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Fluctuation in Relationship Quality Over Time and Individual Well-being: Main, Mediated, and Moderated Effects

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Abstract

This study examined how the degree of within-person variation (or temporal fluctuation) in relationship quality over time was associated with well-being (psychological distress and life satisfaction). A national sample of 18 to 34 year old men and women in unmarried, opposite-sex relationships completed six waves of surveys every four months ($N = 748$). Controlling for initial levels of and linear changes in relationship quality, greater temporal fluctuation in relationship quality over time was associated with increasing psychological distress and decreasing life satisfaction over time. Decreased confidence in one's relationship partially mediated these associations. Moderation analyses revealed that the association between fluctuations in relationship quality and change in life satisfaction was stronger for women, participants cohabiting with their partners, and those with greater anxious attachment, whereas the association between fluctuations in relationship quality and change in psychological distress was stronger for people with greater avoidant attachment.

Keywords

relationship quality; within-person; fluctuation; variability; life satisfaction; well-being

Prior research has shown that the quality of intimate romantic relationships, including marriage, is an important predictor of individual well-being. For example, Proulx, Helms, and Buehler (2007) completed a meta-analysis of the concurrent and longitudinal associations between relationship quality and personal well-being, defined in terms of depressive symptoms, self-esteem, life satisfaction, global happiness, and physical health. The weighted mean effect size (r) was .37 for cross-sectional studies and .25 for longitudinal studies, indicating that higher levels of relationship quality are associated with higher levels of well-being, both concurrently and over time.

It is possible, however, that the influences of relationship quality on well-being may not be fully addressed by models that focus exclusively on the level of relationship quality at

particular time points or linear change over time. Rather, it may also be important to consider the degree of variability, or fluctuation, in relationship quality across time. Recent research indicates that individuals differ in the degree to which their relationship quality fluctuates over time, and that these differences are predictive of couple outcomes beyond what can be accounted for by between-person differences in quality level. Controlling for individuals' mean level of relationship quality, greater within-person variability in relationship quality across time has been associated with lower commitment and higher breakup rates in dating couples (Arriaga, 2001), as well as more destructive conflict between dating partners and more relationship problems in cohabiting couples (Campbell, Simpson, Boldry, & Rubin, 2010). We propose that temporal fluctuations in relationship quality may not only contribute to poor relationship outcomes, but also may undermine individuals' well-being. Accordingly, the present study was conducted to evaluate whether fluctuation in relationship quality over time is associated with individual well-being (i.e., psychological distress and life satisfaction), and if so, to explore potential mediators and moderators of this association.

Fluctuations in Relationship Quality and Individual Well-being

People generally strive for a sense of confidence that their relationship is right for them and their partner is steadily reliable (Murray, 1999). Perceptions of relationship quality that remain consistent over time are likely to foster sustained certainty about the partner (Arriaga, Reed, Goodfriend, & Agnew, 2006) and growing relationship confidence (i.e., an overall perception that a relationship will be successful into the future, which includes a sense of efficacy to succeed as a couple; Whitton et al., 2007). In contrast, perceptions of the relationship and partner that vacillate highly over time may promote a state of doubt about the relationship, fueling uncertainties about the couple's future (e.g., Kelley, 1979, 1983) and the trustworthiness of the partner (Campbell et al., 2010). In turn, decreasing levels of relationship confidence may engender feelings of helplessness and hopelessness that may undermine well-being. Low general interpersonal efficacy and low relationship efficacy have been associated with perceived helplessness (Fincham & Bradbury, 1987) and depressive symptoms (Jenkins, Goodness, & Buhrmester, 2002; H. M. Smith & Betz, 2002) and lower relationship confidence has been associated with increases in women's depressive symptoms over the first year of marriage (Whitton et al., 2007). Together, these findings suggest that, by reducing relationship confidence, fluctuation in relationship quality may be an important factor in individual well-being. Accordingly, we hypothesized that larger fluctuations in relationship quality over time will be associated with deteriorating individual well-being (i.e., increasing levels of psychological distress and decreasing levels of life satisfaction over time), and that this effect would be mediated by declining relationship confidence.

There is some preliminary evidence to support these hypotheses. Whitton and Whisman (2010) found that cohabiting and married women whose relationship quality fluctuated more widely from week to week tended to have higher depression scores, even when controlling for their average relationship quality over time Further, prospective analyses suggested that relationship quality fluctuations preceded rather than followed elevated depressive symptoms. However, these findings are limited in that they were tested in women only, used only one indicator of individual well-being (depressive symptoms), did not encompass a

sufficiently lengthy period of time to assess the effects of relationship quality fluctuations on individuals' linear trajectories of individual well-being, and did not assess mechanisms of effect, such as declining relationship confidence.

Moderators of the Association between Fluctuations in Relationship Quality and Individual Well-being

In addition to examining the association between fluctuations in relationship quality and well-being across participants, we were also interested in examining whether certain individuals may be more vulnerable to ill effects of unstable relationship quality than others. We explored whether three individual and relationship characteristics – gender, cohabitation status, and adult attachment – might moderate this association.

Gender

There is evidence that relationships are more central to women's than men's lives, as indicated by women's greater tendency to have an interdependent self-concept, report greater relationship commitment, and engage in more relationship maintenance behaviors than men (reviewed by Impett & Peplau, 2006). Therefore, we hypothesized that greater fluctuations in relationship quality, which reflect instability and uncertainty about the relationship, would be more strongly associated with declining well-being for women than for men. The cross-sectional associations of relationship quality with well-being (i.e., depressive symptoms, self-esteem, physical health, global happiness, life satisfaction; Proulx et al., 2007) are stronger for women than for men. In comparison, gender differences have generally not been found in the longitudinal associations between relationship quality and well-being (Proulx et al., 2007). Exploration of whether women are more vulnerable to decrements in individual well-being when faced with fluctuating relationship quality may further our understanding of how gender may affect the interrelations between relationship and individual functioning.

Cohabitation status

Characteristics of the relationship may also moderate the association between temporal fluctuations in relationship quality and well-being. One such characteristic is whether or not the dating partners live together. Compared to non-cohabiting daters, cohabiting partners have generally invested more in their relationships, are more committed, and experience more constraints to stay together (Rhoades, Stanley, & Markman, 2012). As such, cohabitation involves a higher level of interdependence between partners, defined as the extent to which each partner depends upon or "needs" the relationship (Kelley, 1979). Individuals in relationships characterized by higher, versus lower, levels of interdependence may experience threats of relationship dissolution as more upsetting because the perceived costs of the relationship ending are higher (Rusbult, 1980, 1983). Indeed, the cross-sectional association between relationship quality level and depressive symptoms has been shown to increase in relation to the interdependence level of young adult dating relationships (Whitton & Kuryluk, 2012). Given the uncertainty of the relationship's future that is conveyed by fluctuations in relationship quality, such fluctuations may more strongly affect people who are more dependent upon their relationships. Therefore, we hypothesized that compared to

participants in non-cohabiting dating relationships, those who were living together would exhibit stronger associations between relationship quality fluctuation and individual well-being.

Adult Attachment

Individual differences in adult attachment, which reflect variability in internal working models of the self and of intimate relationships (Hazan & Shaver, 1987), may also be relevant to understanding who is most susceptible to declines in individual well-being when experiencing temporal fluctuations in relationship quality. Researchers generally view adult attachment as varying continuously along two underlying dimensions: avoidance and anxiety (Brennan, Clark, & Shaver, 1998). Whereas avoidant attachment refers to the degree to which people fear becoming close with and dependent upon other people, anxious attachment refers to the degree to which people worry about whether their attachment figures will be available to provide them with care.

Although both avoidant attachment and anxious attachment are well-accepted risk factors for poor relationship quality (Li & Chan, 2012) and lower well-being (e.g., Roberts, Gotlib, & Kassel, 1996), anxious attachment may be particularly relevant to understanding links between relationship quality fluctuations and well-being, given the propensity for anxiously attached individuals' attachment system to be hyper-activated under conditions of threat. Individuals with high levels of anxious attachment tend to be hyper-vigilant for cues of potential threat to the partner's availability or the relationship's stability, and have exaggerated emotional responses to those cues they detect (Shaver & Mikulincer, 2008). Consequently, people high in anxious attachment are theorized to question their self-worth and draw negative conclusions about themselves when faced with negative relationship events, leading to symptoms of depression (Scott & Cordova, 2002). Grounded in this perspective, we hypothesized that individuals higher in anxious attachment may be particularly sensitive to instability in relationship quality.

In contrast, it is possible that avoidant attachment may protect individuals' well-being from fluctuating relationship quality, as individuals higher in avoidance tend to devalue the importance of intimate relationships and refrain from emotional dependence upon romantic partners (Hazan & Shaver, 1987). However, research to date has not supported this speculation. Avoidant attachment did not moderate the cross-sectional association between marital quality and depressive symptoms (Scott & Cordova, 2002) and, in fact, the within-person association between marital quality and depressive symptoms was *stronger* for wives who were higher in avoidant attachment (D. Smith, Breiding, & Papp, 2012). Given the inconsistency between theoretical speculations and existing findings, we explored avoidant attachment as a potential moderator of the association between relationship quality fluctuations and individual well-being, but did not make directional hypotheses.

The Present Study

In the current study, we used data from a multiwave longitudinal study of a large, national sample of men and women in unmarried opposite-sex relationships. Participants provided data on relationship quality and individual well-being at 4 month intervals for 20 months

(more than 1½ years), allowing us to capture changes in relationship quality over time for each participant, including not only initial levels and linear change over time, but also the degree of fluctuations over time. We tested the hypotheses that (a) greater relationship quality fluctuation would be associated with poorer well-being over time; (b) decreases in relationship confidence over time would mediate the effect of relationship quality fluctuation on decreasing well-being over time; and (c) these associations would be moderated by gender, cohabitation status, and adult attachment. We used two broad indicators of individual well-being: psychological distress and life satisfaction. Prior longitudinal research on relationship quality and well-being has most often focused on a particular set of symptoms such as depression (Proulx et al., 2007). However, given that there is a large conceptual (e.g., Clark & Watson, 1991) and measurement (e.g., Feldman, 1993) overlap between depression and related constructs such as anxiety, we chose to focus on non-specific psychological distress as one measure of well-being. With respect to the positive aspects of well-being, we focused on life satisfaction, which is conceptualized as the cognitive evaluation of one's life based on an internal set of standards (Diener, Emmons, Larsen, & Griffin, 1985), and which is linked with occupational, mental health, and physical health outcomes (for a review, see Pavot & Diener, 2008). Although psychological distress and life satisfaction are conceptually related constructs, they capture different ends of the spectrum of well-being and therefore including measures of both constructs provides a more comprehensive assessment of well-being that includes both negative and positive aspects (Seligman & Csikszentmihalyi, 2000).[1]

Method

Participants

Participants were drawn from a sample of 1,294 individuals who took part in a longitudinal project on romantic relationship development (see Rhoades, Stanley, & Markman, 2010) recruited through a calling center using a targeted-listed telephone sampling strategy of households in the contiguous United States. To be eligible for the first wave, respondents had to be between 18 and 34 years old and in an unmarried relationship with a member of the opposite sex for at least 2 months.

Participants completed surveys by mail every 4 months for 6 waves of data collection. They were paid $40 for each survey. We excluded 484 participants who did not provide data on the same relationship for at least three time points, because the primary variable of interest was fluctuations in relationship quality (i.e., individuals' variability around their overall trajectory of quality during the 2 years) and we were concerned that estimates of within-person variability across fewer time points might be unreliable. In addition, 62 participants who neglected to complete the final item on the measure of relationship quality at Time 1, so that their Time 1 relationship quality score was missing, were dropped from the multilevel modeling analyses. This yielded a final sample of 748 (263 men; 35.2%). Analyses re-run including only participants with more data points (≥ 4 or ≥ 5 relationship quality scores) yielded highly similar results. In the final sample, 43% of participants provided relationships

[1]Furthermore, individuals' average levels of psychological distress and life satisfaction over time and linear slopes over time in the two variables were only moderately negatively correlated in this sample (see Table 1).

quality scores at 6 time points, 26% at 5 points, 16% at 4 points, and 15% at 3 points. Response rates for the surveys have been high (86.3% averaging across these six waves) and the main reason that participants did not provide data on the same relationship for at least three waves was that they broke up.

At the first assessment, the average length of participants' relationships was 37.62 months (*SD* = 34.62 months); 37.0% of the sample was cohabiting (defined as sharing a single address without either partner having a separate place to live). Participants ranged in age from 18 to 35 years (*M* = 25.71 *SD* = 4.70), had a median of 14 years of education, and an average annual income of $15,000 to $19,999. Comparisons with Census 2000 data indicate that the larger sample is reasonably representative of the U.S. population of unmarried, English-speaking adults in terms of race and ethnicity. The subsample for the current analyses was 79.0% White, 11.5% Black, 3.3% Asian, 1.4% American Indian/Alaska Native, and 0.1% Native Hawaiian or Other Pacific Islander, and 3.6% Multiracial; In terms of ethnicity, 7.9% were Hispanic.

Measures

Relationship quality—To measure relationship quality, we used the 4-item version (DAS-4; Sabourin, Valois, & Lussier, 2005) of the Dyadic Adjustment Scale (Spanier, 1976). Items about thoughts about dissolution, frequency of confiding in one another, and a general item about the degree of happiness with the relationship are summed to create a total score, which could range from 0 – 21, with higher scores indicating higher relationship quality. In this sample, internal consistency was good (αs ranged from .80 - .89 across waves).

Psychological distress—Psychological distress was measured with 12 items from the longer Mood and Anxiety Symptom Questionnaire (Watson & Clark, 1991), selected based on factor analyses that indicate that they measure general psychological distress rather than symptoms specific to anxiety or depressive disorders (Keogh & Reidy, 2000). Participant ratings of how much (1 = not at all; 5 = extremely) they experienced each item (e.g., "Felt dissatisfied with everything" and "Felt tense or 'high strung'") were summed. Higher scores indicate greater distress. In this sample, internal consistency was excellent (αs ranged from .92-.94 across waves).

Life satisfaction—Life satisfaction was measured with the 5-item Satisfaction With Life Scale (SWLS; Diener et al., 1985). Items, rated on a 7-point scale, are summed, with higher scores indicating greater life satisfaction. Diener et al. reported good internal consistency and test-retest reliability for the measure. In this sample, internal consistency was excellent (αs ranged from .88-.90 across waves).

Relationship confidence—Relationship confidence was assessed using 5 items from the Confidence Scale (CS), developed by Stanley, Hoyer, and Trathen (1994) to measure individuals' confidence in the future of their relationship. Scores reflect participants' average rating on a 7-point scale of their level of agreement with 5 statements (e.g., "I believe we can handle whatever conflicts will arise in the future," "I am very confident when I think of our

future together"). The CS has demonstrated internal consistency and evidence of construct validity (e.g., Whitton et al., 2007). In this sample, internal consistency was excellent (αs ranged from .92-.94 across waves).

Adult attachment—Participants completed the 18-item Adult Attachment Scale (AAS; (Collins & Read, 1990). Anxious attachment was assessed using the Anxiety subscale, which measures a person's worry about being rejected or unloved (e.g., "I often worry my partner will not want to stay with me"). Because the 6-item Anxiety subscale had low internal consistency in this sample (α = .60), as in others (Rhoades, Stanley, & Markman, 2009), we deleted 2 items that correlated poorly with the others (items 7 "I do not often worry about being abandoned" and 11 "I want to merge completely with another person"), yielding a 4 item scale with more acceptable internal consistency (α = .72). Avoidant attachment was assessed with the 6-item Close subscale (α = .68; e.g., "I am somewhat uncomfortable being close to others"). Although the AAS does not include a direct measure of avoidance, this subscale serves as a good proxy for avoidant attachment. Discomfort with closeness is theorized to capture the dimension that contrasts avoidance with attachment security, and is used to assess avoidance on other measures of adult attachment (Feeney, Noller, & Hanrahan, 1994). For each subscale, scores represent participants' average endorsement of subscale items on a 1-5 scale; higher scores reflect greater anxious attachment and avoidant attachment (difficulty with closeness).

Results

Data Analytic Strategy

We used a two-step analytic strategy to test whether, controlling for the individual's overall trajectory of relationship quality over time, within-person fluctuations in relationship quality were associated with: (a) average levels of psychological distress and life satisfaction across time, and (b) changes in psychological distress and life satisfaction over time.

First, we obtained parameters that describe changes in relationship quality over time for each participant using separate ordinary least squares (OLS) regression analyses for each participant, in which the given individual's DAS-4 scores from each time point were regressed onto time (measured in months since the first assessment). This yielded estimates of three parameters for each individual: (a) the intercept, which estimates the individual's relationship quality at the initial assessment (i.e., when time = 0); (b) the slope, or the coefficient for the linear association between time and relationship quality, which estimates the individual's linear change in relationship quality over time; and (c) the standard error of the estimate (SEE), which estimates the extent to which the individual's scores at each time point deviate from the linear regression line. Consistent with previous research (e.g., Arriaga, 2001; Arriaga et al., 2006), we used the SEE as an index of the degree of fluctuation in the individual's relationship quality across time, because it estimates the fluctuation that is independent from linear changes over time, ruling out that the fluctuations are an artifact of stable increases or decreases across time. For descriptive purposes, we also calculated each individual's average level of relationship quality across time using the mean of their DAS-4 scores across all waves of assessment.

Means and standard deviations of each relationship quality change parameter, as well as the other study variables, are displayed in Table 1, along with simple correlations among them. There was significant variability between participants in the degree of temporal fluctuation in relationship quality. Only 14 individuals (less than 2% of the sample) reported the highest possible DAS-4 score across all waves, mitigating concerns of ceiling effects that might obscure findings. Fluctuations in relationship quality were negatively associated with all other change parameters, indicating that individuals whose DAS-4 scores fluctuated more across time points tended to report lower initial and average levels of relationship quality and more negative linear change in relationship quality over time. The small magnitudes of these correlations (−.09 to −.29) suggest that fluctuations in relationship quality are relatively independent of the other parameters describing trajectories of relationship quality over time. Nevertheless, we tested the hypothesized associations between relationship quality fluctuation and change in individual functioning controlling for initial levels and linear slopes of relationship quality.

Second, these person-specific parameters (i.e., initial level, linear slope, and fluctuation in DAS-4 score) were used in multilevel models to predict linear change in well-being. Specifically, we used the following multilevel-modeling equations and HLM 7.0 (Raudenbush, Bryk, Fai, Congdon, & du Toit, 2011).

Level 1: $$Y_{ij}=\beta_{0j}+\beta_{1j}(time_{ij})+r_{ij}$$

Level 2:

$$\beta_{0j}=\gamma_{00}+\gamma_{01}(initial\,;DAS-4_j)+\gamma_{02}(DAS-4\,;slope_j)+\gamma_{03}(DAS-4\,;fluctuation_j)+u_{0j}$$
$$\beta_{1j}=\gamma_{10}+\gamma_{11}(initial\,;DAS-4_j)+\gamma_{12}(DAS-4\,;slope_j)+\gamma_{13}(DAS-4\,;fluctuation_j)+u_{1j}$$

Separate models were conducted using psychological distress and life satisfaction as the outcome (*Y*). In these equations, *i* indexed the time point and *j* indexed individuals.[2] Time was group mean centered, so that the intercept (β_{0j}) represents the average level of the outcome variable (psychological distress or life satisfaction) over time within each individual.[3] All three parameters describing within-person changes in the DAS-4 (i.e., initial DAS-4, DAS-4 slope, and DAS-4 fluctuation) were included in both the Level 2 equation predicting the intercept, or individuals' average levels of the outcome variable, and the Level 2 equation predicting the slope over time in the outcome variable. The coefficients γ_{03} and γ_{13} tested our primary hypothesis, as they represented the effects of fluctuations in DAS-4 score on average levels and slopes of the outcome variable, respectively, controlling for

[2]We specified a linear model of change in life satisfaction and psychological distress for several reasons. First, in unconditional models with only time included as a Level 1 predictor of either life satisfaction or psychological distress, the coefficient for time was significant, indicating that on average, participants' life satisfaction increased (b = 0.004, $p < .05$) and their psychological distress decreased (b = −0.003, $p < .05$) over time. Second, in the same models, there was significant variability between persons in the time slopes for life satisfaction (0.002, $p < .001$) and psychological distress (0.0005, $p < .001$), indicating that other between-person variables (e.g., fluctuation) may predict individual differences in change over time in these variables. Lastly, we statistically compared models that included and excluded the time variable and found that the model including the linear term fit better than the model without it for both life satisfaction ($\chi^2[2] = 111.08$, $p < .001$) and psychological distress ($\chi^2[2] = 36.21$, $p < .001$).

[3]Group-centering time yields slope estimates that differ slightly from those in models that use uncentered or grand-centered values for time, because the slope for time is estimated so that it is unbiased by differences across people in their intercepts. However, associations between the relationship quality variables and the slopes of life satisfaction and psychological distress across time did not differ depending on the method selected for centering time (i.e., the results presented, which were from models using group-centered values for time, were virtually identical to those from models in which time was grand-centered).

initial level and linear slope of DAS-4. We first present results of tests of these hypotheses before describing how mediation and moderation were tested.

Tests of Main Hypotheses

Results are displayed in Table 2. In the model predicting psychological distress, all three parameters describing changes in relationship quality over time were associated in expected directions with average psychological distress levels over time. Specifically, as shown in the top panel, higher average psychological distress levels across time points were associated with lower initial relationship quality, more linear decline in relationship quality, and greater fluctuation in relationship quality across assessments. Further, controlling for these associations, the slope of psychological distress over time was: (a) negatively associated with the slope of relationship quality, indicating that individuals who experienced declines in relationship quality also tended to experience increases in psychological distress; and (b) positively associated with fluctuation in relationship quality, indicating that fluctuation in relationship quality predicted unique variance in the slopes of psychological distress over time, beyond what could be accounted for by initial levels or linear changes in relationship quality over time. In sum, consistent with hypotheses, greater fluctuation in relationship quality across time was associated with both higher mean psychological distress levels and greater increases in psychological distress over time, even when controlling for overall trajectories of relationship quality. Effect sizes for the associations between fluctuations in relationship quality and psychological distress, calculated as $r = \sqrt{t^2/(t^2 + df)}$, were $r = .12$ for mean levels of psychological distress over time and $r = .12$ for the slope in psychological distress.

Results from models predicting life satisfaction were similar. Individuals' average level of life satisfaction was positively associated with their initial relationship quality and with linear changes in their relationship quality over time, and negatively associated with the degree of fluctuation in their relationship quality across assessments. In addition, fluctuation in relationship quality predicted unique variance in the mean levels and slopes of life satisfaction over time beyond what could be accounted for by these two other relationship quality indices. That is, consistent with hypotheses, fluctuation in individuals' relationship quality predicted lower mean levels of life satisfaction as well as declining life satisfaction across time, controlling for initial levels and linear change in relationship quality. As shown in Table 2, the effect size of the association between fluctuation in relationship quality and life satisfaction was $r = .12$ for mean life satisfaction over time and $r = .14$ for the slope in life satisfaction.

Alternate Models

To assess whether we correctly specified the model, in which fluctuations in relationship quality are predictive of well-being rather than vice-versa, we conducted a parallel set of multilevel analyses in which parameters describing individuals' change in psychological distress and life satisfaction (i.e., intercepts, slopes of time, and standard errors of the estimate from OLS regression analyses conducted for each individual, in which either psychological distress or life satisfaction was regressed onto time) were used to predict individuals' average level of relationship quality and linear slope of relationship quality

across time. In these models, degree of fluctuation in psychological distress was not predictive of mean levels of relationship quality, $\gamma_{03} = -0.45$, $SE = 0.35$, $t = -1.28$, $p = .20$, or slopes over time of relationship quality, $\gamma_{13} = -0.03$, $SE = 0.03$, $t = -1.33$, $p = .19$. Similarly, fluctuation in life satisfaction was not predictive of mean levels of relationship quality, $\gamma_{03} = 0.02$, $SE = 0.28$, $t(743) = 0.07$, $p = .94$, or slopes over time of relationship quality, $\gamma_{13} = 0.01$, $SE = 0.02$, $t(743) = 0.59$, $p = .55$. These results suggest that whereas fluctuation in relationship quality may promote psychological distress and reduced life satisfaction, fluctuation in well-being does not appear to negatively impact relationship quality.

Tests of Mediation

The second hypothesis was that decreases in relationship confidence over time would mediate the effect of relationship quality fluctuation on increasing psychological distress and decreasing life satisfaction over time. Prior to testing mediation, we obtained estimates of each participant's linear change in relationship confidence over time using the same procedures described above for relationship quality. Specifically, we regressed relationship confidence scores from each time point onto time for each participant. The coefficient for time from these regressions provided an unbiased estimate of each individual's linear change in relationship confidence.

Then, we followed the procedure outlined by Krull and MacKinnon (2001) to estimate *upper level mediation*, in which the effect of a Level 2 predictor variable (here, relationship quality fluctuation) on a Level 1 outcome variable (here, linear changes in psychological distress or life satisfaction over time) is mediated by a Level 2 variable (here, linear decline in relationship confidence). First, we obtained the coefficient (β_a) and standard error for the association between the predictor (i.e., relationship quality fluctuation) and the mediator (i.e., relationship confidence slope) from an OLS regression. This strategy, which used a single-level (rather than multi-level) specification, is appropriate because both the predictor and mediator are Level 2 individual level variables that do not vary across the repeated assessments at Level 1. Next, the coefficient (γ_b) and standard error for the association between the mediator and the outcome variable, controlling for the predictor variable, were obtained using multilevel equations. Specifically, the mediator (relationship confidence slope) was added to the Level 2 equations predicting the outcome variables, described above in tests of Hypothesis 1. Initial relationship quality and linear trend in relationship quality were controlled in all single-level and multi-level models. The mediated (i.e., indirect) effect was estimated using the RMediation software (Tofighi & MacKinnon, 2011), which computes confidence intervals for the mediated effect using a variety of methods including the distribution of product of coefficients method (PRODCLIN).

As hypothesized, fluctuation in relationship quality (the proposed predictor) was negatively associated with predicted relationship confidence slope (the mediator), unstandardized beta (B_a) = −.04 (.017), standardized $b = -.08$, $t(743) = -2.413$, $p = .02$. When the slope of relationship confidence was added to the multilevel equations predicting psychological distress, it had a unique negative association with the slope of psychological distress over time, $\gamma_b = -0.17$ (.04), $t(741) = -4.09$, $p < .001$. Relationship quality fluctuation continued

to predict the slope of psychological distress ($p = .02$). The estimated indirect effect of relationship quality fluctuation via decreasing relationship confidence differed significantly from zero (μ = 0.01; 95% CI: 0.001−0.014), suggesting the presence of the hypothesized mediating effect.

Results using life satisfaction as the outcome variable were similar to the results obtained for psychological distress. The slope of relationship confidence, when added to the multilevel equations predicting life satisfaction, had a unique positive association with the slope of life satisfaction over time, $\gamma_b = 0.12$ (.02), $t(741) = 5.10$, $p < .001$. Relationship quality fluctuation continued to predict the slope of life satisfaction ($p = .001$). The estimated indirect effect of relationship quality fluctuation via decreasing relationship confidence differed significantly from zero (μ = −0.01; 95% CI: − 0.009 to −0.001). Together, these mediation results support the hypothesis that the influence of fluctuation in relationship quality on psychological distress and life satisfaction is partially mediated through declining levels of relationship confidence.

Tests of Moderation

Next, we assessed whether gender, living together, and adult attachment moderated the associations between relationship quality fluctuation and changes in psychological distress and life satisfaction over time. We added each proposed moderator to both of the Level 2 (between-person) equations, along with interaction terms between the moderator and each of the parameters describing individuals' change in relationship quality (e.g., for gender we included the following interaction terms: gender × initial DAS-4 score, gender × DAS-4 slope, and gender × DAS-4 fluctuation). All variables were centered around the sample mean prior to analyses.

In Table 3, we present the resulting coefficients for the interaction terms between DAS-4 fluctuations and each proposed moderator predicting the intercept (i.e., average level over time) and the linear slope over time in the individual functioning outcomes. Results indicated that gender did not moderate the effect of relationship quality fluctuation on mean psychological distress level or change in psychological distress over time. In contrast, gender did demonstrate the hypothesized moderating effect on the association between relationship quality fluctuation and linear change in life satisfaction over time, such that the effect was stronger for women than for men. Decomposition of this interaction revealed that for women, controlling for mean levels of relationship quality and the linear slope of relationship quality, relationship quality fluctuation was associated with a more negative (i.e., less positive) linear slope of life satisfaction over time, $B = −0.06$ (.01), $t(736) = -4.24$, $p < .001$. In contrast, relationship quality fluctuation was not associated with the linear slope of life satisfaction over time for men, $B = −0.02$ (.02), $t(736) = −0.92$, $p = .36$.

Similarly, cohabitation did not moderate the impact of relationship quality fluctuation on mean level of, or changes in, psychological distress. However, consistent with our hypotheses, cohabitation moderated the association between DAS-4 fluctuation and change in life satisfaction over time, such that the association was stronger (i.e., more negative) for those who were living with their partner than for those who were not. Decomposition of this interaction revealed that, among participants who were living with their partners, greater

fluctuation in relationship quality was associated with a more negative (i.e., less positive) linear slope of life satisfaction over time, $B = -0.08$ (.02), $t(736) = -4.60$, $p < .001$. In contrast, controlling for average levels of relationship quality and the linear slope of relationship quality, degree of fluctuation was not associated with the linear slope of life satisfaction over time for non-cohabiters, $B = -0.02$ (.01), $t(736) = -1.36$, $p = .18$.

Anxious and avoidant attachment were examined simultaneously, to control for the effects of the other. Contrary to hypotheses, anxious attachment did not moderate the association between relationship quality fluctuation and either average levels or the slope of general psychological distress over time. However, avoidant attachment did moderate the association between DAS-4 fluctuation and change in psychological distress over time. Decomposition of this interaction revealed that, at high levels of avoidant attachment, greater fluctuation in relationship quality was associated with a more positive linear slope of psychological distress over time, $B = 0.09$ (.02), $t(736) = -4.60$, $p < .001$. In contrast, degree of fluctuation in relationship quality was not associated with the linear slope of psychological distress over time at low levels of avoidance, $B = -0.02$ (.01), $t(736) = -1.36$, $p = .18$.

In contrast, in models predicting life satisfaction, anxious attachment but not avoidant attachment moderated the effect of relationship quality fluctuation on change in life satisfaction over time (i.e., the linear slope). That is, consistent with the hypothesis that relationship quality fluctuation may be more detrimental to individuals' life satisfaction over time when they have higher levels of anxious attachment, decomposition of the interaction (Preacher, Curran, & Bauer, 2006) revealed that when anxious attachment was one standard deviation below the mean, relationship quality fluctuation was not associated with the linear slope of life satisfaction, $B = -0.01$ (.01), $t(732) = -0.70$ $p = .48$. In contrast, with anxious attachment levels one standard deviation above the mean, greater fluctuation in relationship quality was associated with a more negative (i.e., less positive) linear slope of life satisfaction over time, $B = -0.06$ (.02), $t(732) = -4.07$, $p < .001$. Neither attachment variable moderated the effect of relationship quality fluctuations on mean levels of life satisfaction.

Discussion

The central finding of this study was that greater temporal fluctuation in individuals' relationship quality was associated with poorer individual well-being. First, relationship quality fluctuation predicted higher mean levels of psychological distress and greater increases in psychological distress over time, controlling for the overall trajectory of relationship quality. These results suggest that temporal variability is an important aspect of relationship quality to consider in theoretical and empirical models of how relationships influence individual well-being. For example, interpersonal relationship theories of depression, which generally focus on how low levels of relationship quality can promote depression through such mechanisms as increased conflict and reduced social support from the partner (e.g., Beach, Sandeen, & O'Leary, 1990), may be enhanced by widening their lens to encompass how oscillations in relationship quality over time may also raise risk for depression. In parallel, research investigating links between relationship quality and various measures of well-being would be well advised to include estimates of temporal instability in

relationship quality; by focusing only on baseline assessment (i.e., initial level) of relationship quality, they could underestimate the magnitude of these associations.

Results from the study indicate that fluctuations in relationship quality affect not only psychological distress but also subjective well-being: greater relationship quality fluctuation was associated with lower levels of life satisfaction and with greater declines in life satisfaction over time. Although cross-sectional associations between relationship quality and life satisfaction are well-established (for a meta-analysis, see Heller, Watson, & Ilies, 2004), it has remained unclear "whether life satisfaction causes domain [e.g., relationship] satisfaction or whether domain satisfaction causes life satisfaction" (Heller et al., 2004, p. 593). By demonstrating that greater fluctuations in relationship quality contribute to greater life satisfaction – and that fluctuations in life satisfaction are not associated with changes in relationship quality – the results of the study build on prior studies that have evaluated the longitudinal association between relationship quality and life satisfaction (e.g., BE, Whisman, & Uebelacker, 2013; Headey, Veenhoven, & Wearing, 1991; Stanley, Ragan, Rhoades, & Markman, 2012). The current findings support what Diener (1984) labeled as a *bottom-up* approach, in which life conditions and situations, such as the quality of one's relationship, determine one's level of life satisfaction. Moreover, results offer further refinement in our understanding of these bottom-up processes by indicating that life satisfaction may be influenced not only by level of, but also temporal fluctuations in, satisfaction with specific life domains such as one's intimate relationship. Future research is needed to evaluate whether fluctuations in relationship quality predict longitudinal changes in other measures of subjective well-being (e.g., positive affect, negative affect) and whether fluctuations over time in satisfaction in other life domains (e.g., occupation, health) are similarly predictive of longitudinal changes in life satisfaction.

In interpreting the results of the study, it is interesting to note that fluctuations in psychological distress and life satisfaction did not predict longitudinal changes in relationship quality. It is possible that we failed to detect a true association between fluctuations in individual well-being and relationship quality that does exist in the population. However, together with similar findings from the only other study examining associations between relationship quality fluctuations and well-being (depressive symptoms; Whitton & Whisman, 2010), these data suggest that the path of influence between fluctuation in relationship quality and individual functioning may move in one direction only. In contrast, panel studies, in which relationship quality and individual functioning are measured at only two points in time, have found that relationship quality and well-being (e.g., BE et al., 2013; Whisman & Uebelacker, 2009) influence one another in a bidirectional or recursive fashion. Therefore, there may be something unique about relationship quality fluctuation that contributes to changes in individual functioning, which may not be observed by measuring relationship quality levels at only one or two points in time.

Consistent with previous research, we found that individuals who experienced greater fluctuations in their relationship quality tended to have lower average levels of relationship quality across time (Arriaga, 2001; Arriaga et al., 2006; Campbell et al., 2010; Whitton & Whisman, 2010) and slightly greater linear decreases in relationship quality over time (Arriaga et al., 2006). However, these small to moderate correlations indicate that initial

levels and slopes of relationship quality do not explain all of the variance in relationship quality fluctuations; it is not only individuals with low relationship quality who experience fluctuations in their relationship quality. Indeed, Arriaga and colleagues (2006) demonstrated that individuals show varying temporal profiles in relationship evaluations that reflect different combinations of initial level, general linear trend, and degree of temporal instability (e.g., steady increase, fluctuating increase, steady decrease, and fluctuating decrease), which have unique associations with break-up rates. Together with our finding that fluctuations in relationship quality are predictive of longitudinal changes in individual well-being beyond what can be attributed to mean levels and slopes, these patterns suggest the unique importance of temporal fluctuations in relationship quality to understanding how romantic relationships affect individual well-being.

Building upon relationship theories (e.g., Kelley, 1979, 1983), we hypothesized that what is unique about relationship quality fluctuation relative to a single (e.g., baseline) assessment of relationship quality is that fluctuations in relationship quality undermine a sense of certainty that one's relationship will be successful in the future. This decreased sense of relationship confidence would, in turn, promote poorer individual well-being. Consistent with this hypothesis, we found that longitudinal changes in relationship confidence partially mediated the association between relationship quality fluctuations and longitudinal changes in psychological distress and life satisfaction. Compared to people with smaller fluctuations in relationship quality, those with larger fluctuations exhibited greater declines in relationship confidence across the waves of the study, which in turn were associated with greater increases in psychological distress and greater decreases in life satisfaction. These results echo earlier findings that married women with lower relationship confidence experienced greater increases in depressive symptoms across the first years of marriage (Whitton et al., 2007). Given that life satisfaction is conceptualized as the successful realization of one's goals and desires, including in close relationships, it is reasonable that people who do not feel confident in their relationship's future would experience declines in their life satisfaction over time.

Results of moderation analyses indicate that the association between relationship quality fluctuation and declining life satisfaction was stronger for women (who, on average, place more importance than men on interpersonal relationships; Impett & Peplau, 2006), people who were cohabiting with their partner (who are more highly interdependent with their partners than those in non-cohabiting dating relationships; Rhoades et al., 2012), and people with higher levels of anxious attachment (who are often hypervigilant to signs of relationship threat; Shaver & Mikulincer, 2008). This pattern of findings may reflect that some individuals – based on their gender, cohabitation status, and/or their internal working models of attachment – place a greater emphasis on their intimate relationship than others as they form global evaluations of life satisfaction. Consequently, they may be at greatest risk for declining life satisfaction in the face of unstable relationship quality (Campbell et al., 2010). Given the lack of previous research on moderators of associations between relationship quality and life satisfaction, these results are noteworthy, and suggest the utility of future research exploring the factors that may place individuals at greater risk for negative cycles of relationship distress and life dissatisfaction. The findings extend past research, which suggests that the global relationship and partner evaluations of anxiously attached

individuals are highly reactive to daily relationship events (Campbell, Simpson, Boldry, & Kashy, 2005) and more volatile over time (Arriaga et al., 2006), by indicating that this reactivity may have negative consequences for individual well-being.

In contrast, the association between relationship quality fluctuations and psychological distress was not moderated by gender, cohabitation, or anxious attachment, but was moderated by avoidant attachment. Specifically, for individuals high in avoidant attachment, fluctuations in relationship quality were associated with trajectories of increasing psychological distress over time. This association was not present, however, in individuals who were low in avoidant attachment. This finding runs counter to speculations that, by maintaining distance from intimate partners, individuals high in avoidant attachment may insulate themselves from the potentially painful or harmful effects of romantic relationships. Rather, when considered together with recent evidence that avoidant attachment may increase women's depressive reactions to negative changes in marital quality (D. Smith et al., 2012), this result suggests that perhaps attachment insecurity – whether it is anxious or avoidant in nature – may increase individuals' vulnerability to diminished well-being in the face of relationship distress. Additional research is needed to further explore these associations. More broadly, the moderating effects of anxious and avoidant attachment observed in this study add to the literature suggesting that adult attachment is a key personal characteristic associated with vulnerability to negative individual consequences in the face of relationship problems (e.g., Heene, Buysse, & Van Oost, 2007; Scott & Cordova, 2002; D. Smith et al., 2012).

Strengths, Limitations, and Future Directions

In interpreting the present findings, it is important to consider the study's strengths and limitations. One strength was the use of a large sample of individuals recruited from across the United States via random digit dialing, which provided high power to detect effects and was more representative than many convenience samples. However, because only unmarried and fairly young (18-34 year old) participants in opposite-sex dating relationships were recruited, future research is needed to evaluate whether the results generalize to those in same-sex relationships or to married and older individuals. Further, we selected participants who remained in one relationship for at least 3 waves of assessment (spanning approximately 8 months), which may limit generalizability to shorter dating relationships that end in break-up. Also, given that there are partner effects for the association between relationship quality and well-being (e.g., Whisman, Uebelacker, & Weinstock, 2004), and that fluctuations in *partners'* perceived relationship quality are associated with relationship behaviors (Campbell et al., 2010), future research using couple level data is needed.

The multiwave, longitudinal data allowed us to assess temporal patterns of change in relationship quality and individual well-being using prospectively observed patterns in participants' self-reports, avoiding problems of bias that are associated with retrospective perceptions of relationship constructs (e.g., self-protective memory biases in recollections of negative relationship events; Luchies et al., 2013). The study assessments spanned approximately 20 months, a significantly longer amount of time than covered in previous studies of fluctuations in relationship constructs, which have involved daily assessments

across 2-3 weeks (Campbell et al., 2010) or weekly or monthly assessments spanning a maximum of 9 months (Arriaga et al., 2006; Whitton & Whisman, 2010). These data are therefore more likely to capture meaningful, longer-term changes – rather than small, rapid fluctuations – in relationship and individual functioning. As such, the current findings suggest that instability in relationship evaluations over an extended period of time can impact an individual's trajectory of well-being across years. However, an important topic for future research will be to identify the most appropriate time lag between assessments to capture the type of fluctuations in relationship quality that are important to well-being. Evidence that the relative influence of fluctuations versus linear trends in perceived partner commitment on break-up rates differed when assessed at weekly versus monthly intervals (Arriaga et al., 2006) underscores the need for such research. Further, because fluctuations over several months, versus over days or weeks, may be less influenced by a person's general emotional reactivity or lability, the current findings raise confidence that the observed associations between fluctuations in relationship quality and well-being are not secondary to individual differences that might drive shorter-term fluctuations in relationship and individual functioning.

Nevertheless, it is possible that some unmeasured variable is contributing both to fluctuations in relationship quality and to longitudinal declines in well-being, accounting for the observed associations. For example, generally living a more variable and unpredictable life may lead to fluctuating perceptions of relationship quality, lower confidence in long-term relationship stability, and less life satisfaction. Therefore, it may be that fluctuation in relationship quality and decline in well-being or both due to exposure or reactivity to life events. In addition, neuroticism, a personality trait reflecting a general tendency to experience negative affect and to experience strong emotional reactions to negative or stressful events, has been linked with both poorer relationship quality and poorer individual well-being (Lahey, 2009). Because higher levels of neuroticism could therefore be contributing both to greater fluctuations in relationship quality and greater declines in well-being, it will be important to control for it in future studies. Of note, previous research has found that relationship quality fluctuations predicted relationship problems even when controlling for neuroticism (Campbell et al., 2010).

Furthermore, future research is needed to explore individual, relationship, and partner characteristics that may drive fluctuations in relationship quality. Because such fluctuations are linked with negative couple and individual outcomes, determining the factors that predict who experiences them might help us to identify individuals at risk for relationship distress and poor individual functioning. In this study, we found that neither gender (an individual factor) nor cohabitation status (a relationship factor) were associated with the degree of relationship quality fluctuations experienced by participants (see Table 1); however, as has been observed previously (Arriaga et al., 2006; D. Smith et al., 2012), higher levels of anxious attachment and avoidant attachment were associated with greater fluctuations. These findings are consistent with evidence that individuals who are less trusting of their partners – that is, who are less certain of their partner's dependability and future availability to meet their needs – report greater fluctuations in relationship quality (Campbell et al., 2010). According to Attachment Theory (Bowlby, 1969), based on their early relationship experiences, individuals develop fairly stable ways of approaching intimate relationships and

perceiving intimate partner behaviors. The present findings suggest that individuals who develop less secure attachment styles may be at heightened risk for experiencing fluctuating relationship quality, and for their well-being to decline in the face of such fluctuations.

Conclusions

The current study broadens our understanding of how relationship quality may influence individual well-being by demonstrating that larger temporal fluctuations in relationship quality are associated with greater increases in psychological distress and decreases in life satisfaction over time. By suggesting that within-person fluctuation in relationship quality, and not just absolute levels of quality, are predictive of well-being, these results highlight the importance of considering variability within individuals on relationship factors (Campbell et al., 2010). Relationship theorists and researchers may want to adopt more dynamic models of relationships that incorporate temporal fluctuations in relationship quality in predicting individual and relationship outcomes. The results also enrich our understanding of how and for whom temporal instability in relationship evaluations may influence individual well-being. Specifically, decreases in relationship confidence were identified as a mechanism of this effect, and moderation analyses suggested that women, individuals cohabiting with their dating partners, and those with high levels of anxious attachment may be most at risk for declining life satisfaction, and those high in avoidant attachment may be most at risk for increasing psychological distress, when faced with unstable, fluctuating relationship quality.

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Table 1

Means, Standard Deviations, and Correlations Among Relationship Quality Change Parameters, Outcomes, and Moderators

Variable	Mean (*SD*) or %	1	2	3	4	5	6	7	8	9	10	11
Relationship Quality												
1. Initial level	16.71 (3.24)											
2. Linear slope over time	−0.07 (0.59)	−.20*										
3. Fluctuation over time	1.41 (1.09)	−.29*	−.09*									
4. Average across time	16.42 (3.35)	.81*	−.21*	−.43*								
Psychological Distress												
5. Average across time	26.67 (9.27)	−.32*	−.12*	.23*	−.41*							
6. Linear slope over time	−0.05 (0.55)	.06	−.21*	.06	−.06	.14*						
Life Satisfaction												
7. Average across time	23.32 (6.05)	.47*	.14*	−.27*	.54*	−.62*	−.07*					
8. Linear slope over time	0.02 (0.58)	−.09*	.29*	−.09*	.07*	−.14*	−.36*	.06				
Moderators												
9. Female	65%	.04	−.05	−.01	.00	.10	−.06	.02	.04			
10. Cohabiting	37%	−.11	−.02	.06	−.11	.06	.03	−.11	.01	.07		
11. Anxious Attachment	2.01 (0.83)	−.37*	.00	.14*	−.34*	.44*	−.05	−.34*	.02	.03	.01	
12. Avoidant Attachment	2.37 (0.70)	−.34*	.02	.12*	−.33*	.29*	−.10*	−.36*	.04	.04	.05	.26*

*$p < .05$.

Table 2

The Prediction of Psychological Distress and Life Satisfaction

	Outcome: Psychological Distress				Outcome: Life Satisfaction			
Fixed Effects	***B***	***SE***	***t* (744)**	***ES (r)***	***B***	***SE***	***t* (744)**	***ES (r)***
Predicting Average Level Across Time								
Intercept	40.17**	1.94	20.69		9.30**	1.15	8.06	
Initial relationship quality	–0.91**	0.10	–8.71	0.30	0.90**	0.06	14.60	0.47
Relationship quality slope	–2.76**	0.55	–4.97	0.18	2.47**	0.33	7.50	0.27
Relationship quality fluctuations	0.98**	0.31	3.21	0.12	–0.63**	0.18	–3.43	0.12
Predicting Linear Slope Across Time								
Intercept	–0.24*	0.12	–1.97		0.33**	0.07	4.69	
Initial relationship quality	0.01	0.01	1.10	0.04	–0.01**	0.01	–3.96	0.14
Relationship quality slope	–0.20**	0.03	–5.96	0.21	0.15**	0.02	7.54	0.27
Relationship quality fluctuations	0.06**	0.02	2.74	0.10	–0.04**	0.01	–3.81	0.14
Random Effects	Variance Component	*SD*	χ^2(744)		Variance Component	*SD*	χ^2(744)	
Average Level, u_0	63.87	7.99	5907.11		23.39	4.83	7903.06	
Linear Slope over Time, u_1	0.06	0.25	1008.54		0.03	0.17	1210.62	
Level-1, r	44.58	6.68			11.94	3.46		

* $p < .05$.

** $p < .01$.

Table 3

Tests of the Moderating Effects of Gender, Cohabitation Status, and Adult Attachment on the Association between Fluctuations in Relationship Quality and Individual Well-being Over Time

	Outcome: Psychological Distress			Outcome: Life Satisfaction		
	B	***SE***	***t* (736)**	***B***	***SE***	***t* (736)**
Moderation of Association between Relationship Quality Fluctuations and Average Level Across Time						
Gender	0.69	0.62	1.10	−0.01	0.37	−0.04
Cohabitation Status	0.42	0.65	−0.65	0.38	0.39	0.99
Anxious Attachment	0.37	0.32	1.18	0.10	0.20	0.52
Avoidant Attachment	0.00	0.40	0.01	0.41	0.25	1.63
Moderation of Association between Relationship Quality Fluctuations and Linear Slope Across Time						
Gender	0.04	0.04	0.93	−0.05*	0.02	−1.96
Cohabitation Status	0.03	0.04	0.82	−0.06**	0.02	−2.75
Anxious Attachment	−0.02	0.02	−0.97	−0.03**	0.01	−2.33
Avoidant Attachment	0.06	0.02	2.38*	−0.01	0.02	−0.64

Note. Coefficients were estimated controlling for the proposed moderator, initial relationship quality level, and linear slope in relationship quality; and for interactions between the proposed moderator and initial levels and slopes of relationship quality. Moderating effects of the two attachment measures were estimated in the same model to control for effects of the other.

* $p < .05$.

** $p < .01$.