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## A Randomized Controlled Trial of the Web-Based OurRelationship Program: Effects on Relationship and Individual Functioning

**Brian D. Doss,**

Department of Psychology, University of Miami

**Larisa N. Cicila,**

Department of Psychology, University of Miami

**Emily J. Georgia,**

Department of Psychology, University of Miami

**McKenzie K. Roddy,**

Department of Psychology, University of Miami

**Kathryn M. Nowlan,**

Department of Psychology, University of Miami

**Lisa A. Benson,** and

Psychology Division, Department of Psychiatry, Harbor-UCLA Medical Center

**Andrew Christensen**

Department of Psychology, University of California, Los Angeles

### Abstract

**Objective**—Within the United States, one-third of married couples are distressed and almost half of first marriages (and more than half of unmarried cohabiting relationships) end in divorce/separation. Additionally, relationship distress has been linked to mental and physical health problems in partners and their children. Although couple therapy is effective in reducing relationship distress, it is utilized by less than one third of divorcing couples. Therefore, more accessible interventions for relationship distress are needed.

**Method**—This study tests the efficacy of the OurRelationship (OR) program, an eight-hour online program adapted from an empirically-based, in-person couple therapy. In the program, couples complete online activities and have four, 15-minute calls with project staff. Nationwide, 300 heterosexual couples ( $N = 600$  participants) participated; couples were generally representative of the US in terms of race, ethnicity, and education. Couples were randomly assigned to begin the program immediately or to a two month waitlist control group.

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Correspondence concerning this article should be addressed to Brian D. Doss, Department of Psychology, University of Miami, PO Box 248185, Coral Gables, FL 33124-0751. bdoss@miami.edu.  
Drs. Doss and Christensen hold the intellectual property of the OurRelationship program and could gain royalties from any future commercialization of this intellectual property.

**Results**—Compared to the waitlist group, intervention couples reported significant improvements in relationship satisfaction (Cohen’s  $d=0.69$ ), relationship confidence ( $d=0.47$ ), and negative relationship quality ( $d=0.57$ ). Additionally, couples reported significant improvements in multiple domains of individual functioning, especially when individuals began the program with difficulties in that domain: depressive ( $d=0.71$ ) and anxious symptoms ( $d=0.94$ ), perceived health ( $d=0.51$ ), work functioning ( $d=0.57$ ), and quality of life ( $d=0.44$ ).

**Conclusions**—In a nationally-representative sample of couples, the OR program was effective in significantly improving both relationship and individual functioning, suggesting it can substantially increase the reach of current interventions through its low-cost, web-based format.

### Keywords

*Couple; Marriage; Relationship Distress; Internet; Web-based Intervention*

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Almost half of first marriages in the United States ultimately end in divorce (Copen, Daniels, Vespa, & Mosher, 2012) and approximately one-third of married individuals are relationally distressed at any given time (Whisman, Beach, & Snyder, 2008). Unmarried couples living together (“cohabiting” couples) are at even higher rates for distress and separation (Bramlett & Mosher, 2002). Moreover, relationship distress and divorce are strongly linked with poorer mental and physical health in partners. Relationship distress and divorce are associated with anxiety, mood, and substance use disorders (e.g., Whisman, 2007) and linked to subsequent increased risk of metabolic syndrome (Whisman & Uebelacker, 2012), cardiovascular disease (Zhang & Hayward, 2006), and poorer immune functioning (Jaremka, Glaser, Malarkey & Kiecolt-Glaser, 2013). Relationship distress is also associated with poorer child functioning (O’Leary & Vidair, 2005), social and work impairments (Whisman & Uebelacker, 2006), and longitudinally predicts poorer global life satisfaction (Be, Whisman, & Uebelacker, 2013).

Numerous interventions have been developed with an eye toward preventing relationship distress. These psychoeducational interventions, most commonly offered in the United States in the form of premarital education, are sought by approximately half of couples getting married for the first time (Doss, Rhoades, Stanley, Markman, & Johnson, 2009). Empirically-based prevention interventions typically focus on teaching couples effective communication and problem-solving skills. Although they significantly improve relationship satisfaction at post-intervention and follow-up (Hawkins, Blanchard, Balwin & Fawcett, 2008), the effects are relatively small (Cohen’s  $d=0.31-0.36$ ). Additionally, programs designed to prevent relationship distress tend to be underutilized by couples at high-risk for developing later relationship distress (e.g. cohabiting couples, lower religiosity, African-American couples; Doss et al., 2009; Halford, O’Donnell, Lizzio & Wilson, 2006).

Rather than attempting to prevent relationship distress, couple therapy attempts to reduce moderate to severe levels of relationship distress after it has developed. Couple therapy is efficacious in randomized trials (Cohen’s  $d=0.56-0.82$ ; Lebow, Chambers, Christensen, & Johnson, 2012), with evidence that Integrative Behavioral Couple Therapy, on which the current program is based, is effective for as long as five years following treatment (Christensen, Atkins, Baucom, & Yi, 2010). However, couple therapy is underutilized; only

19% of couples have sought couple therapy to improve their current relationship and only 37% of divorced couples sought couple therapy prior to ending their marriage (Johnson et al., 2002). Furthermore, ethnic minority couples—who are at highest risk for relationship distress—are half as likely to seek couple therapy before divorce (Doss, 2014).

While research on prevention programs and couple therapy is encouraging, the population-level impact of these interventions is limited. Within the field of public health, the population-level impact of an intervention is approximated by the product of its effectiveness and its reach (e.g. the RE-AIM framework, Glasgow, Vogt & Boles, 1999). Viewed in this way, prevention programs are limited primarily by their small effect size (as they reach approximately 50% of first-time marriages) while couple therapy is primarily limited by its insufficient reach (as it has repeatedly demonstrated medium-to-large effect sizes). To begin to make meaningful improvements in relationship functioning at the national level, what is needed is an intervention that can achieve an optimal balance of effectiveness and reach.

One way to improve effect sizes of couple interventions – while simultaneously increasing reach – is to target couples experiencing moderate relationship distress. Satisfied couples may find limited opportunities to apply skills which are at the center of relationship education programs; in contrast, couples with moderate levels of distress may be more motivated to participate in targeted problem-solving than their counterparts. Recent research on relationship education interventions supports this assertion, with the largest intervention effects found for distressed couples in trials of in-person relationship enrichment (Hawkins & Erickson, 2015) and in trials of DVD-based interventions (Halford et al., 2015). Although most programs have been designed for non-distressed couples, one intervention that has specifically targeted couples with mild-moderate distress is the Marriage Checkup (Cordova et al., 2015). Although intervention effects on relationship satisfaction were small ( $d = 0.11$  to  $0.39$ ; Cordova et al., 2015), the effects for couples at the distress cutoff were 1.5–2 times larger (Cordova, Gray, & Harrilenko, 2014). Another way to increase effect sizes may be to prioritize interventions for dissemination that do not assume a pre-existing competency in working with couples. Currently, most therapists and religious leaders, who typically deliver many of the couple interventions in the United States, receive no or minimal training with couples.

When considering the population-level impact of couple interventions, however, effectiveness is literally only half of the equation –increasing reach is critically important. One way to increase the reach of relationship interventions is to remove commonly-reported obstacles to seeking couple interventions. In a nationwide study of relationship education for lower-income couples (Gaubert, Gubits, Alderson, & Knox, 2012), the most common barriers to attendance were conflict with work/school schedule (45%), lack of child care (11%) and transportation difficulties (11%). Similarly, in a sample of church congregations, the most common barrier to relationship education was a lack of time; money constraints were also a common concern (Roberts & Morris, 1998). Financial concerns are also likely an important barrier to couple therapy given its high cost and the low rate of insurance reimbursement.

One way to bypass these obstacles is to deliver a blended program of self-help materials augmented with staff contact over the internet. Indeed, over 70% of households in the United States have broadband/cable internet access (File, 2013). Moreover, of individuals under 50 years old, 83–98% of African-Americans (Smith, 2014), 80–89% of Hispanics (Lopez, Gonzalez-Barrera, & Patten, 2013), and 67% of households with incomes <\$30,000, as well as 79% of households with incomes \$30–49,000 (Zickuhr & Smith, 2013) have either a smartphone or a home computer with broadband access. Couples also appear to view the internet as an important source of relationship resources. The most popular self-help relationship advice websites have over 3.8 million unique visitors over the course of a year (Georgia & Doss, 2013). Additionally, in a large online study of individuals interested in improving their relationship, couples indicated that they were significantly more likely to seek a web-based intervention to improve their relationship than any of the other currently available resources (Georgia & Doss, 2013).

While research into the effectiveness of web-based relationship interventions is in its infancy, initial results from relationship education programs are promising. The ePREP program has been shown to improve relationship satisfaction in some (e.g., Braithwaite & Fincham, 2011) but not all (e.g., Braithwaite & Fincham, 2014) studies. Additionally, a blended bibliotherapy and web-based couple intervention was found to improve relationship satisfaction in new and expectant parents (Kalinka, Fincham & Hirsch, 2012). Unfortunately, no web-based program to reduce relationship distress has been tested, raising the question of whether couples' more severe problems can be productively handled online. However, the effects of web-based interventions for psychopathology (e.g. anxiety and depression) are encouraging, with effect sizes comparable to in-person therapy (Andrews, Cuijpers, Craske, McEvoy & Titov, 2010; Cuijpers, Donker, van Straten, Li & Andersson, 2010).

In an effort to increase the reach of couple interventions while maintaining (or even improving) their effectiveness, this study endeavors to examine the reach and efficacy of a web-based secondary intervention aimed at ameliorating relationship distress. Specifically, our first aim was to determine the characteristics of couples who seek out a web-based secondary intervention for relationship. We expected that the program would reach a relationally-distressed and demographically representative sample of the population. The second aim was to assess the efficacy of the intervention on relationship functioning; we hypothesized that the program would create significant, medium-sized improvements in relationship functioning outcomes (smaller than intensive, in-person couple therapy but larger than relationship education programs). Finally, we explored whether the program significantly impacted individual functioning. We expected that, for individuals who began the program with significant individual difficulties, the intervention would lead to small- to medium-sized gains in these individual outcomes.

## Methods

The study design, final sample size, exclusion criteria, and nine primary outcome measures (assessing four relationship and five individual functioning constructs) were determined

before data collection began. An additional outcome measure of relationship commitment was omitted from our analyses because of poor internal reliability ( $\alpha < .60$ ).

## Participants

A total of 300 heterosexual couples (600 individuals) participated in the present study. Eighty percent were married, 6% were engaged, and 14% had lived together for more than six months but were not married/engaged. On average, couples had been together for 9.72 years ( $Mdn = 7.08$ ;  $SD = 8.34$ ) and 73% had children ( $M$  number of children=1.63,  $SD=1.52$ ). Most participants (85.6%) endorsed initial relationship satisfaction scores in the distressed range ( $<13.5$ ; Funk & Rogge, 2007). Individuals were primarily White, non-Hispanic (67.2%), African American (17.2%), or White, Hispanic (10.2%), with smaller numbers of Asian/Pacific Islander (3.3%), American Indian/Alaska Native (0.7%), and Biracial/Other (1.4%) participants. Participants were generally in their mid-thirties ( $M = 36.11$ ;  $SD = 9.58$ ) and reported their highest level of education as high school or less (30.5%), some college or technical training (21.3%), or a Bachelors or graduate degree (47.7%). The majority of the sample was employed part- (14.0%) or full-time (61.5%). Couples reported a median annual household income of \$70,500 ( $M = \$97,738$ ;  $Range = \$0-\$1,400,000$ ). Twenty eight percent of couples reported an annual household income below 200% of the poverty threshold.

## Procedures

Fifty seven percent of couples first came to the site after visiting an online search engine such as Google, entering a search term such as “free marriage counseling”, and clicking on an “organic” (i.e., non-paid) search result. Thirteen percent of couples were directed to the site after clicking on paid advertisements on search engines. The remainder of couples (30%) came directly to the site after learning about the program through media coverage, social media (e.g., Facebook), paid advertisements on other relationship-oriented sites, or through word of mouth. After reading about the program, couples were instructed to complete an online consent form followed by a screening questionnaire to determine eligibility.

To be eligible for the study, couples had to be heterosexual and married, engaged, or cohabiting for at least six months. At least one partner needed to score in the distressed range on relationship satisfaction ( $<1$  SD below the population mean) or both partners needed to score  $<0.5$  SD below the population mean on relationship satisfaction. Both partners also needed to be living in the United States and be between the ages of 21 and 64 (inclusive). Couples were excluded from the study if one or both partners reported moderate to severe levels of suicidal ideation ( $>7$  on the Suicidal Behaviors Questionnaire-Revised; Osman et al., 2001) in the past three months or if they reported injury or fear resulting from intimate partner violence in the past three months (using a self-report version of an interview developed by Heyman, Felbau-Kohn, Ehrensaft, Langhinrichsen-Rohling, & O’Leary, 2001). Couples were also excluded if either partner reported: a) concrete plans to separate/divorce, b) an ongoing affair; c) no access to a private, high-speed internet connection, or d) ongoing couple therapy or refusal to refrain from seeking couple therapy in the next three months (see Figure 1). Eligible couples then completed an online baseline assessment

followed by a call with project staff to ask questions and provide verbal consent. Following this call, couples were enrolled and randomized to condition.

Throughout this process, it was repeatedly emphasized that this program was not therapy. In all advertisements, it was described as a “self-help” program. On our public website, it was described as a “marriage counseling alternative”. Additionally, on both the public website and informed consent form, it was explicitly stated that the coach would not offer therapy. All procedures were approved by a university IRB.

### Description of Conditions

Using a random number generator, 151 couples were randomized into the web-based intervention condition and 149 couples were randomized into the waitlist control condition. There were no significant between-group differences at the pre-treatment assessment on any of the 12 demographic variables or on any the eight demographic variables.

**Waitlist control condition**—Couples randomized to the wait-list control group were asked to complete assessments four and eight weeks after the initial assessment; following the waiting period, they were provided the option to complete a brief version of the intervention.

**Web-based intervention condition**—The OR program was developed to serve as an online tool to help couples solve a specific relationship problem they selected. The program was based on Integrative Behavioral Couple Therapy (IBCT; Christensen et al., 2010); accordingly, its key components were the promotion of emotional acceptance and resulting behavior change. The program consisted of three sections: *Observe*, *Understand*, and *Respond (OUR)*. In each section, each partner worked separately as they generated material for a joint conversation that took place at the end of each section. The first section, “Observe”, provided individuals feedback on the current state of their relationship and helped them identify one or two relationship problems on which to focus during the program. The “Understand” section lead individuals through steps to achieve a more accurate understanding of the problem, including how differences between partners, hidden emotions, external stressors, and patterns of communication might affect the core problem(s). In the “Respond” phase, which included information about acceptance, self-change, communication tips, and suggestions tailored to their presenting problem, partners developed a plan for ameliorating the problem. The program concluded by providing tailored feedback to the couple showing their improvement since beginning the program and offering suggestions for next steps (e.g., referrals). A more detailed description of the OR program can be found in (*omitted for blind review*).

Contact with project staff during the intervention occurred in two ways. First, couples had four conversations over the phone or via videoconference with their “Coach”; in the current study, two Master’s-level graduate students and a Bachelor’s-level project coordinator served as coaches. Coaches received initial training in the intervention and were supervised in weekly meetings led by the first author. The four Coach conversations included the initial call to obtain verbal consent and calls following each of the three phases of the program. The coach calls were tightly scripted and content was limited to reviewing the couple’s

progress through the program, dealing with general questions about the program or content, or helping the couple tailor the program to meet their specific needs. As planned, coaches spent an average of less than one hour with each couple ( $Mdn = 50$  minutes;  $M = 51.32$  minutes,  $SD = 17.11$ ). Following each appointment, coaches reported adherence to the call script. There were a total of six total reported deviations (1.1% of calls): five were extended discussions of technical problems that precluded coverage of scripted material and one resulted from a coach encouraging couples to repeat an online activity because they had considerable difficulty completing it correctly.

The second type of contact couples had with their coach was through an asynchronous chat feature, which was used primarily to send standardized reminders to participants regarding upcoming appointments as well as encouragement to stay on schedule. Individuals were also instructed to contact coaches through chat if they had technical problems or questions about the program that they needed answered before the next scheduled call. On average, individuals received five scripted chat reminders ( $Median = 5$ ,  $M = 5.11$ ,  $SD = 1.7$ ) and zero tailored chat messages from their coach ( $Median = 0$ ,  $M = 1.27$ ,  $SD = 1.98$ ).

## Measures

The intervention and wait-list control groups completed assessments approximately four and eight weeks after the initial assessment. Additionally, intervention couples completed brief assessments approximately two, three, and six weeks following the initial assessment.

**Relationship Measures**—Relationship measures were included at all assessment points.

**Relationship Satisfaction:** Global relationship satisfaction was measured using the 4-item version of the Couple Satisfaction Index (CSI; Funk & Rogge, 2007); an example item is, “In general, how satisfied are you with your relationship?” The CSI-4 was developed using Item Response Theory (IRT) and has strong convergence with other satisfaction measures ( $r = .87$  with the Dyadic Adjustment Scale; Funk & Rogge, 2007). In this study, Cronbach’s alpha = .93.

**Positive and Negative Relationship Quality:** The Positive and Negative Relationship Quality (PNRQ; Fincham, & Rogge, 2010) is an 8-item self-report scale which asks participants to separately rate four positive (e.g., enjoyable, alive) and four negative (e.g., bad, lifeless) dimensions of relationship quality with responses ranging on a Likert scale from “not at all” to “extremely.” Reliability was excellent in this sample for both positives (Cronbach’s alpha = .94) and negatives (Cronbach’s alpha = .93).

**Relationship Confidence:** Confidence was assessed with two items: “I believe we can handle whatever conflicts will arise in the future” and “I feel good about our prospects to make this relationship work”. These two items from the Confidence Scale were used in previous studies (Rhoades, Stanley, & Markman, 2009) and were shown to function adequately. In the present sample, Cronbach’s alpha = .88.

**Individual Functioning Measures**—These measures were included in the initial screening questionnaire and eight weeks following the initial assessment for all couples.

**Depression:** The 10-item version of the Center for Epidemiologic Studies – Depression Scale (CES-D) was used; it is a well-validated measure of depression designed for the general community (Cole, Rabin, Smith, & Kaufman, 2004) and is highly correlated with the Beck Depression Inventory (BDI;  $r = .74$ ). All items were rated on a 0–3 Likert scale; Cronbach’s alpha in the present sample was .84.

**Anxiety:** The GAD-7 is an seven-item measure assessing DSM-IV symptoms of Generalized Anxiety Disorder (GAD; Spitzer, Kroenke, Williams, & Löwe, 2006) which has strong test-retest reliability (ICC = 0.83) and discriminates between depression and anxiety symptoms. Cronbach’s alpha in the present sample was .91.

**Perceived Health:** One item from the Quality of Life – Brief developed by the World Health Organization (WHO) was used to assess perceived health. Participants were asked to rate on a 5-point scale over the last 4 weeks, “*How satisfied are you with your health?*” (WHOQOL Group, 1998). Similar one-item ratings have repeatedly been found to predict important outcomes such as mortality (e.g., Idler & Benyamini, 1997)

**Work Functioning:** Participants were asked, “*Please rate your ability to function at work. If you do not work outside the home, please rate your ability to complete household tasks.*” Responses were scored on a Likert scale from 1- *excellent* to 5- *poor*; for the present study, the item were reversed scored such that higher scores indicate better work functioning.

**Quality of Life:** A one-item question, “*How would you rate your quality of life?*”, from the WHO Quality of Life – Brief (WHOQOL Group, 1998) was used to assess quality of life. Ratings were made on a five point Likert scale, with higher scores indicating higher quality.

### **Couples’ Evaluation of the Intervention**

**Evaluation of Services:** The eight-item Client Evaluation of Services Questionnaire (Nguyen, Attkisson, & Stegner, 1983) was administered after the intervention; Cronbach’s alpha in the present study was .93. The mean score was 27.09 ( $SD = 4.01$ ) in the normative sample of individual therapy and 27.65 ( $SD = 4.82$ ) in a randomized controlled trial of high-quality, in-person couple therapies (Christensen, Atkins, Berns, Wheeler, Baucom, & Simpson, 2004).

### **Missing Data**

Across the assessments analyzed in the current study, relationship functioning data was missing at 7.9% of the time points (8.9% in the intervention condition and 6.0% in the control condition). Data on individual functioning was missing at 6.3% of the time points (6.3% in the intervention condition and 6.4% in the control condition). Of the individuals who did not complete the intervention, we collected at least one measure of relationship functioning following the initial assessment in 99% of cases and a measure of individual functioning at the final assessment in 95% of cases. Missing data was unrelated to condition ( $p = 0.882$ ) as well as to change in the eight dependent variables (all  $p > .15$ ). All available data was included in all analyses (see Figure 1).



## Results

### Completion Rates

Of the 151 couples randomly assigned to complete the intervention, 129 couples (86%) completed the entire program. An additional eight couples (5%) completed the program through the “Understand” phase, the point where we hypothesized couples would receive a therapeutic dose of the intervention even if they did not complete the entire program.

### Relationship Outcomes

The means, standard deviations, and within-group effect sizes of the four relationship outcomes are presented in Table 1. To determine the best-fitting shape of change, we inspected the means (Table 1) and compared deviance statistics for linear and log linear parameterizations of time (results available from the first author). Quadratic and higher terms to model change were not examined because the waitlist control group was only assessed at three time points. Based on this procedure, a linear parameterization of time was selected to model change.

Analyses of relationship outcomes were conducted within the Hierarchical Linear Modeling (HLM version 7.01; Raudenbush, Bryk, Cheong, Congdon, & du Toit, 2011) using three-level models for couple data (see Atkins, 2005). Specifically, time was entered as the sole predictor at level 1 and gender was grand-mean centered and entered as a level-2 predictor of both the level 1 intercept and slope. At level 3, condition was entered as a predictor of all four level 2 terms. Random effects were included for the intercept at level 2 and for all four terms in level 3. Nesting of couples within the three coaches did not account for significant variability (all ICCs < .008; all  $p > .46$ ); however, robust standard errors were used for all analyses to adjust for this unmodeled heterogeneity. Between-group effect sizes were calculated from the estimated group differences in slopes at a point two months following the initial assessment. Clinically-significant changes were calculated using the last-available time point for each participant.

Full results for relationship outcomes are presented in Table 2 and effect sizes are depicted in Figure 2. Results reveal that the intervention created significant, medium-sized improvements in relationship satisfaction (Cohen's  $d = 0.69$ ). Examinations of clinically-significant change in relationship satisfaction revealed that 32% of participants were recovered by the end of the intervention, 25% were improved, 36% experienced no change, and 7% deteriorated. The intervention also significantly improved relationship confidence, with an effect size approaching a medium effect ( $d = 0.47$ ). Likely due to a lower reliability, the majority of participants showed no clinically-significant improvement in relationship confidence (64%) while others reported that they were recovered (31%) or deteriorated (5%). The effects of the program on relationship satisfaction and confidence did not significantly differ by gender.

As hypothesized, the intervention was more successful in reducing negative relationship quality ( $d = 0.57$ ) than increasing positive relationship quality ( $d = 0.15$ ). This difference was reflected in calculations of clinically significant change: 24.3% of participants were classified as recovered and 16.9% were classified as improved in negative relationship

quality while only 12.3% were classified as recovered and 5.3% classified as improved in positive relationship quality. Notably, only 6.0% showed significant deterioration in negative relationship quality but 23.2% evidenced deterioration in positive relationship quality. The effects of the program on positive relationship quality did not significantly differ by gender. However, there was a significant time-by-gender-by-condition interaction for negative relationship quality ( $b = 0.223, p = .043$ ), indicating that women in the intervention condition reported approximately 1.5 times larger reductions in negative relationship quality than did men in the intervention condition.

### Individual Outcomes

Descriptive statistics for individual outcomes are presented in Table 3. Individual outcomes were only assessed before and following the intervention; therefore, analyses of residualized change were conducted in HLM in a two-level model (individuals nested within couples). Specifically, at level 1, the post-intervention score was regressed on gender and pre-intervention level of the dependent variable (both grand-mean centered). At level 2, intervention condition was entered as a predictor of the intercept and both level 1 predictors.

The first set of analyses examined change in individual outcomes in the full sample; full results are presented in Table 4 and effect sizes are depicted in Figure 3. Compared to the waitlist control, individuals in the intervention condition experienced significantly greater reductions in depressive symptoms ( $d = 0.50$ ) and anxiety symptoms ( $d = 0.21$ ). Additionally, individuals in the intervention condition experienced significantly greater improvements in work functioning ( $d = 0.19$ ), quality of life ( $d = 0.18$ ), and perceived health ( $d = 0.23$ ).

As hypothesized, the effect of the intervention on individual functioning was significantly greater for individuals who began the program reporting problematic individual functioning. Specifically, the intervention was significantly more effective in reducing depressive symptoms for individuals who reported an initial score on the CESD greater than 11 (indicative of probable clinical depression; Cole et al., 2004) and significantly more effective in improving overall quality of life for individuals who initially reported it was less than “good” (see Table 4).

To examine intervention effects on individual outcomes for participants experiencing initial problems in those areas, analyses were rerun in subsamples of participants reporting elevated levels of depressive symptoms (CESD greater than 11), anxiety symptoms (GAD-7 greater than 9, “moderate” anxiety) and in samples reporting that their initial work functioning, quality of life, and perceived health were less than “good”. To ensure that our effect sizes were comparable to previous studies that only enrolled individuals with those problems, we used the *SD* from the subsample to calculate Cohen’s *d*. As depicted in Figure 3, the magnitudes of improvements were greater for individuals reporting initial difficulties. Additionally, despite the smaller sample sizes, intervention effects continued to be significant for all outcomes except perceived health (see Table 4).

## Couples' Reaction to Intervention

On the Client Evaluation of Services, participants reported a mean score of 26.81 ( $SD = 4.44$ ), indicating satisfaction levels nearly equivalent to in-person individual therapy ( $d = -0.07$ ; Nguyen et al., 1983) and high-quality couple therapy ( $d = -0.18$ ; Christensen et al., 2004). Indeed, of couples completing the web-based program, 94% reported they were mostly or very satisfied with the services received and 97% said they would recommend it to a friend.

## Discussion

### Reach of the Program

There are at least three broad groups of couples who could be considered “underserved” by existing couple interventions – moderately distressed couples, racial/ethnic minorities, and economically disadvantaged couples. The goal of the OR program was to reach these couples; fortunately, we were fairly successful in serving the underserved.

First, the program showed it could fill an important gap between enrichment programs (targeting generally happy couples) and in-person couple therapy (often only reaching couples on the brink of divorce or separation). Indeed, 86% of individuals in this study were relationally distressed when they began the program, higher than other secondary interventions such as the Marriage Checkup (18% distressed; Cordova et al., 2015). Second, couples enrolling in the program were generally representative of the broader United States in terms of race and ethnicity. In contrast, except in cases where lower-income couples were explicitly recruited (e.g., Lundquist et al., 2013), previous trials of couple interventions have underrepresented ethnic and racial minorities. Third, we were encouraged that 28% of couples came from households within 200% of the federal poverty level; nationwide, 31% of people aged 18–64 live within 200% of the poverty level (DeNavas-Walt & Proctor, 2014). These results suggest that the web-based program was successful in overcoming some financial and logistic barriers common for lower-income households (e.g., work schedule conflicts and childcare difficulties).

However, there were two remaining barriers to reaching underserved couples which should be noted. First, ethnic/racial minority couples were more likely to be excluded from the present study – often because they reported intimate partner violence resulting in injury of fear. Second, it is likely that many lower-income couples did not have the opportunity to participate because they did not have access to a home computer with broadband internet access. Nationwide, only 62% of African Americans have a broadband connection at home (Smith, 2014). Additionally, 60% of Hispanic individuals, 43% of African American individuals, but only 27% of non-Hispanic White individuals, rely “mostly” on their smartphones to go online (Duggan & Smith, 2013). Future programs should be designed so that they can be completed on a smartphone in order to improve access for lower-income couples.

## Effects on Relationship Functioning

The OR program resulted in significant improvements in relationship functioning compared to the wait-list control group. Benchmarking analyses (e.g., Minami, Serlin, Wampold, Kircher, & Brown, 2008) indicated that the effects of the OR program on relationship satisfaction (Cohen's  $d = 0.69$ ) were statistically significantly higher than what has been found immediately following primary prevention interventions for in-person programs ( $d = 0.36$ ; Hawkins et al., 2008), DVD-based programs ( $d = 0.40$ , Halford, Moore, Wilson, Farrugia, & Dyer, 2004), and internet-based programs (Hedges'  $g = 0.24$ ; Kalinka et al., 2012), as well as in-person secondary interventions ( $d = 0.22$ ; Cordova et al., 2015). Results of benchmarking analyses also indicated that the effects on relationship satisfaction were roughly equivalent to those found in a meta-analysis of in-person behavioral couple therapy ( $d = 0.59$ ; Shadish & Baldwin, 2005) but smaller than the within-group effect sizes found for IBCT ( $d = 0.86$ ; Christensen et al., 2004) as well as the average between-group effect sizes for Emotionally-Focused Couple Therapy ( $d = 1.31$ ; Johnson, Hunsley, Greenberg, & Schindler, 1999). Thus, as hypothesized, the OR program is more effective in increasing relationship satisfaction than existing primary and secondary interventions, but less effective than high-quality couple therapy. Notably, however, the OR program also included substantially less staff contact with couples than these interventions, increasing cost effectiveness and potential for dissemination.

The OR program also demonstrated significant improvements in other aspects of relationship functioning. Indeed, compared to the control group, couples in the program experienced significant improvements in relationship confidence ( $d = 0.47$ ) and negative relationship quality ( $d = 0.57$ ). In contrast, the program did not result in significant gains in positive relationship quality ( $d = 0.15$ ). As we have previously written (*omitted for blind review*), we were unable to include in the OR program a significant focus on empathic joining – the primary mechanism in IBCT to increase emotional intimacy – because we were concerned about the possibility of starting an argument without a therapist present. Thus, the smaller effects on positive aspects of the relationship may point to ways in which the intervention can be further improved. Alternatively, it may be that significant effects on positive relationship quality will be observed at later follow-up time points, with a reduction in relationship negatives or conflict paving the way for an increase in relationship positives.

## Effects on Individual Functioning

The OR program also created significant improvements on all five measures of individual health: depressive and anxious symptoms, perceived health, work functioning, and quality of life. Within the full sample, the effects on these variables ( $d = 0.18$ – $0.50$ ) were generally smaller than those observed on the targeted relationship outcomes variables, as would be expected. Indeed, the OR program included only minimal content on individual functioning (and, even then, that content was focused on buffering the relationship from mental health problems rather than improving individual functioning directly). The effects of the intervention on individual functioning for individuals who presented to the program with existing difficulties were notably larger ( $d = 0.44$ – $0.94$ ); they were only slightly smaller than what has been found in studies of web-based interventions targeting depression ( $d = 0.76$ ; Johansson et al., 2012) and anxiety ( $d = 1.12$ ; Andrews et al., 2010). However, the

moderating role of initial difficulty was statistically significant only for depressive symptoms and quality of life. The increase in effect sizes for the other variables was largely a function of use of a smaller standard deviation from the subsample in their calculation (to make them comparable to studies enrolling only those with difficulties).

When the randomized controlled design is viewed as an experimental manipulation of relationship functioning that results in improvements in individual functioning, the present study provides some of the most convincing evidence to date that relationship and individual functioning are causally related. While relationship and individual functioning have been shown to be strongly associated in cross-sectional (e.g., Whisman, 2007; Whisman & Uebelacker, 2006) and longitudinal studies (e.g., Whisman, Uebelacker, & Bruce, 2006), by experimentally manipulating one variable and demonstrating corresponding change in another variable, one can be more confident in their causal link. Thus, the present study provides additional evidence that intervening “upstream” in the social environment of close relationships affects health, as envisioned by the federal “Healthy People 2020” Initiative (HHS, 2014).

### Limitations and Future Directions

Despite its strengths, this study also has two important limitations that should be noted. First, the present study relies upon self-report data. While assessment of relationship quality has typically focused on self-report methods, observational data (especially of communication) and implicit measures (Lee, Rogge, & Reis, 2010) have been shown to be valuable in understanding relationship functioning. More importantly, although self-reported evaluations of mental health, physical health, and functioning have been found to be valid measures of their underlying constructs, they do not shed light on the mechanisms through which relationships affect individual functioning. Inclusion of biological markers would help us map these mechanisms. A second study limitation is that several individual functioning constructs were assessed with a single item, potentially limiting the magnitude of intervention effects on those constructs.

The present results also point to a number of future directions. Within the current sample, it will be important to determine whether effects are maintained over follow-up and whether they will generalize to other domains (e.g., coparenting quality, child functioning). It will also be important to explore moderators of intervention effects – especially factors related to the increased reach of the OR program. For example, it may not be sufficient to reach underserved couples if the intervention is less effective for them. We can also envision a number of exciting possibilities for the expansion of web-based interventions for distressed relationships, including whether even briefer interventions or interventions delivered to only one member of a couple can improve distressed relationships. More intensive web-based interventions for relationship problems excluded in the current trial (e.g., ongoing affairs or even violence with fear or injury) would also be valuable in increasing the reach of these programs. OR could also be integrated into a stepped care model – either as a more intensive follow-up to enrichment classes or as a precursor to couple therapy. Moreover, because relationship distress predicts disease outcomes for conditions such as heart disease (e.g., Rohrbaugh, Shoham, & Coyne, 2006) and cancer (Yang & Schuler, 2009), a web-based

secondary relationship intervention could be offered to these patients with comorbid relationship distress.

Finally, with the rapidly-accumulating evidence supporting the efficacy of web-based interventions (e.g., Andrews et al., 2010; Cuijpers et al., 2010), there is an increasing need for guidance for both developers and consumers of these interventions. For developers, best-standards for maintaining confidentiality, advertising, and complying with differing state regulations (e.g., ages of consent, licensure laws) are needed. For consumers, more assistance in identifying and selecting empirically-validated online interventions is essential. Indeed, the field may be quickly approaching the point where the reach of empirically-validated online interventions is limited not by users' access but by their inability to differentiate effective programs from untested (but more cleverly or attractively advertised) alternatives.

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**Public Health Significance**

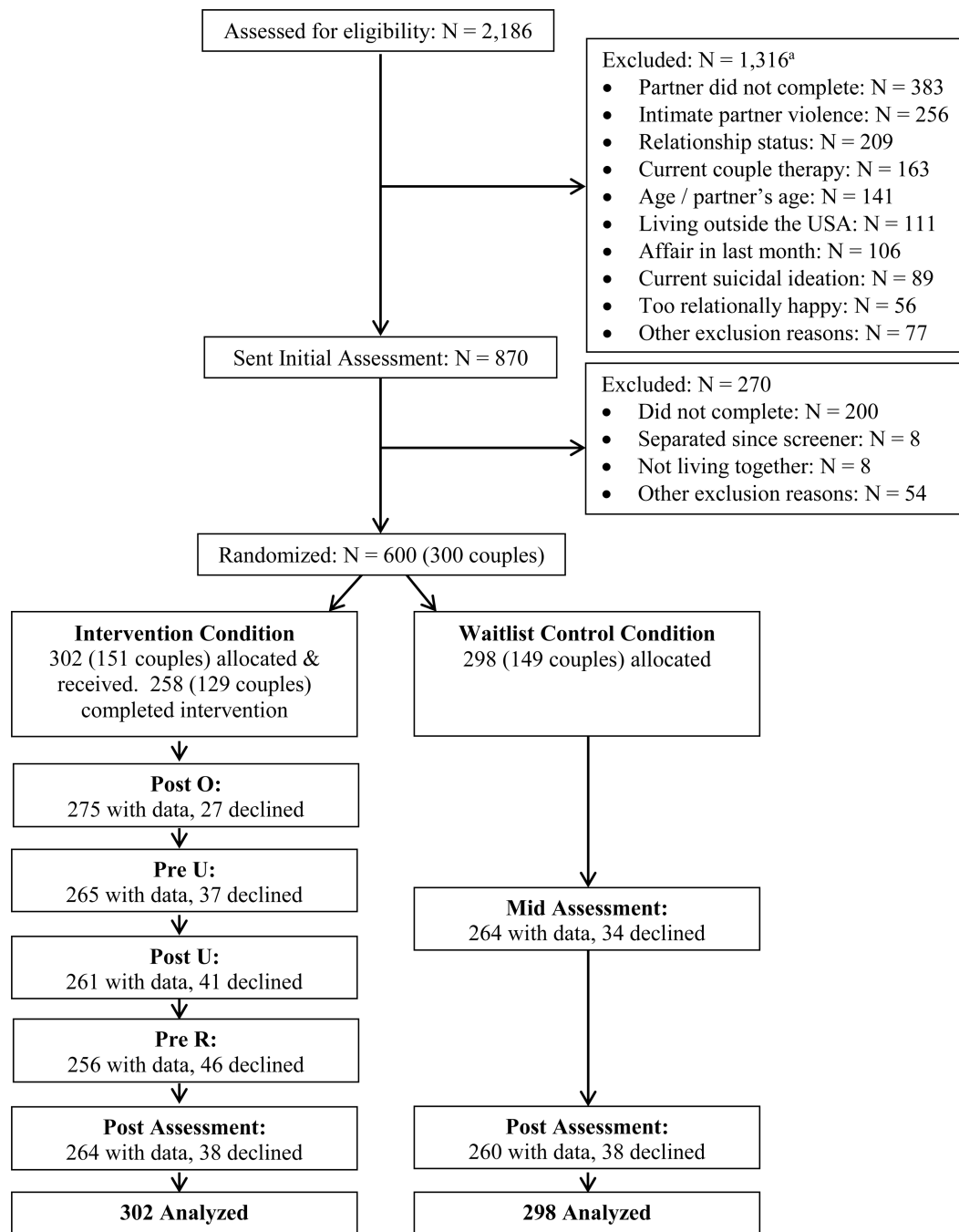
In a nationally-representative sample, this study demonstrates that a brief, web-based intervention for distressed couples can improve relationship functioning. Additionally, the program significantly improved reported problems with depression, anxiety, work functioning, and perceived health.

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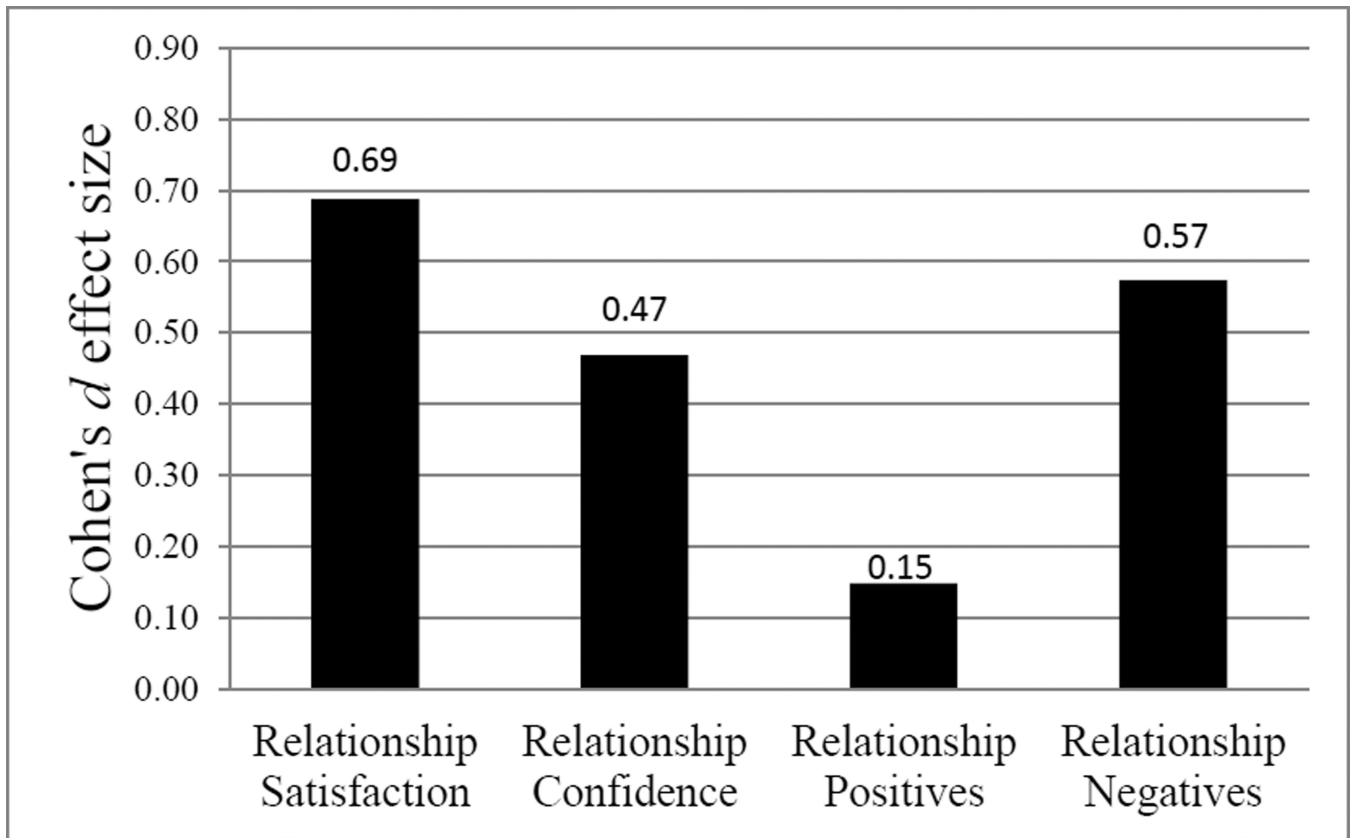
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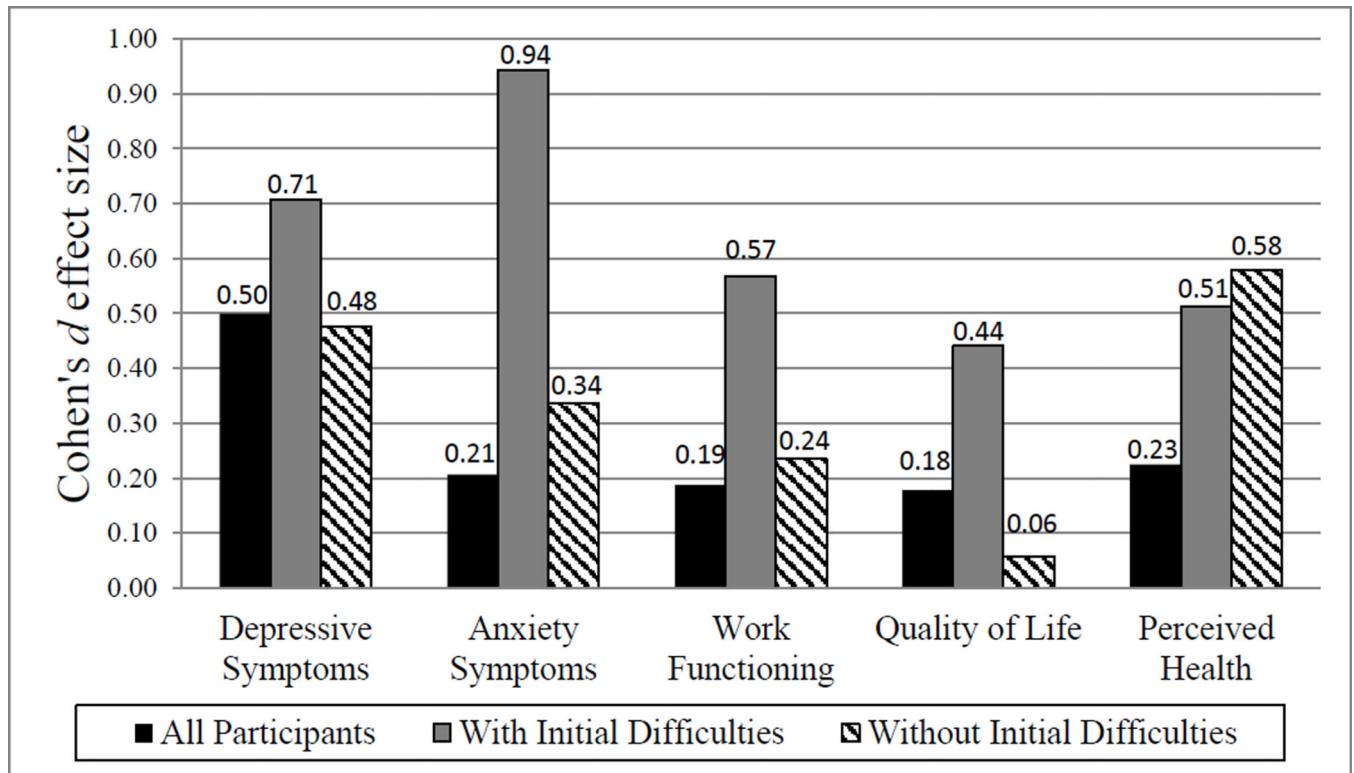
**Figure 1. CONSORT Diagram**

<sup>a</sup>Numbers do not sum to 1,316 because some individuals were ineligible for multiple reasons.



**Figure 2. Between-Group Effect Sizes for Relationship Outcomes**

*Note* N = 594 individuals for whom there was at least two assessments.



**Figure 3. Between-Group Effect Sizes for Individual Outcomes**

*Note:* With and Without Initial Difficulties are participants who did / did not meet a clinical or problematic cutoff on that measure at the initial assessment. In these subsamples, effect sizes were calculated by dividing by the subsample SD (to facilitate comparisons to clinical and non-clinical samples). All Participants  $N = 570$  with both pre- and post-intervention data; With Initial Difficulties  $N = 250$  to  $388$ ; Without Initial Difficulties  $N = 217$ – $320$ .

Table 1

## Relationship Outcomes by Gender, Condition, and Assessment Point

	Pre	Post-O	Pre-U	Post-U	Pre-R	Post	Within-group <i>d</i>
<i>Wait-list Control Group</i>							
	Men	9.41 (4.02)	10.41 (4.24)	10.50 (4.80)	10.50 (4.80)	10.50 (4.80)	0.27
Relationship Satisfaction	Women	7.33 (4.03)	8.70 (4.82)	8.52 (4.84)	8.52 (4.84)	8.52 (4.84)	0.30
	Men	8.01 (3.16)	8.65 (2.95)	8.42 (3.34)	8.42 (3.34)	8.42 (3.34)	0.13
Relationship Confidence	Women	7.15 (3.21)	7.44 (3.48)	7.68 (3.33)	7.68 (3.33)	7.68 (3.33)	0.17
	Men	11.51 (6.56)	9.23 (5.95)	10.26 (6.77)	10.26 (6.77)	10.26 (6.77)	-0.19
Relationship Negatives	Women	14.05 (6.47)	12.05 (6.47)	13.03 (6.71)	13.03 (6.71)	13.03 (6.71)	-0.16
	Men	17.20 (4.86)	16.37 (5.09)	16.33 (5.34)	16.33 (5.34)	16.33 (5.34)	-0.18
Relationship Positives	Women	16.57 (5.92)	15.14 (6.49)	15.20 (5.96)	15.20 (5.96)	15.20 (5.96)	-0.23
<i>Intervention Group</i>							
	Men	9.09 (3.67)	10.18 (4.51)	11.29 (4.31)	11.71 (4.22)	12.14 (4.03)	1.03
Relationship Satisfaction	Women	7.58 (4.16)	8.59 (4.11)	9.97 (4.36)	10.86 (4.27)	11.16 (4.52)	0.89
	Men	8.57 (2.40)	9.08 (2.41)	9.32 (2.32)	9.44 (2.32)	9.87 (1.80)	0.62
Relationship Confidence	Women	7.31 (2.73)	8.16 (2.83)	8.52 (2.67)	8.90 (2.66)	9.14 (2.67)	0.70
	Men	10.62 (6.12)	10.08 (6.05)	8.98 (5.63)	7.76 (6.00)	7.32 (5.68)	-0.64
Relationship Negatives	Women	13.09 (5.75)	11.67 (6.24)	10.20 (6.15)	8.90 (6.60)	8.08 (6.12)	-0.85

	Pre	Post-O	Pre-U	Post-U	Pre-R	Post	Within-group <i>d</i>
<i>Men</i>	17.38 (4.54)	16.14 (5.11)	16.02 (5.07)	16.06 (5.25)	16.00 (5.19)	17.38 (4.57)	0.00
<i>Women</i>	16.29 (5.17)	15.12 (5.72)	15.32 (5.46)	16.04 (4.97)	15.61 (5.19)	16.18 (4.92)	-0.02

Note: *SDs* are in parentheses. Within-group *d* calculated as post minus pre means divided by the pre assessment *SD*.

**Table 2**

## HLM Results for Relationship Outcomes

	<b>b</b>	<b>95% CI</b>	<b>t-ratio</b>	<b>p-value</b>
<i>Relationship Satisfaction</i>				
Gender	1.912	( 1.254, 2.570)	5.699	<.001
Time	0.136	( 0.084, 0.188)	5.106	<.001
Time X condition	0.372	( 0.279, 0.465)	7.844	<.001
Time X gender	-0.023	(-0.095, 0.049)	-0.631	.530
Time X gender X condition	-0.011	(-0.119, 0.097)	-0.197	.844
<i>Relationship Confidence</i>				
Gender	0.953	( 0.313, 1.593)	2.918	.004
Time	0.053	( 0.010, 0.096)	2.415	.016
Time X condition	0.170	( 0.105, 0.235)	5.122	<.001
Time X gender	-0.002	(-0.076, 0.072)	-0.593	.553
Time X gender X condition	-0.033	(-0.140, 0.074)	-0.612	.541
<i>Positive Relationship Quality</i>				
Gender	0.687	(-0.373, 1.747)	1.270	.205
Time	-0.155	(-0.222,-0.088)	-4.549	<.001
Time X condition	0.089	(-0.017, 0.195)	1.639	.102
Time X gender	0.062	(-0.073, 0.197)	0.898	.370
Time X gender X condition	-0.169	(-0.359, 0.021)	-1.741	.083
<i>Negative Relationship Quality</i>				
Gender	-2.545	(-3.786,-1.304)	-4.020	<.001
Time	-0.140	(-0.217,-0.063)	-3.589	<.001
Time X condition	-0.464	( 0.602,-0.326)	-6.582	<.001
Time X gender	-0.043	(-0.181, 0.095)	-0.607	.583
Time X gender X condition	0.223	( 0.007, 0.439)	2.028	.043

Note:  $df = 298$  for all statistical tests. All tests of condition differences at the intercept (i.e., failure of randomization) were non-significant (all  $p > 0.17$ ). Additionally, all tests of gender-by-condition interactions were non-significant (all  $p > 0.32$ ).



**Table 3**  
Individual Functioning Outcomes by Gender, Condition, and Assessment Point

	Depression	Anxiety	QoL	Health	Work
<i>Wait-list Control Group</i>					
<i>Pre</i>	10.63 (4.27)	6.73 (5.36)	3.22 (1.05)	3.29 (1.12)	3.92 (0.92)
<i>Post</i>	9.73 (4.04)	5.06 (4.82)	3.69 (0.89)	3.35 (1.11)	3.98 (0.88)
<i>Within group d</i>	-0.21	-0.31	0.45	0.05	0.07
<i>Pre</i>	10.21 (4.41)	9.75 (5.93)	3.08 (0.95)	3.18 (1.18)	3.63 (1.03)
<i>Post</i>	10.06 (4.33)	7.16 (5.45)	3.61 (0.85)	3.20 (1.22)	3.69 (1.01)
<i>Within group d</i>	-0.03	-0.44	0.56	0.02	0.06
<i>Intervention Group</i>					
<i>Pre</i>	9.80 (3.95)	7.10 (5.02)	3.25 (0.91)	3.24 (1.04)	3.97 (0.99)
<i>Post</i>	8.73 (2.91)	4.28 (4.25)	3.84 (0.71)	3.64 (1.01)	4.16 (0.78)
<i>Within group d</i>	-0.27	-0.56	0.65	0.38	0.19
<i>Pre</i>	11.84 (4.53)	8.89 (5.75)	3.13 (1.03)	3.15 (1.10)	3.64 (1.00)
<i>Post</i>	9.48 (3.53)	5.47 (4.75)	3.84 (0.79)	3.42 (1.11)	3.91 (0.86)
<i>Within group d</i>	-0.52	-0.59	0.69	0.25	0.27

Note: SDs are in parentheses. Within-group *d* calculated as post minus pre means divided by the pre assessment SD.

**Table 4**

HLM Results for Individual Outcomes

	Full Sample				Participants Experiencing Initial Problems					
	b	95% CI	t-ratio	df	p-value	b	95% CI	t-ratio	df	p-value
<i>Depression Symptoms</i>										
Condition	-2.149	(-2.974,-1.324)	-5.106	269	<.001	-2.070	(-3.402,-0.738)	-3.047	133	.003
Initial level	0.555	(0.457,0.653)	11.102	237	<.001	0.186	(0.037,0.335)	2.458	172	.015
Condition X Initial level	-0.157	(-0.298,-0.016)	-2.173	237	.031					
<i>Anxiety Symptoms</i>										
Condition	-1.144	(-1.871,-0.417)	-3.085	269	.002	-3.371	(-6.519,-0.223)	-2.099	123	.038
Initial level	0.551	(0.444,0.658)	10.140	237	<.001	0.893	(0.406,1.380)	3.591	165	<.001
Condition X Initial level	-0.066	(-0.210,0.078)	-0.894	237	.372					
<i>Work Functioning</i>										
Condition	0.185	(0.036,0.334)	2.442	269	.015	0.335	(0.073,0.597)	2.507	136	.013
Initial level	0.414	(0.304,0.524)	7.355	235	<.001	0.239	(0.005,0.473)	1.999	170	.047
Condition X Initial level	0.042	(-0.111,0.195)	0.539	235	.590					
<i>Quality of Life</i>										
Condition	0.175	(0.040,0.310)	2.525	269	.012	0.280	(0.079,0.481)	2.734	197	.007
Initial level	0.449	(0.340,0.558)	9.622	236	<.001	0.332	(0.179,0.485)	4.219	284	<.001
Condition X Initial level	0.167	(0.026,0.308)	2.321	236	.021					
<i>Perceived Health</i>										
Condition	0.250	(0.096,0.404)	3.195	269	.002	0.189	(-0.104,0.482)	1.260	127	.209
Initial level	0.585	(0.492,0.678)	12.370	237	<.001	0.663	(0.308,1.018)	3.670	157	<.001
Condition X Initial level	0.043	(-0.092,0.178)	0.634	237	.526					

Note: Gender and gender-by-condition interactions were non-significant in all cases (all  $p > 0.10$ ); therefore, they are not included in the table to save space. (Full results are available from the authors.) Condition-by-initial level interactions were not included in the model in the subsample of participants reporting initial problems on these variables.