Marriage Checkup in Integrated Primary Care: A Randomized Controlled Trial with Active Duty Military Couples

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Abstract

Objective: This study assessed the efficacy of the Marriage Checkup (MC), as adapted to integrated primary care settings and active duty military couples, for improving relationship health, depressive symptoms, and home-work stress spillover. **Method:** Married couples (N = 244, M_{age} = 32.4, 67.6% Caucasian) in which at least one member was active duty Air Force were recruited from several bases across the U.S. via online advertisement, emails sent from medical clinics to enrolled beneficiaries, social media posts, and flyers, and randomly assigned to active treatment or wait-list control. Treatment and control couples were linked in pairs sequentially and pairs completed 9 sets of questionnaires at baseline, and one- and six-months post treatment. Outcome measures included the Couples Satisfaction Index, Intimate Safety Questionnaire, Responsive Attention Scale, Partner Compassion Scale, Communication Skills Test, Center for Epidemiologic Studies Depression Scale – Short, and the Home Work-Stress Spillover questionnaire. **Results:** A 3-level multilevel model indicated, after adjustment for multiple comparisons, treatment couples experienced statistically significant small to moderate improvements compared to the control group (Cohen's d from 0.21 to 0.55) at 1 month that were sustained at 6 months for relationship satisfaction, responsive attention, compassion towards their partner, communication skills, intimate safety, and depressive symptoms. The single outcome that did not differ between treatment and control couples was home work-stress spillover. **Conclusions:** A longitudinal randomized control trial of the MC supports the hypotheses that the MC significantly improves relationship satisfaction, intimacy, communication, partner compassion, responsive attention, and depressive symptoms. Implications for theory, treatment, and dissemination are discussed.

Key words: Marriage, couples, intervention, primary care, military

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Marital health has been robustly associated with the full range of mental and physical health outcomes. For example, the quality of relationship health has been associated with risk factors for suicide (Bush et al. 2013; Stack & Scourfield, 2015), intimate partner violence (Foran, Slep, & Heyman, 2011), substance abuse (Whisman, Uebelacker, & Bruce, 2006), depression (Whisman & Uebelacker, 2009), and PTSD symptom severity (Allen, Rhoades, Stanley, & Markman, 2010). Additionally, relationship health has been shown to affect overall physical health through its effects on both immune system functioning (Kiecolt-Glaser & Wilson, 2017; Robles, Slatcher, Trombello, & McGinn, 2014) and health maintenance behaviors (Trief, Ploutz-Snyder, Britton, & Weinstock, 2004). In a 12-year longitudinal study, marital health and job satisfaction were found to be bidirectionally related, though marital health was a stronger predictor of job satisfaction than vice versa (Rogers & May, 2004). Regarding suicide risk, studies have indicated that relationship distress is associated with the 12-month prevalence of suicidal ideation and attempts (Robustelli, Trytko, Li, & Whisman, 2015). Regarding mental health, poor relationship health has been shown to undermine substance abuse treatment outcomes (Klosterman & O'Farrell, 2013); relationship functioning has been associated with the onset, course, and treatment outcomes for depression (Beach & O'Leary, 1992); and relationship health has been shown to positively predict decreases in reliving the trauma, emotional numbness, and irritability associated with PTSD (LeBlanc, et. al., 2016).

Barriers to Relationship Help Seeking

Despite the public health significance of maintaining robust relationship health, few health resources are readily accessible to couples. The barriers to relationship help seeking are

high. Couples therapy is most commonly accessed as a tertiary intervention, meaning that couples do not seek help until they have been in significant pain for many years (Notarius & Buongiorno, 1992, as cited in Gottman & Gottman, 1999; Jarnecke et al., 2020). Furthermore, of couples who ultimately divorce, only 20% ever seek any kind of relationship health services. Barriers include time and cost, as well as the emotional difficulty of admitting the need for marital help. Recent research indicates that couple help seeking is hindered by unique barriers compared to individual help seeking. For example, seeking help as a couple requires the motivation and buy-in of both partners, either of whom can refuse to participate (Fleming & Cordova, 2012). Additional barriers include partner's lack of confidence in the outcome, preference to solve problems on their own, or logistical challenges such as cost, conflicting schedules, or lack of childcare (e.g. Uebelacker, Hecht, & Miller, 2006).

In a recent Air Force study, only 6% of Airmen in distressed relationships reported making use of couple counseling after returning from deployment (Snyder et al., 2016). Indeed, distressed couples wait an average of 6 years before seeking help, at which point their relationship likely has deteriorated dramatically (Notarius & Buongiorno, 1992, as cited in Gottman & Gottman, 1999). Similar delays in seeking couples counseling have been found for military veterans and their partners (Jarnecke et al., 2020).

Although evidence suggests that couple counseling is effective, with the average treated couple faring better than about 70-80% of untreated couples (Gurman, 2011), tertiary treatment only works when couples attend, and the percentage of military service members in distressed relationships who attend therapy is alarmingly low. Additionally, the availability of evidence-based relationship health care is also low. Specialists in relationship health care are in short

supply and thus even those willing to seek services often find that they cannot find a nearby provider who has available openings.

Integrated Primary Care

The integration of behavioral health providers into primary care has created opportunity to reach a greater proportion of community members who may benefit from relationship help (Lindahl & Wigderson, 2016). In a fully integrated care model, mental health providers are embedded into the primary care setting and serve as behavioral health consultants (BHCs) to the medical providers (Vogel et al. 2017). The BHC provides brief, focused assessments and interventions for patients referred by their primary care provider (Hunter et al., 2018; Hunter, Goodie, Oordt, & Dobmeyer, 2017). The availability of a BHC in primary care increases the rate of referral follow-through by patients and may reduce help-seeking stigma (Rowan et al., 2020). A limitation of the BHC research literature is that relatively few protocols for treating psychological problems have been adapted for BHC use in primary care, i.e., delivered in four to six 30-minute face-to-face appointments, and tested in randomized controlled trials (RCT; Hunter et al., 2018). Examples of brief treatment protocols for primary care that have demonstrated effectiveness in RCTs are prolonged exposure for PTSD (Cigrang et al., 2017) and behavioral treatment for depression (Katon et al., 1996). Other RCTs are ongoing (e.g., Lopez-Montoyo et al., 2019). Relationship distress and mental health problems often co-occur in primary care patients (Woods & Denton, 2014). Indeed, some integrated primary care clinics have started including marriage and family therapists as team members (Marlowe, Hodgson, Lamson, White, & Irons, 2012). Yet there has been no effort toward developing and testing brief marital interventions suitable for use by a BHC in primary care.

The Marriage Checkup

The Marriage Checkup (MC; e.g., Cordova, et. al., 2014) is an evidence-based program explicitly designed to be the relationship health equivalent of physical and dental health checkups – a brief, repeatable, prevention and early intervention program situated between primary prevention and tertiary therapy. The MC consists of both therapeutic assessment and motivational feedback. Therapeutic assessment begins with couples completing a questionnaire assessing both empirically-supported relationship strengths and concerns. Following questionnaire completion, couples meet with a trained counselor who conducts an oral history interview (e.g., Gottman, 1994), and uses the MC questionnaire results to review the couples' top strengths and address their most pressing relationship concerns. Therapeutic techniques are used during the assessment session to build intimacy, shared understanding, and a collaborative set. Following the therapeutic assessment session, a feedback report is constructed providing research-based psychoeducation and health maintenance recommendations. This feedback report is reviewed with the couple at a subsequent session designed to solidify the treatment effects of the previous session and motivate the adoption of healthy relationship habits (for details of the Marriage Checkup protocol, see Cigrang, et. al., 2016; Gray & Cordova, 2018).

A randomized control trial with 215 civilian couples demonstrated significant increases in relationship satisfaction, intimacy, and acceptance both in the short term and at two-year follow-up for treatment couples compared to no-treatment control couples. Emerging evidence further suggests that the primary mediator of improvements in marital health is the effect of the MC on increasing the level of intimate connection between spouses. In addition, the MC worked to affect both distal (i.e., depression; Gray, Hawrilenko, & Cordova, 2020) and specific (i.e., time together, sexual satisfaction and communication) outcomes (Hawrilenko, Gray, & Cordova, *in progress*).

The MC is designed to significantly lower the barriers to couple help seeking. The MC is brief and advertised as an informational marital health service rather than therapy, intended for all couples who are interested in learning more about their strengths and areas of concern. The MC has been shown to attract a broad range of couples across the range of satisfaction from relationally satisfied to severely distressed and has been shown to successfully attract couples who would not otherwise seek any kind of relationship intervention (Fleming & Cordova, 2012; Morrill, et al., 2011).

Marriage Checkup for Military Couples Pilot Study

In our pilot study, the original Marriage Checkup was adapted for military couples and fit into the fast-paced environment of primary care. We chose to work with the active military because of their record of innovation in integrated care (Bryan et al., 2012; Cigrang et al., 2017; Hunter, Goodie, Dobmeyer, & Dorrance, 2014; Landoll, Nielsen, Waggoner, & Najera, 2019) and the clear need for increased support to military couples in the context of frequent deployments and combat exposure (Balderrama-Durbin et al., 2015; Cigrang et al., 2014). Military specific content for the assessment tools in the Marriage Checkup were developed. In addition, the team developed and piloted a protocol to use when only one member of the couple is available to come in for a Marriage Checkup, given the likelihood that some partners seeking an MC may have a partner who is currently deployed or otherwise unable/unwilling to participate in an in-person checkup. Finally, the Marriage Checkup was streamlined to fit within a Primary Care setting. More specifically, it was re-formatted into three 30-minute sessions. Session 1 consisted of the couple's relationship history and each partner's primary strengths, Session 2 focused on each partner's primary concern, and Session 3 was dedicated to feedback for the couple. Feedback report creation was automated by consolidating common themes from

across a library of previously written feedback reports and building a computer database associating each assessed strength and concern with empirically supported feedback. BHCs working in primary care were then trained to offer the intervention within a quasi-experimental research design in which pre-post changes were evaluated within subjects.

Results of the open trial of Marriage Checkup in primary care supported both feasibility and effectiveness (Cigrang et al., 2016; Cordova et al., 2017). Statistically significant pre-post changes were found for all study variables at both two weeks and two months, with effect sizes in the moderate range. In addition, both couples and BHCs reported a high level of satisfaction with the MC intervention itself.

The Current Study

Following the results of the open trial, the study we report here was designed as a full-scale randomized controlled trial. The overall purpose of the study was to build on the pilot study findings by conducting a randomized trial of the military-adapted MC delivered in primary care by BHCs. The primary outcome of interest was relationship health (e.g., greater satisfaction, deeper intimacy). Specific aims of the study were to (1) conduct a randomized trial comparing MC for use in military primary care clinics to a wait list control condition, (2) examine the effects of MC participation on relationship health at post-treatment and a six-month follow-up period. The study hypothesis was that military couples who participate in the Marriage Checkup for primary care will demonstrate positive relationship health trajectories for intimacy, acceptance, communication skills, partner compassion, responsive attention, and relationship satisfaction over the course of six months when compared to couples in a wait-list control condition. Secondary hypotheses were that participants in the Marriage Checkup will

demonstrate improvements in depressive symptoms and home-work stress spillover when compared to the wait-list control condition.

Method

All study procedures were approved by the 59th Medical Wing Institutional Review Board (San Antonio, Texas).

Inclusion Procedures

Inclusion criteria were (1) at least one member of couple was on active-duty in the military, (2) couples were married, and (3) couples were able to attend four 30-minute in person appointments. Beyond that there were no exclusion criteria. Couples were recruited via online advertisement, emails sent from medical clinic to enrolled beneficiaries, social media posts, and flyers. The two conditions were outlined as (a) an active treatment (MC-T) with a Checkup immediately after sign-up, and a waitlist Control (WL-C) with a Checkup approximately 6 months after sign-up. All couples were compensated for completing questionnaires at each timepoint ($25 at baseline, $50 at one-month, and $75 at six-month).

The flow of participants is shown in Figure 1. Participants were randomized to either MC-T (n=128) or WL-C (n=116) using sequentially numbered, opaque, sealed envelopes (SNOSE Method; Doig and Simpson, 2005). Couples assigned to different conditions were linked in pairs sequentially (one MC-T couple with one WL-C couple) to ensure similar time lapse between the pre- and post-measurements. MC-T couples completed questionnaires at baseline and one and six months after their Checkup. The linked WL-C couples filled out questionnaires at the same time points as their partner MC-T couple; however, they waited to complete their Checkup until after they had completed the final six-month questionnaire.

Measures

Demographics. Twenty-two demographic questions were included measuring race, ethnicity, income, relationship length, education, military history, and number of children.

Marriage Checkup Questionnaires- Air Force (MCQ-AF). The MCQ- AF is a measure used solely for clinical purposes. The scale has been adapted to include military-specific items for active duty Air Force couples. The questionnaire assesses 33 strengths and 48 concerns within the relationship. The MCQ is used to guide the Marriage Checkup sessions.

Responsive Attention Scale (*RAS;* Trillingsgaard & Fentz, 2016) The RAS is 12-item scale measuring partners' responses to various bids for attention. Items are rated on a 1(*very rarely*) to 5 (*very often*) Likert scale. Sample items include "I receive a warm welcome from my partner when we meet at the end of the day," "my partner smiles or laughs if I try to show him/her something funny," and "my partner is present and attentive when we eat together." In the present study, internal consistency was adequate at baseline (Chronbach's alpha = .66) and good at one and six months (Chronbach's alpha = .88 and .91, respectively).

Partner Compassion Scale (*PCS*; Gray, Cordova & Maher, 2015). The PCS is a 9-item scale of compassionate expressions demonstrated by partners. This measure was developed to measure the primary mechanism of compassionate understanding within the Marriage Checkup. Items are rated on a 0 (*never*) to 4 (*always*) Likert scale. Sample items include "when my partner sees that I am hurting, he/she tries to comfort me," "even when he/she is upset or angry, my partner tries to be careful with my feelings," and "even when we disagree, my partner can put him/herself in my shoes." In this sample, internal consistency was good at baseline, one month, and six months (Chronbachs alpha = .93, .94, and .95, respectively).

Communication Skills Test (CST; Saiz & Jenkins, 1996). The CST is 10-item scale measuring communication skills within intimate relationships. Items are rated on a 1(*almost*

never) to 7 (*almost always*) Likert scale. Sample items include "I interrupt my partner when we are arguing" and "when discussing issues, I summarize what my partner says in order to make sure I understand him/her. Studies support the general reliability and validity of this measure (Stanley et al., 2001; Stanley et al., 2005). Reliability for the CST in the present study was good at baseline, one month, and six months (Chronbach's alpha = .84, .88, .86, respectively).

Center for Epidemiologic Studies Depression Scale - Short (CES-D 10). The CES-D 10 is a shortened version of the CESD -20 (Radloff, 1977) and has demonstrated consistency and reliability consistent with the CESD-20 (Andresen et al., 1994). The CESD measures symptoms of depression within the previous week and uses a scale ranging from 0 (*Rarely or none of the time; less than one day*) to 3 (*All of the time, 5-7 days*). Sample items include "I felt lonely," "my sleep was restless," and "I felt like I could not 'get going.'" The CESD demonstrated good reliability at baseline, one month, and six months (Chronbach's alpha = .83, .87, .87, respectively)

Couples Satisfaction Index (CSI; Funk & Rogge, 2007). The CSI is a self-report questionnaire that assesses relationship satisfaction. Items include "please indicate the degree of happiness, all things considered, of your relationship" which is rated on a scale from 1 (*extremely unhappy*) to 6 (*perfect*) and "in general, how satisfied are you with your relationship?" which is rated on a scale from 0 (*not at all*) to 5 (*completely*). These four items have been selected from a larger pool of items which together contribute information to the construct of relationship satisfaction with arguably more precision than commonly used measures like the 32-item Dyadic Adjustment Scale (Spanier, 1976). The CSI has demonstrated excellent internal consistency, Cronbach's alpha equal to .94, and strong convergent validity with existing measures of relationship satisfaction by showing strong correlations with such

measures, intercorrelations equal to .87 with the 32-item DAS and .91 with the 4-item DAS. In the present study, the internal consistency of the CSI was high at baseline, one month, and six months (Cronbach's alpha = .97, .97, .98, respectively).

Intimate Safety Questionnaire (ISQ; Cordova, Gee, & Warren, 2005**).** The ISQ is a 28-item measure of the degree to which partners feel safe being vulnerable with each other across several different domains of the relationship (Emotional Safety, Sexual Safety, Safety Disagreeing, Safety Being Yourself, and Safety in Public). The ISQ is a Likert-style scale rated from 0 (*never*) to 4 (*always*). Sample items include "I feel comfortable telling my partner when I'm feeling sad," "sex with my partner makes me feel uncomfortable," and "when I am with my partner I feel safe and comfortable." Internal consistency for the ISQ was good in the present study at all baseline, one month, and six months (Cronbach's alpha = .91, .93, .95, respectively).

Home Work-Stress Spillover (HWSS). The Home Work Stress Spillover (Dilworth & Kingsbury, 2005; Dilworth, 2004) is a 5-item measure of how often conflicts or worries related to one's relationship impact work life. Items are rated on a Likert scale ranging from 0 (*never*) to 4 (*several times per week*), with an option to select "not applicable". Sample items include an assessment of how relationship stress "kept you from getting work done on time," "caused you to miss work," and "kept you from concentrating at work." The HWSS demonstrated good internal consistency at baseline, one month, and six months, Cronbach's alpha = .91, .93, .93, respectively)

Intervention Procedures

The Checkup was conducted as a three-session intervention. Session One consisted of reviewing the couple's relationship history and assessing their strengths as a couple. Session Two drew on techniques from Integrative Behavioral Couple Therapy (IBCT; Jacobson &

Christensen, 1998) to address each partner's primary relationship concern. Session three continued the therapeutic work and incorporated strategies from Motivational Interviewing (Miller & Rollnick, 2002) and was designed to 1) provide feedback to the couple based on the current literature 2) review a menu of research-based options for addressing their concerns and 3) work collaboratively with both partners to explore ways in which they can continue to take care of the health of their relationship. For a more complete description of the Checkup procedures please see Cigrang et.al, 2016.

Over the course of the study and across the five sites, there were a total of seven clinicians, both active duty and civilian contractors, who conducted the Checkups. Clinicians were all trained by the creator of the Checkup and received ongoing supervision throughout the intervention period.

Statistical Analysis

This trial design assumed 20% attrition and was powered to detect a small effect (d = 0.23) on relationship satisfaction. We calculated that we would need 250 couples to achieve 80% power, accounting for clustering within-person and within couples.

The current trial resulted a in a 4-level data structure, with time-varying outcome measures (level 1) nested within individuals (level 2) nested within couples (level 3) nested within sites (level 4). To evaluate the effectiveness of the intervention, we used a 3-level multilevel model (Atkins, 2005), controlling for site-level clustering (level 4) with fixed effects (McNeish & Stapleton, 2016). We included random intercepts at the individual and couple levels, and a random linear effect of time at the couple level. Because we anticipated nonlinear trajectories, we included binary indicator variables to allow time-specific effects at each follow-up wave. We controlled for main effects of sex and site. The intervention effect was modeled as

the *treatment X time* interaction term at each wave. We calculated Cohen's *d* effect sizes by dividing the intervention effect by the raw baseline standard deviation.

Missing data. This trial had two types of missing data. The first type of missingness was typical attrition, where both control (10%) and treatment couples (8%) did not complete 6-month follow-up questionnaires. The second type of missingness was pre-treatment dropout, where couples did not attend the intervention *and also* did not complete follow-up questionnaires (12 couples, 9.4% of treatment group). We used two complementary approaches to account for these two types of missingness.

To account for typical attrition, we used intention-to-treat analyses with full information maximum likelihood estimation, where all randomized couples were included in the analysis. Using full information maximum likelihood estimation, estimates are unbiased when reasons for missingness are included in the model (i.e., *missing at random*; Graham, 2009). Given the low attrition rate and that dropouts differed from completers only in relationship satisfaction which is included in the outcome model, this *missing at random* assumption appears reasonable. To account for pre-treatment dropout, we reweighted the model constraining the treatment effect for these pre-treatment dropouts to be zero (Hedeker & Gibbons, 1997). Thus, treatment estimates are unbiased conditional on the assumption that pre-treatment dropouts had equivalent trajectories to control couples with similar baseline scores. We examined the sensitivity of the primary outcomes to this assumption by estimating how effect sizes would differ depending on the true dropout trajectories.

Multiple comparisons. To adjust for multiple comparisons, we used the Benjamini-Hochberg (Benjamini & Hochberg, 1995) method with the false discovery rate set to 5%.

Results

Participants

A total of 244 couples were enrolled between February 2016 and February 2019 across five Air Force bases located in the contiguous United States. 128 were assigned to the Marriage Checkup treatment group and 116 to the waitlist control (Figure 1). One hundred and thirteen couples completed at least one of the three intervention sessions, with 110 completing all three. Participants were an average of 32 years old (range: 20 to 53), 68% white, 14% Hispanic/Latino, and 9% Black/African American. The majority had a college education (interquartile range: 14 to 18 years of schooling) and had a median military rank of E5 (79.9% Enlisted and 20.1% Officer). Twenty-two percent of couples met criteria for relationship distress (Funk & Rogge, 2007). Complete demographic information is included in Table 1. Treatment couples who dropped out before treatment, and all other couples who dropped out before 6-month follow-up, did not differ from completers on the basis of age, family composition, race/ethnicity, military status, or rank (Supplementary Table S1). Both types of dropouts had moderately lower relationship satisfaction than completers (Cohen's *d* from 0.53 to 0.63).

Primary Outcome. Changes in the Couples Satisfaction Index were statistically significantly higher in the treatment group than the control group at 1 month (B = 4.1, $p < .001$; 95% CI, 1.9 to 6.1) and this effect was sustained through 6-month follow-up (B = 4.0, $p = .009$; 95% CI, 1.0 to 7.0; Figures 2 and 3), inclusive of adjustments for pre-treatment dropout. Notably, the average relationship satisfaction in the control group declined over time. Treatment effects corresponded to a small effect size ($d = 0.27$; 95% CI, 0.07 to 0.47; Figure 2).

Couple Outcomes. After adjustment for multiple comparisons, treatment couples experienced statistically significant small to moderate improvements compared to the control group (Cohen's *d* from 0.21 to 0.55) at 1 month that were sustained at 6 months across all four

couple outcomes of responsive attention, compassion towards their partner, communication skills, and intimate safety (Figure 2). The single outcome that did not differ between treatment and control couples at follow-ups was home work-stress spillover.

Individual Outcomes. Depression scores significantly decreased in the treatment group relative to the control group at 1 month (B = -1.27, adjusted p = .006; 95% CI, -2.09 to -0.45) and these decreases were sustained through six months (B = -1.33, adjusted p = .011; 95% CI, -2.31 to -0.35), with both points corresponding to small effect sizes.

Sensitivity Analysis. Sensitivity of the estimated treatment effect to the assumption that pre-treatment dropouts followed the control group's trajectory was minimal, with the estimated effect size changing by d = 0.06 for each standard deviation change in the control trajectory.

Discussion

This study examined the effectiveness of the MC when adapted for use in integrated primary care settings within the active-duty military system. Given the exceptionally low rates of seeking and utilizing professional relationship treatment within the military (Snyder, et al., 2016), increasing access to care is a significant priority due to the variety of important health outcomes associated with ongoing relationship health. Of note, a recent study of active-duty Soldiers found that marital distress was positively associated with past 30-day incidence of suicidal ideation and predicted new cases of major depression, generalized anxiety, and posttraumatic stress disorder assessed 5 years later (Whisman, Salinger, Gilmour, Steele, & Snyder, 2021; Whisman, Salinger, Labrecque, Gilmore, & Snyder, 2020).

The current study indicated that the MC was exceptionally well-tolerated by couples, with 85% of couples in the treatment condition completing all three Checkup sessions. This in comparison to studies noting that 50%-80% of veteran couples initiating couple therapy in the

VA system drop out before completion (Doss, Hsueh, & Carhart, 2011).Ten couples were unable to complete their sessions due to the site closing, rather than lack of interest. Based on these recruitment and retention numbers, evidence suggests that the brevity of the MC intervention, accessibility of care in a familiar setting, and the reduced stigma of working with a BHC successfully lowered barriers to treatment and demonstrated the effectiveness of integrating the Marriage Checkup in primary care settings.

Beyond access, the results of the current study provided further evidence for the efficacy of the MC with military couples. Most notably, treatment couples reported both immediate and lasting gains in their overall relationship health in both the short and long term. Good relationship health can play an important role in buffering the strain of combat deployments for active duty military couples (Balderrama-Durbin, et al., 2015; Balderrama-Durbin, et al., 2013). Active duty couples who are more openly affectionate and supportive of one another tend to also cope better with the military lifestyle in general (Lucier-Greer, et al., 2020). Thus, the positive benefits of such a brief intervention bode well for MC's potential value to the military community.

Notably, analyses also indicated a trend toward relationship satisfaction deterioration over time for control group couples. This evidence is in keeping with speculation that relationship health may be subject to a natural decay process that, in the absence of prevention and early intervention, tends to corrode relationship health over time. Similar trends were noted in previous RCT studies of the Marriage Checkup (Cordova et al., 2014; Trillingsgaard & Fentz, 2016). These accumulating findings may be notable for two reasons: 1) in keeping with our checkup model, they suggest that romantic relationships may require regular health maintenance, to arrest and reverse an otherwise natural vulnerability to health decline over time and 2) early

prevention and intervention programs like the Marriage Checkup can be effectively applied to arrest the posited decay process.

In addition to relationship satisfaction, the current study also found that, in comparison to controls, treatment couples experienced significant increases in how responsive their partners were to their bids for attention. Within the treatment paradigm of the MC, the expectation is that therapeutic work to build intimacy bridges between partners out of greater mutual compassionate understanding of their most significant areas of concern diminishes the aversion underlying relationship withdrawal and hostile conflict. In other words, the therapeutic techniques of the MC are designed to turn partners back towards each other in places where they have been turned away. Theoretically, this process should remove the emotional barriers that interfere with partner responsiveness, resulting in an unforced reemergence of this type of enacted relational connection. Our results provide some suggestive evidence in support of our treatment theory that partners will become more responsive to each other's bids for attention as a result of addressing relationship concerns in ways designed to promote intimacy and acceptance.

The results also indicate that partners who had a Checkup reported experiencing greater compassion from their partner, in comparison to control couples. Central to the MC approach to treatment is the idea that the elicitation of partner compassion facilitates gains in partner acceptance, particularly around areas of concern and conflict. Our data here suggest that the treatment approach does, indeed, result in measurable improvements in partners' experience of compassion for each other in the context of their top relationship concerns.

Treatment couples also reported increased skillfulness in the realm of communication. MC treatment training posits that partners' often have communication skills that they are not using, because those skills are suppressed or undermined by relationship withdrawal or

problematic patterns arising from emotional polarization around areas of conflict. It is theorized that those suppressed communication skills will naturally reemerge as partners experience greater mutual compassionate understanding of their most significant relationship concerns. The results of this study provide some preliminary evidence that partners' communication skills can improve in the absence of direct skills training, in response to treatment techniques designed elicit compassion, acceptance, and intimacy.

Finally, couples who received a Checkup reported feeling safer being their authentic selves with one another, indicating a greater sense of felt intimacy both immediately after treatment and continuing to six-months after their Checkup. Previous research has found support for our contention that intimacy and acceptance are the principal treatment mechanisms of the MC (Hawrilenko, Gray, & Cordova, 2016). MC treatment theory posits that felt intimacy is a significant component of overall relationship health, and the treatment model directly targets felt intimacy by eliciting partners' mutual compassion towards each other in the context of their most pressing relationship issues. Our current results continue to provide evidence that the MC causes increases in couples' felt intimacy.

Treatment and control couples did not differ significantly at follow-up on the rating of home-work stress spillover. Our ability to detect a treatment effect may have been reduced by a floor effect. A significant minority (41%) of participants scored a zero at baseline, meaning that they "Never" experienced stress spillover from home to work. A total of 77% of participants had a score of 1 or below (an average of one incident of stress spillover per month), and only 9% of participants experienced stress spillover at a frequency of 2-3 times per month or greater. Indicated preventive efforts in samples endorsing higher rates of home-work stress spillover may be necessary to more fully test this hypothesis.

At the individual level, participants who received a MC reported significant decreases on measures of depression at both one month and six months after their Checkup. While this effect size was small, it is notable that a brief intervention primarily designed to improve overall relationship health, has a predictable and seemingly lawful beneficial effect on self-reported depressive symptoms that are sustained over the course of six months. These findings are consistent with previous MC outcomes (Gray, Hawrilenko, & Cordova, 2020). One implication of these findings is that other important mental health domains can be effectively addressed as sequelae even when targeting relationship health exclusively.

One notable strength of this study includes its representative sample regarding demographic identities, military status, and rank. In particular the current sample is similar to the national census of race and ethnicity in America, and furthermore included active duty airmen ranging from Junior Enlisted through Commissioned Officers. The percentage in our study sample of enlisted personnel (79%) to officers (21%) compares very favorably to the percentages in the Air Force population (81% and 19%) (Air Force Personnel Center, n.d.).

Limitations of the current study include limited long-term follow-up and evaluation of repeated annual Checkups. Previous studies have demonstrated an additional increase in relationship satisfaction, intimacy, acceptance, and responsive attention following a second annual Checkup (Cordova et al., 2014; Trillingsgaard & Fentz, 2016). Given the results of prior studies, we might predict that military couples would also experience a similar boost in relationship health with the addition of subsequent checkups, however the effects on ongoing repeated checkups remains unknown for this population.

In addition, the study included a small number of same-sex couples. Only 1.7% of participants were in a same-sex relationship, despite increased recruitment efforts to signify the

MC as safe and affirming for all couples. This may indicate that further efforts are needed in order to reach same-sex couples. Historically, lesbian, gay, bisexual, and transgender (LGBT) individuals in the military (and same-sex couples) risked discharge if they served openly (Goldbach & Castro, 2016). To our knowledge, there are no published studies that have examined the relationship health of LGBT couples in the military. A recent study sampled LGBT and heterosexual individuals serving in the Army and found that LGBT Soldiers scored significantly higher on measures of psychological distress and suicidality when perceived prejudice for the LGBT community was high (Conway, Dretsch, Taylor, & Quartana, 2020). Thus, it is likely that relationship health is even more difficult to maintain for LGBT couples in the military when the additional stressor of prejudice is present.

This research was designed to address the substantial need to lower barriers for military couples' relationship health help-seeking. Overall, results of this study suggest the adapted MC is an effective and accessible relationship intervention for military couples. The model fits well within an integrated primary care setting and the findings suggest that the Checkup offers a significant benefit to service members and their partners.

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Table 1. Descriptive statistics by treatment condition

Variable	Overall mean or n	Control	Marriage Checkup
N	479	227	252
Age (mean (SD))	32.4 (6.4)	32.0 (6.5)	32.73 (6.2)
Number of children (mean (SD))	2.3 (1.2)	2.4 (1.4)	2.1 (1.0)
Same sex relationship (%)	8 (1.7)	2 (0.9)	6 (2.4)
Race/Ethnicity (%)			
American Indian/Alaska Native	12 (2.5)	7 (3.1)	5 (2.0)
Asian	17 (3.6)	10 (4.4)	7 (2.8)
Black or African American	44 (9.3)	23 (10.2)	21 (8.4)
Hispanic/Latino	67 (14.1)	28 (12.4)	39 (15.6)
Native Hawaiian/Pacific Islander	9 (1.9)	4 (1.8)	5 (2.0)
White	321 (67.6)	149 (66.2)	172 (68.8)
Not listed	5 (1.1)	4 (1.8)	1 (0.4)
Years schooling (Median (IQR))	16 (14, 17)	16 (14, 18)	16 (14, 16)
Military status (%)			
Active duty	254 (53.4)	122 (54.2)	132 (52.6)
Spouse of active duty	203 (42.6)	97 (43.1)	106 (42.2)
Guard/reserve	7 (1.5)	3 (1.3)	4 (1.6)
Spouse of guard/reserve	4 (0.8)	1 (0.4)	3 (1.2)
Military retiree	6 (1.3)	2 (0.9)	4 (1.6)
Spouse of retiree	2 (0.4)	0 (0.0)	2 (0.8)
Rank (%)			
Airmen (E1-E4)	109 (39.8)	49 (37.7)	60 (41.7)
NCO (E5-E6)	97 (35.4)	52 (40.0)	45 (31.2)
Senior NCO (E7-E9)	12 (4.4)	3 (2.3)	9 (6.2)
Commissioned Officer (O1-O5)	56 (20.4)	26 (20.0)	30 (20.8)
Relationship distress (%)	106 (22.6)	51 (23.0)	55 (22.3)

Note. IQR = Interquartile range. NCO = Non-commissioned officer.

Figure 1. CONSORT Diagram of Participant Flow

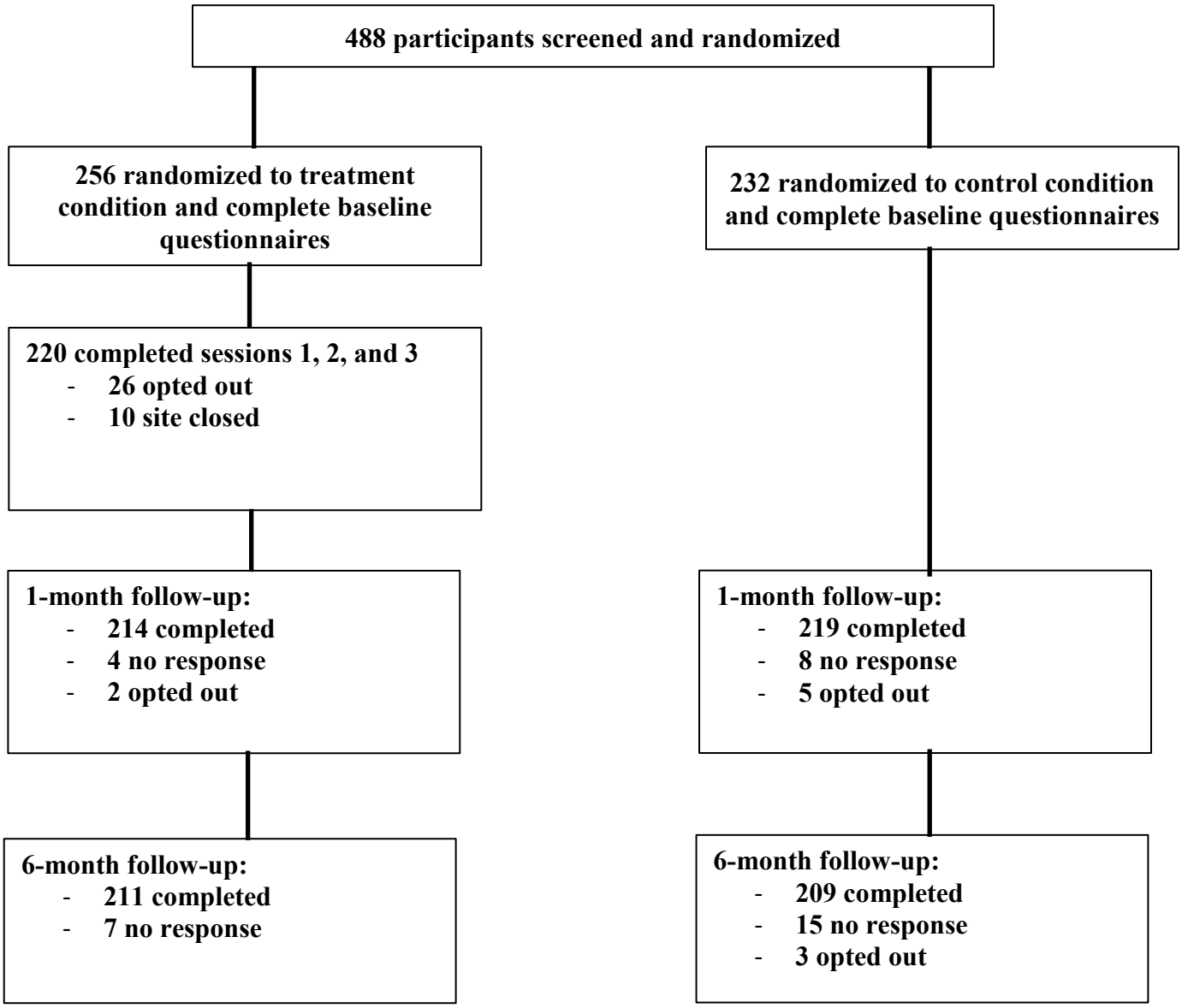
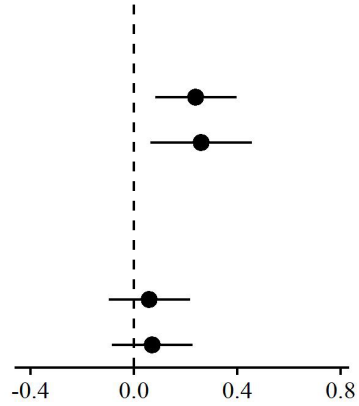


Figure 2. Observed and Adjusted Outcomes for Marriage Checkup vs. Control Couples

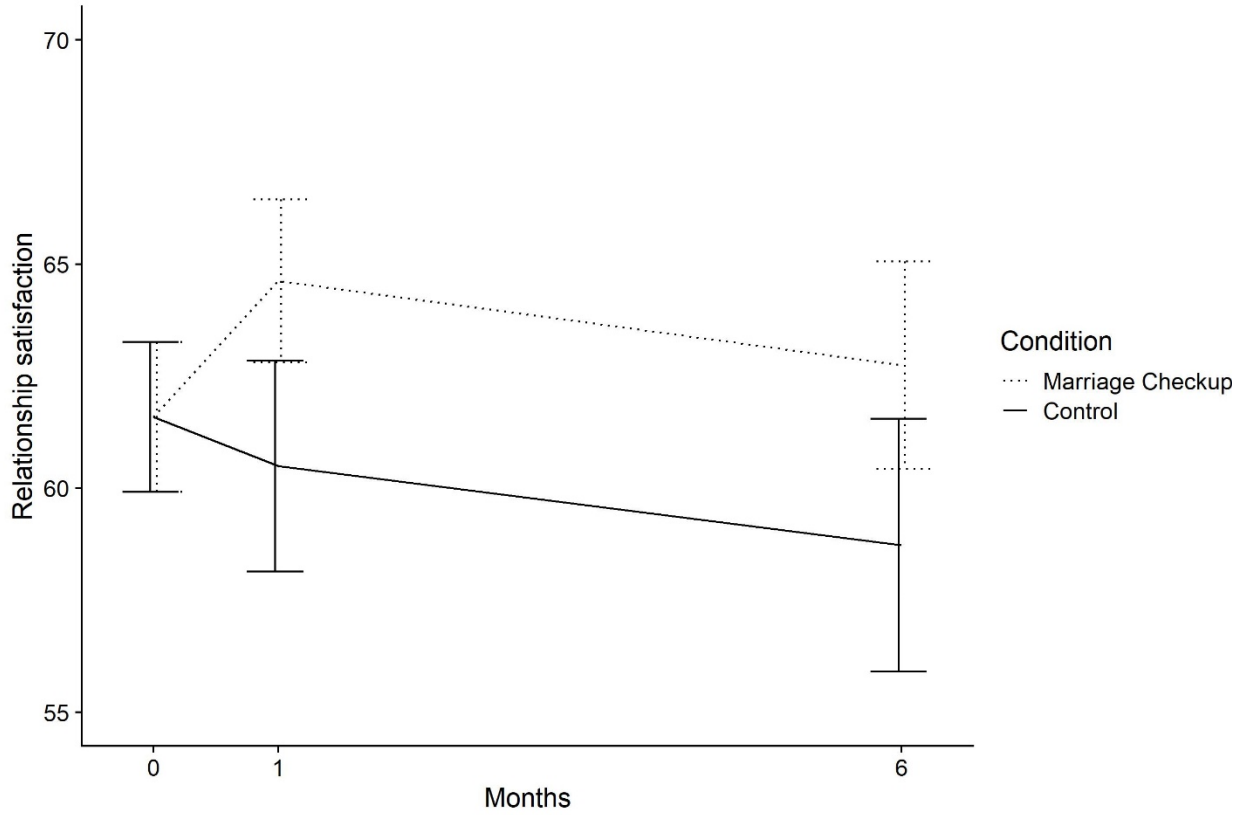
	Marriage Checkup			*Control Group*			*Treatment Comparison*			
Variable	N	Mean (SD)	Adjusted Change (SE)	N	Mean (SD)	Adjusted Change (SE)	Adjusted Difference (SE)	p-value[a]	*Cohen's d* (SE)	Cohen's *d* Effect Size (95% CI)
										Control is better ← → MC is better
Couples Satisfaction Index-4										
Baseline	247	61.9 (14.3)	…	222	61.7 (15.2)	…	…	…	…	
1 Month	207	66.3 (13.5)	3.0 (0.6)	210	60.8 (17.0)	-1.1 (0.9)	4.13 (1.1)	< .001	0.28 (0.07)	
6 Months	209	64.6 (15.6)	1.2 (1.0)	195	60.2 (18.2)	-2.9 (1.2)	4.03 (1.5)	.009	0.27 (0.10)	
Responsive Attention										
Baseline	244	3.51 (0.47)	…	223	3.53 (0.43)	…	…	…	…	
1 Month	214	4.08 (0.52)	0.53 (0.03)	215	3.81 (0.64)	0.28 (0.04)	0.25 (0.05)	< .001	0.55 (0.11)	
6 Months	212	3.96 (0.67)	0.41 (0.04)	199	3.79 (0.69)	0.22 (0.04)	0.19 (0.06)	.008	0.41 (0.14)	
Partner Compassion										
Baseline	247	2.53 (0.85)	…	225	2.60 (0.84)	…	…	…	…	
1 Month	211	2.69 (0.74)	0.06 (0.04)	213	2.43 (0.86)	-0.19 (0.04)	0.25 (0.05)	< .001	0.30 (0.06)	
6 Months	212	2.68 (0.86)	0.03 (0.05)	198	2.42 (0.91)	-0.24 (0.05)	0.27 (0.07)	< .001	0.32 (0.08)	
Intimate Safety										
Baseline	250	3.17 (0.51)	…	226	3.14 (0.53)	…	…	…	…	
1 Month	212	3.28 (0.47)	0.05 (0.02)	215	3.05 (0.60)	-0.10 (0.03)	0.15 (0.04)	< .001	0.29 (0.07)	
6 Months	211	3.22 (0.58)	-0.02 (0.03)	198	3.06 (0.63)	-0.13 (0.03)	0.11 (0.05)	.033	0.21 (0.09)	
Communication Skills										
Baseline	239	4.20 (1.07)	…	215	4.12 (1.14)	…	…	…	…	
1 Month	209	4.82 (1.07)	0.54 (0.06)	213	4.44 (1.23)	0.30 (0.06)	0.25 (0.09)	.008	0.22 (0.08)	
6 Months	209	4.76 (1.15)	0.50 (0.07)	196	4.40 (1.21)	0.23 (0.06)	0.27 (0.10)	.008	0.25 (0.09)	

Depression									
Baseline	250	6.82 (5.07)	…	226	7.25 (5.38)	…	…	…	…
1 Month	213	5.37 (4.96)	-1.38 (0.26)	215	7.06 (5.55)	-0.11 (0.33)	-1.27 (0.42)	.006	0.24 (0.08)
6 Months	213	5.95 (5.21)	-0.81 (0.34)	199	7.47 (5.83)	0.52 (0.37)	-1.33 (0.50)	.011	0.26 (0.10)
Home-Work Stress Spillover									
Baseline	214	0.61 (0.88)	…	198	0.71 (0.92)	…	…	…	…
1 Month	203	0.52 (0.78)	-0.04 (0.05)	204	0.69 (0.91)	0.02 (0.06)	-0.05 (0.07)	.47	0.06 (0.08)
6 Months	197	0.48 (0.73)	-0.05 (0.05)	187	0.65 (0.90)	0.01 (0.07)	-0.06 (0.08)	.47	0.07 (0.08)



Adj. Change = Model-adjusted change. SD = Standard Deviation. SE = Standard Error. CI = Confidence Interval. MC = Marriage Checkup. a = P-values for secondary outcomes were adjusted using the Benjamini-Hochberg adjustment with the false discovery rate set to 5%.
Note. All effect sizes have been recoded so that positive values represent better outcomes.

Figure 3. Marriage Checkup and Control Trajectories of Relationship Satisfaction



Note. The y-axis represents 1 standard deviation of relationship satisfaction.