Program Dosage and Relationship Quality in Healthy Relationship Education:

The Role of Facilitation Alliance

by

Daniel Neely

Approved by

Christine Totura, Chair, Assistant Professor of Psychology
Chris Correia, Professor of Psychology
Francesca Adler-Baeder, Professor of Human Development and Family Studies
Scott Ketring, Associate Professor of Human Development and Family Studies

Abstract

Program dosage and facilitation alliance have been related to improvements, namely couple relationship quality, in Couple Relationship Education (CRE) programs. However, little has been done to investigate how these variables might jointly function. Building on theoretical and functional similarities established between alliance in the therapeutic and educational contexts, this study seeks to test facilitation alliance as a mediator between program dosage and residual change in couple relationship quality. Participants were a diverse subset of adult couples enrolled as part of a statewide randomized controlled trial evaluating two CRE programs (n = 968). Results revealed poor model fit, and therefore did not support facilitation alliance as a mediator between program dosage and residual change in couple relationship quality. Alternatives were explored, investigating sex and program group differences. Possible explanations are discussed regarding why results may have failed to support the hypothesized model, including the specific nature of CRE contexts and participants.

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Review of Literature

Much research in the past several decades has been devoted to marital or relationship

quality. In the literature, the construct of marital quality (and the more recently adopted inclusive

term relationship quality) has been measured as relationship satisfaction, longevity and

commitment, happiness derived from the relationship, partner agreement, and various relational

problems or obstacles. It involves defining what makes a marriage or relationship functional or

not and has been linked to many important outcomes (Norton, 1983; Robles, Slatcher,

Trombello, & McGinn, 2014). Couple Relationship Education (CRE) programs seek to improve

the lives of their participating couples and individuals by focusing on skills and information

related to improving relationship quality. As with any programmatic intervention, effective

implementation and adequate exposure to program content, or dosage, is important in achieving

meaningful results (Hawkins, Blanchard, Baldwin, & Fawcett, 2008; Hawkins, Stanley,

Blanchard, & Albright, 2012; Pinquart & Teubert, 2010a, 2010b). Further, the development of a

relationship between the program facilitator and the participant is an important aspect of

effective implementation that has been examined in several prevention and intervention fields

(Marmor, et al., 1991; Ribisl, et al., 1996; Schmidt, Chomycz, Houlding, Kruse, & Franks, 2014;

Shirk, Karver, & Brown, 2011).

In exploring implementation of CRE programs, studies have looked at the alliance

between program facilitators and participants (i.e., facilitation alliance) and program dosage

separately in relation to outcomes, yet little has been done to understand the role these factors play together in understanding outcomes such as couple relationship quality. Therefore, the purpose of this study is to determine how these factors function in CRE program implementation, thereby contributing to better understanding of program effectiveness.

Couple Relationship Quality and CRE

Importance has been placed on couple relationship quality due to its many links to peoples' quality of life. In their 2007 meta-analysis, Proulx, Helms, and Buehler found couple relationship quality significantly predictive (both longitudinally and cross-sectionally) of measures of personal well-being, including depressive symptoms, self-esteem, life satisfaction, happiness, anxiety, and physical health. In a more recent meta-analysis, Robles et al., (2014) found that couple relationship quality and satisfaction were related to a number of health outcomes, including indicators of cardiovascular disease, early mortality, self-rated health, debilitating pain, and medical adherence. Additionally, the effects of couple relationship quality on health and well-being may become more potent the older an individual becomes (Umberson, Williams, Powers, Liu, & Needham, 2006).

The field of CRE seeks to improve the wellbeing of community members through many outcomes, including couple relationship quality. Though CRE programs vary in format and content, they generally include a structured, group psychoeducational experience with the goal of helping participants improve their relationships via attitudes, behaviors, and skills (Markman & Rhoades, 2012; Rauer et al., 2014). Evidence has accumulated demonstrating significant CRE program effects on couples following participation, including greater ability to form quality relationships, improved relationship, communication, parenting, and stress-management skills, and greater financial responsibility and stability, among others (Hawkins, Blanchard, Baldwin, &

Fawcett, 2008; Hawkins & Ooms, 2012; Markman & Rhoades, 2012). According to Rauer et al. (2014), three prevailing theories attempt to explain how CRE programs affect change in relationship quality: a direct effects model, a behavior model, and a commitment model. The direct effects model posits that both prorelationship behaviors, such as problem-solving and communication skills, and relational commitment positively and jointly influence relationship quality. The behavioral model theorizes that prorelationship behaviors are most important, and that CRE programs improve positive interactions and reduce negative interactions in couples, enhancing motivation to stay in the relationship and ultimately leading to couples' more positive evaluations of their relationships. Finally, the commitment model theorizes that relational commitment is most important, and that CRE programs improve participant's attitudes and commitment toward their relationship, leading to improved positive interactions and reduced negative interactions within the couple, and ultimately leading to more positive evaluations of the relationship. Consistent with prevailing opinions, the authors found evidence that the behavioral model may best explain changes in couple relationship quality, with increases in positive interactions showing particular promise for improving relationship quality. CRE programs, then, are right in targeting behavioral skills, as well as targeting increases in positive interactions.

Given the importance of CRE programs, care should be taken in implementing them effectively. As with most programmatic interventions, the quality of implementation of CRE programs is important to consider when attempting to explain program effectiveness and outcomes. Several aspects of the implementation of CRE programs have been identified as important for producing the desired outcomes. For example, Halford, Markman, Kline, and Stanley (2003) found that focused efforts in recruitment and retention for high-risk couples,

match of program content to couple needs, as well as increased accessibility to programs for community couples all contribute to CRE effectiveness. Furthermore, programs are often designed such that participants are expected to receive a specific level of exposure in order to gain maximal benefits, thereby increasing their accessibility and potency (Hawkins, Carroll, Doherty, & Willoughby, 2004).

Program Dosage

Overall, in the arena of prevention research, dosage (quantitative measure of time spent engaging with the program, i.e., hours or number of sessions offered or attended) has been identified as an important aspect of exposure in achieving desired outcomes (Nation et al., 2003; Olweus & Limber, 2010; Reyes et al., 2012). Inadequate dosage – even with effective program content – may indicate, then, that participants were not exposed to *enough*, either due to lack of retention and engagement with the program or because the program was designed to be too brief. In other words, adequate program dosage is thought of as a necessary component of program implementation, but not sufficient in itself. Nation et al. (2003) note that the threshold for adequate or ideal dosage is influenced by both the program's material and the level of the needs of its recipients. Even the best prevention program implemented without a carefully chosen dosage is likely to fail. Similarly, a program with ample dosage but poor content is also unlikely to result in the desired outcomes. Because CRE programs seek to prevent expensive, disruptive, and distressing deterioration of family relationships, which lead to poorer well-being and health, within non-clinical populations, it stands to reason that dosage considerations from other prevention efforts would relate to CRE programs as well.

Dosage plays an important role in CRE programming, with more comprehensive and complex programs that cover greater amounts of material necessitating greater dosage and higher

dosage predicting stronger program effects, such as relationship satisfaction, couple communication, parenting skills, and reductions in relationship conflict (Bradford, Drean, Adler-Baeder, Ketring, & Smith, 2017; Hawkins, Blanchard, Baldwin, & Fawcett, 2008; Hawkins, Stanley, Blanchard, & Albright, 2012; Pinquart & Teubert, 2010a, 2010b). Seemingly little CRE research has addressed the relationship between program dosage and couple relationship quality specifically, with one 2004 meta-analysis noting that high-dosage (20 hours or more) and moderate-dosage (9-20 hours) programming resulted in larger effects on relationship quality compared with low-dosage (1-8 hours; Hawkins et al., 2004). Notably, this relationship was found to be non-linear, with additional dosage beyond moderate no longer providing significant gains in relationship quality. Generally consistent with this finding, researchers in the area of premarital education found that couples who spent more time in the educational program reported improved results on measures of couple relationship quality, including increased marital satisfaction and reduced marital conflict (Stanley, Amato, Johnson, and Markman, 2006).

Facilitation Alliance

Compared to dosage, the role of alliance between facilitators and participants, another potentially impactful facet of prevention (and accordingly CRE) program implementation, is relatively less studied, though it is well explored in the psychotherapy and education literatures (Hawkins et al., 2012). Alliance between the therapist and client (or "clients" in group therapy settings) has consistently been shown to predict positive outcomes in therapy, including reductions in negative psychological symptoms and improved relationships, and is characterized by positive collaboration, affective warmth, and mutual contribution and goal-setting (Horvath & Symonds, 1991; Martin, Garske, & Davis, 2000; Schmidt et al, 2014; Shirk, Karver, & Brown, 2011). Further, alliance in the field of psychotherapy, and as newly established in the prevention

field (Totura, Labouliere, Gryglewicz, & Karver, in press), is often conceptualized as mediating the outcomes to therapy, both as a mechanism for positive results due to the establishment of strong alliance (Elvins & Green, 2008; Joyce, Ogrodniczuk, Piper, & McCallum, 2003; Saatsi, Hardy, & Cahill, 2007), and – when absent – as a mechanism explaining failure to achieve positive outcomes (Howard, Turner, Olin, & Mohr, 2006). As a mechanism for change, therapeutic alliance is sometimes theorized to be inherently beneficial, independent of other intervention content, but also to indirectly influence therapy outcomes by interacting with other aspects of the intervention such as increased motivation, agreement on therapy content and goals, and increased collaboration and adherence (Horvath, Del Re, Flückiger, & Symonds, 2011; Martin, Garske, & Davis, 2000). Finally, most of the few studies assessing facilitation alliance in CRE programs have often utilized measures originally created for assessing therapeutic alliance in a treatment context (Owen, Rhoades, Stanley & Markman, 2011; Quirk, Owen, Inch, France, & Bergen 2014).

Education research has identified the quality of teacher-student relationships, particularly rapport, as an essential element for effective teaching (Cornelius-White, 2007; Frisby & Martin, 2010). Mirroring the positive effects of therapeutic alliance, quality teacher-student relationships, with specific attention given to rapport – defined as a prosocial bond of mutual trust and respect – are predictive of increased learning, student participation, student motivation, and affect towards the course and its content (Frisby & Martin, 2010; Frisby & Myers, 2008; Granitz, Koernig, & Harich, 2009). Conceptual and associative similarities can be seen with alliance in both therapeutic and educational settings (e.g., the formation of a positive relationship, including respect, trust, and common goals, leading to improved outcomes), supporting its positive effects on intervention and programmatic outcomes across both contexts (Bordin, 1979).

As previously mentioned, the measurement of alliance in psychoeducational settings such as CRE is in relative infancy, typically borrowing directly from more established theory and measurement in the therapeutic alliance literature. However, more recent studies have adapted current measures of alliance to better fit the CRE context (Ketring, et al., 2017). While there are certainly distinct differences between CRE programs and education and therapy, Ketring et al. argued for the conceptual similarity of alliance in these fields with alliance in CRE programming. Based on Bordin's (1979) theory of alliance, CRE program facilitators, educators, and therapists can be seen as agents of change, all of which seek to set collaborative goals and form a bond with their clients, students, or program participants. Following this argument, alliance is defined within CRE by collaborative goal setting, flexible and adaptive teaching approaches, a positive and professional relationship or bond, and responsiveness to needs and feedback. A small number of CRE studies have shown alliance to be modestly related to CRE program outcomes, such as relationship quality, improved communication, and reduced negative interactions (Bradford, Adler-Baeder, Ketring, & Smith, 2012; Ketring et al., 2017; Owen, Rhoades, Stanley & Markman, 2011; Quirk, Owen, Inch, France, & Bergen 2014).

The therapeutic alliance literature has further suggested that treatment dosage and alliance relate to each other, such that increased dosage in therapy may leave adequate time for the development of therapeutic alliance, which, in addition to potential inherent benefits, increases motivation for change, collaborative goal setting, and hopefulness, while the time constraint of low-dosage therapy may inhibit the formation of alliance (Eaton, Abeles, & Gutfreund, 1988; Hogue et al., 2006; Martin, Garske, & Davis, 2000). In other words, therapeutic alliance is conceptualized to act as a mediating mechanism between therapy dosage and outcomes. However, this mechanism between alliance and dosage has yet to be evaluated in

CRE programming. Given that CRE facilitators, and the alliance they develop with program participants, appear to share common qualities and functions to that of therapists and therapeutic alliance, it can be reasonably expected that facilitation alliance may also mediate the relationship between dosage and critical indicators of CRE effectiveness, such as relationship quality.

Purpose of the Present Study

Drawing from the established pantheoretical understanding of alliance and its similarities to the educational and psychoeducational contexts (Bordin, 1979; Ketring, et al., 2017), this study seeks to test facilitation alliance as a potential mechanism in the relationship between dosage and change in couple relationship quality. Couple relationship quality was determined to be the best choice among testable CRE program outcomes for multiple reasons: couple relationship quality is commonly targeted as an outcome for CRE programs, CRE programs have been shown to be effective in improving couple relationship quality, and couple relationship quality has been linked with improvements in overall physical and mental well-being (Hawkins, Blanchard, Baldwin, & Fawcett, 2008; Norton, 1983). This means that selecting couple relationship quality as an outcome should result in findings that are both meaningful and generalizable. Notably, this study will uniquely contribute to the literature as currently no study has measured the effect of program dosage, as facilitator-recorded attendance to a program, specifically on couple relationship quality, or the mechanism by which this relationship works. Because the therapeutic alliance literature often conceptualizes alliance as a mediating mechanism for treatment outcomes, this study will test facilitation alliance, as reported by participants, as a mediator of the relationship between program attendance (dosage) and couple relationship quality (Figure 1). It is expected that:

1. Program dosage will positively predict post-program couple relationship quality, while controlling for pre-program couple relationship quality. This relationship is expected to be linear, as the range of dosage in the study would be classified as low- to moderate-dosage according to the framework of Hawkins, et. al. (2012).

2. Program dosage will positively predict facilitation alliance.

3. Alliance in turn will positively predict post-program couple relationship quality, while controlling for pre-program couple relationship quality.

4. Therefore, facilitation alliance will mediate the relationship between program dosage and post-program couple relationship quality.

Methods

Participants

Participants in this study are a subset of adult couples, married and non-married, enrolled, as part of the Alabama Healthy Marriage and Relationship Education Initiative (AHMREI), a randomized controlled trial (RCT) of two CRE programs compared to a control condition. Of the participants enrolled in the overall RCT, those included for the present study were randomly assigned into one of two CRE programs. The first of these was ELEVATE, which utilizes activities, practices, and media to facilitate the learning of core skills for healthy relationships (Futris, et al., 2014). The second was Couples Connecting Mindfully (CCM), which emphasizes physiology, emotion, and utilizing mindfulness-based stress reduction skills to facilitate healthy interactions, emotion regulation, and reductions in personal stress (McGill, Ketring, & Adler-Baeder, 2015). Participants were expected to attend as couples, and therefore random assignment was at the couple level (i.e., members of each couple were always assigned the same condition). Both programs were six sessions in length, each session lasting 1.5 hours, carried out in

consecutive weeks. Programs were held in 11 family resources centers in varying locations across the state, some of which had been implementing these or similar CRE programs for years. This study focused on factors of change among program participants, rather than program efficacy; thus, as members of the control group never attended these CRE courses, and therefore never had a facilitator with which to form alliance, they were not included in this study. Those who were randomly assigned into one of the two program groups but failed to attend any sessions were similarly not included in the sample for this study. The final sample includes 968 individuals (M age = 38.4, SD = 12.4; 48.3% male), coming from 505 couples, of which 70.6% reported that they were married, 8.0% reported that they were engaged, and 19.4% reported that they were in a committed relationship. Further, 60.4% identified as Caucasian, 33.7% as African American, 1.2% as Asian American, with 4.9% identifying as Hispanic/Latino. The remaining participants identified as "Other" or declined to answer about their race and ethnicity. On the whole, attendance of partners was highly congruent (i.e., attendance of members of each couple was highly and positively correlated; $r = .834$, $p < .001$), with 86.5% of couples having a difference in session attendance of one or less.

Measures

Dosage. Dosage was operationally defined as the number of sessions attended as recorded by class facilitators. As previously mentioned, dosage is a quantitative measure of time spent engaging with a program and can refer to either the quantity of sessions a program offers or, as is more appropriate for comparing individuals within a program, the quantity of sessions a participant actually attends (Dane & Schneider, 1998; Nation, et al., 2003). For this reason, session attendance was used to define dosage in this study, with the maximum possible value of six.

Alliance. Facilitation alliance was measured using an adaptation of Duncan, et al.'s Session Rating Scale (SRS; Duncan, et al., 2003). The SRS is described as a brief, visual analogue instrument, meaning that participants endorse their response along an anchored spectrum with negative statements on the left and positive statements on the right (e.g. "The facilitators were not approachable nor were they personable in helping us" on the left and "The facilitators were approachable and personable in helping us" on the right). Responses are translated to a score from 0 to 100. New items were added to the original measure to reflect the adaptation from a therapy session to the CRE context. The resulting 10 items were developed using the original SRS items, with the additional items reflecting aspects of CRE facilitation which align with characteristics of effective teachers and educational theory (S. Ketring, personal communication, June 4, 2018). The scale demonstrated strong internal consistency (α_{males} = .94; $\alpha_{females}$ = .91), and in other studies has demonstrated both concurrent and predictive validity while remaining one of the easiest to administer measures of its kind (Duncan, et al., 2003). Facilitation alliance was measured post-program.

Couple Relationship Quality. A self-report revised 3-item version of the Quality Marriage Index (QMI) was used to measure couple relationship quality before (2 weeks prior) and after (8 weeks following) the 6-week CRE programming. The QMI asks participants to rate their agreement with statements of relationship quality, such as "We have a good relationship," on a seven-point Likert scale of 1 (Very Strongly Disagree) to 7 (Very Strongly Agree). The average of the three items are taken as a final index score. (Norton, 1983). The scale is considered to be one of the most valid commonly used measures for relationship quality (Funk, & Rogge, 2007; Norton, 1983) The scale demonstrated strong internal consistency both pre-program (α_{males} = .94; $\alpha_{females}$ = .96) and post-program (α_{males} = .97; $\alpha_{females}$ = .97).

Procedures

The overall randomized controlled AHMREI study was approved by university

Institutional Review Board (IRB). Recruitment for enrollment in CRE classes and the study was

done in local communities via the partnering family resources centers and community agencies,

word of mouth, posted advertisements, and radio advertising. Programs were 6 weeks long and

implemented in a group-based format in 11 family resource centers or community agencies

across Alabama. When participants initially enrolled in the study, they were consented via email

(or via hard copy consent form if recruited in person at their participating agency) and then

randomly assigned to a condition (i.e., ELEVATE, CCM, or the no program comparison group).

Pre-program Qualtrics surveys were sent via email two-weeks before the program began and

then again by email following the completion of the final program class 8 weeks later.

Analytic Strategy

Preliminary analyses were run to check for issues of multicollinearity. Given that the

participants were couples, analyses were completed using a nested model – participants nested

within couples – to address issues of data dependency. Monte Carlo simulations were conducted

to test for significant indirect effects (Hayes, 2009). Missing data was handled using Full

Information Maximum Likelihood (FIML). Tests of the mediation hypothesis (Figure 1) were

conducted using Mplus (Muthén & Muthén, 2012). Controlling for pre-program couple

relationship quality, post-program relationship quality was regressed on facilitation alliance and

program dosage, while facilitation alliance was also regressed on program dosage. Per Hayes

(2009), the use of modern tests of mediation and indirect effects do not rely on the significance

of a direct effect between predictor (dosage) and criterion (couple relationship quality) in the

absence of the mediator (alliance). However, in the event that a significant indirect effect is

found, a model which excludes the alliance mediator will be run to explore completeness of mediation. In order to determine adequacy of model fit, Root Mean Square Error of Approximation (RMSEA), chi-square test of model fit, and the Comparative Fit Index (CFI) will be used and evaluated based on Schreiber, Nora, Stage, Barlow, and King (2006). The model is considered of adequate fit if the RMSEA is between .06 and .08 or less, if the resulting p value from the chi-square index is greater than $p = .05$, and if the CFI is greater than .95. The chi-square test has a tendency to be sensitive to sample size with larger samples often resulting in significant fit indices. Therefore, the chi-square/degrees of freedom (df) will also be evaluated, with a X^2/df ratio of less than 3 indicating good fit.

Results

Preliminary Analyses

Table 1 provides the means, standard deviations, and correlations among all model variables used in this analysis (coefficients and values are for the variables outside the model; not while accounting for between-couple variance). No issues with multicollinearity were detected. As expected, average couple relationship quality was higher post-program ($t(871) = 5.135$, $p < .001$). Participants attended 4.68 session on average (approximately 80%) and average alliance was high, at 94.23. Unexpectedly, according to bivariate correlations, no significant associations among model variables were found with dosage. Alliance was positively and significantly associated with post-program couple relationship quality. Finally, as expected, pre-program couple relationship quality was highly related to post-program couple relationship quality.

Nested Mediation Model

Interclass correlation coefficients demonstrated that data was dependent across all model variables, indicating that a nested model was appropriate. Model fit statistics indicate poor model fit (RMSEA = .158; $X^2(8) = 203.202$, $p < .001$; $X^2/df = 25.400$; CFI = .501). Because of this, the coefficients generated by this model may not be valid and cannot be interpreted with confidence. Further, because of the poor model fit, another model was not run (dropping the mediator) to test for completeness of mediation.

Due to nesting, all path coefficients reported are at the individual level (Table 2). As expected, program dosage was found to significantly and positively predict facilitation alliance ($\beta = .109$, $p = .017$), but was not significantly predictive of post-program couple relationship quality ($\beta = -.002$, $p = .954$), controlling for pre-program couple relationship quality. Facilitation alliance was significantly and positively predictive of post-program couple relationship quality ($\beta = .110$, $p = .001$), controlling for pre-program couple relationship quality. As would be expected, pre-program couple relationship quality was significantly and positively predictive of post-program couple relationship quality ($\beta = .649$, $p < .001$). All model pathways are also shown in Figure 2. Monte Carlo simulation testing for the indirect effect of dosage on post-program relationship quality, controlling for pre-program relationship quality, yielded a 95% confidence interval of .0017 - .0557, indicating the potential of a significant indirect effect if the model fit were adequate. However, as previously mentioned, the conceptual model fit the data poorly, and therefore all of these reported pathway coefficients cannot be interpreted with confidence.

Mediation Models by Gender

Recent studies of the effect of facilitation alliance in CRE have found no difference based on gender or sex (Ketring, et al., 2017). However, analyzing the proposed model, without nesting, separately for men and women allows for the possibility that poor model fit is due to differential functioning of model variables by sex, while also offering an alternative method to handling data dependency issues. To this end, the same proposed dosage→alliance→relationship quality mediation model was run separately for men and women, without nesting. Bias-corrected bootstrapped 95% confidence intervals were used to determine the significance of any potential indirect effect (Preacher & Hayes, 2008).

Preliminary analyses indicated no significant bivariate correlations between program dosage and facilitation alliance ($r_{Men} = -.013$, $p = .786$; $r_{Women} = .079$, $p = .085$). Model fit statistics for each model again indicated inadequate fit. The model for female participants resulted in somewhat improved fit statistics compared to the nested model (RMSEA = .110; $X^2(1) = 6.757$, $p = .009$; X^2/df = 6.757; CFI = .980), with one out of four indices indicating adequate fit. Results for the male participant model were similar (RMSEA = .092; $X^2(1) = 4.463$, $p = .035$; X^2/df = 4.463; CFI = .982), with one out of four indices indicating adequate fit. Though the model fit statistics are improved over the original model, fit is still poor and so the individual pathways and effects cannot be interpreted with confidence.

Though these pathway coefficients cannot be interpreted with confidence, the pattern of significance was similar in both models (Table 3). Dosage was not significantly predictive of residual change in couple relationship quality in either model. Unlike the overall model, program dosage was not significantly predictive of facilitation alliance. However, facilitation alliance was significantly predictive of residual change in couple relationship quality for both sexes (Men: $\beta =$

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.146, $p = .002$; Women: $\beta = .098$, $p = .005$). Further, bias-correct bootstrapped confidence intervals did not indicate a significant indirect effect for either model.

Program Group Differences

Participants were randomly assigned to one of two CRE programs. Though a complete analysis of how all the possible differences between programs (e.g., differences in facilitators, curriculum, or foundational theory) might relate to the associations among dosage, alliance, and relationship quality is beyond the scope of the current study, a simple post hoc examination indicated that that some program group differences exist (Table 4). Participants from both ELEVATE and CCM report similar levels of dosage (M = 4.69, SD = 1.48 and M = 4.66, SD = 1.56, respectively; $t(966) = .301$, $p = .763$) and facilitation alliance (M = 94.86, SD = 10.47 and M = 93.51, SD = 11.38, respectively; $t(896) = 1.839$, $p = .066$). However, dosage was significantly associated with facilitation alliance in the CCM group ($r = .117$, $p = .010$), while no significant association was found for ELEVATE participants ($r = -.043$, $p = .378$).

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Discussion

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This study sought to determine if, similar to the therapy context, dosage and alliance jointly influence program outcomes in CRE. More specifically, this study tested if facilitation alliance mediated the relationship between program dosage and residual change in targeted outcomes, specifically couple relationship quality, such that dosage would positively predict increased facilitation alliance, which would in turn predict improvements in couple relationship quality. Though model pathway coefficients seemed to confirm these hypotheses, the model fit poorly, and therefore the model results cannot be interpreted with confidence.

Dosage is predictive of targeted improvements in both the CRE and clinical intervention contexts, with greater dosage needed for programs with more, or more complex, material, and

with this greater dosage theoretically allowing for adequate time for alliance formation (Eaton, Abeles, & Gutfreund, 1988; Hawkins, Blanchard, Baldwin, & Fawcett, 2008; Hawkins, Stanley, Blanchard, & Albright, 2012; Hogue et al., 2006; Pinquart & Teubert, 2010a, 2010b; Martin, Garske, & Davis, 2000). However, the range of dosage levels, the nature of dosage when attending as a couple, and the methods used to encourage program attendance that conceivably resulted in higher dosage, may differ between CRE (specifically with this study's programs) and therapy. Couples in this study's sample were randomly assigned to one of two CRE programs, with partners attending anywhere from one (minimum attendance) to six (maximum attendance) program sessions. Based on the one-and-a-half-hour length of sessions, and using Hawkins, et al.'s categorization (2012), participants received from a "low" (1-8 contact hours) to a "moderate" (9-20 contact hours) level of dosage, with participants who attended all six sessions receiving nine total contact hours. Comparatively, studies of dosage in the therapy context report wider ranges of dosage. One analysis of program effectiveness found median dosage of therapy sessions ranging from 4 to 33, ultimately concluding that 26 sessions were needed, on average, for three-fourths of clients to see significant improvement (Howard, Kopta, Krause, & Orlinsky, 1986). More recent explorations of dosage in therapy found that 18 sessions was typical to achieve a modest outcome of 50% of clients improving, with highly structured empirically supported treatments suggesting as many as approximately 26 sessions (Hansen, Lambert, & Forman, 2002). It is possible that the lack of significant correlational and model indices (as well as the relatively weak association between dosage and alliance) could be attributable to a relatively restricted range of sessions to attend and limited variability in the average number of sessions participants reported attending (M = 4.68). In fact, 80.3% of participants in the study

attended between four and six sessions; the sample may not have provided adequate variance to properly model the effect of dosage on facilitation alliance.

Hansen, Lambert, and Forman (2002) also noted that, in more naturalistic treatment settings, the average number of sessions attended was less than five, indicating that most individuals receiving therapy are not retained for the intended dosage of the intervention. In contrast, the participants in this study's sample were retained at a high rate, using methods that may be unique and extensive when compared to the therapeutic context. As noted in Table 1, the average participant in our sample attended 80% of the total sessions. Retention efforts were consistent with the findings of Skogrand, et al. (2010), which presented multimodal, evidence-based methods of improving participant retention. Program facilitators at each site in the current study were asked to reach out to participants to offer friendly reminders of session times and survey deadlines, and provide meals, and at some sites, childcare. All of these methods sought to remove practical barriers to attendance and cultivate a warm and trusting relationship between participants and the program facilitators. In addition, researchers administering the online surveys also contacted the participants to congratulate and celebrate special occasions such as birthdays and couples' anniversaries. For this reason, dosage may have been optimized in ways unlike in other similar evaluation studies.

All model variables were found to significantly vary at the couple level, meaning that, as expected and consistent with previous research, couple's dosage, alliance, and outcomes were dependent upon one another (Quirk, et al., 2014). What this indicates is that each participants' dosage and alliance is highly correlated with his or her partner's dosage and alliance ($r = .843$, $p < .001$, and $r = .338$, $p < .001$, respectively). Dosage and alliance may function differently in CRE because in therapy, clients often are attending alone rather than with a partner, and so their

dosage and alliance likely function outside of a partner's influence. In fact, even couples enrolled in marital therapy who do attend treatment sessions together are not completely analogous, as the CRE programs in this study are conducted in a group format and do not center on the individual couple's unique relationship needs and problems. Participants in this study who continued to attend, and therefore exhibited high levels of dosage, may have been encouraged by their partner's willingness to attend, rather than just their own motivation. In other words, some participants' attendance may represent an artifact, individual dosage that is largely due to their partners' desires to attend and might not indicate true buy-in or lead to alliance formation. Similarly, a participant's formation and ratings of facilitation alliance may be influenced by the perception of their partner's facilitation alliance. The processes of dosage and facilitation alliance do not appear to function outside of the influence or experience of the participants' partners. The addition of participants whose dosage and alliance may be an artifact could potentially loosen the statistical associations between these variables. Illustratively, a participant who might have individually had low dosage yet attended due to the influence of their partner may still report low facilitation alliance, thereby weakening the association between these variables. In order to approach the issue of dependency from an additional angle, the proposed model was run separately for men and women, with both models resulting in improved, but still inadequate model fit. Though the pattern of significant findings were the same across both sexes, the relationship between dosage and alliance demonstrated greater magnitude for women, which was reflected in the very-nearly-significant mediational indirect affect from dosage to residual change in couple relationship quality (95% CI [.000 - .025]). Therefore, it is also possible that the model variables are related, but function differently for men and women.

Just as CRE participants in this study worked in dyads, programs also involved co-facilitation in which educators worked in pairs delivering program material each session. Theories of alliance discussed previously drew from the therapeutic and educational contexts, which describes alliance as a relationship formed between a client or participant and a singular therapist, clinician, or educator. In most cases, the facilitator dyad was comprised of one male and one female educator, with the intention of maximizing the potential benefits of participant-facilitator demographic match, such as improvements in perceived facilitation quality due to simple participant preference for similar facilitators or greater perceived cultural sensitivity of like facilitators (for more information, see "matching hypothesis"; Bradford, et al., 2012). However, alliance might function differently when formed with a facilitator dyad. For example, it is not known how alliance might mediate between dosage and program outcomes if disparities arose in the strength of alliance formed with each facilitator. The current study does not have alliance data for each individual facilitator to evaluate the potential for such disparities. However, future studies should consider more comprehensively evaluating the influence of various facilitation models in these types of preventive-interventions.

An alternative possible explanation for the lack of support for the expected mediated relationship is that the relationships tested may function differently for each of the two programs (ELEVATE and CCM). Though each program was evaluated by the same outcomes, including couple relationship quality, the curricula differ in meaningful ways. The ELEVATE curriculum focuses on the delivery and practice of seven, evidence-informed key skills associated with healthy relationships, and includes a relatively brief module on the management of stress and its effect on relationships (Furtris & Adler-Baeder, 2013). CCM focuses more centrally on mindfulness-based stress reduction in combination with skills training. The CCM curriculum is

notably more interactive (e.g., engaging in mindfulness meditation exercises as a group with the facilitators, followed by discussion). Though it was not anticipated that facilitation alliance development would differ by program, it is possible that these variations in program content and delivery contributed to disparate associations between dosage and alliance. A thorough exploration of these program differences and the relationship amongst model variables is beyond the scope of this study, yet simple post hoc analyses indicated that variable associations show somewhat different patterns across program groups. Specifically, while dosage was not associated with facilitation alliance for the ELEVATE program group, a significant correlation was observed for CCM. It is possible that the interactive approach of the CCM program boosted aspects of facilitation alliance by enhancing formation of a warm and collaborative bond and encouraging the facilitators to take a more flexible or adaptive approach that was favored by participants, as opposed to maintaining a relatively more "one-way" approach to skills acquisition and teaching. Further, the focus on mindfulness-based stress reduction could result in the removal of barriers to alliance development by, for example, improving social functioning, reducing health-related barriers to attendance and engagement, improving cognitive and behavioral flexibility, or by generating salient values and goals on which to collaborate with facilitators (Carmody, Baer, Lykins, & Olendzki, 2009; Reibel, Greeson, Brainard, & Rosenzweig, 2001; Grossman, Niemann, Schmidt, & Walach, 2004). In other words, attendance (dosage) to sessions may have mattered more for CCM because of these differences. While alliance was predictive of change in outcomes for both groups, dosage was more important for CCM. Further process evaluations of CRE program content and implementation is an important area to explore in future research.

Strengths and Limitations

This study was limited in a number of ways which may have contributed to the current findings. High levels of participant attendance and retention, as well as strong facilitation alliance are excellent goals in implementing CRE programs. However, it is possible that the relatively narrow range of dosage and alliance in this study might have made it methodologically difficult to detect effects; a sample from a lengthier program and one in which efforts to maintain engagement were less than extraordinary compared to the typical prevention program might be more representative of how efforts are usually implemented. Further, the measure used to assess facilitation alliance is relatively new. This adapted version of the SRS is based on considerable established evidence from the therapeutic treatment and education literatures. Given the many contextual differences between therapy and CRE, it represents an advancement over the past common practice of simply using un-adapted measures of therapeutic alliance. However, further validation will be needed to determine its construct validity as a measure of facilitation alliance that can be conceptualized similarly to that in the therapy and education fields. This study relied on self-report measurement of both facilitation alliance and couple relationship quality. Though some have argued that the problems associated with this commonly used method of data-collection are somewhat exaggerated, especially in measurement of constructs that are inherently subjective personal experiences rather than objective observable behaviors (e.g., personal ratings of relationship satisfaction vs. frequency of attending a session), issues may still exist (e.g., social desirability bias or shared method effects; Chan, 2009). Finally, if facilitation alliance had been measured at regular intervals throughout the program, more information might have been gleaned regarding the formation of facilitation alliance as an effort progresses and the role dosage may play in this formation over time. For example, if it were measured following each

session, then observations could be made about how quickly facilitation alliance is formed, at what particular level of dosage, whether or not the relationship was linear as expected, or how the curriculum content of each session may relate to increases in facilitation alliance (i.e., do more interactive sessions predict greater improvements in facilitation alliance?). Again, this is another pertinent area for future research in CRE evaluations.

Conversely, the current study demonstrated several strengths. Firstly, the longitudinal nature of the analysis (data collected before, during, and after the program) would, in the presence of improved model fit, allow for more rigorous conclusions to be drawn from the results (Cole & Maxwell, 2003), beyond what could be drawn from purely cross-sectional data. While facilitation alliance was measured at the same timepoint as post-program couple relationship quality, the addition of pre-program couple relationship quality allows for modeling an improvement in couple relationship quality, not just a single-moment measurement of the outcome variable. The model used accounted for bias-correction on the estimation of the indirect effect, through Monte Carlo simulation, while also accounting for the dependent nature of dyadic program participation. Additionally, the sample used for the study was both diverse and large, further strengthening the analytic power. Further, in order to combat the problems that come from associating single-source self-report data (Chan, 2009), dosage was measured by observation via the program facilitators. Finally, this study represents an effort to move beyond basic evaluations of program efficacy by including evaluation of program processes to answer "how" CRE programs may or may not be effective when disseminated to community settings.

Future Directions

Future work exploring alliance and dosage in the field of CRE can take direction from this study in several ways. The findings did not support previous work in the clinical and

prevention literatures suggesting that alliance serves as a mediator in program implementation processes and outcomes (Elvins & Green, 2008; Joyce, Ogrodniczuk, Piper, & McCallum, 2003; Saatsi, Hardy, & Cahill, 2007). Future research will need to take a more nuanced approach to find confident results. For instance, program group differences in levels of facilitation alliance and the association of dosage with facilitation beg the question about which types of content in CRE programs lead to differing levels of alliance. In other words, future studies should evaluate this dosage-alliance relationship across differing CRE programs with a closer look at how each programs' content, theoretical foundation, or methodology moderate this relationship. Similarly, the seeming improvement in statistical fit when running the model separately for men and women may indicate that dosage, alliance, and CRE outcomes may function differently based on sex. Future work is needed to determine if alliance may serve as a mediator between dosage and outcomes in specific programs or for specific participants.

As an extension, effects among study variables would be elucidated by evaluations that compare programs with dual- and single-facilitator designs (more similar to a single educator or therapist) or comparing dyadic participants with those who are not recruited into the program as a couple (more similar to therapy clients and students who typically attend alone) with the aim of answering questions regarding whether development of facilitation alliance with one of two facilitators is sufficient to gain the benefits facilitation alliance offers, or whether alliance need to be formed with both. Further, these types of evaluations will also be able to examine whether a breakdown in facilitation alliance with just one facilitator undermines the benefit of alliance with the second facilitator. Addressing these potential implications of program design and implementation will inform how alliance is conceptualized and measured in CRE. Additionally, given that CRE is dyadic in nature, a greater understanding is needed for how alliance and

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program attendance are partner dependent in their relationship with program outcomes. These are unique areas of research in the alliance field. Future studies should utilize CRE study samples which allow for greater variability of dosage and facilitation alliance as its measurement advances. Finally, the measurement of facilitation alliance as it was done in this study, drawing from therapeutic alliance and alliance/rapport in the educational context, should continue to be evaluated to provide evidence of construct validity and the potential mediated mechanism of alliance to program outcomes. Addressing these research areas could guide future development, design, and implementation of CRE programs through better understanding for how program processes enhance their effectiveness across diverse populations and within particular contexts.

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Table 1

Descriptive Statistics for Model Variables

	Mean (SD)	Skewness (SE)	Kurtosis (SE)	1	2	3	4
1. Dosage	4.67 (1.52)	-1.14 (.079)	.217 (.157)	--			
2. Facilitation Alliance	94.23 (10.92)	-3.45 (.082)	15.84 (.163)	.039	--		
3. Pre-Program CRQ[a]	5.66 (1.25)	-1.00 (.080)	.985 (.159)	.007	.113***	--	
4. Post-Program CRQ	5.86 (1.22)	-1.28 (.082)	1.91 (.164)	.033	.180***	.627***	--

Note: [a] CRQ = Couple Relationship Quality; * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$.

Table 2

Pathway Coefficients for the Overall Model

Regression Pathway	B (SE)	β (SE)	*p*
Facilitation Alliance on			
Dosage	1.589 (.678)	.109 (.046)	.019
Post-Program CRQ[a] on			
Facilitation Alliance	.015 (.004)	.119 (.034)	<.001
Program Dosage	.005 (.062)	.003 (.035)	.941
Pre-Program CRQ	.667 (.041)	.654 (026)	<.001

Note: [a] CRQ = Couple Relationship Quality; 95% CI for indirect effect [.0017 - .0557]; RMSEA = .158; $X^2(8) = 203.202$, $p < .001$; $X^2/df = 25.400$; CFI = .501.

Table 3

Pathway Coefficients for the Male and Female Models

| Regression Pathway	B (SE)	β (SE)	*p*
Male Model			
Facilitation Alliance on			
Dosage	-.059 (.336)	-.008 (.050)	.873
Post-Program CRQ[a] on			
Facilitation Alliance	.018 (.006)	.146 (.047)	.002
Program Dosage	.034 (.041)	.038 (.045)	.411
Pre-Program CRQ	.609 (.051)	.581 (.045)	<.001
Female Model			
Facilitation Alliance on			
Dosage	.803 (.533)	.098 (.060)	.132
Post-Program CRQ on			
Facilitation Alliance	.010 (.004)	.098 (.032)	.005
Program Dosage	.035 (.029)	.042 (.035)	.238
Pre-Program CRQ	.592 (.044)	.656 (.041)	<.001

Note: [a] CRQ = Couple Relationship Quality; Male Model: Bias-corrected Bootstrapped 95% CI for indirect effect [-.014 - .012], RMSEA = .092; $X^2(1) = 4.463$, $p = .035$; $X^2/df = 4.463$, CFI = .982; Female Model: Bias-corrected Bootstrapped 95% CI for indirect effect [.000 - .025], RMSEA = .110; $X^2(1) = 6.757$, $p = .009$; $X^2/df = 6.757$; CFI = .980.

Table 4

*Variable Descriptive Statistics and Correlations by Program Group*

	Mean (SD)		*t*	*r*	
	ELEVATE	CCM		1	2
1. Dosage	4.69 (1.48)	4.66 (1.56)	.301	--	.117**
2. Facilitation Alliance	93.51 (11.38)	94.86 (10.47)	1.839	-.043	--

Note: * $p \le .05$, ** $p \le .01$, *** $p \le .001$; The bottom coefficient reflects ELEVATE program participants and the top coefficient represents CCM program participants.

Figure 1,
Proposed OLS Regression Model for Testing Mediation Hypotheses
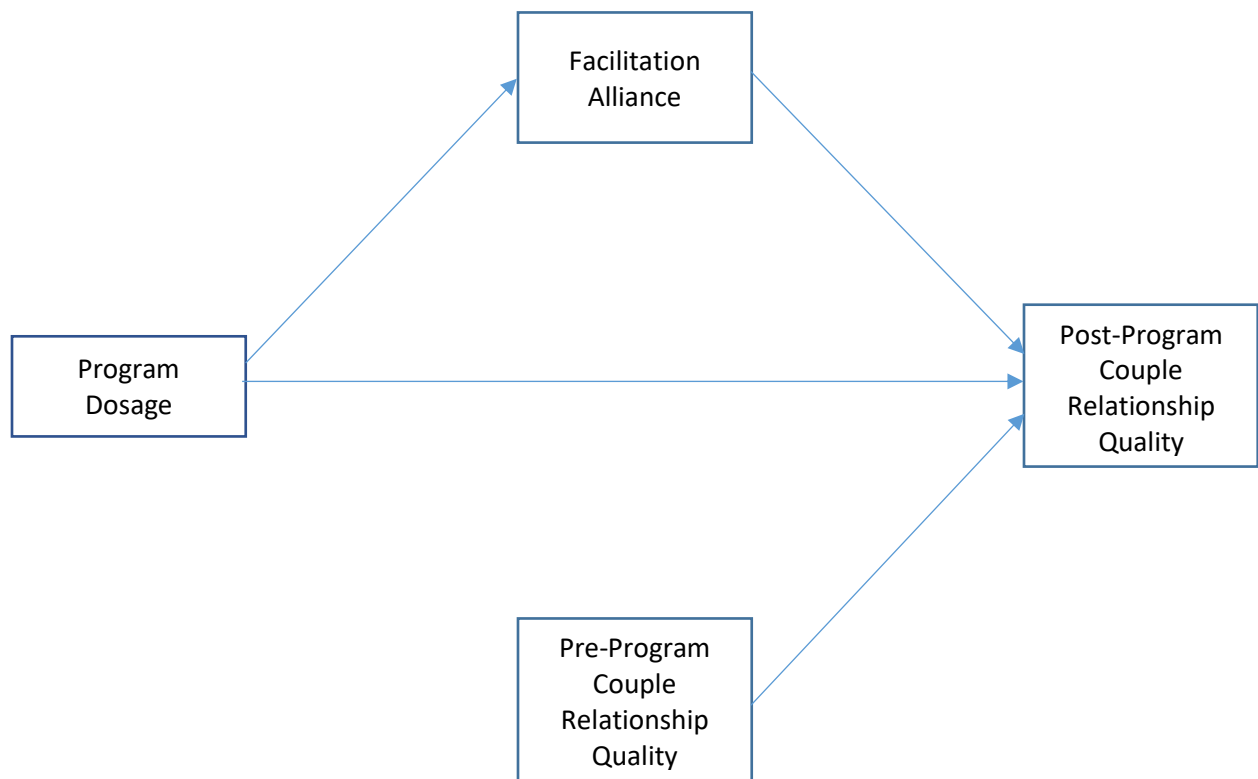
Figure 2,
Results: Mediation Model with Pathway Coefficients
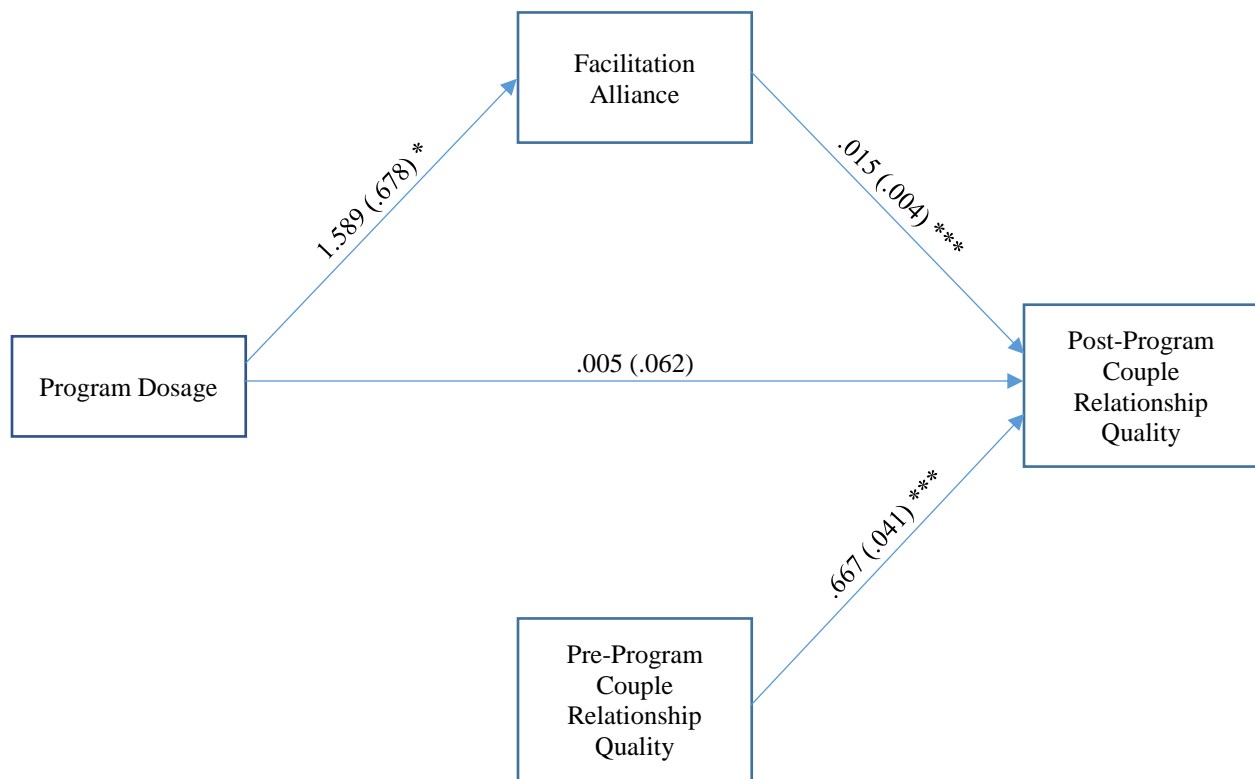
Note: All path coefficients reported are unstandardized; * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$; RMSEA = .158; $X^2(8) = 203.202$, $p < .001$; X^2/df = 25.400; CFI = .501.