THE ROLE OF CHRONIC STRESS IN THE ASSOCIATION BETWEEN DEPRESSIVE SYMPTOMS AND MARITAL SATISFACTION

by

Patrick W. Poyner-Del Vento
M.S.T., Fordham University
B.S., University of Florida

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Chair:	Dr. Kathleen Slaney Assistant Professor
	Dr. Rebecca Cobb Senior Supervisor Assistant Professor
	Dr. Alexander Chapman Supervisor Assistant Professor
External Examiner:	Dr. Norm O'Rourke Associate Professor Department of Gerontology Simon Fraser University
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Abstract

In an 18-month longitudinal study of 200 newlywed couples, growth curve analyses indicated that marital satisfaction and chronic stress interact to predict depressive symptoms. When chronic stress decreased over time, the association between changes in marital satisfaction and depressive symptoms was relatively weak, but when chronic stress increased, the association between marital satisfaction and depressive symptoms was stronger and more negative. Cross-spouse analyses generally indicated that when spouses experienced increases in chronic stress or higher average chronic stress across time points, the bidirectional association between wives' depressive symptoms and husbands' marital satisfaction became weaker and less negative. In sum, increases in chronic stress over the first year of marriage strengthened the within-spouse association between marital satisfaction and depressive symptoms but weakened the bidirectional cross-spouse association between husbands' marital satisfaction and wives' depressive symptoms. This highlights how the broader social context may put maritally distressed spouses at greater risk for depression.

Keywords: *marital satisfaction, depressive symptoms, chronic stress, newlyweds*

Subject Terms: *marriage, close relationships, depression, stress, longitudinal research*

Dedication

To Mom and Dad.

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Introduction

In spite of a large body of literature documenting the association between depressive symptoms and marital satisfaction (for reviews, see Gotlib & Beach, 1995; Whisman, 2001a), the circumstances that place spouses at greater risk of martial distress or depression remain unclear. Spouses suffering from depression and marital distress are among the most difficult to treat in psychotherapy (Whisman, 2001b), and research to understand circumstances that exacerbate these negative outcomes is warranted. In particular, there has been a call to identify mediators and moderators of this association (Whisman, 2001a). To date, research on moderators has focused on individual characteristics (e.g., Davila, Karney, Hall, & Bradbury, 2003), and the broader social context has been largely neglected. Thus, the purpose of this study is to examine chronic stress as a potential moderator of the association between depressive symptoms and marital satisfaction.

Depressive Symptoms and Marital Satisfaction

During the first few years of marriage, most relationships will significantly decline in quality, and half of all first marriages in the United States (Karney & Bradbury, 1995) and about 40% of all Canadian couples will divorce (Statistics Canada, 2004). Maritally distressed couples are also at higher risk for a range of negative physical and mental health outcomes, including depression (Whisman & Uebelacker, 2003). This underscores a clear need to identify and understand the processes involved in the development of marital distress and depression.

Cross-sectional and longitudinal studies to date have focused on depressive symptoms as a predictor and an outcome of marital distress, underscoring a bidirectional

link between marital distress and depressive symptoms (e.g., Davila et al., 2003). Cross-spouse associations are also evident; spouses' marital distress is associated with partners' depressive symptoms over time (Beach, Katz, Kim, & Brody, 2003) and partners of depressed spouses have more negative evaluations of the marriage (Uebelacker & Whisman, 2005).

Although individual variables (e.g., neuroticism, self-esteem, chronic dysphoria) have been identified as moderators of the association between depressive symptoms and marital satisfaction (Beach & O'Leary, 1993; Culp & Beach, 1998; Davila et al., 2003), there is a lack of understanding about how the broader social context, such as stress from work, finances, health, or relationships with family and in-laws, might be related to this association. The dearth of research in this area suggests that there may be much to gain by understanding contextual factors, which could in turn inform clinical intervention and policy decisions. Thus, the exploration of how ongoing non-marital stressors contribute to marital distress and depressive symptoms is timely and important.

Chronic Stress as a Moderator of the Depressive Symptoms – Marital Satisfaction Link

Various kinds of stressful events outside the marital relationship are linked to negative interpersonal outcomes such as a lack of intimacy, marital distress, and marital instability (e.g., Bahr, 1979; Gimbel & Booth, 1994; Repetti, 1989), and to negative intrapersonal outcomes such as declines in physical health (Whisman, 2001b). Generally, experiencing stressful life events is a major risk factor for depressive symptoms (e.g., Avison & Turner, 1988), and the severity of stress correlates with depressive symptoms (e.g., Hammen, Davila, Brown, Ellicott, & Gitlin, 1992).

In spite of these robust findings, several methodological issues limit the interpretations of the links between stress, depressive symptoms and marital satisfaction. Most examinations of stress as a predictor of marital satisfaction or depressive symptoms consist of cross-sectional or retrospective designs, making it difficult to infer causal connections. In addition, the magnitude of the association varies depending on the way stress is assessed. For example, life event checklists are less predictive of depression than participants' subjective impact ratings (Brown & Harris, 1978). Furthermore, cross-spouse associations are rarely examined, thus limiting the understanding of how these factors may have an influence on the dyadic level.

One major gap in the current literature is that chronic stress has been largely ignored as a variable of interest. This is a shortcoming for three reasons. First, the assumption that all stress affects couples in basically the same way has yet to be investigated empirically—transient stressors and chronic stress may not have the same role (cf. Karney, Story, & Bradbury, 2005). Second, chronic stress is a common source of variability and disregarding it may obscure a more complete understanding of the stress-depression link (cf. Hammen, 2005). Third, chronic stress is a stronger predictor of depressive symptoms than acute stress (McGonagle & Kessler, 1990), suggesting that ongoing difficulties may be more potent contextual variables than discrete life events.

Several factors that can be conceptualized as chronic stress (e.g., poverty, parenting difficulties, medical disabilities, lack of social support) are associated with depressive symptoms (e.g., Paykel & Cooper, 1992; Swindle, Cronkite, & Moos, 1989) and with marital satisfaction (Kinnunan & Pulkkinan, 1998; Lavee, Sharlin, & Katz, 1992). However, many of these studies are limited in that the focus is on one ongoing

difficulty when in reality chronic stress may originate from many different contexts. In addition, chronic stress from multiple domains is seldom aggregated to examine the overall effect on marital satisfaction or depressive symptoms. Even when multiple domains are assessed, operational definitions of chronicity vary, ranging from stressful circumstances lasting at least 4 weeks to more than 12 months. These divergent definitions complicate the conclusions that can be drawn about how chronic stress might be related to depressive symptoms, especially when considering that shorter time intervals introduce a greater possibility that what has been described as chronic stress may actually be acute stress.

A few studies have assessed chronic stress in multiple domains, such as intimate relationships, friendships, family relations, finances, and health over a six month period. Chronic stress aggregated across domains predicted steeper declines in marital satisfaction in newlywed couples (Karney et al., 2005), greater depressive symptoms in psychiatric patients (Hammen, Davila, Brown, Ellicott, & Gitlin, 1992), and greater depressive symptoms in a community sample of youth at risk for depression (Hammen, Shih, & Brennan, 2004), suggesting that ongoing negative circumstances can significantly exacerbate depressive symptoms and increase risk of marital distress.

The Current Study

There is clear evidence of bidirectional and cross-spousal associations between depressive symptoms and marital satisfaction in cross-sectional and longitudinal studies. However, it is not clear whether chronic stress places depressed spouses at risk of further declines in marital satisfaction, or maritally distressed spouses at risk of steeper increases in depressive symptoms. Thus, a goal of the current study is to examine how chronic

stress from non-marital domains plays a role in this association over the first year and a half of marriage in a large community sample of newlywed couples

Consistent with prior research on newlyweds, I did not expect systematic change in marital satisfaction or depressive symptoms; however, I expected that there would be significant within-spouse variability in trajectories. Further, I hypothesized that marital satisfaction and depressive symptoms would covary. Finally, I hypothesized that initial non-marital chronic stress, mean levels of chronic stress over the study period, and changes in chronic stress over time would strengthen the bidirectional negative association between changes in depressive symptoms and changes in marital satisfaction. Given the strong association of trait neuroticism with marital satisfaction (Karney & Bradbury, 1995), reactions to stressful life events, and depression (Kendler, Kuhn, & Prescott, 2004), neuroticism was controlled in all analyses.

Method

Participants

Participants were 200 heterosexual couples initially living in the Metro Vancouver area who participated in a two-year study of newlywed marriage (the SFU Transition to Marriage Study). Of those participants, 176 couples provided sufficient data to be included in the analyses.[1] All couples were engaged to be married at Time 1 (T1), and almost all were married within the first six months of the study. The majority of couples were recruited through advertisements or articles in local newspapers (n = 68), attendance at bridal shows (n = 60), internet advertising (n = 41), or word of mouth (n = 24). Couples were eligible to participate if they were between 18–45 years old, were entering into their first marriage, were proficient in English, planned to marry no later

than six months after the beginning of the study, had no children, and both spouses agreed to participate. These criteria helped to ensure that the couples were experiencing similar life events and had not already been exposed to issues involving parenthood or divorce (for further discussion of the costs and benefits of similar sampling strategies, see Rogge et al., 2006).

At T1, husbands averaged 29.2 years of age (*SD* = 4.9) and wives averaged 27.4 years of age (*SD* = 4.2). On average, husbands (*M* = 12.6, *SD* = 6.5) and wives (*M* = 13.4, *SD* = 6.0) had completed some college or post-secondary education. Husbands earned an average of $32,500 (*SD* = 15,900) and wives earned an average of $24,600 (*SD* = 17,600). Of the husbands, there were 74% Caucasian, 14% Asian, 3% Indo-Canadian, 1% First Nations, 2% Middle-Eastern, and 4% identified as "other." Of the wives, there were 71% Caucasian, 18% Asian, 6% Indo-Canadian, 1% First Nations, and 3% identified as "other." At T1, the mean duration of relationships was 3.9 years (*SD* = 2.81) and 64% of couples lived together prior to marriage.

Procedures

The Department of Research Ethics at Simon Fraser University approved all study procedures. Interested individuals contacted the lab by phone or email and one member of the couple was screened to determine eligibility. Approximately four months prior to their wedding date, eligible couples were sent an e-mail with additional information about the study, an electronic copy of the consent form, a hypertext link to the online questionnaires, a unique ID number, and a password. Participants logged onto the online questionnaires that were hosted on a secure university website and after reading the informed consent, they indicated willingness to participate by clicking on the appropriate

radio button. Participants completed questionnaires every three months over two years for a total of nine waves of data collection (T1 – T9). Spouses were asked to complete the survey without consulting their partners. The first and every other subsequent phase consisted of an hour-long set of questionnaires (T1, T3, T5, T7, and T9). The remaining intervening time points (T2, T4, T6, and T8) consisted of a brief marital satisfaction questionnaire. Couples also visited the laboratory twice for a series of digitally recorded interviews, marital discussions, and physical data collection (height, weight, body mass index, and two saliva samples) about 4 months into the marriage (T3) and again at the last data collection point (T9, about 1.5 years after the wedding date). Only data collected every six months at the large questionnaire phases will be included in this study (i.e., T1, T3, T5, and T7) because depression symptoms were not assessed at the intervening time points (for the purposes of this study, those time points were labeled T1, T2, T3, and T4, respectively). Couples were paid $425 for participation in the two-year study as follows: T1, $75; T3 (questionnaires and lab session), $100; T5, $50; T7, $50; T9 (questionnaires and lab session), $150.

Measures

Marital Satisfaction. The Quality of Marriage Index (QMI; Norton, 1983) is a widely used global measure of marital satisfaction. Total scores are derived by summing responses to six items. The QMI has good psychometric properties, with scores reliably differentiating maritally distressed and non-distressed couples. Coefficient alphas for this study consistently met or exceeded .90 over the 4 waves of data.

Depressive Symptoms. The Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961; Beck, Steer, & Garbin, 1988) is widely used and

discriminates well between mild, moderate, and severe levels of depression. The 21 items are scored on a scale of 0-3, and the total score is obtained by summing the items. Coefficient alphas for this study consistently met or exceeded .85 over the 4 waves of data.

Chronic Stress. Participants completed the Chronic Stress Questionnaire (CSQ; Hammen et al., 1987), which assesses chronic stress in several domains (i.e., marriage, family, in-laws, work, school, homemaking, finances, friends, own health, health of family). Participants were asked to consider all facets of each domain and give appropriate weight to areas that have more of an impact on their overall level of stress. For each domain, participants rated their experience over the last six months on a scale of 1 to 9, with higher numbers indicating a greater amount of stress. Scores across domains (excluding marital stress) were averaged to yield a total chronic stress score.

Neuroticism. The Neuroticism Scale of the Eysenck Personality Questionnaire (EPQN; Barrett, Petrides, Eysenck, & Eysenck, 1998) assessed neuroticism at T1 only. Participants responded to yes-or-no questions (scored 0 or 1) about their tendency to be emotionally reactive or to experience negative affectivity (e.g., "Does your mood often go up and down?", "Are your feelings easily hurt?"). Coefficient alphas in this sample were above .85 for husbands and wives.

Data Analysis

Hypotheses were tested with Growth Curve Analysis (GCA) using the Hierarchical Linear Modeling 6 software program (HLM6; Raudenbush, Bryk, Cheong, Congdon, 2000). A distinct advantage of using GCA over other data analysis methods (e.g., linear regression or repeated measures ANOVA) is that GCA models individual

change (rather than mean level change) and does not assume that multiple assessment are equally spaced in time.

GCA proceeds in two stages: The first stage (Level 1) estimates a trajectory of change which is described by at least two parameters: the intercept (initial level of the variable) and slope (rate of change over time). At Level 1, HLM provides tests of whether, on average, these intercepts and slopes differ significantly from zero, and whether there is variability in these estimates across spouses. In all analyses, two time variables were included, one that estimated linear change and one that estimated non-linear change. This model was tested with the following equation:

$$Y_{ij} = \beta_{0j} + \beta_{1j}(\text{time}) + \beta_{2j}(\text{time}^2) + r_{ij} \qquad \text{[Equation 1]}$$

where Y_{ij} is the outcome variable of each spouse *j* at Time *i*; β_{0j} is the initial level of the outcome variable of spouse *j* at Time 1 (the intercept); β_{1j} is the rate of linear change in the outcome variable for spouse *j* (in months); β_{2j} is the rate of quadratic change in the outcome variable (in months squared); and r_{ij} is the residual variance in repeated measurements for spouse *j*. At Level 1, the association of time-varying covariates with changes in the outcome was estimated with the following equation:

$$Y_{ij} = \beta_{0j} + \beta_{1j}(\text{time}) + \beta_{2j}(\text{time}^2) + \beta_{3j}(\text{covariate}) + r_{ij} \qquad \text{[Equation 2]}$$

where β_{3j} is the association between the trajectories of the covariate and the outcome.

In HLM, the coefficients can be understood as functionally similar to unstandardized regression coefficients, and they represent the degree of association between two variables (for example in Equation 1, the association between time and the outcome). In the current analyses, the linear (time) and non-linear (time^2) contrast

coefficients were coded as months since T1, with T1 coded as 0. This weighting results in the intercept representing the initial level of satisfaction at Time 1 of the study.

The second stage of analysis (Level 2) allows for examination of between-subject differences in intercepts and trajectories of change (slopes), or moderation of the association between a time-varying covariate and outcome by time-invariant predictors. At Level 2, the Level 1 parameters can be modeled as a function of a moderator:

Intercept: $\beta_{0j} = \gamma_{00} + \gamma_{01}$ (moderator) $+ \mu_{0j}$ [Equation 3]

Time: $\beta_{1j} = \gamma_{10} + \gamma_{11}$ (moderator) $+ \mu_{1j}$ [Equation 4]

Time2: $\beta_{2j} = \gamma_{20} + \gamma_{21}$ (moderator) $+ \mu_{2j}$ [Equation 5]

Covariate: $\beta_{3j} = \gamma_{30} + \gamma_{31}$ (moderator) $+ \mu_{3j}$ [Equation 6]

where γ_{00} is the intercept of the outcome when the moderator is low and γ_{01} is the intercept of the outcome when the moderator is high; γ_{10} is the mean slope of the outcome when the moderator is low and γ_{11} is the mean slope of the outcome when the moderator is high; γ_{20} is the mean slope of the outcome when the moderator is low and γ_{21} is the mean slope of the outcome when the moderator is high; and each μ_j represents the error term of the expression (residual variance across *j* subjects). The coefficients in the equation expressing moderation of the association between covariates and the outcome can be interpreted in the same manner.

The moderator was included in the intercept and time equations in all moderating analyses because it allowed for increased accuracy of the estimated parameters and tests of significance (Nezlek, 2001). With noted exceptions, all coefficients were modeled as random (Nezlek, 2001); that is, a random error parameter was estimated for the

coefficient. When model convergence was problematic, specific coefficients were fixed and this was noted in the results.

Analyses were conducted simultaneously for husbands and wives, which takes into account the dependence of the data (Raudenbush, Brennan, & Barnett, 1995). At Level 1all variables except linear time variables were entered as group mean centered. At Level 2, continuous variables were entered as grand mean centered and categorical variables were entered as non-centered (Nezlek, 2001).

Results

Descriptive Statistics and Preliminary Analyses

Means and standard deviations of study variables at all time points are in Table 1. Generally, concurrent cross-spouse associations were low to moderate. Wives were more satisfied than husbands at all assessments except T2, and husband and wife marital satisfaction were consistently correlated at each time point (*r*s range from .18 at T1 to .40 at T3). GCA indicated that on average, QMI scores changed in a curvilinear fashion for husbands, and a trend was observed for the same pattern of change for wives (see Figure 1). In other words, marital satisfaction showed a slight increase over the first half of the study and then a steady decline.

Wives' BDI scores were consistently higher than husbands' scores at all time points. Unlike QMI scores, husbands' and wives' BDI scores were not consistently related (scores were significantly correlated only at T2 and T3). BDI scores did not change linearly over time; however, GCA indicated a marginal curvilinear relationship for husbands but not wives (see Figure 2). In other words, husbands' depressive symptoms declined slightly over the first year of the study and then increased.

There were no gender differences in chronic stress (CSQ) at any time point, and husbands' and wives' scores were significantly correlated at time points (*r*s range from .22 at T3 to .34 at T4). Chronic stress did not systematically change over time, although there was significant between-subject variability in slopes. Wives ($M = 9.9$, $SD = 5.6$) reported higher EPQN scores than husbands ($M = 6.2$, $SD = 4.9$; $t\ (175) = -7.11$, $p < .01$) at T1. Neuroticism was only assessed at T1, thus no change parameters were estimated.

Cross-Sectional Correlations

Within-spouse correlations between measures were generally low to moderate. Consistent with prior research on marital satisfaction and depressive symptoms, the QMI and BDI were significantly negatively correlated at each time point for husbands (average $r = -.24$; range $r = -.19$ to $-.33$) and for wives (average $r = -.38$; range $r = -.25$ to $-.48$). QMI and CSQ scores were negatively correlated for husbands (average $r = -.32$; range $r = -.27$ to $-.39$) and for wives (average $r = -.33$; range $r = -.18$ to $-.44$). BDI and CSQ were positively correlated for husbands (average $r = .56$, range $r = .49$ to .63) and for wives (average $r = .48$; range $r = .38$ to .54). EPQN scores at T1 were negatively correlated with T1 QMI scores for wives ($r = -.30$) but not husbands ($r = -.12$). EPQN scores were positively associated with T1 BDI scores for husbands ($r = .70$) and wives ($r = .62$) and with T1 CSQ for husbands ($r = .37$) and wives ($r = .39$).

Level 1 Analyses: Predicting Trajectories of Marital Satisfaction from Depressive Symptoms and Chronic Stress

As I predicted a bidirectional association between depressive symptoms and marital satisfaction, two sets of analyses were conducted. In the first, depressive symptoms were entered at Level 1 as a time-varying predictor of marital satisfaction. In

the second set of analyses, marital quality was entered as a time-varying predictor of depressive symptoms.[2]

Do Changes in Depressive Symptoms Predict Changes in Marital Satisfaction Within and Across Spouses? I hypothesized that changes in depressive symptoms would be related to changes in marital satisfaction, within and across spouses. In these analyses, QMI was entered as the outcome, and time variables and BDI scores were entered as time-varying covariates[3]:

$$QMI_{ij} = \beta_{0j} + \beta_{1j}(time) + \beta_{2j}(time^2) + \beta_{3j}(BDI) + r_{ij} \qquad \text{[Equation 7]}$$

As shown in Table 2, changes in BDI were negatively associated with changes in QMI for husbands and wives. Thus, increases in depressive symptoms over time were associated with corresponding declines in marital satisfaction for husbands and wives.

The hypotheses regarding cross-spouse analyses were tested as in Equation 7, but with spouses' BDI entered as time-varying covariates predicting partners' QMI, while controlling for the partners' BDI. As shown in Table 3, changes in wives' BDI were negatively associated with changes in husbands' QMI, even after controlling for husbands' BDI. However, changes in husbands' BDI were not correlated with changes in wives' QMI. In other words, increases in wives' depressive symptoms were associated with declines in husbands' marital satisfaction, but changes in husbands' depressive symptoms did not predict changes in wives' marital satisfaction.

Do Changes in Chronic Stress Predict Changes in Marital Satisfaction Within and Across Spouses? I predicted that increases in chronic stress would be associated with declines in marital satisfaction over time. As in Equation 7, CSQ was entered as a time-varying covariate predicting trajectories of marital satisfaction. As shown in Table 2,

increases in CSQ were associated with declines in QMI for husbands and wives. In other words, increases in spouses' chronic stress were correlated with declines in their own marital satisfaction.

Similar to the previous cross-spouse analyses, and as in Equation 7, spouses' BDI were entered as time-varying covariates of partners' QMI while controlling for partners' CSQ. Increases in spouses' CSQ scores were positively associated with increases in partners' QMI scores for husbands and wives. However, when controlling for partners' CSQ, spouses' CSQ scores no longer predicted partner's QMI scores (see Table 3). In other words, spouses' chronic stress appeared to account for the much of the same variance in their partner's marital satisfaction as did their partners' chronic stress.

Do Changes in Depressive Symptoms and Changes in Chronic Stress Interact to Predict Changes in Marital Satisfaction Within and Across Spouses? I examined whether changes in chronic stress interacted with changes in depressive symptoms to predict changes in marital satisfaction using the following equation at Level 1:

$$QMI_{ij} = \beta_{0j} + \beta_{1j}(\text{time}) + \beta_{2j}(\text{time}^2) + \beta_{3j}(\text{BDI}) + \beta_{4j}(\text{CSQ}) + \beta_{5j}(\text{BDI x CSQ}) + r_{ij}$$

[Equation 8]

In this equation, β_{5j} represents the association between the interaction term and QMI. I created the interaction term by centering BDI and CSQ scores and then multiplying the centered scores at each time point (e.g., T3 CSQ x T3 BDI). Contrary to expectations, the interaction term was not significant (see Table 2), indicating that changes in chronic stress do not interact with changes in depressive symptoms to predict trajectories of marital satisfaction.

Next, I examined cross-spouse associations to determine whether changes in spouses' depressive symptoms and chronic stress interacted to predict changes in their partners' marital satisfaction. As in Equation 8, I entered spouses' BDI, CSQ and the interaction term (BDI and CSQ) as time-varying covariates of partners' QMI. The interaction term was a marginally significant predictor of husbands' marital satisfaction and did not predict wives' satisfaction (see Table 3). To probe the nature of the interaction, values corresponding to one standard deviation above and one standard deviation below the mean of the time-varying covariates were entered into the HLM equations to estimate four QMI scores, which were then plotted in Figure 3. Contrary to prediction, the association between husbands' marital satisfaction and wives' depressive symptoms became weaker and less negative when wives experienced increases in chronic stress.

Level 1 Analysis: Predicting Trajectories of Depressive Symptoms from Marital Satisfaction and Chronic Stress

Do Changes in Marital Satisfaction Predict Changes in Depressive Symptoms Within and Across Spouses? Consistent with prior research (e.g., Karney, 2001; Davila et al., 2003), I predicted that the association between marital satisfaction and depressive symptoms would be bidirectional. Thus, all analyses were repeated examining depressive symptoms as the outcome with marital satisfaction as the predictor. As in Equation 7, QMI was entered as a time-varying covariate predicting trajectories of depressive symptoms. As shown in Table 4, changes in QMI were negatively associated with changes in BDI, and decreases in marital satisfaction were associated with corresponding increases in depressive symptoms. Thus, increases in marital quality predict declines in

depressive symptoms, and increases in depressive symptoms predict declines in marital quality. These results suggest that, consistent with prior research, there is a dynamic bidirectional association between marital satisfaction and depressive symptoms within spouses.

Cross-spouse associations were examined by entering spouses' QMI as a time-varying predictor of partners' BDI as in Equation 7, while controlling for the partners' QMI. As shown in Table 5, changes in husbands' QMI predicted changes in wives' BDI, but changes in wives' QMI did not predict changes in husbands' QMI. Thus, declines in husbands' marital satisfaction were associated with corresponding increases in wives' depressive symptoms but the same was not true for wives' marital satisfaction predicting husbands' depressive symptoms. This finding corresponds with the finding that increases in wives' marital satisfaction predicted declines in husbands' depressive symptoms. Similar to the within-spouse analyses, these results suggest a dynamic bidirectional cross-spouse association between wives' depressive symptoms and husbands' marital satisfaction, but not between husbands' depressive symptoms and wives' marital satisfaction.

Do Changes in Chronic Stress Predict Changes in Depressive Symptoms Within and Across Spouses? Next, I tested whether increases in chronic stress were correlated with increases in depressive symptoms over time. As in Equation 7, CSQ was entered as the time-varying covariate predicting trajectories of depressive symptoms. As expected, changes in CSQ scores were significantly positively correlated with changes in BDI scores for husbands and wives (see Table 4). When spouses reported increases in chronic stress, they experienced corresponding increases in their depressive symptoms.

For cross-spouse analyses, as in Equation 7, spouses' CSQ scores were entered as time-varying predictors of partners' BDI scores. Increases in spouses' CSQ scores were positively associated with increases in partners' BDI scores for husbands and wives. However, when controlling for partners' CSQ, spouses' CSQ scores no longer predicted partner's BDI scores (see Table 5). In other words, spouses' chronic stress appeared to account for the much of the same variance in their partner's depressive symptoms as did their partners' chronic stress.

Do Changes in Marital Satisfaction and Changes in Chronic Stress Interact to Predict Changes in Depressive Symptoms Within and Across Spouses? Next, I examined whether changes in spouses' marital satisfaction and changes in their own chronic stress interacted to predict changes their own depressive symptoms. As in Equation 8, QMI, CSQ and the interaction term (QMI x CSQ) were entered as time-varying covariates predicting depressive symptoms. Consistent with hypotheses, the interaction term was significant for husbands and wives (see Table 4). As shown in Figures 4 and 5, when chronic stress increased over time, the association between marital satisfaction and depressive symptoms became stronger and more negative for husbands and for wives.

Next, I examined trajectories of spouses' chronic stress as a moderator of the association between changes in spouses' marital satisfaction and partners' depressive symptoms. As in Equation 8, I entered spouses' QMI, CSQ and the interaction term of spouses' QMI and CSQ as time-varying predictors of partners' BDI. The interaction term was significant when predicting wives' depressive symptoms, but not husbands' depressive symptoms (see Table 5). However, the nature of the interaction was contrary to prediction. As shown in Figure 6, when husbands' chronic stress declined over time,

the association between husbands' marital satisfaction and wives' depressive symptoms was negative. The association became weaker when husbands' chronic stress increased over time—even when controlling for wives' marital satisfaction and chronic stress.

Level 2 Analyses: Chronic Stress as a Moderator

Do Initial and Mean Chronic Stress Moderate the Association between Depressive Symptoms and Marital Satisfaction Within and Across Spouses? To test the hypothesis that the association between changes in marital satisfaction and changes in depressive symptoms would be stronger when initial levels (T1) or mean levels (the average of T1, T2, T3, and T4) of chronic stress were high, I used the following equation at Level 1:

$$QMI_{ij} = \beta_{0j} + \beta_{1j}(\text{time}) + \beta_{2j}(\text{time}^2) + \beta_{3j}(\text{BDI}) + r_{ij} \qquad \text{[Equation 9]}$$

Then, initial or mean chronic stress were entered at Level 2 as a moderator of the Level 1 parameters: the intercept and the association between the time-varying covariates (time and BDI) and the outcome (QMI).

$$\text{Intercept:} \quad \beta_{0j} = \gamma_{00} + \gamma_{01}(\text{CSQ}) + \mu_{0j} \qquad \text{[Equation 10]}$$

$$\text{Time:} \quad \beta_{1j} = \gamma_{10} + \gamma_{11}(\text{CSQ}) + \mu_{1j} \qquad \text{[Equation 11]}$$

$$\text{Time}^2\text{:} \quad \beta_{2j} = \gamma_{20} + \gamma_{21}(\text{CSQ}) + \mu_{2j} \qquad \text{[Equation 12]}$$

$$\text{BDI:} \quad \beta_{3j} = \gamma_{30} + \gamma_{31}(\text{CSQ}) + \mu_{3j} \qquad \text{[Equation 13]}$$

As previously noted, this model tests whether the slope of the association between depressive symptoms and marital satisfaction is significantly different when chronic stress is low versus high.[4] As shown in Table 6, initial and mean CSQ scores did not moderate the association between depressive symptoms as a time varying covariate predicting marital satisfaction.

Next, I examined cross-spouse associations and whether initial or mean chronic stress at Level 2 moderated the association between changes in spouses' depressive symptoms entered as a time-varying covariate at Level 1 and partners' marital satisfaction, while controlling for partners' depressive symptoms and chronic stress. As in Equation 9, I entered spouses' BDI as a time-varying covariate predicting partners' QMI and as in Equations 10–13, initial or mean chronic stress were entered as Level 2 moderators. As shown in Table 7, these hypotheses were not supported; initial and mean CSQ scores did not moderate the association between spouses' depressive symptoms and partners' marital satisfaction.

Do Initial and Mean Chronic Stress Moderate the Association between Marital Satisfaction and Depressive Symptoms Within and Across Spouses? Next, I examined whether initial or mean chronic stress at Level 2 moderated the association between marital satisfaction entered as a time-varying covariate and depressive symptoms. As in Equation 9, I entered QMI as a time-varying covariate predicting BDI, and as in Equations 10–13 initial or mean chronic stress were entered as Level 2 moderators. As shown in Table 8, initial and mean chronic stress did not moderate the association between marital satisfaction as a time varying covariate predicting depressive symptoms.

Finally, I examined cross-spouse associations and whether initial or mean chronic stress at Level 2 moderated the association between spouses' marital satisfaction entered as a time-varying covariate at Level 1 and partners' depressive symptoms, while controlling for partners' marital satisfaction and chronic stress. As in Equation 9, I entered spouses' QMI as a time-varying covariate predicting partners' BDI, and as in Equations 10–13 initial or mean chronic stress were entered as Level 2 moderators. As

shown in Table 9, husbands' initial chronic stress moderated the association between husbands' marital satisfaction and wives' depressive symptoms; as husbands experienced more initial chronic stress prior to marriage, the association became stronger and more negative (see Figure 7). Husbands' mean chronic stress moderated the association, but contrary to prediction, higher mean levels of chronic stress weakened the association (see Figure 8). Wives' initial chronic stress and mean chronic stress did not moderate the association between wives' marital satisfaction and husbands' depressive symptoms.[5]

Discussion

Although there is a strong, robust and bidirectional association between depressive symptoms and marital satisfaction, experiencing depressive symptoms in marriage does not always lead to marital distress, and marital distress does not guarantee increases in depressive symptoms. The purpose of this study was to identify the couples most at risk of experiencing marital distress or depressive symptoms by examining the contextual factors that exacerbate these associations. Specifically, I examined whether chronic stress moderated the depressive symptoms – marital satisfaction association in newlyweds over the first year and a half of marriage. The results were consistent with hypotheses, with a few notable exceptions.

Marital satisfaction changed systematically in a curvilinear fashion over time (although marginally for wives). Wives did not experience systematic change in depressive symptoms, but husbands experienced a slight inverse curvilinear trajectory such that depressive symptoms declined immediately prior to and following the wedding and then increased over the following year. This suggests that the wedding event may provide a temporary boost in marital satisfaction (and in the case of husbands, a

temporary decline in depressive symptoms) because of the positive outpour of social support from friends and family, or possibly because of a positive mood spillover around the time of the wedding. Alternatively, these increases in satisfaction and declines in depressive symptoms may be a rebound to relationship satisfaction levels prior to wedding preparation. During the wedding planning phase, satisfaction may have declined and depression increased because of the added stress of wedding preparations, dealing with family members' expectations, and perhaps financial stressors. Once the majority of the planning is complete in the month or two prior to the wedding, the couple may rebound in satisfaction, but then continue on the downward marital trajectory that is generally seen in married couples. Couples were assessed only once prior to marriage and that assessment took place about two months before marriage; therefore, it is unclear which of these explanations is more plausible.

As expected and consistent with previous research (e.g., Karney, 2001), the association between marital satisfaction and depression appeared to be bidirectional; marital satisfaction covaried with changes in depressive symptoms and depressive symptoms covaried with changes in marital satisfaction. Although several theoretical perspectives have been proposed to account for this association, three general explanations have dominated this discussion in the literature. First, depressive symptoms may lead to declines in marital satisfaction through stress generation in marital interactions (e.g., Davila, Bradbury, Cohan, & Tochluk, 1997; Hammen, 1991). Second, marital distress may lead to lead to higher depressive symptoms through reductions in intimacy, social support, or dependency and increases in hostility, verbal aggression, or disruption of routines (e.g., Beach, Sandeen, & O'Leary, 1990). Alternatively, some

researchers hypothesize that third variables (i.e., personality factors) may be contributing to an increased risk in both depressive symptoms and marital distress (e.g., Birtchnell, 1988). This study and others (e.g., Miller et al., 1992; Whisman, Uebelacker, Tolejko, Chatav, & McKelvie, 2006) indicate that the association cannot be accounted for by personality differences alone (i.e., neuroticism). However, there may be other third variables that influence the development of depressive symptoms and marital distress and thus it may be that depression and marital distress are not causally related.

Regarding cross-spouse associations, a bidirectional association was present only for the association between wives' depressive symptoms and husbands' marital satisfaction, and not for the association between husbands' depressive symptoms and wives' marital satisfaction. It may be that wives are more likely to personally invest in the marital relationship and consequently, when husbands become more dissatisfied with their marriage, wives may be more likely to internalize husbands' negative appraisals and become more depressed. Moreover, husbands' marital satisfaction may also be dependent upon fluctuations in wives' mood. If wives experience increases in depressive symptoms, husbands may interpret this as evidence that the relationship is not going as well as expected. Alternatively, marital satisfaction may be more dependent on wives' relationship maintenance behaviors, and when wives experience more depressive symptoms they may be less likely to perform this role. For example, when wives are feeling more depressed, they may be less likely to be supportive or initiate fun or companionate activities, and more likely to be critical or hostile when differences arise. Alone or together, these interactions could lead to husbands evaluating the marriage more negatively (cf. Beach et al., 1990).

Previously, Beach et al. (2003) observed cross-spouse associations between depressive symptoms and marital satisfaction for husbands and wives; in the current study the association was not present between wives' marital satisfaction and husbands' depressive symptoms. It is not clear why husbands do not experience increases in depressive symptoms with wives' declines in marital satisfaction. However, it is important to note that the sample in Beach et al. consisted of couples in established marriages with at least one adolescent child, and the sample in this study consisted of a group of highly satisfied newlywed couples beginning their first marriages with no children. It is possible that newlywed husbands may externalize or dismiss wives' marital dissatisfaction more easily, thus are less likely to take negative feedback about the marriage personally. It may also be that wives are not sufficiently maritally distressed to influence husbands' moods; wives may need to experience more distress before husbands are affected. Alternatively, husbands may become more socially committed to the marital relationship with the advent of children and thus feel more depressed when they are unable to resolve marital conflicts. Future research is needed to address this seeming inconsistency.

When examining whether chronic stress predicted changes in marital satisfaction or changes in depressive symptoms, the results differed depending on the type of analysis. For within-spouse analyses, spouses' chronic stress predicted their own marital satisfaction and depressive symptoms. However, spouses' chronic stress did not predict their partners' marital satisfaction or depressive symptoms when controlling for partners' chronic stress. This suggests that spouses' chronic stress is not an independent predictor

of their partners' marital satisfaction or depressive symptoms because of the large amount of variability already predicted by partners' chronic stress.

The focus of this study and the results underscore the circumstances in which depressive symptoms and marital satisfaction are most strongly linked. The hypotheses that chronic stress would moderate the association between depressive symptoms and marital satisfaction within and across spouses were partially supported. There was evidence that changes in chronic stress interacted with changes in marital satisfaction to predict changes depressive symptoms. Note that the reverse was not true; chronic stress did not interact with depressive symptoms to predict marital satisfaction. In other words, when spouses experience increases in chronic stress, declines in marital distress may be more detrimental for spouses' mood and psychological well-being than when chronic stress decreases. This may result from diminishing social, cognitive, emotional resources while coping with chronic stress. For example, an increasingly difficult relationship with family or in-laws and diminishing benefits at work that requires careful financial planning may divert maritally distressed spouses' resources away from coping with the stress, thus leading to increases in depressive symptoms.

Contrary to expectations, mean levels of chronic stress did not moderate the association between depressive symptoms and marital satisfaction. This suggests that it is the interaction between changes in stress and depressive symptoms that matters—and that average levels of stress are less informative in understanding the association between trajectories of depressive symptoms and marital distress.

With regard to cross-spouse analyses, generally results did not support the prediction that chronic stress strengthens the association between spouses' depressive

symptoms and partners' marital satisfaction. One exception was when husbands' initial chronic stress was high, the association between husbands' marital satisfaction and wives' depressive symptoms strengthened. However, wives' initial chronic stress did not moderate the association between their own marital satisfaction and husbands' depressive symptoms. This suggests that maritally distressed husbands may put their wives at higher risk of experiencing depressive symptoms when husbands' initial chronic stress is also high, but the same is not true for wives. It is unclear why this difference occurred; it may be that brides and grooms assume different roles for the wedding and hence experience different sources of chronic stress. Alternatively, higher initial chronic stress in husbands may indicate a lack of social integration between families and roles during this transition period, making it difficult for newlywed wives to navigate their new role. This also suggests that the time period prior to the wedding is a unique context for both husbands and wives that is not fully understood and warrants further study.

Results from three cross-spouse moderation analyses were contrary to predictions. First, the association between trajectories of wives' depressive symptoms and husbands' marital satisfaction became marginally weaker and less negative when wives experienced increases in chronic stress. Second, the association between husbands' marital satisfaction and wives' depressive symptoms became less negative when husbands' chronic stress increased. Third, when husbands reported higher average levels of chronic stress, the same association weakened. Although it is not entirely clear why these interactions were present, a few explanations are worth noting. First, it may be that when husbands identify sources of stress outside the marriage, they may also be more understanding of or excuse wives' depressive symptoms rather than personalizing their

wives' feelings or behavior. Second, when husbands are more maritally distressed but have identified a source of stress outside the marital relationship as the cause of their problems, wives may also be less likely to internalize their husbands' negative evaluations and hence experience less depressive symptoms. Third, it may be that the wives of these husbands are sacrificing more personal resources to support their husbands. Consequently, these wives may actually experience increases in depressive symptoms. In a post-hoc analysis, I examined whether husbands' perceptions of social support from wives interacted with changes in their own marital satisfaction to predict wives' depressive symptoms while controlling for changes in husbands' chronic stress and the interaction of changes in husbands' chronic stress and husbands' marital satisfaction. The interaction of social support and marital satisfaction was non-significant, thus this explanation was not supported. Ultimately, researchers must replicate these findings before stronger conclusions can be proposed.

Strengths and Limitations

There are several design and data analytic advantages to this study. First, the large sample size allowed for detection of medium or larger effect sizes. Second, the homogeneous developmental stage of the relationships (i.e., younger couples beginning first marriages with no children) allowed for more specific interpretations about how chronic stress may be related to the development of depressive symptoms and marital dissatisfaction given that all of the couples were relatively satisfied at the beginning of the study. Third, the longitudinal design and use of growth curve analyses across four time points provided a more complete picture of how marital satisfaction and depressive

symptoms change over time. Fourth, the focus on cross-spouse associations provided a better understanding of whether interactions on a dyadic level were present.

In spite of these advantages, results should be interpreted in light of several limitations. Regarding the method, the couples were not randomly selected from the local population of engaged couples. In the United States, researchers have access to marriage licenses from local county clerk offices to potentially obtain a random sample of all couples in a given area marrying in a specific time frame. In Canada, this information is not publicly available. However, participants in this study comprised a relatively diverse group of people culturally and economically, which may render more generalizability and specificity[6] across groups than previous marital studies that have almost exclusively focused on relatively well-off Caucasian couples. Another limit to the method is that all data is self-report, which can be prone to social desirability biases or other response sets. This is especially important regarding the assessment of the CSQ, which only measured subjective stress. It may be more fruitful to use an objective measure of stress, such as interviewer ratings (e.g., Kessler, 1997), which would take into account the severity, proximity, and controllability of chronic stress and perhaps also make the ratings more reliable and comparable between individuals. Finally, couples completed questionnaires over the first year and a half of marriage, a period when marital satisfaction and depressive symptoms are relatively stable (e.g., Davila et al., 2003). Because changes in marital satisfaction are more apparent by about three or four years into marriage (Karney & Bradbury, 1995), these results may not be generalizable to more established couples and a longer follow-up period may be warranted.

A final concern is the debatable issue of how to conceptualize and measure depression-related constructs. Some researchers argue that depression is a categorical mental illness operationalized as present (i.e., diagnosable) or absent, while others argue that depressed mood is best captured by dimensional measures (for further discussion of this issue see Beach & Amir, 2003 and Flett, Vrendenburg, & Krames, 1997). In keeping with the evidence that even subclinical levels of depression can be detrimental to relationships and individual functioning (e.g., Lewinsohn, Solomon, Seeley, & Zeiss, 2000), I conceptualized and assessed depressive symptoms dimensionally. This was also particularly useful because most of the spouses scored in the subclinical range of depression or below, thus allowing for assessment of a greater range of symptoms. However, it is likely that few spouses in the study would meet criteria for current major depressive disorder, thus these findings may not be generalizable to a clinical population of couples with diagnosable depression.

Conclusion and Directions for Future Research

Results of this study underscore the role of non-marital chronic stress in the development of marital distress and depressive symptoms and suggest who may be most at risk for these negative outcomes. Clinicians may be able to make more informed decisions when treating depressed or maritally distressed spouses by assessing chronic stress in relevant domains and intervening to help spouses improve their interpersonal skills (e.g., coping skills) or to directly reduce stress in spouses' lives (e.g., changing careers). Spouses with larger increases in chronic stress may require a more focused intervention to prevent and to treat depression or marital distress. Administrators of

secondary prevention programs may consider screening couples for chronic stress to engage them in prevention initiatives that protect against marital distress and depression.

Ultimately, this study suggests that interventions at a broader social context (e.g., changes in governmental regulations and policies) may be useful to prevent adverse marital and personal outcomes—intervention at the individual or dyadic level may not be sufficient. Policymakers can make use of important information to decide where and how to allocate resources to help couples most disadvantaged by ongoing difficult circumstances.

Future research should attempt to generalize these findings to other populations such as more established couples, same-sex couples, and clinical populations. Another important step would be to identify moderators of the depressive symptoms – marital satisfaction link. This study and others (e.g., Davila et al., 2003; Culp & Beach, 1998) have identified some moderators of the marital satisfaction – depressive symptoms link. However, little is known about depressed spouses (or partners of depressed spouses) who are at greater risk of marital distress. It may also be helpful to distinguish among types of stress and how these stressors may lead to different outcomes (for a discussion of these and related issues, see Hammen, 2005; Karney et al., 2005). Furthermore, it may be helpful to assess physiological responsivity to stress (e.g., cortisol reactivity) and depression (see Nolen-Hoeksema, 2006) to more fully understand mechanisms of associations between depression and marital distress. The prevalence and detrimental effects of chronic stress from sources outside the marital dyad can have a profound and adverse effect on couples' lives (e.g., Story & Bradbury, 2004; Story & Repetti, 2006). Researchers must understand the different roles chronic stress plays in marriage on

individual and dyadic levels so that clinicians, policymakers, and other stakeholders can make effective decisions to prevent depressive symptoms or adverse marital outcomes.

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Footnotes

[1] In the HLM program, missing data is permitted at Level 1, but not at Level 2. Thus, for participants missing more than 25% of items from any T1 measure, both spouse and partner data were excluded from the analyses. When less than 25% of the responses for a specific measure (excluding the CSQ, which was simply averaged with the data provided) were missing, missing values were replaced with the sample item mean.

[2] All effect size *r*s were calculated with the following formula:

$$r = \sqrt{\frac{t^2}{t^2 + df}}$$

[3] Although in some cases the linear and quadratic time variables became marginal or non-significant once other time-varying covariates were entered into the equations, time variables were retained across all analyses for improved parameter estimation.

[4] In all tables depicting results of the Level 2 analyses (Tables 6–9), the coefficient in the first row represents the association between the time-varying covariate and the outcome when the moderator is low, and the coefficient below represents the association between the time-varying covariate and the outcome when the moderator is high. The *t*-value corresponding to the coefficient when the moderator is low indicates whether that coefficient is significantly different from zero. The t-value corresponding to the coefficient when the moderator is high indicates whether the moderator is significant.

[5] As originally predicted, results supported chronic stress as a moderator of the marital satisfaction – depressive symptoms link. However, it is possible that depressive symptoms or marital satisfaction may be mediators. To explore this possibility, I examined whether changes in depressive symptoms mediated the association between

changes in chronic stress and changes in marital satisfaction, and whether changes in marital satisfaction mediated the association between changes in chronic stress and changes in depressive symptoms. Following the recommendations of Baron and Kenny (1986) for detecting mediation, I specified four models at Level 1; the first three models tested whether the conditions necessary for mediation were present (i.e., the predictor is related to the mediator and the outcome, and the mediator is related to the outcome at Level 1), and a final model evaluated whether mediation exists. In the final model, the mediator and predictor were entered in the equation at Level 1 as time-varying covariates of the outcome. If mediation is present, then only the mediator will significant predict the outcome. Analyses were conducted within and across spouses, and of the 16 possible models tested, none supported mediation.

[6] The diversity of the sample in this study did allow for preliminary analyses of demographic variables as Level 2 moderators. With regard to depressive symptoms predicting marital satisfaction, being a non-white man or a man born outside of Canada weakened the association, and being an older woman or a woman with a higher level of income strengthened the association. With regard to marital satisfaction predicting depressive symptoms, being a religious woman weakened the association, and being a woman earning a higher income strengthened the association. Both sets of findings suggest that gender roles and culture may play a role in the development of marital distress or depressive symptoms. Contrary to previous research conducted in the United States where relationship status (i.e., cohabitation or marriage) moderated the association between depressive symptoms and relationship satisfaction (Uebelacker & Whisman, 2006), cohabitation prior to marriage did not moderate the association in this sample.

However, it is important to note the differences in reasons for cohabitation (Heuveline & Timberlake, 2004) and in religiosity (Reimer, 1995) between people living in Canada and the United States. Future research should continue to examine these variables in the different populations before stronger conclusions can be proposed.

Figure 1

Examining Trajectories of Marital Satisfaction Over Time For Husbands and Wives

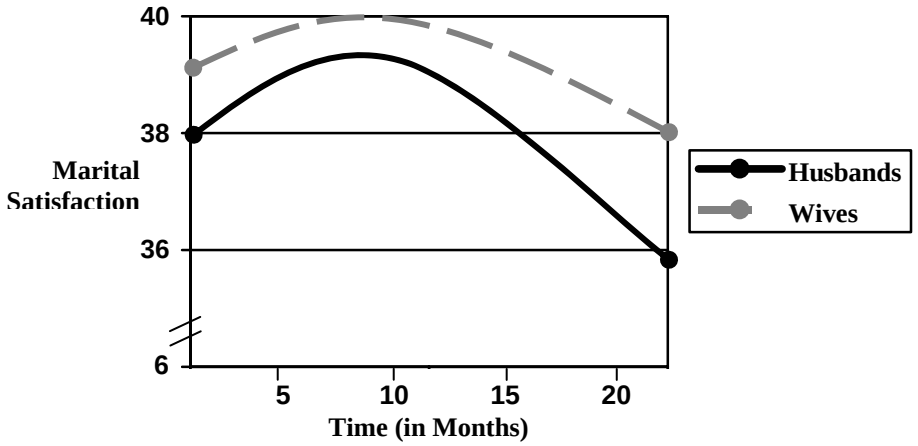

Figure 2

Examining Trajectories of Depressive Symptoms Over Time For Husbands and Wives

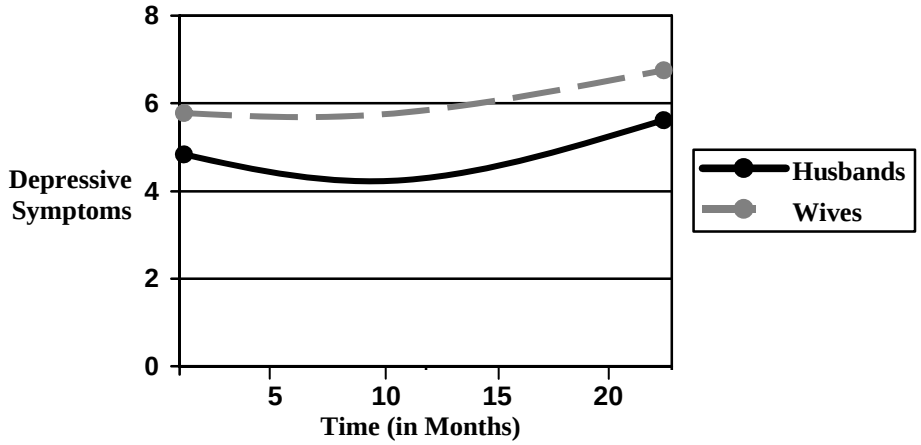

Figure 3

Predicting Husbands' Marital Satisfaction from Changes in Wives' Depressive Symptoms and Changes in Wives' Chronic Stress

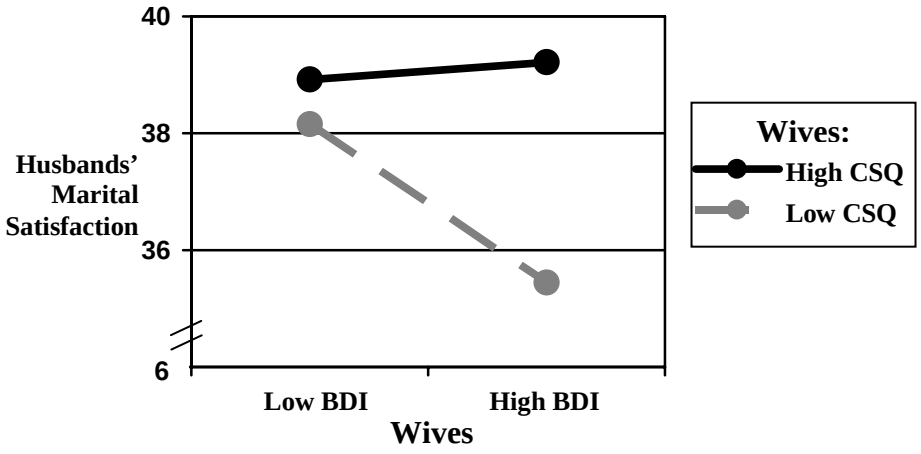

Figure 4

Predicting Husbands' Depressive Symptoms from Changes in Marital Satisfaction and Changes in Chronic Stress

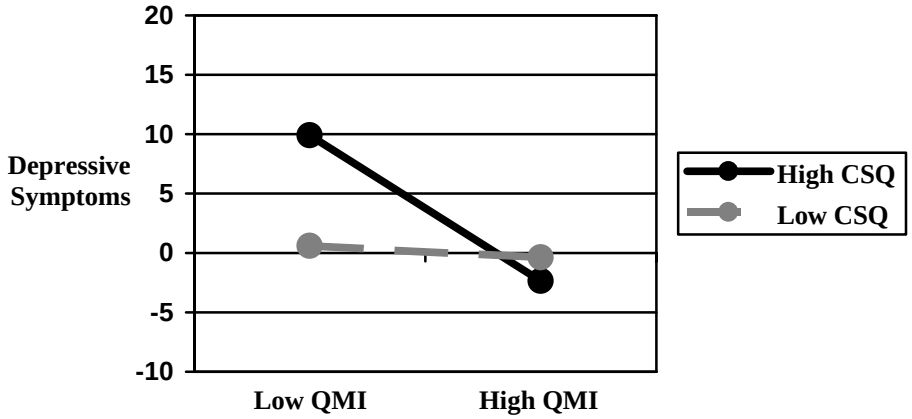

Figure 5

Predicting Wives' Depressive Symptoms from Changes in Marital Satisfaction and Changes in Chronic Stress

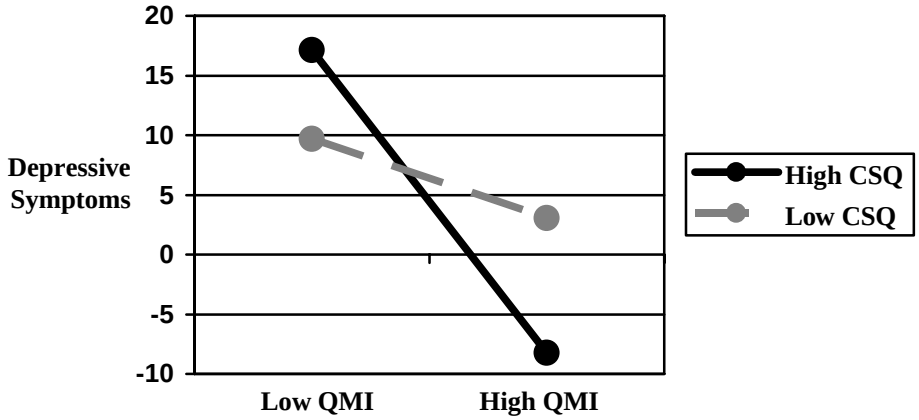

Figure 6

Predicting Wives' Depressive Symptoms from Changes in Husbands' Marital Satisfaction and Changes in Husbands' Chronic Stress

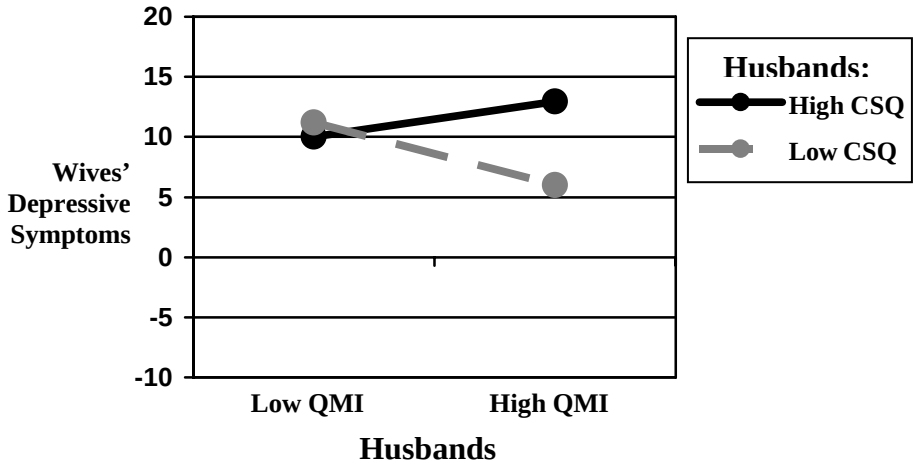

Figure 7

Predicting Wives' Depressive Symptoms from Changes in Husbands' Marital Satisfaction and Husbands' Initial Chronic Stress

Figure 8

Predicting Wives' Depressive Symptoms from Changes in Husbands' Marital Satisfaction and Husbands' Mean Chronic Stress

Table 1

Means and Standard Deviations of Time-Varying Covariates at Each Time Point

	Husbands				Wives			
	Time 1	Time 2	Time 3	Time 4	Time 1	Time 2	Time 3	Time 4
QMI								
M	39.05	40.81	39.78	39.01	40.59	41.17	41.34	40.13
SD	7.35	5.99	6.91	7.23	6.17	5.39	5.28	6.92
BDI								
M	4.39	3.88	3.60	4.64	5.57	5.23	5.77	6.01
SD	4.24	4.55	3.99	5.48	5.74	5.68	6.62	6.27
CSQ								
M	3.13	3.18	3.28	3.19	3.38	3.35	3.39	3.32
SD	.78	.77	.79	.94	.75	.81	.87	.84

Note: QMI = Quality of Marriage Index (Norton, 1983); BDI = Beck Depression Inventory (Beck et al., 1961); CSQ = Chronic Stress Questionnaire (Hammen et al., 1987).

Table 2

Level 1 Within-Spouse Analyses: Predicting Marital Satisfaction from Depressive Symptoms and Chronic Stress

	Husbands' Marital Satisfaction				Wives' Marital Satisfaction			
	Coefficient	*SE*	*t*	Effect-size *r*	Coefficient	*SE*	*t*	Effect-size *r*
BDI								
Intercept^{+}	37.882	.787	48.11**		40.132	.649	61.84**	
Time^{+}	.200	.102	1.97*	.15	.075	.078	.97	
Time^{2+}	–.011	.005	–2.46*	.18	–.004	.003	–1.13	
BDI^{++}	–.224	.075	–2.99**	.09	–.337	.053	–6.36**	.18
CSQ								
Intercept^{+}	37.685	0.963	39.12**		39.551	.965	40.99**	
Time^{+}	.272	.101	2.68**	.20	.084	.078	1.08	
Time^{2+}	–.015	.005	–3.16**	.23	.005	.003	–1.48	
CSQ^{++}	–1.888	.336	–5.62**	.16	–1.886	.352	–5.35**	.15
BDI X CSQ								
Intercept^{+}	38.058	.919	40.41**		39.268	.983	39.97**	
Time^{+}	.256	.101	2.54**	.19	.093	.076	1.23	
Time^{2+}	–.014	.005	–3.01**	.22	–.005	.003	–1.53	
BDI^{++}	–.061	.081	–.75		–.255	.056	–4.52**	.13
CSQ^{++}	–1.671	.355	–4.70**	.13	–1.149	.332	–3.46**	.10
BDIxCSQ^{++}	–.014	.029	–.49		–.031	.041	–.76	

Note: $^{+}$Approx. $df = 175$. $^{++}$Approx. $df = 1200$. QMI = Quality of Marriage Index (Norton, 1983); BDI = Beck Depression Inventory (Beck et al., 1961); CSQ = Chronic Stress Questionnaire (Hammen et al., 1987). $^{\dagger}p < .10$. $*p < .05$. $**p < .01$.

Table 3

Level 1 Cross-Spouse Analyses: Predicting Partners' Marital Satisfaction from Spouses' Depressive Symptoms and Chronic Stress

	Husbands → Wives' Marital Satisfaction				Wives → Husbands' Marital Satisfaction			
	Coefficient	*SE*	*t*	Effect-size *r*	Coefficient	*SE*	*t*	Effect-size *r*
BDI								
Intercept[+]	40.127	.632	63.47**		38.404	.739	51.95**	
Time[+]	.055	.076	.72		.193	.100	1.93[†]	.14
Time[2+]	–.002	.004	–.53		–.011	.005	–2.32*	.17
BDI[++]	–.008	.071	–.11		–.178	.055	–3.26**	.09
CSQ								
Intercept[+]	40.310	.957	42.14**		37.540	.981	38.27**	
Time[+]	.069	.077	.90		.250	.104	2.42*	.18
Time[2+]	–.003	.003	–.98		–.013	.005	–2.77**	.21
CSQ[++]	–.020	.399	–.05		.017	.400	.04	
BDI X CSQ								
Intercept[+]	40.611	.928	43.78**		37.575	.955	39.35**	
Time[+]	.072	.077	.94		.221	.100	2.20*	.16
Time[2+]	–.003	.004	–.77		–.011	.005	–2.54*	.19
BDI[++]	.001	.082	.01		–.251	.070	–3.59**	.10
CSQ[++]	–.154	.415	–.37		.421	.401	1.05	
BDIxCSQ[++]	.006	.021	.28		.084	.044	1.88[†]	.05

Note: [+]Approx. $df = 175$. [++]Approx. $df = 1200$. QMI = Quality of Marriage Index (Norton, 1983); BDI = Beck Depression Inventory (Beck et al., 1961); CSQ = Chronic Stress Questionnaire (Hammen et al., 1987). [†]$p < .10$. *$p < .05$. **$p < .01$.

Table 4

Level 1 Within-Spouse Analyses: Predicting Depressive Symptoms from Marital Satisfaction and Chronic Stress

	Husbands' Depressive Symptoms				Wives' Depressive Symptoms			
	Coefficient	*SE*	*t*	Effect-size *r*	Coefficient	*SE*	*t*	Effect-size *r*
QMI								
Intercept^{+}	1.115	1.455	.77		8.948	1.495	5.98**	
Time^{+}	–.068	.058	–1.18		.025	.070	.36	
Time^{2+}	.025	.003	1.40		.004	.003	–.03	
QMI^{++}	–.113	.041	–2.72**	.08	–.274	.062	–4.39**	.13
CSQ								
Intercept^{+}	4.501	.808	5.57**		6.692	.949	7.05**	
Time^{+}	–.149	.053	–2.85**	.21	.006	.074	–.08	
Time^{2+}	.007	.002	2.91**	.22	.002	.003	.60	
CSQ^{++}	2.898	.419	6.91**	.20	2.367	.301	7.87**	.22
QMI X CSQ								
Intercept^{+}	1.080	1.464	.73		9.816	1.521	6.45*	
Time^{+}	–.128	.053	–2.44**	.18	.000	.068	.00	
Time^{2+}	.006	.002	2.40**	.18	.001	.003	.37	
QMI^{++}	–.040	.024	–1.71†	.05	–.184	.057	–3.24**	.09
CSQ^{++}	2.618	.299	8.77**	.25	1.917	.275	6.98**	.20
QMIxCSQ^{++}	–.082	.035	–2.33*	.07	–.127	.044	–2.89**	.08

Note: $^{+}$Approx. $df = 175$. $^{++}$Approx. $df = 1200$. QMI = Quality of Marriage Index (Norton, 1983); BDI = Beck Depression Inventory (Beck et al., 1961); CSQ = Chronic Stress Questionnaire (Hammen et al., 1987). $^{\dagger}p < .10$. $*p < .05$. $**p < .01$.

Table 5

Level 1 Cross-Spouse Analyses: Predicting Partners' Depressive Symptoms from Spouses' Marital Satisfaction and Chronic Stress

	Husbands → Wives' Depressive Symptoms				Wives → Husbands' Depressive Symptoms			
	Coefficient	*SE*	*t*	Effect-size *r*	Coefficient	*SE*	*t*	Effect-size *r*
QMI								
Intercept[+]	9.515	1.707	5.58**		.313	1.676	.85	
Time[+]	.047	.069	.68		–.060	.059	–1.02	
Time[2+]	.002	.003	–.76		–.003	.003	1.23	
QMI[++]	–.115	.044	–2.61**	.07	–.019	.043	–.44	
CSQ								
Intercept[+]	6.512	.965	6.75**		4.505	.826	5.45**	
Time[+]	.007	.076	.10		–.139	.054	–2.55*	.19
Time[2+]	.001	.003	.31		.006	.002	2.59*	.19
CSQ[++]	–.173	.284	–.61		–.319	.259	–1.23	
QMI X CSQ								
Intercept[+]	10.924	1.857	5.88**		–.239	1.788	–.13	
Time[+]	.029	.070	.42		–.120	.055	–2.17*	.16
Time[2+]	.000	.003	–.12		.005	.003	2.14*	.16
QMI[++]	–.115	.034	–3.40**	.10	–.003	.041	–.07	
CSQ[++]	–.252	.305	–.83		–.373	.253	–1.47	
QMIxCSQ[++]	.059	.024	2.49**	.07	.024	.027	.87	

Note: [+]Approx. *df* = 175. [++]Approx. *df* = 1200. QMI = Quality of Marriage Index (Norton, 1983); BDI = Beck Depression Inventory (Beck et al., 1961); CSQ = Chronic Stress Questionnaire (Ha0mmen et al., 1987). [†]$p < .10$. *$p < .05$. **$p < .01$.

Table 6

Chronic Stress as a Level 2 Moderator: Predicting Marital Satisfaction from Depressive Symptoms

	Husbands' Marital Satisfaction				Wives' Marital Satisfaction			
	Coefficient	*SE*	*t*	Effect-size *r*	Coefficient	*SE*	*t*	Effect-size *r*
Intercept[+]								
Low T1 CSQ	37.819	.802	47.13**		40.139	.643	62.45**	
High T1 CSQ	39.148	.678	1.96[†]	.15	40.855	.567	1.26	
Time[+]								
Low T1 CSQ	.200	.104	1.91[†]	.14	.078	.077	1.02	
High T1 CSQ	.239	.090	.43		.063	.075	.20	
Time^{2}[+]								
Low T1 CSQ	–.011	.005	–2.42*	.18	–.004	.003	–1.13	
High T1 CSQ	–.013	.004	–.46		–.003	.003	.39	
BDI[++]								
Low T1 CSQ	–.200	.079	–2.53*	.07	–.342	.057	–5.94**	.17
High T1 CSQ	–.220	.053	–.38		–.410	.066	–1.03	
Intercept[+]								
Low Mean CSQ	37.727	.785	48.07**		40.172	.653	61.49**	
High Mean CSQ	35.997	.885	–1.96[†]	.15	39.589	.533	–1.09	
Time[+]								
Low Mean CSQ	.206	.102	2.01*	.15	.082	.077	1.06	
High Mean CSQ	–.006	.104	–2.03*	.15	–.107	.088	–2.14*	.16
Time^{2}[+]								
Low Mean CSQ	–.012	.005	–2.48*	.18	–.004	.003	–1.27	
High Mean CSQ	–.005	.004	1.39		.002	.004	1.47	
BDI[++]								
Low Mean CSQ	–.163	.080	–2.03*	.06	–.330	.059	–5.57**	.16
High Mean CSQ	–.125	.088	.44		–.277	.068	.77	

Note: [+]Approx. $df = 175$. [++]Approx. $df = 1200$. QMI = Quality of Marriage Index (Norton, 1983); BDI = Beck Depression Inventory (Beck et al., 1961); CSQ = Chronic Stress Questionnaire (Hammen et al., 1987). [†]$p < .10$. *$p < .05$. **$p < .01$.

Table 7

Chronic Stress as a Level 2 Moderator: Predicting Partners' Marital Satisfaction from Spouses' Depressive Symptoms

	Husbands → Wives' Marital Satisfaction				Wives → Husbands' Marital Satisfaction			
	Coefficient	*SE*	*t*	Effect-size *r*	Coefficient	*SE*	*t*	Effect-size *r*
Intercept[+]								
Low T1 CSQ	40.188	.600	66.96**		38.439	.746	51.50**	
High T1 CSQ	41.133	.817	.91		39.180	.816	.91	
Time[+]								
Low T1 CSQ	.048	.073	.66		.186	.102	1.82[†]	.14
High T1 CSQ	.114	.085	.78		.296	.120	.92	
Time^{2}[+]								
Low T1 CSQ	–.002	.003	–.46		–.010	.004	–2.26*	.17
High T1 CSQ	–.008	.004	–1.56		–.011	.005	–1.49	
BDI[++]								
Low T1 CSQ	.005	.068	.08		–.201	.064	–3.12**	.09
High T1 CSQ	.059	.059	.90		–.278	.076	–1.01	
Intercept[+]								
Low Mean CSQ	40.151	.635	63.21**		38.554	.723	53.29**	
High Mean CSQ	39.078	1.084	–.99		38.238	.810	–.39	
Time[+]								
Low Mean CSQ	.050	.073	.68		.175	.099	1.76[†]	.13
High Mean CSQ	.102	.104	.51		.134	.139	–.29	
Time^{2}[+]								
Low Mean CSQ	–.002	.003	–.52		–.010	.005	–2.19*	.16
High Mean CSQ	–.001	.005	.26		–.013	.006	–.53	
BDI[++]								
Low Mean CSQ	–.031	.070	–.45		–.282	.084	–3.37**	.10
High Mean CSQ	–.052	.101	–.21		–.175	.101	1.06	

Note: [+]Approx. $df = 175$. [++]Approx. $df = 1200$. QMI = Quality of Marriage Index (Norton, 1983); BDI = Beck Depression Inventory (Beck et al., 1961); CSQ = Chronic Stress Questionnaire (Hammen et al., 1987). [†]$p < .10$. *$p < .05$. **$p < .01$.

Table 8

Chronic Stress as a Level 2 Moderator: Predicting Depressive Symptoms from Marital Satisfaction

	Husbands Depressive Symptoms				Wives Depressive Symptoms			
	Coefficient	*SE*	*t*	Effect-size *r*	Coefficient	*SE*	*t*	Effect-size *r*
Intercept[+]								
Low T1 CSQ	.962	1.389	.69		9.224	1.428	6.46**	
High T1 CSQ	–2.709	.647	–5.68**	.42	6.380	1.088	–2.61**	.19
Time[+]								
Low T1 CSQ	–.068	.055	–1.22		.012	.068	.18	
High T1 CSQ	.218	.076	3.75**	.28	.072	.097	.53	
Time^{2}[+]								
Low T1 CSQ	.004	.003	1.40		.001	.003	.20	
High T1 CSQ	–.004	.003	–2.42*	.18	.002	.004	.32	
QMI[++]								
Low T1 CSQ	–.094	.040	–2.36*	.07	–.265	.060	–4.44**	.13
High T1 CSQ	–.086	.019	.44		–.261	.021	.20	
Intercept[+]								
Low Mean CSQ	1.151	1.277	.90		9.142	1.343	6.81**	
High Mean CSQ	5.732	.906	5.06**	.37	12.908	1.083	3.48**	.26
Time[+]								
Low Mean CSQ	–.069	.054	–1.27		.003	.067	.04	
High Mean CSQ	–.169	.094	–1.07		.084	.097	.84	
Time^{2}[+]								
Low Mean CSQ	.004	.002	1.45		.001	.003	.34	
High Mean CSQ	.010	.005	1.20		–.001	.004	–.51	
QMI[++]								
Low Mean CSQ	–.094	.037	–2.57*	.07	–.257	.059	–4.36**	.12
High Mean CSQ	–.139	.030	–1.51		–.026	.019	–1.36	

Note: [+]Approx. $df = 175$. [++]Approx. $df = 1200$. QMI = Quality of Marriage Index (Norton, 1983); BDI = Beck Depression Inventory (Beck et al., 1961); CSQ = Chronic Stress Questionnaire (Hammen et al., 1987). [†]$p < .10$. *$p < .05$. **$p < .01$.

Table 9

Chronic Stress as a Level 2 Moderator: Predicting Partners' Depressive Symptoms from Spouses' Marital Satisfaction

	Husbands → Wives' Depressive Symptoms				Wives → Husbands' Depressive Symptoms			
	Coefficient	*SE*	*t*	Effect-size *r*	Coefficient	*SE*	*t*	Effect-size *r*
Intercept[+]								
Low T1 CSQ	9.879	1.535	6.44**		–.011	1.469	–.01	
High T1 CSQ	15.059	2.183	2.37*	.18	3.376	2.548	1.33	
Time[+]								
Low T1 CSQ	.032	.068	.47		–.058	.054	–1.06	
High T1 CSQ	.080	.089	.54		–.038	.075	.27	
Time^{2+}								
Low T1 CSQ	–.001	.003	–.29		.003	.002	1.27	
High T1 CSQ	–.005	.004	–1.15		.001	.003	–.47	
QMI[++]								
Low T1 CSQ	–.026	.038	–.68		–.026	.038	–.68	
High T1 CSQ	–.104	.061	1.71[†]	.05	.037	.085	.74	
Intercept[+]								
Low Mean CSQ	9.440	1.453	6.50**		.574	1.414	.41	
High Mean CSQ	2.913	2.302	–2.84**	.21	–6.221	2.334	–2.67**	.20
Time[+]								
Low Mean CSQ	.018	.065	.28		–.062	.054	–1.15	
High Mean CSQ	–.021	.091	–.43		–.079	.076	–.22	
Time^{2+}								
Low Mean CSQ	–.001	.002	–.27		.003	.002	1.25	
High Mean CSQ	.003	.004	.98		.003	.004	.06	
QMI[++]								
Low Mean CSQ	–.119	.036	–3.29**	.10	–.030	.041	–.73	
High Mean CSQ	.036	.057	2.73**	.08	–.109	.075	–1.05	

Note: [+]Approx. $df = 175$. [++]Approx. $df = 1200$. QMI = Quality of Marriage Index (Norton, 1983); BDI = Beck Depression Inventory (Beck et al., 1961); CSQ = Chronic Stress Questionnaire (Hammen et al., 1987). [†]$p < .10$. *$p < .05$. **$p < .01$.