IMPLEMENTATION OF A BRIEF PREVENTATIVE COUPLES INTERVENTION IN A PRIMARY CARE SETTING

by

Austin M. Grinberg

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ABSTRACT

Healthy romantic relationships are associated with a multitude of positive physical and mental health outcomes. Conversely, low relationship quality and relationship dissolution are associated with risk for poor health outcomes. Accordingly, numerous studies investigate ways to preserve healthy relationships through the use of preventative relationship education interventions, many of which improve relationship outcomes. However, evidence for the efficacy and effectiveness of these interventions is somewhat mixed, and promising interventions often fail to reach at-risk populations due to high participant burden. There is a movement within clinical psychology to create easily accessible, targeted therapy protocols in order to increase the broad availability of these evidence-based interventions. The current study aimed to replicate and extend the Marriage Hack (MH), a brief, evidence-based preventative relationship intervention designed to stabilize the natural decline in relationship quality over time. This study addressed four specific aims designed to: 1) examine the efficacy of the MH intervention using an abbreviated protocol; 2) extend the original MH intervention by investigating theory-based mechanisms of change and assessing individual health outcomes; 3) explore how theory-based mechanisms change over time; and, 4) evaluate the relationship between within-person and between-person variance in process variables and outcome measures. Seventy-eight (N = 78) couples were randomized to the 4-week MH protocol (n = 41) or control condition (n = 37). Results demonstrated men in the intervention group exhibited 1) greater improvements in relationship satisfaction and 2) decreases in both anxiety and depression compared to men in the control group. This study did not replicate the findings of the original MH for additional outcome variables and process variables for men or women. No support was found for mediating effects of additional theory-based mechanisms.
of change on outcome measures. However, exploratory intensive longitudinal analyses revealed noteworthy relationships between within-person and between-person variance in process variables and treatment outcomes. Research recommendations to further improve preventative relationship interventions and clinical implications of the current findings are discussed.
1. BACKGROUND AND RATIONALE

Marital quality is a significant predictor of both mental and physical health (Parker-Pope, 2010; Robles, Slatcher, Trombello, & McGinn, 2013). Adults in high-quality marriages show decreased risk for early death, illness, and depression compared to their non-married counterparts. However, evidence from longitudinal epidemiological studies suggests that marital quality naturally decreases at a steady rate over time, and this negative trend continues throughout the course of marriage (VanLaningham, Johnson, & Amato, 2001). Adults whose marriages ultimately end in divorce are at significantly greater risk of developing psychological and physical health issues (Amato, 2010; Sbarra, Law, & Portley, 2011). Consequently, considerable research and public attention is devoted to maintaining and promoting high-quality relationships.

Relationship researchers have developed a number of evidence-based preventative interventions and relationship education programs with the aim of targeting relationship-level processes associated with long-term relationship quality and decreased risk of relational dissolution and separation (Markman & Rhoades, 2012). Unfortunately, evidence of the efficacy and effectiveness of these interventions, as well as mediators and moderators of change, is equivocal at best (Bradbury & Lavner, 2012; Fawcett, Hawkings, Blanchard, & Carrol, 2010; Halford & Pepping, 2017). Additionally, a recent meta-analysis of relationship education programs found that adults participating in self-directed, preventive interventions show little to no change in relationship satisfaction and communication skills (McAllister, Duncan, & Hawkins, 2012). Given the low-cost of delivering self-directed, relationship education programs for marital satisfaction, there remains a need to examine how to increase the efficacy and effectiveness of brief, easily implemented interventions.
This dissertation project investigated the effectiveness of the Marriage Hack (MH; Finkel, Slotter, Luchies, Walton, & Gross, 2013), a brief, self-directed Internet-based preventive intervention designed to forestall the normal decline in marital quality over time. The study is comprised of two overarching aims designed to examine both empirically and clinically relevant aspects of implementing the MH in a community sample. The first aim examined effectiveness of the MH in a community sample (including populations often underrepresented relationship education programs) across two major domains: 1) global relationship quality, and 2) psychological and physical wellbeing. The second aim investigated theoretically-driven mediators and moderators of treatment outcome. To lay the framework supporting the aims of this project, I briefly discuss relevant research on relationships and health, as well as the current state of relationship education programs. I then outline empirically-founded issues with relationship education programs. Finally, I provide an overview of the current study.

**Relationships and Health**

Marriage is a ubiquitous part of life for adults around the world, and seems to be associated with substantial positive health outcomes. According to the United States Center for Disease Control and Prevention (CDC) in the year 2011, 2.1 million Americans married: a rate of 6.8 per 1,000 of the total population. Adults who enter into marriage have higher levels of wellbeing than their non-married counterparts. Horwitz, White, and Howell-White (1996) found, in a longitudinal, prospective study following a community sample of young adults, that participants who went on to marry were less depressed and had fewer problems with alcohol abuse than participants who remained single. Marriage, specifically high-quality marriage, is also associated with positive prognostic effects such as lower cardiovascular
reactivity during marital conflict, lower risk of all-cause mortality, and more adaptive health behaviors such as quality of diet and frequency of exercise (Robles et al., 2013).

A wrinkle in the fabric of psychological and physiological benefits associated with healthy marriages is the potential of martial dissolution and subsequent divorce. With divorce comes a variety of stressful experiences and psychologically relevant disturbances. There are numerous logistical and financial burdens, such as which member of the couple retains possession of the house, financial considerations (e.g., alimony, savings, investments), and, if the couple has children, custody determinations. There are also emotional challenges, such as grieving the end of the relationship and associated loss of a long-term partner, revising of personal identity (e.g. not being a “husband” or “wife” anymore), and restructuring of social networks (Sbarra et al., 2011). Divorced individuals experience more psychological problems than their non-divorced counterparts including lower levels of happiness, increased psychological distress, and decreased sense of self-concept (Amato, 2000). Divorce is also associated with increased risk of developing symptoms of anxiety and depression, even years after the formal end of the romantic relationship (Richards, Hardy, & Wadsworth, 1997).

A growing body of literature suggests that divorce is not only associated with decreases in psychological wellbeing, but also with increased risk of physical health problems and mortality (Robles et al., 2013; Sbarra et al., 2011; Sbarra, 2015). Recent meta-analyses exploring the relationship between martial dissolution and mortality found that, after controlling for relevant covariates, divorce was associated with a 23%-30% increase in risk for early mortality (Sbarra et al., 2011; Shor, Roelfs, Bugyi, & Schwartz, 2012).

**Preventing Divorce and Relationship Dissolution**
Couples therapy. Given the robust evidence indicating the physical and mental health implications of relationship dissolution and termination, psychologists of various theoretical orientations have developed a variety of evidence-based interventions targeting maladaptive relational processes such as cognitive behavioral couples therapy, solution focused therapy, and integrative behavioral couples therapy (Baucom, Shoham, Mueser, Daiuto, & Stickle, 1998; Christensen, Jacobson, & Babcock, 1995; Gurman, Lebow, & Snyder, 2015). These interventions are, by and large, delivered to distressed couples with the aim of decreasing relationship stress and increasing positive behavioral patterns with the ultimate goal of increasing health of the relationship. Despite a large body of evidence supporting the effectiveness of couples therapy, few couples seek formal couple-level interventions (Markman & Rhoades, 2012). This may be due to the inaccessibility of couples therapy for reasons such as financial burden, availability of specialists in the community, time constraints of the couple, and resistance of members of the couple, particularly men (Judd, Komiti, & Jacson, 2008; Ojeda & Bergstresser, 2008). Given the barriers to engagement in couples therapy, relationship researchers have developed a variety of relationship education programs designed to increase marital satisfaction; the primary aim of such programs being prevention of the deleterious effects of relationship dissolution and divorce without the burdens associated with more traditional couple-level interventions (Markman and Rhoades, 2012; McAllister, Duncan, & Hawkins, 2012; Rogge, Cobb, Lawrence, Johnson, & Bradbury, 2013).

Relationship education programs. Relationship researchers have developed, tested, and widely implemented a multitude of relationship education programs aimed at the prevention of future marital dissolution. The principal theoretical framework of the majority
of these evidence-based relationship education programs, drawing on behavioral exchange and social learning theories (Gottman, Notarius, Markman, Bank, Yoppi, & Rubin, 1976; Jacobson & Margolin, 1979), is that quality of communication and conflict management early in the relationship is predictive of sustained relationship quality over time (Markman & Rhoades, 2012; Rogge et al., 2013). To narrow the focus of this brief review of relationship education programs, I discuss four of the most widely studied relationship education programs: Prevention and Relationship Education Program (PREP; Renick, Blumberg, & Markman, 1992), Compassionate and Accepting Relationships Through Empathy (CARE; Rogge, Johnson, Lawrence, Cobb, & Bradbury, 2002), the Building Strong Families study (BSF; Hershey, Devaney, Dion, & McConnel, 2004), and The Supporting Healthy Marriages project (SHM; Gaubert, Knox, Alderson, Dalton, Fletcher, & McCormick, 2010).

**Prevention and Relationship Education Program (PREP; Renick, Blumberg, & Markman, 1992)** consists of six weekly sessions lasting 2-2.5 hours during which a small group of couples hear a set of brief lectures on communication skills and relationship issues. The program is broken up into 12 units, each of which is designed to 1) provide psychoeducation about principles associated with healthy relationships and 2) teach skills such as healthy communication styles and effective problem solving skills. Couples participating in the first large scale implementation of PREP in the mid 1990’s exhibited improved communication skills and increased relationship satisfaction post-intervention, at 18-month follow-up, and at 36-month follow-up. At 4- and 5- year follow-up, the gap between the intervention group and control group on measures of relationship satisfaction had decreased to a non-significant difference. However, the authors found a group by sex interaction such that men in the intervention group showed higher levels of relationship
satisfaction as compared to men in the control group at 5-year follow-up (Markman, Renick, Floyd, Stanley, & Clements, 1993). The authors also found that couples in the intervention group showed greater communication skills at 4-year follow-up, but no group difference at 5-year follow-up. The results of a recent large scale randomized controlled trial of PREP in the U.S. Army suggest that Army couples participating in PREP had significantly lower divorce rate as compared to couples in the control group at one-year follow-up (Stanley, Allan, Markman, Rhoades, & Prentice, 2010). PREP has also been shown to improve marital satisfaction in couples across multiple countries including the United States, Australia, Germany, the Netherlands, Norway, and Iran (PREP, 2009; Fallahchai, Fallahi, & Ritchie, 2017).

Compassionate and Accepting Relationships Through Empathy (CARE; Rogge, Cobb, Lawrence, Johnson, & Bradbury, 2013) aims to strengthen relationships by training couples on being supportive and empathetic towards each other. CARE, based on integrative behavioral couples therapy (IBCT; Christensen et al., 1995), includes 16 lectures covering a set of acceptance-based skills designed to enhance empathy, compassion, and acceptance. In addition to conflict resolution and problem solving skills, CARE includes modules designed to teach couples basic support and cognitive reframing skills to help them provide positive support and empathically join with their partner to cope with conflict. In a recent randomized controlled trial comparing CARE to PREP and relationship awareness (RA) training¹, CARE performed equally as well as PREP and RA on reducing risk of separation or divorce over the

¹ The Relationship awareness (RA) training, developed specifically for the randomized control trial comparing CARE to PREP and RA, was designed to heighten partner’s attention to their relationships and the importance of regular relationship awareness. This was achieved through having couples focus on their existing behaviors and deciding themselves if the behaviors were adaptive or maladaptive (Rogge et al., 2013).
first 3 years of marriage, and was more successful than PREP and RA in decreasing hostile
conflict and aggression in women (Rogge et al., 2013).

*The Building Strong Families (BSF) Project* (Hershey, Devaney, Dion, & McConnel, 2004), sponsored by the Administration for Children and Families, was a nationwide
evaluation of relationship education interventions targeting unmarried, romantically involved
couples expecting or recently having had a child. The three core components of the BSF
project included: 1) individual support from family coordinators, 2) group sessions on
relationship skills, and 3) assessment and referral to support services as indicated. The main
components of the BSF project were curriculum-based psychoeducational groups designed to
teach participants relationship skills such as effective communication, the role of empathy in
interpersonal relationships, conflict management, and intimacy in marriage. Groups ranged in
size from 4-15 couples and involved 30-42 total hours of instruction. Over 5000 couples
across eight cities in the United States participated in the BSF project. Unfortunately, the
results of the project were somewhat disappointing. BSF had no effect on the quality of
couple’s relationships, and, at one site, had a number of iatrogenic effects on couple’s
relationships (Wood, McConnell, Moore, Clarkwest, & Hsueh, 2010). However, at a different
site, the program showed a consistent pattern of positive effects on couples’ relationships,
which may have been due to differences in the length of curriculum\(^2\) and demographic
characteristics across sites (Wood et al., 2010). Additionally, couples in the BSF program
showed decreases in symptoms of depression for both men and women, and improved
relationship quality in African-American couples.

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\(^2\) It should be noted the site showing positive improvements in relationship functioning, Oklahoma City, had the
shortest curriculum of the eight sites (Wood et al., 2010).
The Supporting Healthy Marriages (SHM project), funded by the Administration for Children and Families, evaluated the effectiveness of an empirically-supported relationship education program in at-risk couples (Gaubert et al., 2010). The program, designed to increase stability and decrease conflict in low-income married couples, provided relationship and marriage education workshops, supplemental activities that built on the workshops, and family support services to 1,769 community-dwelling adult couples. The workshops consisted of 24-30 hours of psychoeducational material delivered in a group setting across 10-15 weeks designed to increase relationship skills and provide information about parenting skills. The intention of the supplementary activities and family support services was to help augment and consolidate skills and information provided in the workshops. At a 30-month follow-up, couples randomized to the SHM group reported small increases in martial quality, reports of warmth and support, and positive communication skills, as well as small decreases in reports of troubled marriages and negative behavior (Lunquist, Hsueh, Lowenstein, Faucetta, Gubits, Michalopoulos, & Knox, 2014). However, it should be noted that the effect sizes of these results were small (d’s = -.09 to .13).

Do Relationship Education Programs Actually Work?

Despite promising evidence that relationship educations programs improve communication and relationship quality (Hawkins, Blanchard, Baldwin, & Fawcett, 2008; Halford & Snyder, 2012), the findings in the literature are mixed. One meta-analysis of premarital education programs found that, when including unpublished studies in the analyses, educational programs failed to show improvement in relationship satisfaction and communication (Fawcett, Hawkings, Blanchard, & Carrol, 2010). A review of relationship education program trials found the positive effects observed post-intervention were sustained
only in couples at risk for future relationship problems (Halford, Sanders, & Behrens, 2001). There is also a discrepancy in the efficacy of relationship education programs across socioeconomic status levels such that lower-income couples report smaller effect sizes (d’s = .25-.29) as compared to middle-income couples (d’s = .30-.40; Hawkins & Fackrell, 2010). Additionally, there is little evidence to suggest that more intensive, systematic relationship education programs are more effective than shorter, less formal programs (Hawkins, Stanely, Blanchard, & Albright, 2012; Rogge et al., 2013). The question remains as to the wide-spread utility of relationship education programs.

Problems in relationship education research. In a recent paper describing the state of relationship education research, Bradbury and Lavner (2012) identify a multitude of problems they believe are slowing the progression of relationship education programs. The current project addresses three of these problems: 1) accessibility of the interventions, 2) programmatic assessment of the potential mechanisms of change across the intervention, and 3) for whom the intervention is best suited.

Accessibility. Although relationship education programs are not as prohibitive as couples therapy with regard to cost and total time commitment, a number of these programs are, nonetheless, relatively time intensive. As such, couples at increased risk of developing relationship problems may have difficulty engaging in these preventative interventions due to conflicts with work, lack of child-care, and financial considerations associated with travel (Bradbury & Lavner, 2012; Halford, O’Donnel, Lizzio, & Wilson, 2006; Wadsworth & Markman, 2012). Evidence suggests that middle class newlyweds are at the lowest risk for marital difficulties in terms of age, education income, parental divorce, neuroticism, stress, and physical aggression, but are also the most likely to attend premarital education programs.
(Sullivan & Bradbury, 1997). Interventions designed to target at-risk populations defined by socioeconomic status (e.g. below the federal poverty line, lower levels of education, unemployment) have lower than expected adherence rates. In the previously mentioned Building Strong Families project, on average, 45% of couples assigned to the program never attended a session and 83% did not receive the recommended dosage (Dion, Avellar, & Clary, 2010).

*A limited focus on mechanisms.* To date, there are a limited number of studies assessing mechanisms of change in relationship education programs. The few studies that have systematically assessed potential mediators have found inconsistent results (Halford & Snyder, 2012; Halford & Pepping, 2017). This may be due to the fact that studies on mechanisms of change in relationship education programs predominately focus on communication as a mediator of treatment outcome. Additionally, the inconsistent results in the literature may be due to a moderated mediation effect such that mediators of change in outcome measures may be moderated by pretreatment sample characteristics. For example, couples entering into an evaluation of a relationship education program with high rates of negative communication have more room for improvement relative to couples entering with moderate to low levels of negative communication (Bradbury & Karney, 2004; Halford & Bodenmann, 2013). A recent study using a subsample of the Supporting Healthy Marriages project based on pretreatment levels of risk⁴ found improvement in communication mediated the relationship between group assignment and post-intervention relationship satisfaction in high-risk couples (Williamson, Altman, Hsueh, & Bradbury, 2016). To this author’s

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⁴ Risk was measured using a 10-item index. Couples were given 1 point for presence of each item (e.g. husband/wife with less than a high school education, income below the poverty line. Couples scoring 4 or more were considered “high-risk”.


knowledge, this is the only study to date that assessed meditational effects in subsamples with specific targeted pretreatment characteristics.

**A focus on moderators: For whom?** Evidence suggests that membership in an at-risk population moderates the efficacy of relationship education programs (e.g. presence of low levels of pretreatment relationship quality, socioeconomic status; Hawkins & Fackrell, 2010; Halford, Sanders, & Behrens, 2001; Williamson et al., 2015). There is some evidence to suggest at-risk couples exhibit greater increases in relationship outcomes than their low-risk counterparts (Amato, 2014; Halford, Sanders, & Behrens, 2001). This may be due to a gap in baseline relationship skills between low-risk and high-risk couples. That is, couples considered to be high-risk may have more room for improvement compared to low-risk couples and gain more from the intervention (e.g. exhibit greater improvement in communication skills; Williamson et al., 2016). However, until recently, the majority of research on relationship education programs has included relatively homogenous samples, comprised of primary white, middle-aged, heterosexual couples (Hawkins et al., 2012; Markman & Rhoades, 2012). The largest study to date assessing the effectiveness of a relationship education program in at-risk couples (the Supporting Healthy Marriages project) found little evidence of clinically significant improvement in relationship-level outcome measures across the entire sample (Lunquist et al., 2014).

**Movement Toward Brief, Theory-driven Interventions**

There is an ongoing movement within relationship education research and clinical psychology broadly highlighting the need to put forth more effort on investigating why and for whom existing evidence-based treatments are effective rather than developing new treatments (Shoham & Insel, 2011; Shoham, et al., 2014). Additionally, some clinical
scientists argue that the field of clinical science should focus more on decreasing the mismatches between interventions and utilizers by building and implementing more efficient and accessible evidence-based interventions (Weisz, Ng, & Bearman, 2014). One way to reconcile this mismatch is through the use of “wise” psychological interventions (Walton, 2014). These wise interventions target basic psychological processes to elicit change with minimal burden on the consumer and community. For example, a study examining the effect of a message framing intervention designed to increase student’s tendency to view difficulties as common and transient, rather than internally driven and fixed, found that students in the intervention group exhibited improved academic performance and self-reported health at 3-year follow-up as compared to the control group (Walton & Cohen, 2011).

A number of brief psychological interventions are effective for improving mental and physical health outcomes. For example, an intervention targeting nursing home resident self-efficacy by reminding the residents of their responsibilities found that those in the intervention group reported increased happiness, physical activity, and alertness. At 18-month follow-up, the residents in the intervention group experienced a lower mortality rate as compared to the control condition (Langer & Rodin, 1976; Rodin & Langer, 1977). In an intervention designed to reduce weight in undergraduate women, participants in the intervention group wrote about values important to them. At a 10-week follow up, participants in the intervention group lost, on average, 6 more pounds as compared to the control group and exhibited small improvements in eating habits (Logel & Cohen, 2012). A recent experimental study found that adults in long distance romantic relationships reported greater positive emotion following a relational savoring task as compared to individuals in a neutral control condition and a personal savoring condition (Borelli, Rasmussen, Burkhard, & Sbarra, 2014). Finally, a recent
meta-analysis examining the overall effect of a relationship check-up, a brief preventative intervention consisting of an assessment and feedback session reviewing couples’ relationship functioning delivered over the course of 2 sessions, found couples receiving the check-up reported improved marital functioning and individual mental health (Fentz & Trillingsgaard, 2017).

There is also a growing body of literature highlighting the utility of the internet as a medium through which to deliver psychological treatments targeting mental and physical health issues including depression, anxiety, posttraumatic stress disorder, diet, and physical activity (Andersson & Cuijpers, 2009; Barak, Hen, Boniel-Nissim, & Shapira, 2008; Van den Berg, Schoones, & Vieland, 2007). Importantly, work in this area has extended to the realm of relationship interventions. For example, a recent randomized control trial of a brief, online-based couples intervention adapted from an empirically-based couples therapy, the OurRelationship Program, showed positive improvements across multiple relationship-level domains (Doss et al., 2016). These results suggest that extremely brief, cost effective, low-dose interventions can have lasting effects, which are comparable to more time intensive and expensive traditional psychotherapeutic interventions.

Relationship education researchers are moving toward more accessible interventions that bypass the issues surrounding accessibility by utilizing various technologies to aide in the dissemination of relationship education programs (Bodenmann, Hilpert, Nussbeck, & Bradbury, 2014; Doss et al., 2016). Preliminary studies of an electronic version of Prevention and Relationship Enhancement Program (ePrep) and a blended bibliotherapy/web-based couples intervention have shown some positive results (Braithwaite & Fincham, 2009, 2011; Kalinka, Fincham, & Hirsch, 2012). Additionally, a self-directed digital video disc (DVD)-
based intervention designed to enhance couples’ communication showed some improvement in dyadic coping, and relationship satisfaction as well as reductions in conflict behavior, albeit only for women (Bodenmann et al., 2014).

The Marriage Hack

Using the previously described logic as a backdrop, the current study employed a randomized-controlled trial research design to implement the “Marriage Hack” (MH) in a community-based sample of couples in romantic relationships. The MH intervention is a brief, web-based intervention designed to negate naturalistic declines in marital quality via promotion of emotional reappraisal of conflict-related behavior in married couples (Finkel et al., 2013). The idea of a “hack,” a term generated from the field of computer science, is essentially a shortcut or work-around for a larger problem. Finkel and colleagues have borrowed this idea and applied it to a preventative relationship intervention. The MH intervention is based on a large body of research suggesting that negative-affect reciprocity, a pattern of retaliatory behavior between spouses during conflict (e.g. a wife’s criticism of husband’s lack of assistance with the children followed by husband’s angry denial or yelling back about wife’s lack of sensitivity to his schedule), is a robust predictor of poor marital quality (Gottman, 1998). This particular process is the target of a multitude of couple and family interventions (Baucom et al., 1998). However, as noted above, these interventions are often time consuming and financially burdensome.

In line with the theory of “wise” interventions that target underlying psychological processes, and the increased accessibility afforded by internet-based interventions, the MH intervention aims to decrease negative-affect reciprocity. Utilizing emotional reappraisal (reinterpreting the meaning of emotion-eliciting situations; Gross, 2002), the MH intervention
aims to decrease conflict-related anger and distress as well as aid in the de-escalation of negativity; behaviors that are associated with long term stability in relationships (Gottman, Coan, Carrere, & Swanson, 1998). The focus on emotional reappraisal was based on evidence from a laboratory experiment in which participants asked to reappraise an interpersonal conflict from a third party perspective experienced less anger and distress as compared to both participants given no instructions and participants asked to dwell on the conflict (see Ray, Wilhelm, & Gross, 2008).

**Results from the original MH prevention study.** Following a one-year baseline measure of marital quality (participants assessed at baseline and once every four months for a total of 4 waves, Waves 1-4), couples (N = 120) were randomized to either a control condition or an emotional reappraisal intervention condition (Waves 5-7). Once every four months for a year, participants in the intervention group engaged in a 7-minute writing task designed to elicit emotional reappraisal of a recent conflict. Conversely, participants in the control group provided a fact-based summary of a conflict that occurred during the previous four months. Participants completed all study assessments and tasks via email. As hypothesized, couples reported a steady decline in marital quality across the baseline period of the study (Waves 1-4) and couples in the control condition continued to exhibit a decline in quality during the treatment phase of the study (Waves 5-7). Conversely, the findings revealed that couples randomized to the emotional reappraisal condition exhibited a flattening of reported marital quality across the treatment phase of the study (Waves 5-7). This finding suggests the emotional reappraisal intervention protected couples from experiencing the normative decline in marital quality observed in the control condition (Finkel et al., 2013). The authors also investigated the possibility that the effect of the emotional reappraisal condition on the
negative slope of marital quality would be mediated by decreases in reported conflict-related distress - a two item measure assessing couple’s subjective distress after the conflict writing task. The results revealed a significant mediation effect suggesting reduced conflict-related distress was integral to explaining the effect of the emotional reappraisal condition on stabilizing marital quality (Finkel et al., 2013).

**The Current Study**

The current study aims to expand the preventative relationship education literature by replicating the MH intervention with modifications to increase accessibility and to test theoretically driven mediators and moderators of change.

**Accessibility.** The original MH study delivered the intervention over the course of one year. To decrease participant burden and increase accessibility, the modified MH intervention used in this study was delivered with shorter duration (four weeks vs. one year), in addition to increased frequency and dosage (once per week vs. once every four months; 28 total minutes vs. 21 total minutes). Additionally, the original MH study was limited to married, heterosexual couples recruited from the Chicago Metropolitan area (an area with a median household income that is $10,000 above the national average; CDC, 2013). The current study targeted a community-based population often under-represented in relationship education research with fewer financial resources than couples in the original study. Finally, the original MH study, similar to other evaluations of relationship education programs and preventative interventions, was not accessible to a large portion of the population due to strict inclusion/exclusion criteria creating a homogenous sample (Bradbury & Lavner, 2012; Halford, O’Donnel, Lizzio, & Wilson, 2006). The current study used broader inclusion/exclusion criteria to allow for the inclusion of non-married cohabitating couples and
same-sex couples (areas of increasing interest for relationship education researchers; Markman and Rhoades, 2012).

Theory-based mechanisms of change. As previously stated, a gap in the relationship education literature exists with regards to mechanisms of change (Halford & Snyder, 2012; Halford & Pepping, 2017). The current study adds to the literature by examining the following theory-based mechanisms of change in addition to replicating the mediation effect of conflict related distress on outcome observed in the original MH study (conflict-related distress): cognitive reappraisal, forgiveness, and communication.

Conflict-related distress. The original MH study (Finkel et al., 2013) found changes in conflict-related distress mediated the effect of the emotional reappraisal condition on changes in marital quality. By taking a 3rd party perspective, couples in the reappraisal group exhibited decreased conflict-related anger and distress based on the default natural tendency for individuals to view interpersonal conflict from a first-person perspective (Ray, Wilhelm, & Gross, 2008). The current study attempted to replicate the finding that change in marital quality in the intervention group would be mediated through decreases in conflict-related distress.

Cognitive reappraisal. Cognitive reappraisal, the ability to engender alternative thoughts in the presence of maladaptive cognitions, is an effective coping strategy associated with improved ability to regulate emotions in the presence of stressful stimuli (Gross, 2002). The ability to reappraise negative thoughts is a major tenant of cognitive-behavioral therapies and some mindfulness-based therapies, and has been shown to be a key mechanism of change in the treatment of depression, chronic stress, and chronic pain (Driessen & Hollon, 2010; Garland, Gaylord, & Fredrickson, 2011). Cognitive reappraisal is also an important part of
cognitive-behavioral therapies for couples (Baucom, Epstein, Kirby, & LaTaillade, 2010; Epstein & Baucom 1989). For example, cognitive-behavioral marital therapy includes cognitive-based interventions designed to help partners “reassess their cognitions about behaviors, so that they can be viewed in a more reasonable and balanced fashion” (Baucom et al., 2010). Although there is strong support for the utility of cognitive reappraisal in marital and couples therapies, less is known about the role of cognitive reappraisal in relationship education programs. Although the MH intervention was based on principles laid out in the seminal literature on emotional reappraisal, the authors of the original MH study did not include a measure of this construct. It may be the case that decreases in conflict-related distress were a proxy for couple’s ability to engage in cognitive reappraisal of thoughts around the conflict.

**Forgiveness.** Forgiveness in romantic relationships is associated with couple-level wellbeing and precedes engagement in a variety of prosocial relationship maintenance behaviors including accommodation, willingness to sacrifice, and conflict resolution (Gordon & Baucom, 2003; Resbult, Hannon, Stocker, & Finkel, 2005). Forgiveness is also associated with strong levels of commitment in romantic relationships. Additionally, the commitment-forgiveness relationship is mediated by positive cognitive interpretations following conflict such as externalizing the cause of the partner’s betrayal to chance or situational variables as opposed to more trait-like dispositional factors (Finkel, Rusbult, Kumashiro, & Hannon, 2002). It may be the case that the MH intervention aids in the partner’s ability to reassess relational transgressions by encouraging psychological transformation, the process by which the victim takes broader considerations (e.g. norms and values) into account when evaluating the transgression. In other words, the victim may be more willing to give his or her partner the
“benefit of the doubt” and develop more benevolent, betrayal-relevant cognitions (Finkel et al., 2002). Additionally, the MH intervention asks couples to view the transgression in a more objective manner which may facilitate couples to engage in empathic joining; a process associated with forgiveness (Resbult et al., 2005) and a major tenant of Integrative Behavioral Couples Therapy (Jacobson, Christensen, Prince, Cordova, & Eldridge, 2000).

Communication. Relationship education programs frequently aim to improve communication skills and, overall, accomplish this goal. A recent meta-analysis analyzing 117 experimental and quasi-experimental studies assessing the efficacy of relationship education programs on improvement in communication skills found that couples enrolled in the intervention group exhibited medium to large effect sizes in improvement of communication skills post-intervention ($d$'s = .36-.54; Hawkins et al., 2008). Improving communication skills is also a major tenant of effective behavioral and cognitive-behavioral marital and couples interventions (Baucom et al., 1998; Epstein & Baucom 1989; Baucom et al., 2010). Many of the techniques utilized in evidence-based behavioral and cognitive-behavioral marital or couples therapies attempt to improve relationship level outcome measures by decreasing the frequency of negative behavioral exchanges (e.g. negative reciprocity - a behavioral pattern observed in distressed couples in which negative response from one partner produces a negative response from the other partner; Epstein & Baucom, 1989). Although the MH intervention does not explicitly target communication patterns, it may be the case that improved communication will be the behavioral manifestation of the intervention’s targeted cognitive processes: decreased conflict-related distress and increased cognitive reappraisal following relational conflict.
**Theory-driven moderators.** As stated above, few studies have examined for whom relationship education programs are most effective. A recent study assessing a sub-sample of low-income couples within the SHM project found that high-risk couples in the intervention group showed improved communication and relationship satisfaction (Williamson, et al., 2016). Mental health status also moderates program effectiveness. A randomized-controlled trial evaluated a version of PREP combined with a program targeting families with economic strain called the Fatherhood, Relationship, and Marriage Education Program (FRAME; Wadsworth et al., 2011). The researchers found participants who met Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) criteria for serious depression had a compromised ability to participate actively in the intervention, and their symptoms interfered with learning new material (Wadsworth & Markman, 2012). The original MH study recruited participants from a primarily white, upper-middle class metropolitan area and did not examine the role of pre-treatment characteristics on the efficacy of the intervention. It may be the case that socioeconomic status and health status moderate the efficacy of the MH intervention.

**Research model.** Based on the literature reviewed above and the growing need to develop brief, highly accessible interventions targeting evidence-based psychological processes in order to bridge the treatment-consumer gap (Kazdin, 2017), the current study used a randomized-controlled trial in which participants were blind to condition to examine the efficacy of a modified version of the MH intervention (Finkel et al., 2013). Table 1 displays the primary study aims and hypotheses.
Table 1

<table>
<thead>
<tr>
<th>Specific Aims</th>
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<tr>
<td><strong>Aim</strong></td>
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2. METHOD

Participants

Participants were 156 (78 couples) community-dwelling adults recruited through flyers in local establishments (e.g. coffee shops, retail stores, restaurants), community agencies, low-cost community clinics, and via online advertising through various University affiliated agencies (e.g. University of Arizona Connect, University of Arizona Graduate and Professional Student Council Listserv). On average, participants were 30 years old ($SD = 8.12$, range $= 18$-$70$), reported having been in a romantic relationship with their current partner for 70 months ($SD = 50.62$, range $= 6$-$276$), and indicated having cohabited with their current partner for 48.5 months ($SD = 48.24$, range $= 1$-$264$). Forty-four percent of participants reported being married and the remainder reported being unmarried. Sixty-eight percent of participants identified as non-Hispanic White, 14.7% as Hispanic, 3.2% as African American, 2.6% as Asian/Pacific Islander, 3.2% as Native American and 2.7% as other. Thirty-two percent of participants reported an annual individual income of less than $20,000, 20.5% reported an income between $20,000-$29,999, 22.4% reported an income between $30,000-$49,999 and 18.9% reported an annual income of $>50,000$. It should be noted that a large portion of the participants reported being full-time students, which may have skewed annual income to the lower range. Sixty-one percent of participants who reported being a full-time student also reported an annual income of less than $20,000$. There was a significantly higher proportion of students in the lowest income bracket compared to non-students $\chi^2 (1, 148) = 15.67$, $p < .001$, $\phi = .32$. However, it should be noted 24.4% of non-students reported an annual income of less than $20,000$ and the majority of non-student participants (73%) reported an annual individual income of less than $50,000$. 
The study employed a randomized-controlled trial design with two treatment arms: an intervention group and an active control group, both of which are described in detail below. Figure 1 depicts a CONSORT Diagram displaying the flow of participants through the randomized-controlled trial. Of the 198 participants (99 couples) who inquired about participation in the study, 178 (89 couples) were screened via a telephone for eligibility. Fourteen (7 couples) people did not meet eligibility criteria and 8 (4 couples) were dropped from the study prior to randomization as they declined participation or were unable to be contacted by study staff following the telephone screening. A total of 156 participants (78 couples) were randomized including 82 (41 couples) to the intervention condition and 74 (37 couples) to the control condition. Following randomization, 33 participants (26 couples) were dropped from the study due to lack of contact and 14 participants (5 couples) requested withdrawal. At the conclusion of the study, a total of 53 participants (23 couples) completed the intervention and 56 participants (24 couples) completed the control condition.

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4 Undergraduate research assistants attempted to contact each participant 3 times via email and 3 times via telephone once a day for 6 days if the participant did not complete the weekly task within 24 hours of receiving the task via email. After the third phone attempt, I attempted one final contact via telephone. The participant was dropped from the study if he/she did not respond to contact attempts within 7 days of initial receipt of the task.

5 One couple separated during the study protocol and requested withdrawal from the study. The reminder of the participants who requested withdrawal during the intervention phase of the study did not provide a specific reason as to why they were withdrawing. Individuals were allowed to remain in the study if their partner requested to withdraw from the study.
Assessed for eligibility (n= 178; 89 couples)

- Excluded (n= 22; 11 couples)
  - Not meeting inclusion criteria (n= 14; 7 couples)
  - Declined to participate (n= 2; 1 couple)
  - Other reasons (n= 6; 3 couples)

Randomized (n=156; 78 couples)

- Excluded (n= 20; 10 couples)
  - Unable to contact (n= 12; 6 couples)
  - Declined to participate (n= 8; 4 couples)

Allocated to control group (n=74; 37 couples)
- Baseline (n=70; 33 couples)
- Time 1 (n=66; 31 couples)
- Time 2 (n=65; 30 couples)
- Time 3 (n=62; 27 couples)
- Time 4 (n=58; 25 couples)
- Time 5 (n=56; 24 couples)

Allocated to intervention (n=82; 41 couples)
- Baseline (n=78; 36 couples)
- Time 1 (n=68; 32 couples)
- Time 2 (n=62; 26 couples)
- Time 3 (n=56; 23 couples)
- Time 4 (n=54; 23 couples)
- Time 5 (n=53; 23 couples)

Figure 1. CONSORT Diagram
The retention rate of participants was as follows: 85.9% at the first weekly assessment \(n=134; 63 \text{ couples}\), 81.4% at the second weekly assessment \(n=127; 56 \text{ couples}\), 75.6% at the third weekly assessment \(n=118; 50 \text{ couples}\), 71.8% at the fourth weekly assessment \(n=112; 48 \text{ couples}\), and 69.9% at the post intervention survey \(n=109; 47 \text{ couples}\). Table 2 displays the results of a series of one-way analysis of variance (ANOVA) and chi-square tests examining baseline differences across treatment conditions in key demographic variables, hypothesized mediators, and outcome variables. Analyses revealed one significant pre-treatment difference in number of participants of self-reported Asian descent randomized to each condition, \(\chi^2(1, 142) = 4.64, p < .05, \phi = .18\). Five participants of Asian descent were randomized to the intervention and none were randomized to the control condition. A series of ANOVA’s and chi-square tests examining differences between participants completing the protocol versus not completing the protocol revealed significant differences in baseline self-reported anxiety symptoms, \(F(1,145) = 12.43, p = .001, \eta^2 = .079\), such that participants completing the protocol entered in the study with less global anxiety \((M = 3.9, SD = 3.0)\) than non-completers \((M = 5.9, SD = 3.5)\). Additionally, a significantly higher proportion of non-completers self-identified as African-American as compared to participants completing the protocol, \(\chi^2(1, N = 142) = 5.24, p = .02, \phi = .18\). Analyses revealed no additional differences between participants completing the study protocol and participants dropping out prior to completion \(p’s > .05\)^6.

\(^6\) It should be noted analyses revealed no difference in completion rate across gender, \(\chi^2(1, 156) = 3.17, p = .08, \phi = .14\).
### Table 2

Equivalence of Groups at Pretreatment

<table>
<thead>
<tr>
<th>Variable</th>
<th>Control</th>
<th>Intervention</th>
<th>Treatment contrast</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of couples</td>
<td>33</td>
<td>36</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>29 (6.5)</td>
<td>31 (9.3)</td>
<td>$F(1, 146) = 2.37$</td>
<td>.016</td>
</tr>
<tr>
<td>Years of education</td>
<td>14.6 (6.0)</td>
<td>15.1 (5.8)</td>
<td>$F(1, 154) = 0.26$</td>
<td>.002</td>
</tr>
<tr>
<td>Caucasian</td>
<td>70%</td>
<td>62.2%</td>
<td>$\chi^2(1) = 1.38$</td>
<td>.097</td>
</tr>
<tr>
<td>Latino/a</td>
<td>16.2%</td>
<td>22.0%</td>
<td>$\chi^2(1) = 0.80$</td>
<td>.074</td>
</tr>
<tr>
<td>Native American</td>
<td>2.7%</td>
<td>6.1%</td>
<td>$\chi^2(1) = 1.03$</td>
<td>.084</td>
</tr>
<tr>
<td>African American</td>
<td>1.4%</td>
<td>6.1%</td>
<td>$\chi^2(1) = 2.35$</td>
<td>.126</td>
</tr>
<tr>
<td>Asian/Pacific Islander</td>
<td>0%</td>
<td>6.1%</td>
<td>$\chi^2(1) = 4.64^*$</td>
<td>.177*</td>
</tr>
<tr>
<td>Length cohabiting</td>
<td>45.7 (51.0)</td>
<td>50.9 (45.8)</td>
<td>$F(1, 146) = 0.42$</td>
<td>.003</td>
</tr>
<tr>
<td>Relationship length</td>
<td>67.3 (54.2)</td>
<td>71.9 (47.4)</td>
<td>$F(1, 146) = 0.30$</td>
<td>.002</td>
</tr>
<tr>
<td>Married</td>
<td>36.5%</td>
<td>50.1%</td>
<td>$\chi^2(1) = 2.91$</td>
<td>.140</td>
</tr>
<tr>
<td>Hx counseling</td>
<td>10.8%</td>
<td>18.3%</td>
<td>$\chi^2(1) = 1.91$</td>
<td>.108</td>
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<tr>
<td>Pre-tx relationship quality</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>CSI-4</td>
<td>10.7 (7.2)</td>
<td>11.1 (8.5)</td>
<td>$F(1, 145) = 3.74$</td>
<td>.025</td>
</tr>
<tr>
<td>PRQC</td>
<td>36.5 (4.7)</td>
<td>35.8 (7.7)</td>
<td>$F(1, 145) = 0.69$</td>
<td>.005</td>
</tr>
<tr>
<td>Pre-tx mental/physical health</td>
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<tr>
<td>CES-D</td>
<td>10.7 (7.2)</td>
<td>11.1 (8.5)</td>
<td>$F(1, 145) = 0.10$</td>
<td>.001</td>
</tr>
<tr>
<td>OASIS</td>
<td>4.2 (2.9)</td>
<td>4.5 (3.5)</td>
<td>$F(1, 145) = 0.44$</td>
<td>.003</td>
</tr>
<tr>
<td>SF-36</td>
<td>76.0 (17.5)</td>
<td>71.3 (17.2)</td>
<td>$F(1, 145) = 2.69$</td>
<td>.018</td>
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</table>

*Note: Values in parentheses are standard deviations. Control = control group; Intervention = Marriage Hack intervention group; effect size = partial eta squared coefficients for all analyses of variance and phi coefficients for the chi-square analyses; length cohabiting = length of cohabitation in months; relationship length = length of relationship in months; Married = dichotomous variable coded 0 (not married) or 1 (married); Hx counseling = self-reported history of couples counseling coded 0 (no history) or 1 (history); CSI-4 = Couples Satisfaction Inventory; PRQC = Perceived Relationship Quality Components Inventory; CES-D = Center for Epidemiological Studies Depression Scale; OASIS = Overall Anxiety Severity and Impairment Scale; SF-36 = 36-item Short Form Survey Instrument - general health subscale.*

* $p < .05$
Procedure

Figure 2 provides a visual representation of the study design. All aspects of the study were approved by the University of Arizona Institutional Board.

A graduate student research coordinator contacted interested participants via telephone to review the consent form and complete a 10-minute telephone screening to assess for participant eligibility, interest, and global relationship quality. Eligibility requirements had to be met by both members of the couple for entry into the study and included a) regular access to a computer or smartphone with internet capability, b) cohabitation, and c) English fluency. Couples were excluded if they reported a) pending legal filings for divorce/separation, b) history of separation/divorce with the current partner, c) severe relationship discord as indicated by a score of $\geq 13$ on the four-item revised Dyadic Adjustment Scale (DAS-4; Sabourin, Valois, & Lussier, 2005; as the current study was designed to be preventative rather than rehabilitative), d) current suicidal or homicidal ideation, e) current diagnosis of a severe mental illness (bipolar, schizophrenia, posttraumatic stress disorder, borderline personality disorder), f) presence of an unmanaged severe medical condition (e.g., terminal cancer, unmanaged HIV), mental disorders due to a medical condition (e.g., dementia, Alzheimer’s disease, Parkinson’s disease), or g) presence of intimate partner violence. The graduate student research coordinator offered community referrals to couples excluded for mental health reasons.

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7 The 4-item revised dyadic adjustment scale (DAS-4) has been shown to correctly classify distressed couples at a high rate (78.2% with a cut off score of 13; Sabourin et al., 2005).
health, physical health, relationship discord, and/or intimate partner violence. At the conclusion of the telephone screening, eligible participants interested in continuing on with the study provided the research coordinator with a preferred start date that fell within 7 days of the screening.

Couples meeting eligibility criteria were randomized to one of two experimental conditions: the control task treatment condition \((n=74; 37 \text{ couples})\) or the intervention condition \((n=82; 41 \text{ couples})\). Following randomization, participants were sent an email containing a unique study ID and a link to the baseline (T0) questionnaires assessing relevant demographic information, relationship satisfaction, perceived socioeconomic status, and physical and mental wellbeing. Following the T0 questionnaires, participants received an email with a link to either the control task or intervention task followed by a set of questionnaires assessing hypothesized mediators once per week for a total of 4 weeks (T1-T4). On these occasions, participants first completed the control task or intervention task, then completed the set of questionnaires. Participants received an expanded set of questionnaires following the third weekly writing task (T3) containing both hypothesized mediators and outcome measures to set temporal precedence for mediation analyses. One week following the final measurement occasion (T4), participants received a post-intervention set of questionnaires including hypothesized mediators of change and outcome measures (T5). Participants also completed a 3-month follow-up set of questionnaires assessing hypothesized mediators, outcome measures, and current relationship status (T6). Participants in both groups completed the same set of questionnaires at each time point. All survey and intervention data were collected using Qualtrics (Qualtrics, Provo, UT), an online data

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\(^8\) As of the writing of this project, data are still being collected from the 3-month follow-up measurement occasion.
collection tool. Participants received $20 upon completion of the post-intervention survey (T5).

**Treatment Conditions**

**Control task.** Following the protocol from the original MH study (Finkel et al., 2013), participants in both treatment conditions completed the weekly control-writing task. During the writing task, each participant was asked to, independently of their partner, write a “fact based summary of the most significant disagreement” they had experienced with their partner over the past week “focusing on behaviors, not thoughts or feelings.” Participants were allowed to write for as long as they desired.

**Intervention.** Participants randomized to the intervention group, following completion of the weekly control-writing task, completed an additional writing-based reappraisal task responding to the following three prompts:

1) “Think about the specific disagreement that you just wrote about having with your partner. Think about this disagreement with your partner from the perspective of a neutral third party who wants the best for all involved; a person who sees things from a neutral point of view. How might this person think about the disagreement? How might he or she find the good that could come from it?”

2) “Some people find it helpful to take this third-party perspective during their interactions with their romantic partner. However, almost everybody finds it challenging to take this third-party perspective at all times. In your relationship with
your partner, what obstacles do you face in trying to take this third-partner perspective, especially when you’re having a disagreement with your partner?”

3) “Despite the obstacles to taking a third-party perspective, people can be successful in doing so. Over the next 7 days, please try your best to take this third-party perspective during interactions with your partner, especially during disagreements. How might you be most successful in taking this perspective in your interactions with your partner over the next week? How might taking this perspective help you make the best of disagreements in your relationship?”

Following the protocol of the original MH study, participants were allotted seven minutes to complete the intervention questions.

Measures

**Relationship quality and relationship satisfaction.** Perceived relationship quality was assessed using the Perceived Relationship Quality Component (PRQC), an 18-item inventory assessing six factors of global relationship quality on a 7-point Likert scale (1 = not at all to 7 = extremely). The factors include relationship satisfaction (e.g., “How satisfied are you with your relationship?”), love (e.g., “How much do you love your partner?”), intimacy (e.g., “How intimate is your relationship?”), trust (e.g., “How much do you trust your partner”), passion (e.g., “How passionate is your relationship”), and commitment (e.g., “How committed are you to your relationship?”). The six factors assessed in the questionnaire are discrete from each other and converge on the higher order construct of perceived global relationship quality (Fletcher, Simpson, & Thomas, 2000). In addition to the six subscales, a
global perceived relationship quality index was created using individual items from each subscale (Items 1, 4, 7, 10, 13, and 16) as recommended by the creators of the scale (Fletcher et al., 2000).

Relationship satisfaction was assessed using the four-item Couples Satisfaction Index (CSI-4; Funk & Rogge, 2007). The CSI-4 is made up of empirically selected items from the original 32-item CSI and assesses global relationship satisfaction. The CSI, developed using item response theory, shows a higher precision of measurement than commonly used self-report measures of relationship quality (e.g., Dyadic Adjustment Scale; Spanier, 1976; Marital Adjustment Test; Locke & Wallace, 1959). Example items include, “please indicate the degree of happiness, all things considered, of your relationship” on a 7-point Likert scale (0 = Extremely Unhappy to 6 = Perfect), and, on a 6-point Likert scale (0 = Not at all True to 5 = Completely True), “I have a warm and comfortable relationship with my partner.” Scores were summed for each occasion. Both the PRQC (α’s = .80-.98) and the CSI-4 (α’s = .93-.98) exhibited good internal reliability across the measurement occasions (see Table 3).

**Relationship discord.** To assess for current relationship discord, couples completed a brief, 4-item version of the Dyadic Adjustment Scale (DAS-4; Sabourin, Valois, & Lussier, 2005) during the telephone screen. Evidence suggests that the DAS-4 is effective in successfully discerning distressed from non-distressed couple with significantly less participant burden than the 32-item original version of the DAS (DAS-32; Spanier, 1976). Because the current study is preventative rather than rehabilitative, couples exceeding the recommended cut off (≥13) were excluded and referred to couple’s therapy. Example items include, on a 6-point Likert scale (0 = All of the Time to 5 = Never), “How often have you discussed or considered divorce, separation, or terminating your relationship”, and “How
often do you confide in your partner?” (item reverse coded). The DAS-4 showed adequate internal reliability ($\alpha = .61$; see Table 3).

**Mental health.** The Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) assessed participant depression. The CES-D is a 20-item scale assessing symptoms of depression on a 4-point Likert scale ($0 = \text{rarely or none of the time [<1 day during the past week]}$ to $3 = \text{most of all the time [5-7 days during the past week]}$). Items 4, 8, 12, and 16 were reverse coded and scores were summed for each measurement occasion. Scores above 16 on the CES-D represent an increased risk for a major depressive episode. The CES-D demonstrated good internal consistency across measurement occasions ($\alpha$’s = .86-.91).

The Overall Anxiety Severity and Impairment Scale (OASIS; Norman, Cissel, Means-Christensen, & Stein, 2006), a 5-item scale assessing symptoms of generalized and specific anxiety disorders, assessed participants’ self-reported global anxiety. Example items include, “In the past week how often have you felt anxious” (answers range from ‘No anxiety in the past week’ to ‘Constant anxiety. Felt anxious all of the time and never really relaxed’) and, “In the past week, how often did you avoid situations, places, objects, or activities because of anxiety or fear?” (answers range from ‘None: I do not avoid places, situations, activities, or things because of fear’ to ‘All of the Time: Avoiding objects, situations, activities, or places has taken over my life. My lifestyle has been extensively affected and I no longer do things that I used to enjoy’). Scores were summed for each measurement occasion and the OASIS showed good internal consistency across measurement occasions ($\alpha$’s = .85-.89).

**Socioeconomic status.** Socioeconomic status was determined using a dichotomized risk score for each participant. Previous relationship education studies have assessed risk by
creating a composite variable comprised of relevant demographic variables (e.g. education level, income, eligibility for government assistance), and dichotomizing each variable to create low-risk and high-risk categories (Williamson et al., 2016; Amato 2014). The initial risk score created for this study consisted of income (reported income <$20,000), education (<15 years - equivalent to “some college”), eligibility for government assistance, and eligibility for government health insurance (e.g. Medicaid/Medicare). This risk score exhibited inadequate reliability ($\alpha = .39$). Based on scale analyses, removing the education variable increased internal consistency of the composite scale ($\alpha = .58$). Participants were considered high risk with a score greater than or equal to 2. Mean risk score in the current sample was .58 ($SD = .84$, range 0-3).

**Self-rated physical health.** The Short Form 36 (SF-36; Ware & Sherbourne, 1992) assessed physical health and general wellbeing. The SF-36 is a 36-item measure assessing eight domains of physical health and general well-being: physical functioning, role limitations due to physical problems, social functioning, bodily pain, emotional wellbeing/general mental health, role limitations due to emotional problems, vitality/energy, and general health perceptions. After recoding each item as specified in the original scale (see Appendix F), items were averaged for each measurement occasion. Each domain exhibited adequate to good internal consistency across measurement occasions: (physical functioning [$\alpha$’s = .83-.91], role limitations due to physical problems [$\alpha$’s = .85-.89], social functioning [$\alpha$’s = .62-.80], bodily pain [$\alpha$’s = .74-.83], general mental health [$\alpha$’s = .80-.86], role limitations due to emotional problems [$\alpha$’s = .73-.80], vitality [$\alpha$’s = .80-.87], and general health perceptions [$\alpha$’s = .78-.83]; see Table 3).
**Hypothesized mediating variables.** Hypothesized mediators of the effect of the MH intervention on relationship quality, mental health, and physical health were assessed at each time point - beginning at the first assessment occasion (T1-T6). Repeated measurement occasions across multiple time points allowed for the investigation of hypothesized mechanisms of change across the intervention, and provided temporal precedent to make conclusive statements as to why the intervention was or was not successful.

**Conflict-related distress.** Conflict-related distress was captured using a 2-item scale created for the original MH study (Finkel et al., 2013): “I am angry at my partner for his/her behavior during this conflict,” and “My partner's behavior during this conflict was highly upsetting to me” on a 7-point Likert scale (1 = *strongly disagree* to 7 = *strongly agree*). In the original MH study, conflict-related distress mediated the relationship between the intervention and marital quality. The measure demonstrated adequate internal consistency in the original MH study (α = .72). Items were summed for each measurement occasion and showed adequate to good internal consistency across measurement occasions (α’s = .76-.87).

**Forgiveness.** A 4-item measure of forgiving based on McCullogh, Worthington, and Rachal’s (1997) 5-item forgiveness scale captured participant’s level of forgiveness following the conflict discussed in the writing task (Fincham, Paleari, & Regalia, 2002). One-item “I wish him/her well,” was omitted as it did not lend itself to assessing forgiveness in a close relationship. The scale asked participants to reflect on how they reacted to their partner following the conflict discussed in the written portion of the weekly writing task (e.g. “I disapproved of him/her” and “I thought favorably of him/her”) on a 5-point Likert scale (1 = *not at all* to 5 = *completely*) with lower scores reflect greater levels of forgiveness. Scores
were summed up at each measurement occasion and showed adequate to good reliability across the study period (α’s = .68-.82).

**Emotional reappraisal.** The six-item reappraisal subscale of the Emotion Regulation Questionnaire (ERQ; Gross & John, 2003) captured changes in participant’s ability to reappraise emotionally salient events (e.g. “When I want to feel more positive emotion [such as joy or amusement], I change what I am thinking about” and “When I want to feel less negative emotion [such as sadness or anger], I change what I am thinking about”) on a 7-point Likert scale (1 = *strongly disagree* to 7 = *strongly agree*). Ability to reappraise emotionally salient situations is associated with greater experience of positive emotion and less negative-emotion expression. In previous studies, the reappraisal subscale exhibited adequate test-retest reliability, convergent validity with regulation success, coping, and mood regulation, in addition to discriminate validity against the Big 5 personality dimensions (Gross & John, 2003). Scores were summed at each measurement occasion and showed good reliability across the study period (α’s = .77-.91).

**Problem solving communication.** The 11-item Problem Solving and Communication Subscale of the Family Assessment Device (FAD; Epstein, Baldwin, & Bishop, 1983) captured changes in participants’ communication styles (e.g. “My partner and I usually act on our decisions regarding problems,” “After my partner and I try to solve a problem, we usually discuss whether it worked or not,” and “My partner and I try to think of different ways to solve problems”) on a 4-point Likert scale (1 = *strongly agree* to 4 = *strongly disagree*). The FAD is designed to test family function across multiple domains including communication and problem solving and has shown good internal reliability, good test-retest reliability, and discriminant validity between the subscales (Epstein et al., 1983). Scores were summed at
each measurement occasion with low scores reflecting more effective communication and showed adequate to good reliability across measurement occasions (α’s = .60-.80).

Table 3.

Descriptive and Reliability Statistics for All Measures

<table>
<thead>
<tr>
<th>Process Variables</th>
<th>M</th>
<th>SD</th>
<th>Range</th>
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<th>Alpha</th>
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<tr>
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<table>
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<th>Outcome Variables</th>
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<td>6.3-21</td>
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<td>.90</td>
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<tr>
<td>Passion</td>
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<tr>
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<td>4.07</td>
<td>4-24</td>
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<td>.96</td>
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<tr>
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<td>3.08</td>
<td>0-15</td>
<td>.85</td>
<td>.88</td>
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Note: M = Mean; SD = Standard Deviation; fx = functioning. CRD = Conflict Related Distress scale; Forgiveness = Forgiveness scale; ERQ-reappraisal = Reappraisal subscale of the Emotion Regulation Questionnaire; PRQC = Perceived Relationship Quality Component; CSI-4 = Couple Satisfaction Index-4; DAS-4 = Dyadic Adjustment Scale-4; CES-D = Center for Epidemiologic Studies Depression Scale; OASIS = Overall Anxiety Severity and Impairment Scale; SF-36 = Short Form- 36.
Data Analysis

Preliminary treatment of the data. Data were examined for outliers and non-normal distributions of responses using residual scatterplots and histograms respectively. In the primary analyses of the data, relationship quality is represented by global relationship quality (global subscale of the PRQC) and relationship satisfaction (CSI-4). Mental health is represented by participant reports of symptoms of depression (CES-D) and anxiety (OASIS) and physical health is represented by participants’ self-reported ratings of general physical wellbeing (general health subscale of the SF-36). To better understand the data, I calculated pre-intervention to post-intervention effect sizes for all variables of interest (outcome and mediator variables; see tables 4 & 5). The effect sizes ranged from -.94 to .55 for men and -.75 to .45 for women.
Table 4
Pre- and Post-Intervention Means and Effect Sizes for Men

<table>
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<tr>
<th></th>
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<th>Intervention</th>
<th>Control</th>
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<td>d</td>
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<tr>
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<td>Forgive</td>
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<tr>
<td>PSC</td>
<td>23.8 (3.47)</td>
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<td>CSI-4</td>
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<td>16.6 (4.24)</td>
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<tr>
<td>PRQC</td>
<td>35.9 (5.27)</td>
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<td>35.4 (5.61)</td>
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<tr>
<td>SF-36</td>
<td>74.2 (16.62)</td>
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<td>72.1 (15.78)</td>
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<td>CESD</td>
<td>10.6 (7.25)</td>
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<td>9.9 (7.08)</td>
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<tr>
<td>OASIS</td>
<td>3.8 (3.01)</td>
<td>-.23</td>
<td>3.8 (2.94)</td>
</tr>
</tbody>
</table>

Note. CRD = Conflict-Related Distress; Forgive = Forgiveness; ERQ = Reappraisal subscale of the Emotion Regulation Questionnaire; PSC = Problem Solving Communication; CSI-4 = Couple Satisfaction Index-4; PRQC = global subscale of the Perceived Relationship Quality Component scale; SF-36 = general health subscale of the Short-Form 36; CESD = Center for Epidemiologic Studies Depression Scale; OASIS = Overall Anxiety Severity and Impairment Scale.
Table 5

*Pre- and Post-Intervention Means and Effect Sizes for Women*

<table>
<thead>
<tr>
<th></th>
<th>All Pre (SD)</th>
<th>Post (SD)</th>
<th>d</th>
<th>Intervention Pre (SD)</th>
<th>Post (SD)</th>
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<th>Control Pre (SD)</th>
<th>Post (SD)</th>
<th>d</th>
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<tbody>
<tr>
<td>CRD</td>
<td>6.6 (3.42)</td>
<td>5.8 (3.37)</td>
<td>-.22</td>
<td>6.3 (3.22)</td>
<td>6.0 (3.31)</td>
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<td>6.9 (3.62)</td>
<td>5.6 (3.46)</td>
<td>-.33</td>
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<tr>
<td>Forgive</td>
<td>15.5 (3.13)</td>
<td>15.9 (3.69)</td>
<td>.12</td>
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<td>15.6 (3.24)</td>
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<td>.06</td>
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<tr>
<td>ERQ</td>
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<td>.45</td>
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<td>PSC</td>
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<td>-.64</td>
<td>24.9 (3.92)</td>
<td>23.0 (4.25)</td>
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<td>CSI-4</td>
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<td>.05</td>
<td>36.5 (4.57)</td>
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<td>-.27</td>
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<tr>
<td>SF-36</td>
<td>73.0 (18.21)</td>
<td>74.3 (20.55)</td>
<td>.11</td>
<td>70.6 (18.55)</td>
<td>71.3 (22.88)</td>
<td>.06</td>
<td>75.4 (17.76)</td>
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<td>10.1 (7.05)</td>
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<td>-.10</td>
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<tr>
<td>OASIS</td>
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<td>-.26</td>
<td>5.3 (3.89)</td>
<td>4.0 (2.95)</td>
<td>-.39</td>
<td>4.5 (2.77)</td>
<td>4.2 (3.21)</td>
<td>-.11</td>
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</table>

Note. CRD = Conflict-Related Distress; Forgive = Forgiveness; ERQ = Reappraisal subscale of the Emotion Regulation Questionnaire; PSC = Problem Solving Communication; CSI-4 = Couple Satisfaction Index-4; PRQC = global subscale of the Perceived Relationship Quality Component scale; SF-36 = general health subscale of the Short-Form 36; CESD = Center for Epidemiologic Studies Depression Scale; OASIS = Overall Anxiety Severity and Impairment Scale.
For the two-intercept multilevel models described below, relevant covariates (e.g. relationship length, SES, age) were averaged to create a single level 2 predictor to decrease the total number of parameters in more complex models (Atkins, 2005). Prior to running unconditional growth models to assess functional form, a series of empty models fixing predictors at 1 (unconditional means models) provided the intraclass correlations for outcome variables of interest. The intraclass correlation provides an estimate of the percentage of within vs. between person variance, (Castro, 2002), and support the use of multilevel modeling (MLM) in the current study.

Multilevel regression models. H1 and H2 analyses were conducted using basic MLM and the analyses preceded in a stepwise fashion: (1) unconditional means models to assess assumptions of normality (normally distributed residuals), variability in the outcome measures of interest (relationship quality, physical functioning, and mental health) excluding covariates and to determine the intraclass correlation (all variables are measured at level 1); (2) unconditional growth models (i.e. empty models) where covariates were excluded to determine the slope of outcome measures over time at the individual level using a two-intercept model for distinguishable dyads (Laurenceau & Bolger, 2005; Radenbush, Brennan, & Barnett, 1995). In this two-intercept model, Level 1 represents a multivariate system where one equation specifies change over time linking within-subject variation in the predictors to within subject variation in the outcome for the male, and the other equation specifies an equivalent process for the female partner.

1. Relationship Quality\(_{ij} = (female)_{ij}[\pi_{0i} + \pi_{1i}(Time)_{ij}] + (male)_{ij}[\pi_{0i} + \pi_{1i}(Time)_{ij}] + e_{ij}$

\(^9\) ICC’s ranged from .61 to .85
The parameters of interests are $\pi_{f1i}$ and $\pi_{m1i}$ which represent linear change over time for females and males respectively; (3) a full MLM including group assignment (control vs. intervention) as a level-2 predictor. **H1** and **H2** were analyzed according to the following level-1/level-2 collapsed model:

$$2. \text{Relationship Quality}_{ij} = (female)[\beta_{f00} + \beta_{f01}(\text{Group}) + \beta_{f10}(\text{Time}) + \beta_{f11}(\text{Group} \times \text{Time}) + u_{f00i} + u_{f10i}(\text{Time})] + (male)[\beta_{m00} + \beta_{m01}(\text{Group}) + \beta_{m10}(\text{Time}) + \beta_{m11}(\text{Group} \times \text{Time}) + u_{m00i} + u_{m10i}(\text{Time})] + e_{ij}$$

The parameters of interest $\beta_{f11}$ and $\beta_{m11}$, represent a cross-level interaction term and will answer the question of whether individuals participating in the MH intervention show increased improvement on outcome measures of interest as compared to individuals in the control group.

Prior to utilizing more complex meditational analyses, basic linear growth models were run to assess for change in the proposed mediators in **H3-H6** (conflict related distress, emotional reappraisal, forgiveness, and problem solving communication).

$$3. \text{Conflict Related Distress}_{ij} = \beta_{0j} + \beta_{ij}(\text{Time})_{ij} + e_{ij}$$

The parameter of interest $\beta_{ij}$ represents linear change in the mediator over time. Quadratic effect of time was then added to the model and compared to determine model fit.

**Mediation and moderation analyses.** **H3-H8** were addressed using simple A-B-C mediation models (Baron & Kenny, 1986) using the PROCESS macro in SPSS (Hayes, 2012). The PROCESS macro provides coefficient estimates of models (with continuous outcome variables) using OLS regression as well as estimates of direct and indirect effects.

---

10 The initial dissertation proposal called for the use of Multilevel Structural Equation Modeling (MSEM; Preacher, Zyphur, & Zhang, 2010) to assess the indirect effect of hypothesized mediators on outcome. However, this approach was abandoned for a simpler analysis given the limited statistical power and small sample size.
Additionally, PROCESS provides bias corrected bootstrap confidence intervals around the indirect effect. The PROCESS macro also provides OLS regression estimates of coefficients in moderation models, as well as significance testing of simple slopes at user-specified cutoff points (e.g. +1/-1 standard deviation).

![Mediation Model Diagram](image)

*Figure 3. Mediation model based on Baron & Kenny (1986).*

**Exploratory analyses using intensive longitudinal data analysis methods.** To further explore the role of hypothesized mediators on treatment outcome, I ran a series of models that allow for the modeling of within-person variance independent of between-person variance as recommended by Bolger and Laurenceau (2013). When the relationship between the independent variable and dependent variable exist at both levels of analysis (level 1: within-person; level 2: between-person), the parameter estimate of the independent variable is a weighted average of the between- and within-subject relationships (Allison, 2005, 2009). In order to prevent this confound, each variable of interest was separated into two re-centered variables; (a) one grand-mean centered variable capturing between-subject variance in mechanisms of change at each measurement occasion, and (b) one person-mean centered variable capturing within-person variance in mechanisms of change at each measurement occasion (Bolger & Laurenceau, 2013).
4. Relationship Quality\(_{ij} = \beta_{00} + \beta_{01}(\text{Group}_j) + \beta_{02}(\text{BP CRD}_j) + \beta_{03}(\text{Group}_j)(\text{BP CRD}_j) + \beta_{10}(\text{WP CRD}_ij) + \beta_{20}(\text{Group}_j)(\text{WP CRD}_ij) + u_{0j} + e_{ij}\)

The parameter of interest \(\beta_{03}\) captures the interaction effect of between-person variance in mediator variables and treatment condition on outcome measures of interest. This interaction term explores the relationship between inter-individual variance in mediator variables and outcome measures and whether this relationship is moderated by treatment condition. \(\beta_{20}\) captures the interaction effect of within-person variance in mediator variables and treatment condition on outcome measures of interest respectively. This interaction term explores the relationship between intra-individual variance in mediator variables and outcome measures, as well as whether this relationship was moderated by treatment condition. For significant interactions, a web-based computational tool allowed for probing of simple slopes (Preacher, Curran, & Bauer, 2006).
3. RESULTS

Aim 1: Implement, Replicate, and Extend the Marriage Hack (MH) Intervention

To assess the efficacy of the MH intervention on outcome variables of interest, I examined H1 and H2 using two-intercept multilevel models to simultaneously examine male and female parameter estimates and account for interdependence observed in distinguishable dyadic data (Raudenbush, Brennan, & Barnett, 1995). Level 1 unconditional growth models revealed no significant effects of linear change over time. After adding treatment condition as a level-2 covariate, the models failed to converge, likely due to limited statistical power. To simplify the models, I restricted the models to pre/post intervention data (T0 and T5). As with the full dataset, two-intercept cross-level interaction models failed to converge.

Because of the interdependence observed in the current sample (see Table 6) and inherent in dyadic data, subsequent analyses were run separately for men and women using a traditional (univariate) single intercept multilevel model with time as a level 1-predictor and treatment condition as a level 2 predictor.

Table 6

<table>
<thead>
<tr>
<th>Variable</th>
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<th>t</th>
<th>p</th>
<th>95% CI</th>
</tr>
</thead>
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<td>.17, .55</td>
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<td>CSI-4</td>
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<td>.065</td>
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<td>3.36</td>
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<td>.15, .54</td>
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<td>-1.14</td>
<td>.256</td>
<td>-.34, .10</td>
</tr>
<tr>
<td>PSC</td>
<td>.14</td>
<td>1.26</td>
<td>.213</td>
<td>-.08, .35</td>
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</table>

Note. r = Pearson’s correlation between men and women on variable of interest; t = t-value from paired sample t test; 95% CI = 95% confidence interval.
Tables 7 and 8 display the results from the progression of models investigating the
effect of treatment condition on relationship satisfaction, relationship quality, self-reported
physical health, depression, and anxiety for men and women respectively. I first ran
unconditional growth models to assess the linear effect of change in outcome over time. I then
added a quadratic effect to capture increases or decreases in linear change. Finally, I added
group as a level 2 predictor and the cross-level interaction term (treatment condition by time)
to assess change in outcome variable over time as a function of treatment condition.
Table 7
Unstandardized Parameter Estimates of Multilevel Models Examining Effect of Treatment Condition Across Time for Men

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
<th></th>
<th>Model 2</th>
<th></th>
<th>Model 3</th>
<th></th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Est.</td>
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<td>Est.</td>
<td>95% CI</td>
<td>Est.</td>
<td>95% CI</td>
</tr>
<tr>
<td><strong>CSI-4</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>time</td>
<td>-.19</td>
<td>-.89, .50</td>
<td>-.21</td>
<td>-.90, .49</td>
<td>-.39</td>
<td>-1.10, .31</td>
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<tr>
<td>time²</td>
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<td>.04</td>
<td>-.10, .17</td>
<td>.03</td>
<td>-.11, .17</td>
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<tr>
<td>grp</td>
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<td>-.88</td>
<td>-2.81, 1.05</td>
<td>-.170</td>
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<tr>
<td>time*grp</td>
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<td></td>
<td>.03</td>
<td>.03, .77</td>
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</tr>
<tr>
<td><strong>PRQC</strong></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>time</td>
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<td>.48</td>
<td>-.19, 1.14</td>
<td>.42</td>
<td>-.26, 1.10</td>
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<tr>
<td>time²</td>
<td>-.10</td>
<td>-.23, .04</td>
<td>-.09</td>
<td>-.23, .04</td>
<td>-.10</td>
<td>-.23, .03</td>
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<td>grp</td>
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<td>-.88</td>
<td>-3.27, 1.52</td>
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<td>-3.58, 1.33</td>
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<tr>
<td>time*grp</td>
<td>.12</td>
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<td>-.24</td>
<td>.48</td>
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<tr>
<td><strong>CES-D</strong></td>
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</tr>
<tr>
<td>time</td>
<td>-.14</td>
<td>-1.44, 1.16</td>
<td>-.17</td>
<td>-1.48, 1.13</td>
<td>.18</td>
<td>-1.12, 1.49</td>
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<td>.02</td>
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<td>-.23, .28</td>
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<tr>
<td>grp</td>
<td>-3.17</td>
<td>-6.80, .46</td>
<td>-1.60</td>
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<td>time*grp</td>
<td>.76*</td>
<td></td>
<td>-1.44</td>
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<tr>
<td><strong>OASIS</strong></td>
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</tr>
<tr>
<td>time</td>
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<td>.01</td>
<td>-.52, .55</td>
<td>.26</td>
<td>-.25, .78</td>
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<td>time²</td>
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<td>-.11, .09</td>
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<td>grp</td>
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<td>-2.43, .31</td>
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<td>-1.42, 1.44</td>
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</tr>
<tr>
<td>time*grp</td>
<td>.52**</td>
<td></td>
<td>-.79</td>
<td>-.24</td>
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<td><strong>SF-36</strong></td>
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</tr>
<tr>
<td>time</td>
<td>-1.14</td>
<td>-3.16, .88</td>
<td>-1.16</td>
<td>-3.18, .86</td>
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<td>-3.38, .74</td>
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<tr>
<td>time²</td>
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<td>-.16, .65</td>
<td>.25</td>
<td>-.16, .65</td>
<td>.24</td>
<td>-.15, .64</td>
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<tr>
<td>grp</td>
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<td>-12.60, 3.65</td>
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<td>-13.43, 3.13</td>
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<td>time*grp</td>
<td>.33</td>
<td></td>
<td>-.75</td>
<td>1.42</td>
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</tbody>
</table>

*Note: Model 1 represents unconditional growth models regressing time and time² on outcome variables. Model 2 represents conditional growth models regressing time, time², and group on outcome variables. Model 3 represents conditional growth models regressing time, time², group, and group by time interaction effect on outcome variables. Group coded 0 = control, 1 = intervention.

*p < .05

** p < .01
Table 8
Unstandardized Parameter Estimates of Multilevel Models Examining Effect of Treatment Condition Across Time for Women

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
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<th>Model 2</th>
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<th>Model 3</th>
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<td></td>
<td>Est.</td>
<td>95% CI</td>
<td>Est.</td>
<td>95% CI</td>
<td>Est.</td>
<td>95% CI</td>
</tr>
<tr>
<td>CSI-4</td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>time</td>
<td>-.56</td>
<td>-1.33, .21</td>
<td>-.57</td>
<td>-1.34, .20</td>
<td>-.66</td>
<td>-1.45, .14</td>
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<tr>
<td>time(^2)</td>
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<td>-.04, .27</td>
<td>.11</td>
<td>-.04, .27</td>
<td>-1.31</td>
<td>-3.44, .82</td>
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<td>grp</td>
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<td>-2.83, 1.00</td>
<td>.11</td>
<td>-.04, .27</td>
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</tr>
<tr>
<td>time*grp</td>
<td>.17</td>
<td>-25, .60</td>
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</tr>
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<td>PRQC</td>
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<td></td>
</tr>
<tr>
<td>time</td>
<td>-.30</td>
<td>-1.01, .41</td>
<td>-.30</td>
<td>-1.01, .41</td>
<td>-.36</td>
<td>-1.09, .37</td>
</tr>
<tr>
<td>time(^2)</td>
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<td>-.11, .18</td>
<td>.04</td>
<td>-.11, .18</td>
<td>.04</td>
<td>-.11, .18</td>
</tr>
<tr>
<td>grp</td>
<td>-.42</td>
<td>-2.59, 1.76</td>
<td>.11</td>
<td>-.27, .50</td>
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</tr>
<tr>
<td>time*grp</td>
<td>.11</td>
<td>-25, .60</td>
<td></td>
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</tr>
<tr>
<td>CES-D</td>
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</tr>
<tr>
<td>time</td>
<td>1.62*</td>
<td>.10, 3.14</td>
<td>1.65*</td>
<td>.12, 3.17</td>
<td>1.72*</td>
<td>.15, 3.29</td>
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<tr>
<td>time(^2)</td>
<td>-.38*</td>
<td>-.68, -.07</td>
<td>-.38*</td>
<td>-.69, -.07</td>
<td>-.38*</td>
<td>-.68, -.07</td>
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<tr>
<td>grp</td>
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<td>-1.445.59</td>
<td>2.42</td>
<td>-.15, 9.8</td>
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<td>time*grp</td>
<td>-.15</td>
<td>-.98, .67</td>
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<tr>
<td>OASIS</td>
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</tr>
<tr>
<td>time</td>
<td>.09</td>
<td>-.43, .61</td>
<td>.10</td>
<td>-.42, .61</td>
<td>.13</td>
<td>-.40, .67</td>
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<tr>
<td>time(^2)</td>
<td>-.04</td>
<td>-.14, .06</td>
<td>-.04</td>
<td>-.15, .06</td>
<td>-.04</td>
<td>-.15, .06</td>
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<tr>
<td>grp</td>
<td>.71</td>
<td>-.66, 2.08</td>
<td>.89</td>
<td>-.60, 2.37</td>
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<tr>
<td>time*grp</td>
<td>-.08</td>
<td>-.36, .20</td>
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<td>SF-36</td>
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</tr>
<tr>
<td>time</td>
<td>-.73</td>
<td>-2.59, 1.12</td>
<td>-.75</td>
<td>-2.61, 1.10</td>
<td>-.70</td>
<td>-2.61, 1.20</td>
</tr>
<tr>
<td>time(^2)</td>
<td>.21</td>
<td>-.16, .58</td>
<td>.21</td>
<td>-.16, .58</td>
<td>.21</td>
<td>-.16, .58</td>
</tr>
<tr>
<td>grp</td>
<td>-4.86</td>
<td>-12.89, 3.16</td>
<td>-4.64</td>
<td>12.85, 3.57</td>
<td></td>
<td></td>
</tr>
<tr>
<td>time*grp</td>
<td>-.10</td>
<td>-1.12, .91</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Model 1 represents unconditional growth models regressing time and time\(^2\) on outcome variables. Model 2 represents conditional growth models regressing time, time\(^2\), and group on outcome variables. Model 3 represents conditional growth models regressing time, time\(^2\), group, and group by time interaction effect on outcome variables. Group coded 0 = control, 1 = intervention.

*p < .05

Figures in Appendix K display the final conditional growth models for outcome variables. Men in the intervention condition exhibited a sharper linear increase in relationship satisfaction over time as compared to men in the control condition (\(b = .40, S.E. = .18, p = .03\)). This suggests men randomized to the intervention condition reported a faster rate of
improvement in relationship satisfaction across the study period as compared to men in the control condition (see Figure 4). No treatment condition by time effects emerged for women.

*Figure 4. Couples Satisfaction Index (4 Item; CSI-4) over time. The linear effect represents the unstandardized parameter estimate of the interaction term between time and treatment condition. The intercept effect for men was not significant (p = .11).

*p < .05

With regards to mental health, significant treatment condition by time interaction effect emerged on self-reported depression ($b = -0.76$, $S.E. = .34$, $p = .03$) such that men in the intervention condition displayed a sharper linear decrease in depressive symptoms over time as compared to men in the control condition. A similar effect emerged for men on self-reported symptoms of anxiety ($b = -0.52$, $S.E. = .14$, $p < .001$). These results suggest men randomized to the intervention condition reported a faster decrease in symptoms of depression and anxiety across the study period as compared to men randomized to the control condition (see Figures 5 & 6).
Figure 5. Center for Epidemiologic Studies of Depression-Scale (CES-D) over time. The linear effect represents the unstandardized parameter estimate of the interaction term between time and treatment condition.
*p < .05

Figure 6. Overall Anxiety Severity and Impairment Scale (OASIS) over time. The linear effect represents the unstandardized parameter estimate of the interaction term between time and treatment condition.

To examine H3, I utilized the PROCESS macro in SPSS (Hayes, 2012). H3 hypothesized that the modified version of the MH protocol utilized in the current study would
replicate the significant mediating effect of conflict-related distress on treatment outcome observed in original MH study (Finkel et al., 2013). Mediation analyses examining the indirect effect of conflict-related distress on relationship satisfaction and relationship quality yielded no significant results for men or women. To decrease the number of parameters estimated due to limited sample size, I also ran the same mediation models using change scores as the hypothesized mediator. As with the residualized regression models, the mediation analyses revealed no significant indirect effect of conflict-related distress on relationship satisfaction and relationship quality for either men or women. These results suggest the current study failed to replicate the results of the original MH study showing marital quality was mediated by reductions in conflict-related distress (Finkel et al., 2013).

Aim 2: Examine Theoretically-derived Mediators and Moderators of Relationship Quality Post-Intervention.

Hypothesized Mediators

To examine H4 through H6, I utilized the PROCESS macro in SPSS (Hayes, 2012). H4 though H6 extended the original MH study by including additional theory-driven mediators of change (forgiveness, emotional reappraisal, and problem solving communication) and outcomes of interest (self-reported physical and mental health). I first ran a series of residualized regressions to examine the relationship between treatment condition and hypothesized mediators to test the ‘a’ path of the mediation model. Results of the residualized regressions yielded no significant relationships between treatment condition and hypothesized mediators for either men or women (see Table 9). These null findings are contrary to the current study hypotheses that increased relationship satisfaction and quality will be mediated by increased forgiveness, improved emotional reappraisal, and improved
problem solving communication skills. The null findings also suggest forgiveness, emotional reappraisal, and problem solving communication skills did not mediate the relationship between treatment condition and self-reported physical and mental health symptoms.

Table 9
Unstandardized Parameter Estimates of Treatment Condition Predicting Mediator and Outcome variables

(Panel A - Men)

<table>
<thead>
<tr>
<th>Mediator (‘a’ path)</th>
<th>B</th>
<th>SE</th>
<th>P value</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRD</td>
<td>-.738</td>
<td>.859</td>
<td>.40</td>
<td>-2.47, .99</td>
</tr>
<tr>
<td>Forgive</td>
<td>.803</td>
<td>.674</td>
<td>.24</td>
<td>-.55, 2.16</td>
</tr>
<tr>
<td>ERQ</td>
<td>-.070</td>
<td>1.532</td>
<td>.96</td>
<td>-3.16, 3.02</td>
</tr>
<tr>
<td>PSC</td>
<td>-.822</td>
<td>1.448</td>
<td>.57</td>
<td>-3.74, 2.10</td>
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</table>

<table>
<thead>
<tr>
<th>Outcome</th>
<th>B</th>
<th>SE</th>
<th>P value</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSI-4</td>
<td>1.412</td>
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<td>-.07, 2.89</td>
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<tr>
<td>PRQC</td>
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<td>.790</td>
<td>.43</td>
<td>-.96, 2.22</td>
</tr>
<tr>
<td>SF-36</td>
<td>2.701</td>
<td>2.902</td>
<td>.36</td>
<td>-3.14, 8.55</td>
</tr>
<tr>
<td>CESD</td>
<td>-4.412</td>
<td>1.672</td>
<td>.01</td>
<td>-7.78, 1.05</td>
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<tr>
<td>OASIS</td>
<td>-2.772</td>
<td>.709</td>
<td>&lt; .01</td>
<td>-4.20, -1.35</td>
</tr>
</tbody>
</table>

(Panel B - Women)

<table>
<thead>
<tr>
<th>Mediator (‘a’ path)</th>
<th>B</th>
<th>SE</th>
<th>P value</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRD</td>
<td>.716</td>
<td>.801</td>
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<td>-1.89, 2.32</td>
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<tr>
<td>Forgive</td>
<td>.490</td>
<td>.817</td>
<td>.58</td>
<td>-1.15, 2.13</td>
</tr>
<tr>
<td>ERQ</td>
<td>-.662</td>
<td>1.578</td>
<td>.68</td>
<td>-3.82, 2.50</td>
</tr>
<tr>
<td>PSC</td>
<td>.461</td>
<td>.824</td>
<td>.58</td>
<td>-1.19, 2.11</td>
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</table>

<table>
<thead>
<tr>
<th>Outcome</th>
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<th>SE</th>
<th>P value</th>
<th>95% CI</th>
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<td>OASIS</td>
<td>-.135</td>
<td>.660</td>
<td>.84</td>
<td>-1.46, 1.19</td>
</tr>
</tbody>
</table>

Note: Men (panel A) and Women (panel B). Treatment condition coded as 0 = control condition, 1 = intervention condition.
To further examine the potential of mediating effects in the current study, I switched the outcome and mediator variables to determine if changes in relationship satisfaction, relationship quality, mental health, and physical health mediate the relationship between treatment condition and conflict-related distress, forgiveness, cognitive reappraisal, and problem solving communication. As with the previous mediation analyses, I ran a series of residualized regressions to test the ‘a’ path of the mediation model. Results of the residualized regression yielded no significant results for men or women (see Table 9).

**Hypothesized Moderators**

To assess H7 and H8, I utilized the PROCESS macro in SPSS (Hayes, 2012). Results of moderation analyses revealed no significant moderating effects of baseline mental health and socioeconomic status on the relationship between treatment condition and relationship satisfaction or quality for either men or women.

**Aim 3: Explore the Trajectory of Theory-based Mechanisms During the Course of the Intervention**

To examine E1, I ran a series of multilevel models assessing differences in theory-based mechanisms of change over time as a function of treatment condition which revealed no significant results for men or women (see Appendix L). For men, a significant linear change in forgiveness emerged ($b = -.57, S.E. = .39, p = .05$) such that, overall, men exhibited decreased forgiveness across the study period. However, this linear effect was offset by a significant quadratic effect ($b = .14, S.E. = .05, p = .01$) such that the magnitude of the linear forgiveness effect of forgiveness decreased and changed directions across the study period (see Figure 7). These results suggest that men, on average across both treatment conditions,
exhibited decreased forgiveness during the beginning of the study protocol and improved across time.

For women, a significant linear effect of problem solving communication over time emerged (b = -.59, S.E. = .25, p = .02). This linear effect suggests that women, on average across treatment conditions, exhibited improvements in problem solving communication across the study period (see Figure 8).

Figure 7. Forgiveness collapsed across treatment conditions over time. Time 0-3 = Writing task occasions. Time 4 = Post-intervention assessment. Linear and quadratic b represent unstandardized parameter estimates of linear and quadratic effects of forgiveness over time for men.

*p < .05

**p < .01
**Figure 8.** Problem Solving Communication collapsed across treatment condition over time. Time 0-3 = Writing task occasions. Time 4 = Post-intervention assessment. Linear b represents the unstandardized parameter estimate of the linear effect of communication over time for women. *p < .05

**Aim 4: Exploratory Analyses: Intensive Longitudinal Models**

Exploratory analyses (E2) followed methodology recommended by Bolger and Laurenceau (2013) in which the variance of predictor variables is partitioned into two independent components: a) a person-mean centered variable capturing within-person variance in mechanisms of change; this level 1 variable fluctuates from occasion to occasion, and b) a grand-mean centered variable capturing between-person variance in mechanisms of change; this level 2 variable is constant across all occasions. For significant interactions, I used a web-based computational tool to allow for probing of simple slopes within a multilevel framework (Preacher, Curran, & Bauer, 2006).

**Within-person effects for men.** Figures 9-13 display the results of multilevel models examining the effect of between- and within-person variance in mechanisms of change on outcome measures of interest for men. A significant interaction emerged for treatment condition by within-person conflict-related distress ($b = -0.49, S.E. = .19, p = .01$). After
probing the simple slopes, the significant interaction effect suggests that men in the intervention condition reported higher levels of relationship satisfaction on occasions when they experienced lower than their own average level of conflict-related distress ($b = -.30, S.E. = .13, p = .03$; see Figure 9). No within-person effect of conflict-related distress emerged in the control condition. A within-person interaction effect emerged for problem solving communication by treatment condition on relationship satisfaction ($b = -.16, S.E. = .08, p < .05$). Results of the simple slope analyses suggest that men in the intervention condition report higher levels of relationship satisfaction on occasions when they are engaging in more than their own average level of effective problem solving communication as compared to occasions when they are using less than their own average level of effective problem solving communication ($b = -.33, S.E. = .15, p = .03$; see Figure 10). No effect of within-person problem solving communication emerged in the control condition.

*Figure 9. Two-way interaction between treatment condition and within-person conflict-related distress (CRD) on relationship satisfaction (CSI-4) in men. Note: low = -1 SD, average = mean, high = +1 SD. *$p < .05$
**Between-person effects: Men.** A between-person emotional reappraisal by treatment condition effect on depression emerged \((b = 1.02, S.E. = .36, p = .01)\). Simple slopes analyses revealed this effect suggests men in the control condition who reported lower than average (sample-wide) levels of emotional reappraisal endorsed higher levels of depression as compared to men reporting higher than average levels of emotional reappraisal \((b = 2.23, S.E. = .58, p < .001; \text{see Figure 11})\). Additionally, there was a significant conditional effect of between-person variance in emotional reappraisal on depression at lower than average and average levels emotional reappraisal. Men in the control condition who reported average and lower-than-average levels of emotional reappraisal exhibited higher levels of depression as compared to men in the intervention condition who reported average or lower-than-average levels of emotional reappraisal \((\text{average: } b = -5.59, S.E. = 1.84, p < .001; \text{low: } b = 11.43, S.E. = .52)\).
= 2.94, p < .001; see Figure 11). These results suggest that differing levels of trait-like emotional reappraisal impacted levels of depression for men in the control condition but not the intervention condition.

*Figure 11. Two-way interaction between treatment condition and between-person cognitive reappraisal (ERQ) on depression (CES-D) in men. Note: low = -1 SD, average = mean, high = +1 SD. *p < .001

**Within-person effects: Women.** Figures 12 & 13 display the results of multilevel models examining the effect of between- and within-person variance in mechanisms of change on outcome measures of interest for women. A significant within-person conflict-related distress by treatment condition effect on depression emerged (b = .52, S.E. = .25, p = .04). Probing of the simple slopes revealed that women in the intervention condition reported lower levels of depression on occasions when they exhibited lower than their own average level of conflict-related distress as compared to occasions when they exhibited higher than their own average level of conflict-related distress (b = 1.08, S.E. = .37, p = .01; see Figure 12). There was also a significant conditional effect of within-person conflict-related distress on
depression at higher than average intra-personal levels of conflict-related distress ($b = 2.22$, $S.E. = 1.11$, $p < .05$; see Figure 12). Women in the control condition reported lower levels of depression on occasions when they exhibited higher than their own average level of conflict-related distress as compared to women in the intervention condition who reported higher levels of depression on occasions when they reported higher than their own average level of conflict-related distress.

![Graph showing two-way interaction between treatment condition and within-person conflict-related distress (CRD) on depression in (CES-D) women. Note: low = -1 SD, average = mean, high = +1 SD. *p < .05](image)

**Figure 12.** Two-way interaction between treatment condition and within-person conflict-related distress (CRD) on depression in (CES-D) women. Note: low = -1 SD, average = mean, high = +1 SD. *p < .05

**Between-person effects: Women.** A between-person forgiveness by treatment condition interaction effect on depression emerged ($b = .70$, $S.E. = .32$, $p = .03$). Probing of the simple slopes suggests two independent effects drove the significant interaction. Women in the control condition who report lower than average (sample-wide) forgiveness endorsed higher levels of depression as compared to women who reported higher than average levels of forgiveness ($b = -2.16$, $S.E. = .50$, $p < .001$; see Figure 13). Additionally, a significant
conditional effect of between-person forgiveness on depression emerged at higher than average levels of forgiveness ($b = 2.75$, $S.E. = 1.30$, $p = .04$; see Figure 13). This effect suggests that women in the treatment condition who reported higher than average forgiveness reported lower levels of depression compared to women in the control condition who reported higher than average forgiveness.

*Figure 13.* Two-way interaction between treatment condition and between-person forgiveness (forgive) on depression (CED-D) in women. Note: low = -1 SD, average = mean, high = +1 SD.

**$p < .01$**

* $p < .05$
4. DISCUSSION

Using a randomized-controlled trial design, the aims of this study were to: 1) implement and replicate the findings of the original Marriage Hack prevention program (MH; Finkel et al., 2013) using a modified study protocol (4 versus 3 assessment points, completed over one-month versus one-year); 2) examine theoretically-driven mediators and moderators of treatment outcome; and, 3) explore the trajectories of the putative mechanisms of change. A final methodological aim (Aim 4) used intensive longitudinal data analysis methodology (Bolger & Laurenceau, 2013) to explore the association between intra- and inter-individual variance in theoretically-driven mediators and outcome measures.

Summary of Results

This study was originally designed to allow for the use of advanced statistical methodology to account for the interdependence observed in dyadic data. However, the final sample size of the study (47 couples completing all assessment occasions) did not allow for the use of these statistical methods. Furthermore, I experienced problems with statistical non-convergence with even the most basic actor-partner interdependence models. As such, the results should be considered pilot data that can potentially inform future studies assessing the effectiveness of the modified version of the MH as well as mediators and moderators of treatment outcome.

Is a modified version of the marriage hack intervention effective (Aim 1)? As hypothesized, men in the MH intervention group exhibited a greater increase in relationship satisfaction as compared to men in the control group. Specifically, men in the intervention group reported a 0.8 point increase in average relationship satisfaction whereas men in the control condition exhibited a decrease in relationship satisfaction. Contrary to the original
hypotheses, men in the MH intervention did not exhibit a greater increase in global relationship quality. This finding for men partially replicates the results from the original MH study for relationship satisfaction (Finkel et al., 2013). Unlike the findings of the original MH study and in contrast to the current study hypotheses, women in the intervention group did not exhibit an improvement in relationship satisfaction or relationship quality. Although the magnitude of the effect of the intervention on increased relationship satisfaction in men was relatively small (d=.14), it was in line with the magnitude of the effect in the original MH study (d = .11; Finkel et al., 2013). However, the result was limited to one outcome (relationship satisfaction) and individual men rather than couples.

One possible explanation for the absence of a relationship quality effect despite the presence of a relationship satisfaction effect is the sensitivity of the measure. Global relationship quality is a multifaceted measure with a number of indices of relationship quality (e.g. trust, intimacy, passion) including relationship satisfaction (Finkel et al., 2013; Fletcher et al., 2000). As such, relationship satisfaction is a more sensitive to day-to-day fluctuations in individual and couple-level processes than a more global measure of relationship quality (Bradbury, Fincham, & Beach, 2000). It may be the case the abbreviated nature of the current study did not allow for the detection of changes in global relationship quality.

*Does a modified version of the marriage hack intervention improve health outcomes?* This study extended the original marriage hack study (Finkel et al., 2013) by investigating the effect of the MH intervention on physical and mental health outcomes including self-reported depression, anxiety, and general physical health. As hypothesized, men in the intervention group reported significantly greater decreases in symptoms of depression as compared to men in the control group. Extending this finding across the study
period from baseline to post-intervention, men in the intervention group exhibited a 2.1 point decrease (d = -.21) in depressive symptoms. Although all men entered into the study with subthreshold levels of depression, the men in the intervention group appeared to report lower depressive symptoms across the study period. Additionally, men in the intervention group also reported significantly greater decreases in symptoms of anxiety compared to men in the control group. This significant decrease in anxiety amounted to a 1.6 point decrease (d = -.29) in reported anxiety symptoms. As with depression, men entered into the study with subthreshold anxiety. As such, this difference did not amount to a clinically meaningful change in symptoms. However, for men in the intervention condition, it may be the case that the intervention decreased individual distress within the context of relationship conflict.

These findings are in line with previous literature suggesting positive relationship functioning is associated with improved mental health (Kiecolt-Glaser & Newton, 2001; Robles et al., 2013). Contrary to the original hypotheses, however, I observed no significant group differences in general physical health for men. Additionally, I found no significant differences in symptoms of depression, anxiety, or general physical health for women. Overall, the absence of group differences in physical health may be indicative of a ceiling effect; this sample was made up of primarily young, healthy adults who endorsed few health problems, despite the fact that many participants were recruited in a family medicine outpatient clinic.

Is improvement in relationship satisfaction and quality mediated by reduced conflict-related distress? In the original MH study, changes in relationship satisfaction and quality were mediated by reduced conflict-related distress (Finkel et al., 2013). In the current study, I found no evidence for this process. The indirect effect of conflict-related distress on
relationship satisfaction and quality did not reliably differ from zero for either men or women. The lack of a significant indirect effect of conflict-related distress on relationship satisfaction and/or quality may be due to lack of statistical power. I address this and additional methodological limitations later in the Discussion.

What Other Factors Mediate and Moderate the Effectiveness of the Relationship Hack Intervention (Aim 2)?

Hypothesized mediators. Based on established literature on behavioral and cognitive factors associated with relationship satisfaction and quality, I selected three potential mechanisms of change in addition to conflict-related distress: forgiveness, emotional-reappraisal, and problem solving communication. The original study proposal called for the use of multilevel-structural equation modeling (MSEM; Preacher, Zyphur, & Zhang, 2010), a statistical methodology that allows for testing of indirect effects across multiple levels of variance. Due to the limited sample size and lack of convergence of more advanced statistical models, I instead used basic A-B-C meditational models (Baron & Kenny, 1986) to investigate potential indirect effects of the theoretically-driven mediators on outcomes of relationship satisfaction and relationship quality. No significant indirect effects of forgiveness, emotional reappraisal or problem solving communication on relationship satisfaction or relationship quality emerged for either men or women. Furthermore, reversing the direction of the mediation effect did not yield any significant results.

Hypothesized Moderators. The study also included theoretically-driven moderators of outcomes unexamined in the original MH Study (Finkel et al., 2013): socioeconomic status and pre-treatment mental health. As with the hypothesized mediators of change, no significant moderation effects of theoretically driven pre-study characteristics emerged.
What are the trajectories of mechanisms of change over time (Aim 3)? Although no significant indirect effects of the hypothesized mediators on outcome measures emerged, investigating the effect of treatment condition on mediators over time is of substantive interest. Regardless of whether these variables operated indirectly to explain outcomes of interest, do they change over time as a function of the treatment condition? Contrary to the original hypotheses, I observed no significant interactions between treatment condition and change in hypothesized mediators over time for either men or women.

To explore change in the hypothesized mediators collapsed across treatment groups, I examined the functional form of these variables separately for men and women. For men, a significant linear decrease in forgiveness at the beginning of the study period was offset by a significant quadratic effect, suggesting men’s self-reported forgiveness ultimately increased by the completion of the study period. However, this increase was minimal (.1 points, d = .03). In addition, women exhibited improved problem solving communication across the study period. When expanded out across the study period, this significant effect amounted to a 1.9 point improvement (d = .37) in problem solving communication. Thus, of the six possible change models I examined, only two of the constructs exhibited systematic change over time (i.e., forgiveness in men and problem solving communication in women).

Evaluating the MH intervention utilizing intensive longitudinal data models (Aim 4). Although the results of the main study aims were largely inconsistent with the study hypotheses and failed to replicate the broad-based effects of the MH writ large, intensive longitudinal data modeling yielded several findings of substantive interest. Following methodology described by Bolger and Laurenceau (2013), I partitioned the within-person and between-person variance in the mediator variables. These two separate variables accounting
for intra- and inter-individual variance independently predicted outcome variables of interest and captured 1) how occasion-to-occasion change in the mediator variables was associated with changes in relationship satisfaction, relationship quality, mental health, and physical health, and 2) how trait-like levels of mediator variables interacted with the MH intervention to influence outcome\textsuperscript{11}.

**Within-person effects in men.** For men, analyses revealed a significant interaction between treatment condition and within-person conflict-related distress on relationship satisfaction (see Figure 9). Probing of the simple slopes revealed the interaction effect was driven by occasion-to-occasion variability in conflict-related distress for men in the intervention group; these men reported higher levels of relationship satisfaction on occasions when they experienced lower (than their own average) levels of conflict-related distress. Conversely, men reported lower levels of relationship satisfaction on occasions when they experienced higher levels of conflict-related distress. This difference amounted to a 1.4 point (d = .23) shift in reported relationship satisfaction depending on men’s occasion-to-occasion rating of conflict-related distress. No such effect was observed for men in the control condition. It may be the case that men in the intervention group were more sensitive to shifts in conflict-related distress compared to men in the control group. This finding is in line with results of the original MH study suggesting the effect of the MH intervention on relationship satisfaction is influenced by decreases in conflict-related distress (Finkel et al., 2013).

Men also exhibited a significant treatment condition by within-person problem solving communication effect on relationship satisfaction such that men in the intervention group

\textsuperscript{11} As a reminder: within-person variables capture the association between intra-individual deviations around one’s own mean in mediator variables and post-treatment outcome measures. Between-person variables capture the association between inter-individual variance in mediator variables (i.e. deviations around the grand mean of the sample) and post-treatment outcome measures.
reported higher levels of relationship satisfaction on occasions in which they endorsed more effective problem solving communication skills relative to their own average scores across time (see Figure 10). When extended out across the entire study period, this amounted to a 1.6 point ($d = .28$) shift in relationship satisfaction depending on within-person occasion-to-occasion variability in problem solving communication. Like conflict-related distress, men in the intervention condition may be more sensitive to changes in problem solving communication with regards to reports of relationship satisfaction following the conflict-writing task as compared to men in the control condition. Intra-individual fluctuations in problem solving communication did not appear to impact reported relationship satisfaction for men in the control group. It may be the case that men completing the MH intervention became more attuned to changes in communication following review of a conflict. This increased sensitivity was beneficial when communication was perceived to be effective but potentially harmful when perceived to be less effective.

**Within-person effects in women.** Women exhibited a significant treatment condition by within-person conflict-related distress interaction effect on depression (see Figure 12). Women in the intervention condition reported lower levels of depression on occasions in which they exhibited lower levels of conflict-related distress. When extended across the entire study period, this effect amounted to a 5.5 point shift ($d = .45$) in depressive symptoms. Like men, women in the intervention group may be more sensitive to changes in conflict-related distress; however, in women, this sensitivity was most strongly associated with symptoms of depression rather than relationship satisfaction. In fact, the magnitude of this shift in depressive symptoms was great enough that women met criteria for mild depression on occasions in which they reported higher conflict-related distress and dropped below clinical
cut-off for mild depression on occasions in which they reported lower conflict-related distress (<16 on the CES-D; Radloff, 1977). Additionally, a significant conditional effect of treatment condition emerged on occasions when women reported higher levels of intra-individual conflict-related distress. On occasions when women reported greater than average conflict-related distress, women in the intervention group reported higher levels of depression compared to women in the control condition. This 4.5 point (d = .37) change in depressive symptoms amounted to a clinically meaningful shift in depression scores from the subthreshold (<16) to the at-risk range of the CES-D (>16; Radloff, 1977). This finding is congruent with the notion that women in the intervention group were more sensitive to within-person variance in conflict-related distress.

**Between-person effects in men.** Men exhibited a significant treatment condition by between-person emotional reappraisal effect on depression (see Figure 11). Men in the control group with lower than average emotional reappraisal (-1 SD below the grand mean) reported higher levels of depression relative to other men in the control group. The difference between these men amounted to a clinically significant difference in depression scores; men with lower levels of emotional reappraisal exceeded the clinical cutoff for depression on the CES-D while men reporting higher levels of emotional reappraisal reported scores indicative of subthreshold levels of depression (26 point difference; d = 2.54). The absence of an effect in the intervention condition may suggest that that the MH intervention buffered men from experiencing changes in depressive symptoms as a function of their (relatively trait-like) ability to engage in emotional reappraisal of a conflict. Additionally, a conditional effect of treatment condition emerged at both average and lower-than-average levels of between-person emotional reappraisal; men in the control group with average levels of emotional reappraisal
(the grand mean) or below average levels of emotional reappraisal (-1 SD below the grand mean) reported higher levels of overall depression across the study period. These men in the control group reporting low to average levels of emotional reappraisal met clinical criteria for depression while their counterparts in the intervention group may have been buffered from this effect by nature of participation in the intervention.

**Between-person effects in women.** For women, a between-person forgiveness by treatment condition interaction effect on depression emerged (see Figure 13). Women in the control group reporting higher levels of forgiveness (+1 SD above the grand mean) exhibited lower levels of depression compared to women in the control group reporting lower average levels of forgiveness (-1 SD below the grand mean) across the study. This 11.4 point (d = 2.50) change in depressive symptoms amounted to a clinically meaningful shift in depression scores from the subthreshold (<16) to the at-risk range of the CES-D (>16; Radloff, 1977). Additionally, a conditional effect of treatment condition emerged at higher than average levels of overall forgiveness (+1 SD above the grand mean). Women in the intervention group endorsing lower levels of depression reported higher levels of forgiveness relative to women in the control group (5.5 point difference; d = 1.21). It may be the case that the intervention buffered women from experiencing depressive symptoms when women reported a tendency toward lower levels of forgiveness.

**Implications**

Given the established literature on the association between healthy relationships and mental and physical wellbeing (e.g., Chin, Murphy, Janicki-Deverts, & Cohen, 2017; Parker Pope, 2010; Robles et al., 2013), interventions designed to maintain romantic relationships are of important clinical interest. Additionally, as technological advances allow for new,
innovative methods to deliver evidence-based psychological interventions, there is a need to develop brief interventions that target specific psychological processes.

**Utility of the marriage hack intervention.** Although I did not replicate the results of the original Marriage Hack study (Finkel et al., 2013) as I expected, it appears that the abbreviated version of the Marriage Hack intervention utilized in this study had a number of promising findings.

**Effect of the MH intervention on relationship satisfaction.** Men in the intervention condition showed increased relationship satisfaction as compared to men in the control condition. This gender specific finding is similar to the results of the original Prevention and Relationship Enhancement Program (PREP; Markman et al., 1993) in which differences in relationship satisfaction between control and treatment conditions at 5-year follow-up were observed only in men. The authors hypothesized this gender difference may be due to men experiencing greater difficulty handling conflict in personal relationships and showing greater benefit from the skill-based interventions than women as suggested by previous studies (Markman & Kraft, 1989). However, given the pattern of change in satisfaction scores in the current study, this effect may be more indicative of regression to the mean rather than a true intervention effect. Men in the control condition entered into the study with higher levels of baseline relationship satisfaction as compared to men in the treatment condition \(M = 18.2\) vs. \(M = 17.0\), although this difference was not statistically significant \((p = .11)\).

**Intra- and inter-individual variance in effective relationship skills.** Although not a main research question, results of the exploratory (intensive longitudinal) models are noteworthy and offer an interesting contribution to the preventative relationship education literature. Relationship satisfaction is not a static concept; rather, a couple’s satisfaction tends
to covary with a multitude of external events from daily stressors, such as experiences at work, school, finances, and social relationships (Neff & Karney, 2009; Schulz, Cowan, Pape Cowan, & Brennan, 2004), to more life altering events such as the birth of a child, loss of a job, or diagnosis of a serious medical illness (Bradbury & Karney, 2004; Bradbury et al., 2000; Burman & Margolin, 1992; Karademas, 2014). As such, interventions aimed at improving the ability to regularly utilize effective coping skills to manage a variety of stressors may be of more empirical interest to relationship education researchers as compared to developing interventions aimed at improving global outcomes of relationship satisfaction and quality.

In the current study, relationship satisfaction and symptoms of depression were sensitive to both intra- and inter-individual variation in the use of (or lack thereof) relationship skills. For men, the MH intervention appeared to bolster relationship satisfaction on occasions when they successfully engaged in effective communication and when men reported lower levels of conflict-related distress. The MH intervention also appeared to buffer men with lower emotional reappraisal skills from exhibiting increases in depressive symptoms. For women, the MH intervention appeared buffer those with lower trait-like forgiveness from experiencing increases in depressive symptoms.

The majority of evidence-based relationship education programs aim to target improvement in couple communication patterns as a mechanism through which to improve couple outcomes (Halford & Pepping, 2017). However, the results of the current study suggest relationship education researchers may be missing out on other potential intra- and inter-individual processes associated with improvements in relationship satisfaction and
psychological health such as variability in conflict-related distress, emotional reappraisal, and forgiveness.

**Expanding the scope of relationship education research.** A strength of the current study was the inclusion of a more heterogeneous sample of couples than is typical for most studies of community-dwelling adults. The majority of previous trials assessing the utility of relationship education programs were limited to married, middle-aged, Caucasian couples (Hawkins et al., 2012; Markman & Rhoades, 2012). The current study was able to examine if the MH intervention could benefit both married and non-married, cohabiting couples. When marriage was entered into statistical models as a covariate, the results remained consistent with the initial findings, suggesting the findings were not impacted by marital status per se.\(^{12}\)

Additionally, the current study included a sample of couples with a substantially lower income than the original MH study. The original MH study recruited couples from the Chicago metropolitan area (Finkel et al, 2013), a relatively wealthy area with a median household income of $63,153 (American Community Study, 2015). Over half of the participants in the current study reported annual incomes below $30,000 (55%) and the vast majority of participants reported annual incomes below $50,000 (79%). It should be noted that 22% of the current sample were students and made up a greater proportion of participants reporting low income (< $20,000) compared to non-students \( (\chi^2 (5) = 26.19, p < .001)\).

Another strength of the current study was the use of unique potential mechanisms of change and moderators influencing treatment outcomes. To this author’s knowledge, this was the first study to examine the potential influence of forgiveness and emotional reappraisal within the context of a preventative relationship education protocol. Forgiveness in romantic

\(^{12}\) It should be noted that the current study allowed for participation of both heterosexual and same-sex couples. Unfortunately, only one same-sex couple entered into the study and dropped out after baseline assessments due to study staff not being able to reach the couple.
relationships has been shown to be associated with a variety of positive relationship outcome measures and interaction patterns (Gordon & Baucom, 2003; Resbult, Hannon, Stocker, & Finkel, 2005). In this study, higher levels of inter-individual forgiveness were associated with improved mental health for women in the treatment condition and decreased mental health for women in the control group. Future relationship education interventions may consider including forgiveness as a variable of interest.

Additionally, relationship education researchers may also consider assessing and targeting emotional reappraisal as a potential mechanism of interest in relationship outcomes. Increasing ability to engage in emotional reappraisal is a frequently targeted mechanism of change in a multitude of evidence-based psychological interventions for both individuals and couples alike (Barlow, Allen, & Choate, 2004; Baucom et al., 2010; Epstein & Baucom 1989). Although emotional reappraisal is often targeted within the context of multi-session therapy protocols for individuals and couples with levels of distress beyond the scope of preventative interventions, there are a number of studies suggesting this process can be manipulated outside the context of psychotherapy and in single session protocols (Gross, 1998; Wolgast, Lundh, & Viborg, 2011).

Methodological Limitations

Although the current study contributed novel findings to the preventive relationship education literature by expanding inclusion criteria, investigating previously unexplored mechanisms of change, and utilizing unique statistical methodology to investigate the relationship of both intra- and inter-individual variance in potential mediators of both relational and individual health outcomes, findings from the study should be interpreted in light of several limitations.
First and foremost, the proposed two-intercept multilevel modeling allowing for the modeling of men and women simultaneously (Laurenceau & Bolger, 2005; Raudenbush, Brennan, & Barnett, 1995) and controlling for interdependence did not converge, likely due to a relative lack of statistical power. The final sample included 47 couples with complete data (23 couples in the intervention group and 24 couples in the control group). In the end, the small sample size limited the analyses in the current study to be completed separately for men and women. In relationship research, use of statistical methods that allow for simultaneous modeling of men and women accounts for the interdependence observed in distinguishable couples (Kenny, 1996; Kenny & Cook, 1999). As such, the results of the current study should be considered in light of the fact that men’s scores on variables of interest were likely influenced by their romantic partner and vice versa. Results of bivariate correlations between men’s and women’s scores on variables of interest suggest the presence of interdependence across the majority of the substantive variables (see Table 6).

A second statistical limitation of the current study was the lack of statistical power to fit the proposed multilevel structural equation models (MSEM; Preacher, Zyphur, & Zhang, 2010) to examine hypothesized mediators of change (H3-H6). MSEM addresses biases and conflations of the indirect effects in traditional multi-level mediation by separating between and within-person components of variance at level 1 into orthogonal latent components and treats the between group component of the level-1 variables as latent indicators of level 2 construct. The MSEM framework also accounts for interdependence of distinguishable dyads by allowing intercept and slope estimates as well as residual variances to covary (Peugh, DiLillo, & Panuzio, 2013). Future studies should aim to have enough statistical power to complete mediation analyses utilizing more advanced statistical methodology that accounts
for potential biases in the data. Although this author is not aware of a paper discussing the sample size required for dyadic MSEM models to converge, a paper reviewing recommended sample sizes needed for .8 power in a variety of mediation models suggest a sample size of 71 for bias-corrected bootstrap mediation models with medium effect sizes (.39) in the ‘a’ and ‘b’ paths (Fritz and MacKinnon, 2007). Based on Fritz and MacKinnon (2007)’s recommended sample size, and the retention rate in the current study (69.9%) 200 couples would be a conservative sample size to detect effects of the MH intervention using the MSEM framework.

One limitation of the current study that applies broadly to relationship education programs centers on the nature of preventative relationship education interventions. Preventative relationship education programs are designed to prevent future relationship discord and are not designed to be rehabilitative. As such, preventative intervention researchers explicitly target healthy couples and potential positive prognostic effects of the intervention may not be observable for months or years following the intervention (Coie et al., 1993; Wadsworth & Markman, 2012). In fact, results the original MH study suggested a statistically significant effect of the intervention on eliminating the normative decrease in marital satisfaction 8 months into the intervention period, but the effect size of this difference was relatively small (d = .11; Finkel et al., 2013) compared to previous relationship education interventions (d’s = .24-.36; Hawkins et al., 2008). It may be the case participants completed the post-intervention assessment too close in proximity to the completion of the intervention to detect significant changes in outcomes in the current study. Following the recommendations of couple relationship education researchers (Bradbury & Lavner, 2012; Wadsworth & Markman, 2012), future studies should include longer-term follow-ups with
multiple assessment points to increase the sensitivity to detect small changes in core components of the intervention and examine if couples continue to utilize the skills gained in the interventions long-term.

Another limitation of the current study was the absence of systematic change in theory-based mediators as a function of treatment engagement. This may be due, in part, to the lack of statistical power to detect small changes in putative mechanisms of change. In fact, the association between post-intervention slope of conflict-related distress and post-intervention slope of martial quality in the original MH study (which contained adequate statistical power to detect small effects) was on the upper limit of statistical significance \( (b = - .87, \, t(117) = -1.91, \, p = .057; \, \text{Finkel et al., 2013}) \). It should be noted all pre- to post-intervention effect sizes in the current study are in the hypothesized direction for the intervention group with the exception of emotional reappraisal in men (see Tables 4 and 5). As previously stated, future studies should consider a larger sample size to have the statistical power to capture subtle changes in process variables.

It is also possible the MH intervention did not adequately target the theorized mechanisms of change. The aim of the MH intervention to decrease negative-affect reciprocity via emotional reappraisal and taking a neutral stance on the conflict may be at odds with the notion of forgiveness. Forgiveness inherently requires that one of the partners is to blame (Finkel et al., 2002). It may be the case that participants successfully employed the MH intervention and felt neither party was to blame for the conflict or felt each partner was equally at fault. Additionally, the MH intervention targets a more intrapersonal process (emotional reappraisal) rather than dyadic process (problem solving communication). Although improved communication may be a distal outcome of improved individual ability to
engage in adaptive emotion regulation skills within the context of a relationship conflict, the timeline of the current version of the MH intervention may not have allowed for changes in communication patterns to emerge.

Finally, despite the strengths of the sample (noted above), the study also was limited by lack of socioeconomic variability in sample. One of the main research questions of interest in the proposed study was to examine the moderating role of socioeconomic status and baseline mental health on outcomes of interest. I aimed to recruit participants at a local family and community medicine outpatient clinic serving a low socioeconomic demographic of the community. Due to recruitment issues at the clinic, many of the participants recruited to the study ultimately came from the area immediately surrounding the University of Arizona and did not meet criteria for being “at-risk” as defined in previous relationship studies (e.g., Williamson et al., 2016). Future studies should utilize more expansive recruitment methods to increase the heterogeneity of the sample and allow for sub-group analyses.

**Future Directions**

A promising model of delivering relationship education interventions is within the context of annual relationship “check-ups” (Fentz & Trillinsgaard, 2017). One such evidence-based annual check-up is the Marriage Check-up (Cordova et al., 2005; Cordova et al., 2014). The Marriage Check-up includes an assessment session covering both social support and problem solving ability within relational interactions. One week following the assessment, a feedback session is conducted with the couple including a customized report of the couple’s strengths and weaknesses, as well as a review of how the couple can improve on their weaknesses. Results of a randomized-controlled trial investigating the effectiveness of the Marriage Check-up suggest annual relationship check-ups can facilitate improvement across
multiple relational domains (Cordova et al., 2005, 2014). One year following the initial Marriage Check-up, couples completed a “booster” session in the same format as the original Marriage Check-up (Cordova et al., 2005, 2014). The authors concluded their recent meta-analysis (Cordova et al., 2014) of the Marriage Check-up treatment with the following statement - “regular checkups appear to improve and sustain relationship health across a range of variables and thus have the potential to become an important part of an overall comprehensive relationship health system.” The creators of the Marriage Check-up are in the process of developing a web-based version of the treatment protocol and acknowledge the importance of web-based interventions to increase accessibility (Cordova et al., 2014). The brevity and online nature of the MH intervention lends itself to a model of implementation similar to the model utilized for the Marriage Check-up; the MH can be delivered electronically at predetermined intervals with little provider and participant burden.

There continues to be a treatment gap between available empirically-supported treatments and individuals who may benefit from participation in a treatment protocol (Kazdin, 2017). As such, it behooves clinical scientists to think outside the box and to explore non-traditional methods of delivering psychological interventions, including outlets such as social media, web-based activities, and smartphone apps. The results of the current study show a few promising results, especially for men, that a brief, easily implemented preventative relationship education intervention can improve relationship satisfaction and mental health symptoms. The results also show that the MH intervention can influence variability in week-to-week engagement in effective communication and emotional reappraisal skills associated with changes in relationship satisfaction and individual mental health. The design of the MH intervention protocol lends itself to be easily adapted to
implementation via social media or smartphone app, or as part of an annual routine “check-up” adults might complete as part of maintaining a healthy lifestyle, such as in conjunction with annual visits to primary care providers.

There is a larger movement toward preventative medicine in the United States to mitigate the outstanding costs of health care (Benjamin, 2011; Woolf, & Atkins, 2001). In fact, one of the major tenants of the affordable care act (ACA) required that insurance companies participating in insurance marketplaces cover routine preventative healthcare services and screenings (Health Plan Implementation of U.S. Preventive Services Task Force A and B Recommendations, 2010). Preventative interventions can decrease healthcare costs by billions of dollars, physician burden by hundreds of thousands of hours, and risk for morbidity and mortality (Maciosek et al., 2017; Maciosek, Coffield, Flottemesch, Edwards, & Solberg, 2010). Given the growing body of literature linking relationship-level processes and prognostic effects (Kiecolt-Glaser & Newton, 2001, Robles et al., 2013, Sbarra et al., 2011; Sbarra, 2015), it may be of public health interest to include relationship health as a target of preventative services on the same level of common health targets (e.g. obesity, smoking cessation). The brief, highly accessible, low-cost nature of interventions like the Marriage Hack and Marriage Check-up lend themselves well to these widespread preventative efforts.

Conclusion

This study of a modified version of the Marriage Hack highlights the feasibility and potential utility of a brief, easily implemented relationship education intervention. Although the results of the study are exploratory in nature, it appears the MH intervention may improve relationship satisfaction, as well as reduce symptoms of depression and anxiety in men. The study also highlights the importance of 1) investigating potential process variables rarely
included in previous relationship education studies, 2) expanding inclusion criteria of relationship education treatment programs, and 3) utilizing statistical methodology to investigate how intra- and inter-individual variance in process variables influences relationship and individual outcomes. The MH intervention appeared to be influenced by process variables largely unexamined in relationship education programs. For men receiving the MH intervention, occasion-to-occasion variability in conflict-related distress and communication skills influenced reported relationship satisfaction. The MH intervention also appeared to be protective for men reporting below average and average levels of ability to engage in emotional reappraisal. For women receiving the MH intervention, occasion-to-occasion variability in conflict-related distress appeared to influence reported symptoms of depression. The MH intervention also appeared to buffer women reporting lower trait-like levels of forgiveness from experiencing an increase in depression. Marital status did not appear to influence the positive effects of the MH intervention, suggesting non-married, cohabiting couples may also benefit from relationship education programs. Finally, the study underscores the potential utility of a “wise” intervention (cf. Walton, 2014) in improving skills associated with positive individual and couple-level prognostic effects while providing a roadmap for future directions in preventative relationship education research.
APPENDIX A. Perceived Relationship Quality Component (PRQC; Fletcher, Simpson, & Thomas, 2000)

The Perceived Relationship Quality Component (PRQC) Inventory consists of 18 items. Each perceived relationship quality component is assessed by three questions. Each statement is answered on a 7-point Likert-type scale (ranging from 1 = not at all to 7 = extremely). Instructions are to rate the current partner and relationship on each item. Component categories are shown as subheadings (which are omitted when the scale is administered).

Relationship Satisfaction
1. How satisfied are you with your relationship?
2. How content are you with your relationship?
3. How happy are you with your relationship?

Commitment
4. How committed are you to your relationship?
5. How dedicated are you to your relationship?
6. How devoted are you to your relationship?

Intimacy
7. How intimate is your relationship?
8. How close is your relationship?
9. How connected are you to your partner?

Trust
10. How much do you trust your partner?
11. How much can you count on your partner?
12. How dependable is your partner?

Passion
13. How passionate is your relationship?
14. How lustful is your relationship?
15. How sexually intense is your relationship?

Love
16. How much do you love your partner?
17. How much do you adore your partner?
18. How much do you cherish your partner?
APPENDIX B. Couple Satisfaction Index-4 (CSI-4; Funk and Rogge, 2007)

1. Please indicate the degree of happiness, all things considered, of your relationship

<table>
<thead>
<tr>
<th>Extremely Unhappy</th>
<th>Fairly Unhappy</th>
<th>A Little Unhappy</th>
<th>Happy</th>
<th>Very Happy</th>
<th>Extremely Happy</th>
<th>Perfect</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

2. I have a warm and comfortable relationship with my partner

<table>
<thead>
<tr>
<th>Not at all True</th>
<th>A little True</th>
<th>Somewhat True</th>
<th>Mostly True</th>
<th>Almost Completely True</th>
<th>Completely True</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

3. How rewarding is your relationship with your partner?

<table>
<thead>
<tr>
<th>Not at all</th>
<th>A little</th>
<th>Somewhat</th>
<th>Mostly</th>
<th>Almost Completely</th>
<th>Completely</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

4. In general, how satisfied are you with your relationship?

<table>
<thead>
<tr>
<th>Not at all</th>
<th>A little</th>
<th>Somewhat</th>
<th>Mostly</th>
<th>Almost Completely</th>
<th>Completely</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
APPENDIX C. Dyadic Adjustment Scale-4 (Sabourin, Valois, & Lussier, Y. 2005)

Most persons have disagreements in their relationships. Please indicate below the approximate extent of the agreement or disagreement between you and your partner for each item on the following list.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>How often do you discuss or have you considered divorce, separation, or terminating your relationship?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>2.</td>
<td>In general, how often do you think that things between you and your partner are going well? (r)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>3.</td>
<td>Do you confide in your mate? (r)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>4.</td>
<td>The dots on the following line represent different degrees of happiness in your relationship. The middle point, “happy” represents the degree of happiness of most relationships. Please circle the dot which best describes the degree of happiness, all things considered, of your relationship</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0 1 2 3 4 5 6</td>
</tr>
</tbody>
</table>
APPENDIX D. Center for Epidemiologic Studies-Depression Scale (Radloff, 1977)

**INSTRUCTIONS:** For each statement, please place a mark in the column that best describes how you have been feeling *in the past week.*

<table>
<thead>
<tr>
<th></th>
<th>Rarely or none of the time (less than 1 day)</th>
<th>Some or a little of the time (1 – 2 days)</th>
<th>Occasionally or a moderate amount of the time (3 – 4 days)</th>
<th>Most or all of the time (5 – 7 days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>I was bothered by things that usually don’t bother me.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>I did not feel like eating; my appetite was poor.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>I felt that I could not shake off the blues, even with the help from family or friends.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>I felt that I was just as good as other people.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>I had trouble keeping my mind on what I was doing.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>I felt depressed.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>I felt that everything I did was an effort.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>I felt hopeful about the future.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>I thought my life had been a failure.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>I felt fearful.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rarely or none of the time (less than 1 day)</td>
<td>Some or a little of the time (1 – 2 days)</td>
<td>Occasionally or a moderate amount of the time (3 – 4 days)</td>
<td>Most or all of the time (5 – 7 days)</td>
</tr>
<tr>
<td>---</td>
<td>------------------------------------------</td>
<td>------------------------------------------</td>
<td>-------------------------------------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>11.</td>
<td>My sleep was restless.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>I was happy.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>I talked less than usual.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>People were unfriendly.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16.</td>
<td>I enjoyed life.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.</td>
<td>I had crying spells.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18.</td>
<td>I felt sad.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19.</td>
<td>I felt that people dislike me.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.</td>
<td>I could not get “going”.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total: _______/60 (CESDT)
APPENDIX E. Overall Anxiety Severity and Impairment Scale (OASIS; Norman, Cissel, Means-Christensen, & Stein, 2006)

The following items ask about anxiety and fear. These symptoms may include panic attacks, situational anxieties, worries, flashbacks, hypervigilence of startle. Include all of your anxiety symptoms when answering these questions. For each item, circle the number for the answer that best describes your experience over the past week.

1. In the past week, how often have you felt anxious?
   - 0 = No anxiety in the past week.
   - 1 = Infrequent anxiety. Felt anxious a few times.
   - 2 = Occasional anxiety. Felt anxious as much of the time as not. It was hard to relax.
   - 3 = Frequent anxiety. Felt anxious most of the time. It was very difficult to relax.
   - 4 = Constant anxiety. Felt anxious all of the time and never really relaxed.

2. In the past week, when you have felt anxious, how intense or severe was your anxiety?
   - 0 = Little or None: Anxiety was absent or barely noticeable.
   - 1 = Mild: Anxiety was at a low level. It was possible to relax when I tried. Physical symptoms were only slightly uncomfortable.
   - 2 = Moderate: Anxiety was distressing at times. It was hard to relax or concentrate, but I could do it if I tried. Physical symptoms were uncomfortable.
   - 3 = Severe: Anxiety was intense much of the time. It was very difficult to relax or focus on anything else. Physical symptoms were extremely uncomfortable.
   - 4 = Extreme: Anxiety was overwhelming. It was impossible to relax at all. Physical symptoms were unbearable.

3. In the past week, how often did you avoid situations, places, objects, or activities because of anxiety or fear?
   - 0 = None: I do not avoid places, situations, activities, or things because of fear.
   - 1 = Infrequent: I avoid something once in a while, but will usually face the situation or confront the object. My lifestyle is not affected.
   - 2 = Occasional: I have some fear of certain situations, places, or objects, but it is still manageable. My lifestyle has only changed in minor ways. I always or almost always avoid the things I fear when I’m alone, but can handle them if someone comes with me.
   - 3 = Frequent: I have considerable fear and really try to avoid the things that frighten me. I have made significant changes in my life style to avoid the object, situation, activity, or place.
   - 4 = All the Time: Avoiding objects, situations, activities, or places has taken over my life. My lifestyle has been extensively affected and I no longer do things that I used to enjoy.
4. In the past week, how much did your anxiety interfere with your ability to do the things you needed to do at work, at school, or at home?

0 = None: No interference at work/home/school from anxiety
1 = Mild: My anxiety has caused some interference at work/home/school. Things are more difficult, but everything that needs to be done is still getting done.
2 = Moderate: My anxiety definitely interferes with tasks. Most things are still getting done, but few things are being done as well as in the past.
3 = Severe: My anxiety has really changed my ability to get things done. Some tasks are still being done, but many things are not. My performance has definitely suffered.
4 = Extreme: My anxiety has become incapacitating. I am unable to complete tasks and have had to leave school, have quit or been fired from my job, or have been unable to complete tasks at home and have faced consequences like bill collectors, eviction, etc.

5. In the past week, how much has anxiety interfered with your social life and relationships?

0 = None: My anxiety doesn’t affect my relationships.
1 = Mild: My anxiety slightly interferes with my relationships. Some of my friendships and other relationships have suffered, but, overall, my social life is still fulfilling
2 = Moderate: I have experienced some interference with my social life, but I still have a few close relationships. I don’t spend as much time with others as in the past, but I still socialize sometimes.
3 = Severe: My friendships and other relationships have suffered a lot because of anxiety. I do not enjoy social activities. I socialize very little.
4 = Extreme: My anxiety has completely disrupted my social activities. All of my relationships have suffered or ended. My family life is extremely strained.
APPENDIX F. Short Form 36 (Ware, 1992)

1. In general, would you say your health is:

   Excellent  1
   Very good   2
   Good        3
   Fair        4
   Poor        5

2. Compared to one year ago, how would you rate your health in general now?

   Much better now than one year ago  1
   Somewhat better now than one year ago  2
   About the same                      3
   Somewhat worse now than one year ago  4
   Much worse now than one year ago     5

The following items are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?

(Circle One Number on Each Line)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Yes, Limited a Lot</th>
<th>Yes, Limited a Little</th>
<th>No, Not limited at All</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports</td>
<td>[1]</td>
<td>[2]</td>
<td>[3]</td>
</tr>
<tr>
<td>4. Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf</td>
<td>[1]</td>
<td>[2]</td>
<td>[3]</td>
</tr>
<tr>
<td>5. Lifting or carrying groceries</td>
<td>[1]</td>
<td>[2]</td>
<td>[3]</td>
</tr>
</tbody>
</table>
6. Climbing several flights of stairs [1] [2] [3]
7. Climbing one flight of stairs [1] [2] [3]
8. Bending, kneeling, or stooping [1] [2] [3]
9. Walking more than a mile [1] [2] [3]
10. Walking several blocks [1] [2] [3]
11. Walking one block [1] [2] [3]
12. Bathing or dressing yourself [1] [2] [3]

During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

(Circle One Number on Each Line)

Yes No
13. Cut down the amount of time you spent on work or other activities 1 2
14. Accomplished less than you would like 1 2
15. Were limited in the kind of work or other activities 1 2
16. Had difficulty performing the work or other activities (for example, it took extra effort) 1 2

During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?

(Circle One Number on Each Line)

Yes No
17. Cut down the amount of time you spent on work or other activities 1 2
18. **Accomplished less** than you would like  
1 2

19. Didn't do work or other activities as **carefully** as usual  
1 2

20. During the **past 4 weeks**, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbors, or groups?

(Circle One Number)

Not at all 1
Slightly 2
Moderately 3
Quite a bit 4
Extremely 5

21. How much **bodily** pain have you had during the **past 4 weeks**?

(Circle One Number)

None 1
Very mild 2
Mild 3
Moderate 4
Severe 5
Very severe 6

22. During the **past 4 weeks**, how much did **pain** interfere with your normal work (including both work outside the home and housework)?

(Circle One Number)

Not at all 1
A little bit 2
Moderately 3
Quite a bit 4

Extremely 5

These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling.

How much of the time during the past 4 weeks . . .

**(Circle One Number on Each Line)**

<table>
<thead>
<tr>
<th>Question</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>23. Did you feel full of pep?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>24. Have you been a very nervous person?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>25. Have you felt so down in the dumps that nothing could cheer you up?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>26. Have you felt calm and peaceful?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>27. Did you have a lot of energy?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>28. Have you felt downhearted and blue?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>29. Did you feel worn out?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>30. Have you been a happy person?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>31. Did you feel tired?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>
32. During the **past 4 weeks**, how much of the time has your **physical health or emotional problems** interfered with your social activities (like visiting with friends, relatives, etc.)?

(Circle One Number)

All of the time 1  
Most of the time 2  
Some of the time 3  
A little of the time 4  
None of the time 5  

How **TRUE** or **FALSE** is each of the following statements for you.

(Circle One Number on Each Line)

<table>
<thead>
<tr>
<th></th>
<th>Definitely True</th>
<th>Mostly True</th>
<th>Don't Know</th>
<th>Mostly False</th>
<th>Definitely False</th>
</tr>
</thead>
<tbody>
<tr>
<td>33. I seem to get sick a little easier than other people</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>34. I am as healthy as anybody I know</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>35. I expect my health to get worse</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>36. My health is excellent</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
APPENDIX G. Conflict-related Distress (Finkel et al., 2013)

Please rate the following items based on the conflict you wrote about in this week’s assessment:

1. I am angry at my partner for his/her behavior during this conflict,” and “

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. My partner's behavior during this conflict was highly upsetting to me

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX H. Forgiveness (Fincham, Paleari, & Regalia 2002)

Think of how you have responded to your partner following the conflict you wrote about (will write about) this week. Indicate the degree to which you agree or disagree with the following statements

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Not at all</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I disapproved of him/her (r)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>2. I thought favorably of him or her</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>3. I condemned my partner (r)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>4. I have forgiven my partner</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

(r) = reverse coded items
APPENDIX I. Emotion Regulation Questionnaire (ERQ; Gross and John, 2003)

The Emotion Regulation Questionnaire is designed to assess individual differences in the habitual use of two emotion regulation strategies: cognitive reappraisal and expressive suppression.

Instructions and Items

We would like to ask you some questions about your emotional life, in particular, how you control (that is, regulate and manage) your emotions. The questions below involve your emotional experience, or what you feel like inside. Although some of the following questions may seem similar to one another, they differ in important ways. For each item, please answer using the following scale:

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Neutral</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. When I want to feel more positive emotion (such as joy or amusement), I change what I’m thinking about.
2. When I want to feel less negative emotion (such as sadness or anger), I change what I’m thinking about.
3. When I’m faced with a stressful situation, I make myself think about it in a way that helps me stay calm.
4. When I want to feel more positive emotion, I change the way I’m thinking about the situation.
5. I control my emotions by changing the way I think about the situation I’m in.
6. When I want to feel less negative emotion, I change the way I’m thinking about the situation.
APPENDIX J. Problem Solving Communication

Problem Solving and Communication Subscale of the Family Assessment Device (FAD; Epstein, Baldwin, & Bishop, 1983)

We are going to ask you a few questions about how you and your partner interact. Please select how much you agree or disagree with the following statements (1= strongly agree to 4=strongly disagree)

1. My partner and I usually act on our decisions regarding problems
2. After my partner and I try to solve a problem, we usually discuss whether it worked or not.
3. My partner and I resolve most emotional upsets that come up
4. My partner and I confront problems involving feelings
5. My partner and I try to think of different ways to solve problems
6. When my partner or I am upset, the other knows why
7. You can’t tell how my partner is feeling from what he/she is saying
8. My partner comes right out and says things instead of hinting at them
9. My partner and I are frank with each other
10. My partner and I don’t talk to each other when we are angry
11. When my partner or I don’t like what the other has done, we tell them
APPENDIX K. Conditional Growth Models for Outcome Variables

**Figure K-1.** Couples Satisfaction Index over time. The linear effect represents the unstandardized parameter estimate of the interaction term between time and treatment condition.
*p < .05

**Figure K-2.** Perceived Relationship Quality Component global relationship quality subscale over time.
Figure K-3. Center for Epidemiologic Studies of Depression-Scale over time. The linear effect represents the unstandardized parameter estimate of the interaction term between time and treatment condition.

*p < .05
**Figure K-4.** Overall Anxiety Severity and Impairment Scale over time. The linear effect represents the unstandardized parameter estimate of the interaction term between time and treatment condition.

**p < .01**

**Figure K-5.** Short-Form 36 General Health Subscale over time.
Figure K-6. Conflict-related distress over time.

Figure K-7. Forgiveness over time.
Figure K-8. Cognitive Reappraisal subscale of the Emotion Regulation Questionnaire over time.

Figure K-9. Problem Solving Communication over time.
APPENDIX L. Theory-based Mechanisms of Change Overt Time

**Figure L-1.** Conflict-related distress collapsed across treatment conditions over time. Time 0-3 = writing task occasions. Time 4 = post intervention assessment.

**Figure L-2.** Forgiveness collapsed across treatment conditions over time. Time 0-3 = writing task occasions. Time 4 = post intervention assessment. Linear and quadratic b represent unstandardized parameter estimates of linear and quadratic effects of forgiveness over time for Men.

*p < .05

**p < .01
**Figure L-3.** Emotional Reappraisal subscale of the Emotion Regulation Questionnaire collapsed across treatment condition over time. Time 0-3 = writing task occasions. Time 4 = post intervention assessment.

**Figure L-4.** Problem Solving Communication collapsed across treatment condition over time. Time 0-3 = writing task occasions. Time 4 = post intervention assessment. Linear b represents the unstandardized parameter estimate of the linear effect of communication over time for women.

* *p < .05*
REFERENCES


