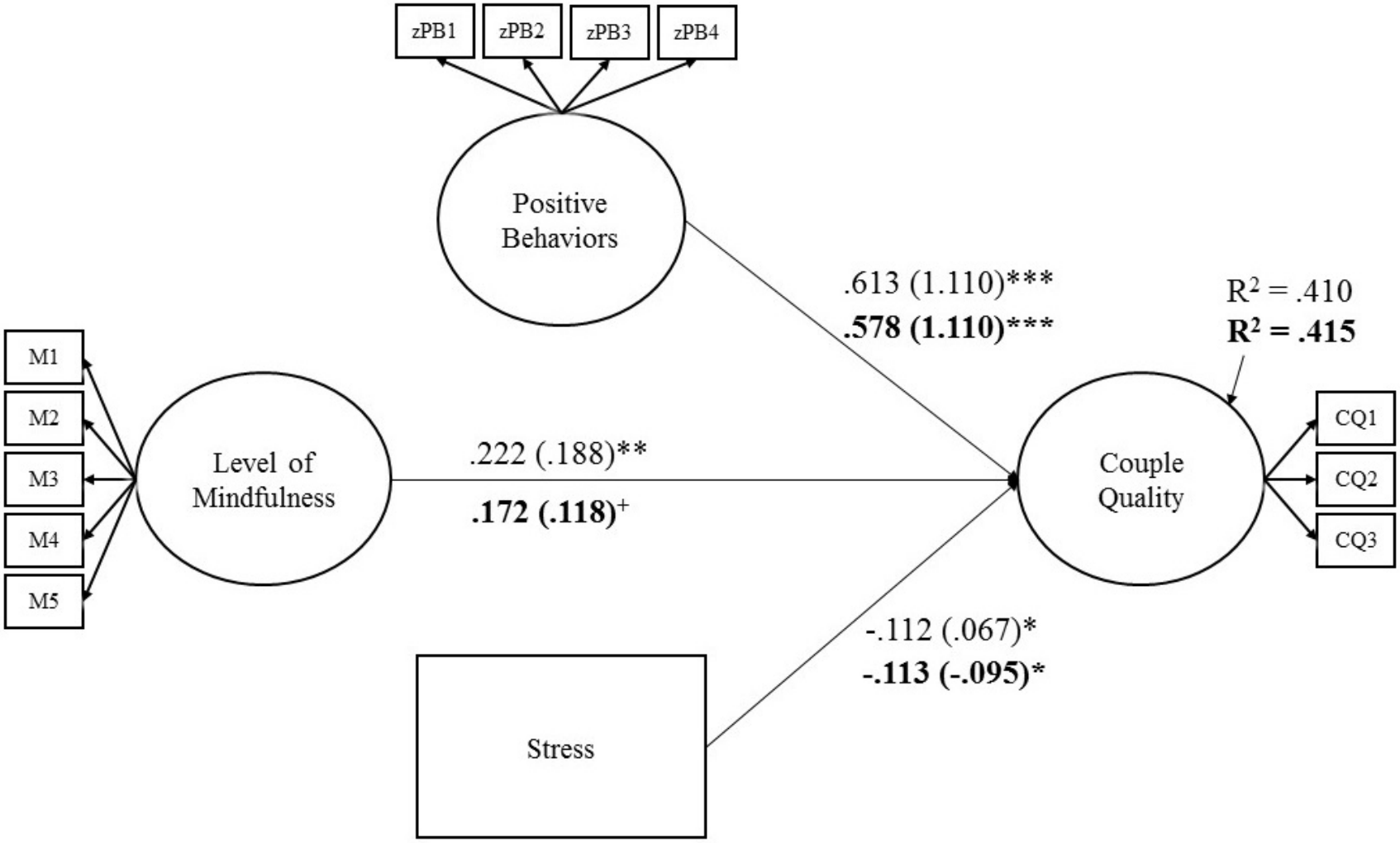

Figure 1. Standardized results (and unstandardized results in parentheses) for Model 1 depicting the direct effects of stress, positive behaviors, and level of mindfulness on relationship quality for women and men (in bold).
χ^2 (199) = 262.526; CFI = .969; RMSEA = .034, p = .995
$p > .10$ NS; $p < .10$ +; $p < .05$*; $p < .01$**; $p < .001$***

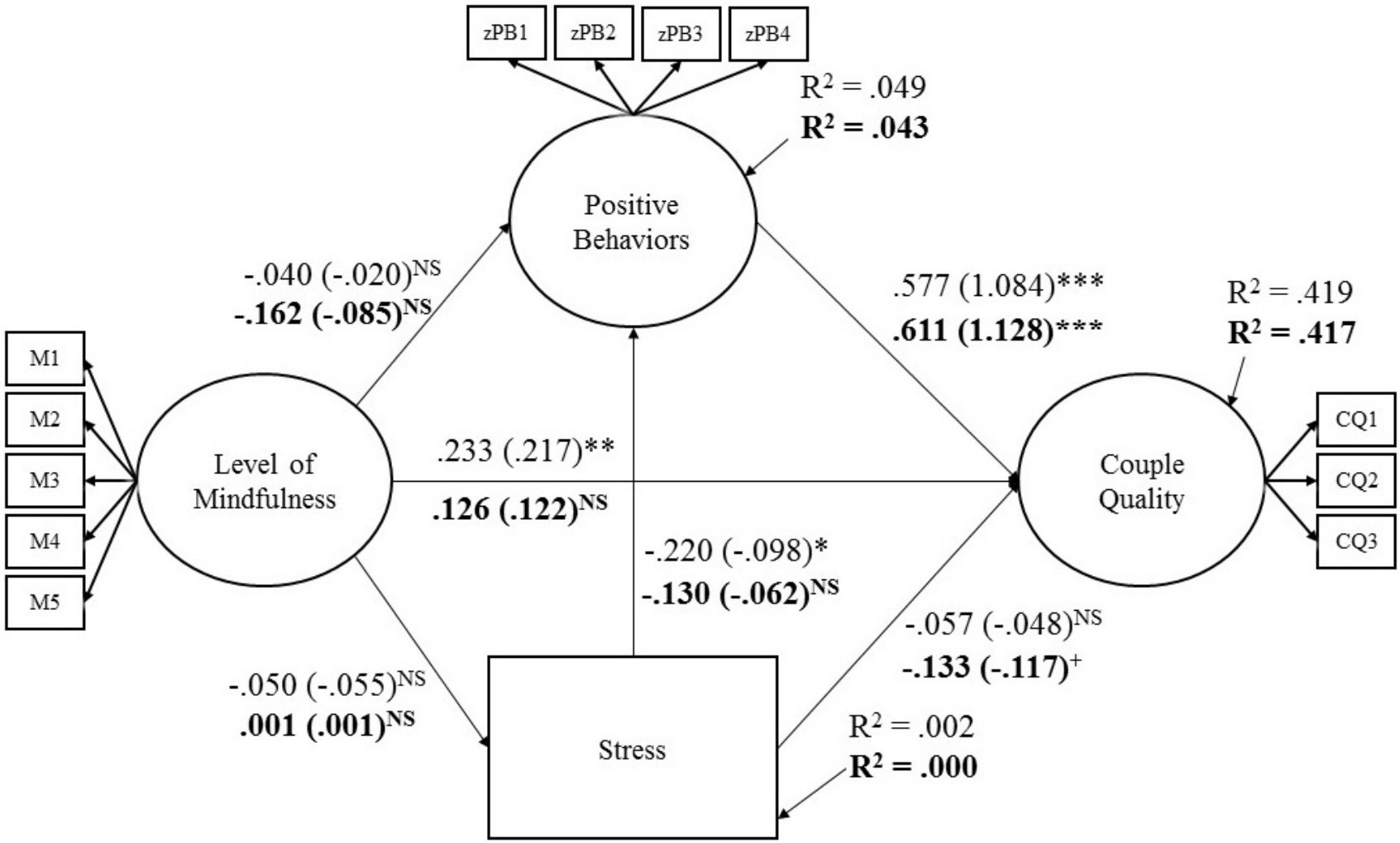

Figure 2. Standardized results (and unstandardized results in parentheses) for Model 2 depicting the direct and indirect effects of stress, positive behaviors, and level of mindfulness on relationship quality for women and men (in bold).
χ^2 (186) = 271.088; CFI = .959; RMSEA = .040, p = .938
$p > .10^{NS}$; $p < .10^{+}$; $p < .05$*; $p < .01$**; $p < .001$***

IV. General Discussion

Over the past several decades there has been significant emphasis placed on understanding how couple relationships best function (Fincham & Beach, 2010). Additionally, in recent decades there has been an emphasis of the evaluation of psychoeducational programs focused on enhancing romantic relationships (Hawkins & Ooms, 2012). Although these research areas have not been conducted within an explicit prevention science framework, these endeavors can be appropriately framed by a prevention science approach which seeks to understand risk and protective factors and assumes that strengthening protective factors will lead to positive outcome trajectories. Thus, the purpose of the current two-study dissertation was to evaluate a new couple and relationship education program focused on improving relational health and to assess the relative potency and interrelationships among several key predictors of relationship quality.

Historically, prevention scientists have focused on public health issues; however, there has been a movement in prevention science research to focus on issues related to human development and family life education (Coie et al., 1993; Hennon, Radina, & Wilson, 2013). This movement has highlighted the need to assess psychoeducational programs from a prevention science framework (Hawkins, Amato, & Kinghorn, 2013) and utilize basic science to guide the development and refinement of curricula and programs. The goal of prevention science researchers is to investigate risk and protective factors to prevent or mitigate undesirable outcomes. Often, in couple relationship literature undesirable outcomes include lower relationship quality and higher rates of relationship instability (Fincham & Beach, 2010). Having

sound theory and empirical evidence is essential for effective practices (Coie et al., 1993), thus taking a comprehensive look at programs focused on predictors of high relationship quality is important. In practice, there is substantial evidence that CRE programs are effective in the short-term for the average participant; however, evaluation researchers have been encouraged to explore "second generation" questions that seek to understand the variations in experiences that likely exist based on participant and program characteristics and contexts. Just as CRE program content continues to evolve based on enhanced understanding of predictors of relationship quality, there continues to be a growing emphasis on the basic science of predicting couple relationship quality and stability.

The first study in this dissertation contributes to the incipient literature committed to understanding more nuanced questions of the effectiveness of CRE. The study used advanced methods, including propensity score matching and multi-level modeling, to more appropriately compare changes over time between participant and comparison groups of couples over a six-month period. It also addressed several suggested areas of improvement for CRE evaluation literature including considering the effectiveness of a specific curriculum, *ELEVATE*, and assessing its effectiveness for subpopulations of participants. The findings provide initial support to consider *ELEVATE* an emerging evidence-based program (SAMHSA's NREPP, 2015), although the results of this study are preliminary. There is evidence of enhanced growth for participants compared to nonparticipants in their intimate knowledge of their partner, their engagement in social support and building community, their use of conflict management strategies, their overall relationship quality and their depressive symptomology. The results also indicated enhanced benefits for subpopulations of participants. Specifically, those with higher levels of income reported greater change in ability to build a couple identity and engage in social

support and building community. Those experiencing less family harmony reported greater change in intentionality and prioritizing the relationship, building a shared couple identity, demonstrating kindness, respect, and positivity, overall couple quality, and reports of depressive symptoms. Finally, those in longer-term relationships reported greater change in the use of positive conflict management strategies, and overall relationship quality.

The first study contributes to efforts to assess the efficacy of a specific curriculum offered to a diverse population through community-based programming and efforts considering the effects of CRE programming beyond the "average" experience. Our findings of greater change in some areas for those in more distressed families provides an assurance for practitioners that they can feel confident in CRE's ability to support distressed families, although certainly, there should be continued efforts to connect more distressed individuals and families with additional family supports in the community. Our hope is this investigation sparks exploration of other possible influences of change. Overall, this type of nuanced approach to CRE evaluation serves to inform practitioners, researchers, and curriculum developers and provides information relevant to the development of best practices for CRE in diverse communities.

The developers of *ELEVATE* cast a wide net in considering predictors of relationship quality and acknowledged the emerging literature linking the biophysical effects of stress to relationship functioning (Birditt, Antonucci, & Tighe, 2012; Randall & Bodenmann, 2009) and relationship quality (Bodenmann, Ledermann, & Bradbury, 2007; Story & Bradbury, 2004). In the study of stress and its effects on relationships, a specific form of stress management that incorporates mindfulness practice has emerged as a key skill for promoting physical, mental, and relational health (Brown, Ryan, & Creswell, 2007). Thus, the second study integrated several established associations including the negative influence of stress and the positive influence of

positive relationship behaviors on relationship quality, in addition to a newly developing area of research focused on the link between mindfulness and relationship quality. First, the second study contributes to the growing dialogue on the influence mindfulness has on romantic relationships and provides support for the direct link between trait mindfulness and relationship quality, particularly for women. Although there is evidence that mindfulness is connected to relationship quality, there is a need to enhance our measurement strategies and investigate further the processes that may explain why this link exists in order to inform practice and the refinement of models of relationship well-being. Furthermore, in line with previous research (Canary, Stafford, & Semic, 2002; Dainton, 2000; Ogolsky & Bowers, 2013), the most potent predictor of relationship quality, accounting for the influence of stress and mindfulness, was positive relationship behaviors for both men and women. This link was direct for men; however, for women the mediating effect of positive relationship behaviors on the link between stress and relationship quality was the most predictive pathway.

The results of the second study suggest an additive model in which stress, positive relationship behaviors, and trait mindfulness uniquely contribute to ratings of relationship quality. The combining of studies from social and health behavioral sciences into a conceptual model reflects a recommendation in the prevention science approach to look across disciplines and expand our knowledge with more comprehensive frameworks to best inform programs (Coie et al., 1993). While the study of mindfulness and its implications has seen a surge in interest and attention, mindfulness, as measured in our study, did not serve as a catalyst for associated benefits in other areas predictive of relationship quality. Specifically, we suggest that the results of this study indicate to interventionists and program developers that an emphasis on all three areas of skill development (i.e., using mindful attentiveness, managing stress, and using positive

relational behaviors) in parallel or integrative will likely be helpful in promoting couple relationship quality. There is still, however, much to be learned regarding the role of mindfulness in relationship functioning. Further, our hope is for continued efforts to integrate multiple areas of research relevant to individual and family functioning and to continue efforts that serve to broaden the definition of health and well-being to include relational and social dimensions. Continuing to move the research focused on successful and healthy romantic relationships forward in a collaborative and clarifying way is central to the refinement of programs that can promote resiliency for diverse couples and families.

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