

# Longitudinal Associations Among Relationship Satisfaction, Sexual Satisfaction, and Frequency of Sex in Early Marriage

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**Abstract** The current research used two 8-wave longitudinal studies spanning the first 4–5 years of 207 marriages to examine the potential bidirectional associations among marital satisfaction, sexual satisfaction, and frequency of sex. All three variables declined over time, though the rate of decline in each variable became increasingly less steep. Controlling for these changes, own marital and sexual satisfaction were bidirectionally positively associated with one another; higher levels of marital satisfaction at one wave of assessment predicted more positive changes in sexual satisfaction from that assessment to the next and higher levels of sexual satisfaction at one wave of assessment predicted more positive changes in marital satisfaction from that assessment to the next. Likewise, own sexual satisfaction and frequency of sex were bidirectionally positively associated with one another. Additionally, partner sexual satisfaction positively predicted changes in frequency of sex and own sexual satisfaction among husbands, yet partner marital satisfaction negatively predicted changes in both frequency of sex and own sexual satisfaction. Controlling these associations, marital satisfaction did not directly predict changes in frequency of sex or vice versa. Only the association between partner sexual satisfaction and changes in own sexual satisfaction varied across men and women and none of the key effects varied across the studies. These findings suggest that sexual and relationship

satisfaction are intricately intertwined and thus that interventions to treat and prevent marital distress may benefit by targeting the sexual relationship and interventions to treat and prevent sexual distress in marriage may benefit by targeting the marital relationship.

**Keywords** Sexual satisfaction · Marital satisfaction · Frequency of sex · Sex differences

## Introduction

What is the role of sex in committed relationships? Does satisfying sex make for a happier relationship or does a happy relationship lead to more satisfying sex? Although sexual satisfaction is clearly a strong correlate of relationship satisfaction (for reviews, see Impett, Muise, & Peragine, 2014; Sprecher & Cate, 2004), the exact nature of that association is much less clear. As with any correlation, it is possible that (1) sexual satisfaction predicts subsequent relationship satisfaction, (2) relationship satisfaction predicts subsequent sexual satisfaction, (3) the association is bidirectional, or (4) there is no causal relationship between sexual and relationship satisfaction.

Several theoretical perspectives can be used to argue that initial levels of sexual satisfaction predict subsequent levels of relationship satisfaction. Specifically, models of person perception suggest that people form attitudes and beliefs through bottom-up processing—i.e., they base their overall evaluations of a target on their perceptions of the specific qualities of that target (e.g., Rothbart, 1981). Interdependence theory (Kelley & Thibaut, 1978; Thibaut & Kelley, 1959) suggests similar processes may unfold in relationships. Specifically, interdependence theory posits that people evaluate their relationships by weighing the perceived relationship rewards against the perceived relationship costs, such that they are more likely to be

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satisfied with the relationship when they perceive that their relationship rewards exceed their relationship costs. Given that sexual satisfaction is an important relationship reward (e.g., Fletcher, Simpson, Thompson, & Giles, 1999), being more satisfied with the sexual relationship should lead people to be more satisfied with their relationship overall.

Other theoretical perspectives can be used to argue that initial levels of relationship satisfaction predict subsequent levels of sexual satisfaction. Specifically, people also form attitudes and beliefs through top-down processing—i.e., they base their perceptions and evaluations of the specific qualities of a target on their overall evaluation of that target (e.g., Olson & Fazio, 2001; Wyer & Srull, 1986). Various theoretical models of relationships are consistent with this perspective as well (Bradbury & Fincham, 1991; Lawrence & Byers, 1995; Weiss, 1980). According to Weiss, for example, couples may experience sentiment override in their relationships, such that their overall evaluations of their relationship influence the way they evaluate the specific qualities of that relationship. Thus, being generally satisfied with a relationship may positively color perceptions of the specific aspects of that relationship, and being generally dissatisfied with a relationship may negatively color perceptions of the specific aspects of that relationship. Accordingly, being more satisfied with a relationship in general should lead intimates to be more satisfied with their sexual relationship.

It is important to note that the two perspectives are not mutually exclusive. It is possible for higher levels of sexual satisfaction to lead to higher levels of subsequent relationship satisfaction and, within the same person, for higher levels of relationship satisfaction to lead to higher levels of subsequent sexual satisfaction. Indeed, such bidirectional models have been proposed in basic research on attitude formation and change generally (e.g., Crisp & Hewstone, 2007; Fiske & Neuberg, 1990; Higgins & Bargh, 1987) as well as interpersonal relationships specifically (e.g., Bulloch, Williams, Lavorato, & Patten, 2009; Karney & Bradbury, 1995b). Fiske and Neuberg's (1990) continuum model of impression formation, for example, posits that although schemas guide information processing and interpretations through top-down processing, those schemas can also be updated through bottom-up processing. Regarding relationships, Karney and Bradbury's (1995b) vulnerability–stress–adaptation model posits that intimates' perceptions of their behavioral exchanges with their partners predict subsequent relationship evaluations through processes of bottom-up processing, but also that those relationship evaluations can predict subsequent perceptions of behavioral exchanges through processes of top-down processing.

Yet, despite theoretical reasons to expect both associations between sexual and relationship satisfaction, empirical research has provided only mixed support for each. In the absence of experimental evidence that one type of satisfaction causes the other type of satisfaction, the strongest evidence that one type of

satisfaction causes changes in the other would come from longitudinal research showing that initial levels of one type of satisfaction precede and predict changes in the other type of satisfaction, independent of initial levels of that other type of satisfaction.

We are aware of four longitudinal studies that have examined the links between initial levels of each type of satisfaction and subsequent levels of the other type of satisfaction (Byers, 2005; Henderson-King & Veroff, 1994; Sprecher, 2002; Yeh, Lorenz, Wickrama, Conger, & Elder, 2006), and although all four provided some evidence consistent with at least one direction of this association, only one provided strong evidence for either association. Specifically, Yeh et al. used a five-wave longitudinal study that spanned 11 years of marriage to demonstrate that husbands and wives who reported higher levels of sexual satisfaction at one wave of assessment reported higher levels of marital quality at the next assessment, controlling for marital quality at the previous assessment. Regarding the others, although Henderson-King and Veroff (1994) demonstrated that initial levels of relationship satisfaction were positively associated with subsequent levels of sexual satisfaction and vice versa, Henderson-King and Veroff did not report whether this association held controlling for initial levels of the criterion variable. As Byers (2005) noted in her critique of that study, not controlling initial levels of the criterion variable makes it difficult to rule out whether these associations emerged because initial levels of the two variables were positively correlated with one another cross-sectionally. Indeed, Sprecher (2002) reported that initial levels of relationship satisfaction were positively associated with subsequent sexual satisfaction and vice versa, but also specifically stated that each association was reduced to non-significance once initial levels of the criterion variable were controlled. Based on these analyses, Sprecher (2002) concluded that, “no evidence was found to indicate that sexual satisfaction leads to change in relationship quality, or, conversely, that relationship quality leads to change in sexual satisfaction.” Likewise, Byers (2005) reported that initial levels of each type of satisfaction were unrelated to subsequent levels of the other type of satisfaction when initial levels of the criterion variable were controlled. As Byers stated, “Relationship satisfaction at Time 1 was not associated with the change in sexual satisfaction between Time 1 and Time 2” (p. 114) and “sexual satisfaction at Time 1 was not associated with change in relationship satisfaction between Time 1 and Time 2” (p. 115). It is worth noting that Byers also reported that changes in the two types of satisfaction were positively correlated in her entire sample and, in exploratory analyses, that initial sexual satisfaction predicted changes in relationship satisfaction among those who demonstrated decreases in relationship satisfaction whereas initial relationship satisfaction predicted changes in sexual satisfaction among those for whom sexual satisfaction increased. In the absence of a priori predictions, however, these findings are difficult to interpret.

## Critique of the Existing Research

One way to interpret this entire body of existing longitudinal research is to conclude that sexual and relationship satisfaction are not directly related to one another; rather, the strong positive correlations that consistently emerge in cross-sectional research may reflect associations with other related variables. But before discounting the various theoretical perspectives suggesting there are direct causal links between sexual and relationship satisfaction, it is worth considering several methodological qualities of these studies that may explain the limited evidence they provide. First, the three studies that failed to demonstrate either effect (Byers, 2005; Henderson-King & Veroff, 1994; Sprecher, 2002) analyzed sexual and relationship satisfaction at only two points in time. Given that such methods can fail to accurately capture the change that takes place over the course of a relationship (Karney & Bradbury, 1995a), this method may limit the opportunity to detect real associations between initial levels of one type of satisfaction and changes in the other type of satisfaction. Indeed, as noted earlier, the one study that documented a positive association between initial sexual satisfaction and subsequent relationship satisfaction (Yeh et al., 2006) was based on five waves of data.

Of course, the Yeh et al. (2006) study did not detect a significant association between initial relationship satisfaction and changes in sexual satisfaction. A second methodological quality of that study may explain that null effect: Yeh et al. sampled from couples in relatively established marriages. In fact, the average length of the marriages examined in that study was 30 years. Given that the first few years of marriage are marked by rapid declines in sexual frequency (e.g., Call, Sprecher, & Schwartz, 1995), studying newer relationships may provide the best opportunity to explain changes in sexual satisfaction. We are not aware of any studies that have used multiple assessments to examine changes in sexual and relationship satisfaction in relatively newer relationships.

Finally, at least two additional methodological qualities of prior research have further limited our understanding of the link between sexual and relationship satisfaction. First, the role of other variables in the association remains unclear. For example, neuroticism is strongly related to both relationship satisfaction (McNulty, 2008) and sexual satisfaction (Fisher & McNulty, 2008), making it possible that sexual and relationship satisfaction have been correlated in previous research because both are linked to neuroticism. The strongest test of the bidirectional association between sexual and relationship satisfaction would control levels of neuroticism. Additionally, the role of the frequency of sexual activity in the association remains unclear. Although it is possible that sexual and relationship satisfaction are associated with one another independent of the frequency with which sexual activity occurs in the relationship, it is also possible that frequency of sexual activity accounts for any association between those two variables. Indeed, just as sexual frequency substantially declines over the course of a relationship (Call et al., 1995), so do sexual

and relationship satisfaction (McNulty, O'Mara, & Karney, 2008; McNulty & Widman, 2013). Understanding the role of evaluative processes in the link between sexual and relationship satisfaction requires knowing whether sexual and relationship satisfaction are directly related to one another above and beyond the influence of the frequency of sexual activity.

Further, the associations between the frequency of sexual activity and sexual and relationship satisfaction are themselves theoretically and practically informative. Models of bottom-up processing suggest that sexual frequency should positively predict sexual satisfaction and perhaps even relationship satisfaction. Additionally, theories of the link between attitudes and subsequent behavior (e.g., Fazio, 1990) suggest more positive attitudes toward the partner, in the form of sexual and relationship satisfaction, should predict more positive behaviors, which could include more frequent sexual activity. Given that attitudes are more likely to predict behavior when the attitudes and behaviors are measured at the same level of specificity (e.g., Davidson & Jaccard, 1979; Fazio, 1990), however, it may be that sexual satisfaction is a better predictor of frequent sex than is relationship satisfaction.

Second, we also know very little about potential differences between men and women in the association between sexual and relationship satisfaction, and there are several reasons to expect such differences to emerge. For example, theoretical perspectives indicate that women's sexual experiences are particularly susceptible to context and processes of cognitive construal (Baumeister, 2000; Peplau, 2003), which suggests that any causal influence of relationship satisfaction on sexual satisfaction may be particularly strong among women. Indeed, not only are women more likely than men to demonstrate processes of top-down processing and sentiment override generally (Butler et al., 2006), women are more likely than men to exhibit top-down processing in their relationships (Fincham, Garnier, Gano-Phillips, & Osborne, 1995; Hawkins, Carrère, & Gottman, 2002) and with regard to their sexual experiences (Bridges, Lease, & Ellison, 2004; McNulty & Fisher, 2008). On the other hand, evolutionary perspectives (e.g., Buss, 1989; Buss & Schmidt, 1993) can be used to argue that sexual satisfaction may more strongly predict changes in relationship satisfaction among men. Specifically, sex and physical intimacy are more important to men than to women (see Fletcher et al., 1999), and thus any causal influence of sexual satisfaction on relationship satisfaction may be stronger among men than women.

## Overview of the Current Study

The goal of the present research was to clarify the associations among relationship satisfaction, sexual satisfaction, and the frequency of sexual activity. We assessed marital satisfaction and sexual satisfaction eight times and the frequency of sex seven times, every 6- to 8-months, in two longitudinal studies of newlywed couples to test the following hypotheses. First,

consistent with principles of bottom-up processing, we predicted that current levels of sexual satisfaction would predict future levels of marital satisfaction, controlling for current levels of marital satisfaction (Hypothesis 1). Second, consistent with principles of top-down processing, we predicted that current levels of marital satisfaction would predict future levels of sexual satisfaction, controlling for current levels of sexual satisfaction (Hypothesis 2). We also examined the bidirectional association between the frequency of sex and both sexual and marital satisfaction. Theories of the link between attitudes and behavior (e.g., Fazio, 1990) suggest that individuals may have more sex to the extent that they have more positive evaluations of the sexual relationship (Hypotheses 3) and/or the relationship as a whole (Hypothesis 4). Although we made no strong predictions, the fact that attitudes are more likely to predict behavior when the attitude and behavior are measured at the same level of specificity (Davidson & Jaccard, 1979) suggests that sexual satisfaction may better predict sexual frequency than relationship satisfaction. Additionally, perspectives on attitude formation (e.g., Olson & Fazio, 2001) suggest that having more frequent sex may lead to more positive evaluations of the sexual relationship (Hypothesis 5) and/or the relationship as a whole (Hypothesis 6). In exploratory analyses, we also examined the role of partner sexual and marital satisfaction in changes in each type of satisfaction and frequency of sex. We are not aware of any studies that have examined the link between initial levels of partner sexual satisfaction and changes in own satisfaction or frequency of sex, but the dyadic nature of relationships suggests positive associations. Finally, we additionally tested whether each association was stronger among men or women. To ensure that any associations that emerged between sexual and marital satisfaction were independent of spouses' levels of neuroticism, a personality variable strongly associated with both sexual and relationship satisfaction (e.g., Fisher & McNulty, 2008), we also assessed neuroticism at baseline and controlled it in all analyses. Given the parallel designs of both studies, they were analyzed simultaneously during tests of the primary hypotheses to maximize power. Nevertheless, we describe the specific samples separately in the next section.

## Method

### Participants

Participants in Study 1 were 72 newlywed couples living in north-central Ohio; participants in Study 2 were 135 newlywed couples living in eastern Tennessee. Neither sample was representative of the community from which the couples were drawn. Couples in both studies were recruited using two methods. The first was to place advertisements in community newspapers and bridal shops offering payment to couples willing to participate in a longitudinal study of newlyweds. The second

was to send invitations to eligible couples who had completed marriage license applications in nearby counties. All couples responding to either method of solicitation were screened for eligibility in an initial telephone interview. Inclusion required that: (1) this was the first marriage for each partner, (2) the couple had been married less than 6 months, (3) each partner was at least 18 years of age, and (4) each partner spoke English and had completed at least 10 years of education (to ensure comprehension of the questionnaires). As part of the larger aims of Study 2, that study included the additional criteria that couples did not yet have children and wives were not older than 35 (to allow a similar probability of transitioning to first parenthood for all couples).

Summaries of the sample characteristics are shown in Table 1. As can be seen, the husbands and wives in both studies were in their mid-20s and had completed several years of post-secondary education, on average. The majority of husbands and approximately half of wives were employed full time. A quarter of the wives in both studies and a quarter of husbands in Study 2 were in school full time; fewer husbands in Study 1 were in school full time. Though husbands earned slightly more money than wives in both studies, the income of both couple members was relatively low across the studies. The large majority of husbands and wives were Caucasian. The spouses in Study 2 had received more education than the spouses in Study 1 (for husbands,  $t[205] = 4.53$ ,  $p < .001$ ; for wives,  $t[205] = 6.56$ ,  $p < .001$ ) and more husbands in Study 2 were in school full time than were husbands in Study 1,  $\chi^2(1) = 9.64$ ,  $p < .01$ . No other differences across the samples were significant.

Regarding characteristics of the couples, 44 of the couples in Study 1 and 40 of the couples in Study 2 reported having children by the end of the study. Although this suggests that a higher proportion of couples had children over the course of the Study 1 compared to Study 2, it is important to keep in mind that 14 of the husbands and 13 of the wives in Study 1 reported having children at the start of the study; Study 2 required that couples not yet have children. Additional differences in the number of children reported in the two studies may be due to attrition, as couples who

**Table 1** Sample characteristics

	Study 1		Study 2	
	Husbands	Wives	Husbands	Wives
Age	24.9 (4.4)	23.5 (3.8)	25.9 (4.6)	24.2 (3.6)
Years of education	14.0 (2.3)	14.6 (2.2)	15.6 (2.3)	16.8 (2.2)
Employed full time (%)	74	49	70	56
In School full time (%)	11	26	26	28
Median income range <sup>a</sup>	\$15–20 K	\$10–15 K	\$20–25 K	\$10–15 K
Caucasian	93 %	96 %	91 %	93 %

Numbers in parentheses are *SDs*

<sup>a</sup> Spouses reported the range of their income rather than their exact yearly income. Thus, the median of that report is presented

participated in fewer subsequent waves had fewer opportunities to report having children. Additionally, 10 couples in Study 1 and 75 couples in Study 2 reported cohabiting before marriage. This difference is difficult to interpret as well, however. Specifically, whereas couples in Study 2 were directly asked about living together, information regarding whether couples in Study 1 lived together was gathered from their intake interviews in which some spouses spontaneously reported cohabiting; it is likely that there are couples in Study 1 who lived together but did not spontaneously report having done so.

## Procedure

Procedures were nearly identical in each study. As part of the broader aims of each study, couples attended an initial laboratory session. Before that session, they completed a packet of questionnaires that contained a consent form approved by the local human subjects review board, self-report measures of demographics, marital satisfaction, sexual satisfaction, frequency of sex, and neuroticism, and a letter instructing couples to complete all questionnaires independently of one another and bring their completed questionnaires to their upcoming laboratory session. Couples were paid \$80 for participating in this initial phase of each study.

At approximately 6- to 8-month intervals subsequent to the initial assessment, couples were re-contacted by phone and again mailed measures of marital satisfaction, sexual satisfaction, and sexual frequency, along with postage-paid return envelopes and a letter of instruction reminding couples to complete the surveys independently of one another. After completing each follow-up phase, couples were mailed a \$50 check for participating. Two exceptions to this general procedure were that (1) the fifth assessment in Study 1 was 1 year after the fourth assessment, due to changes in the location of the study's administration, and (2) the sixth assessment in Study 2 also contained a laboratory session similar to the one that occurred at Baseline. Study 1 spanned approximately 4.5 years and Study 2 spanned approximately 4 years. Regarding attrition, 57 % percent of participants completed six or more waves and 32 % of participants completed all waves. Nevertheless, as detailed in the data analysis section, all spouses were used in the analyses and we controlled for the number of assessments each spouse completed in all primary analyses.

## Measures

### *Marital Satisfaction*

Marital satisfaction was assessed at every wave of measurement in both studies. To ensure that global sentiments toward the relationship were not confounded with sexual satisfaction,

marital satisfaction was assessed with a global measure of marital quality—the Quality of Marriage Index (QMI) (Norton, 1983). As reported by Norton, the QMI is a desirable measure of marital evaluation because the items are reliable, valid, and sufficiently global, the latter of which provides conceptual independence from items that may be examined as possible correlates of marital satisfaction. Indeed, during instrument development, the average item-total correlation was .76, and the total score was related as expected to measures of commitment and partners' attitude similarity. The QMI contains five items that ask spouses the extent to which they agree or disagree with general statements about their marriage (e.g., “We have a good relationship,” “My relationship with my partner makes me happy”) on a scale from 1 (*Very Strong Disagreement*) to 7 (*Very Strong Agreement*), and one item that asks spouses to answer the question “All things considered, how happy are you with your marriage?” on a scale from 1 (*Very Unhappy*) to 10 (*Perfectly Happy*). Thus, the scores on the QMI can range from 6 to 45, with higher scores indicating greater marital satisfaction. Internal consistency of this measure was adequate in both studies. Across all phases in both studies, coefficient alpha was above .85 for both husbands and wives.

### *Sexual Satisfaction*

The degree of spouses' sexual satisfaction was assessed at every wave of measurement in both studies with the Index of Sexual Satisfaction (ISS) (Hudson, 1998). As reported by Hudson, the ISS demonstrated adequate internal consistency ( $\alpha = .92$ ) and an adequate validity coefficient (.76) during instrument development. The ISS measures intimates' satisfaction with their sexual relationship by asking them to indicate the extent to which 25 statements describe their current sexual relations with their partner (e.g., “I think that our sex is wonderful,” “Our sex is monotonous,” reversed on a scale from 1 (*None of the time*) to 7 (*All of the time*)). Responses to these items were reversed when appropriate and summed to form the ISS that ranged from 25 to 175, with higher scores indicating higher levels of sexual satisfaction. Internal consistency of this measure was high in both studies. Across all phases in both studies, coefficient alpha was above .90 for both husbands and wives.

### *Frequency of Sex*

Reports of the frequency of sex were obtained at every assessment of both studies except the final one (the final assessment of both studies included a very small number of surveys to reduce participant burden and increase compliance). Specifically, at Times 1–7, each spouse provided a numerical estimate of the number of times the couple “had sex” over the past 6 months.

## Neuroticism

Because neuroticism is likely to be associated with both sexual and marital satisfaction (Fisher & McNulty, 2008), it was assessed and controlled in all analyses using the short Neuroticism subscale of the Big Five Personality Inventory (Goldberg, 1999). As reported by Goldberg, the full scale, from which the short scale was derived, demonstrated adequate reliability ( $\alpha = .82$ ) and a high measurement-error-adjusted correlation ( $r = .95$ ) with another measure of neuroticism. The short-form used here consists of 10 statements with which participants indicate extent of agreement on a scale ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*), with higher scores indicating a greater degree of neuroticism. Sample items include “I get upset easily” and “I change my mood a lot.” Internal consistency was acceptable in both studies. In Study 1, coefficient alpha was .75 for husbands and .68 for wives; In Study 2, coefficient alpha was .71 for husbands and .72 for wives.

## Overview of Data Analyses

The primary hypotheses were tested in a cross-lagged, 3-level model using the HLM 7.01 computer program (Bryk, Raudenbush, & Congdon, 2004). To examine whether initial sexual satisfaction predicted subsequent marital satisfaction, we conducted a lagged analysis in which spouses’ reports of marital satisfaction at the next wave of assessment were regressed onto own and partner sexual satisfaction assessed at the previous wave of assessment, as well as partner marital satisfaction at the previous assessment, controlling for own marital satisfaction at the previous assessment, the frequency of sex reported between the initial and subsequent assessments, Time, and the Time  $\times$  Time interaction, all in the first level of the model. The Time  $\times$  Time interaction was included because preliminary analyses, described in the results section, indicated that the change in each variable over time was curvilinear. To examine whether initial marital satisfaction predicted subsequent sexual satisfaction, we conducted a similar lagged analysis in which spouses’ reports of sexual satisfaction at the next wave of assessment were regressed onto own and partner marital satisfaction at the previous wave of assessment, as well as partner sexual satisfaction at the previous assessment, controlling for own sexual satisfaction at previous assessment, the frequency of sex reported between the initial and subsequent assessments, Time, and the Time  $\times$  Time interaction, all in the first level of the model. To examine whether either type of satisfaction predicted changes in the frequency of couples’ sex, we conducted a similar lagged analysis in which spouses’ reports of sexual frequency at the next wave of assessment were regressed onto own and partner marital and sexual satisfaction at the previous wave of assessment, controlling for frequency of sex reported at the previous assessment, Time, and the Time  $\times$  Time interaction, all in the first level of the model. In all three analyses, reports of

own neuroticism, a dummy code for participant sex, and the number of waves completed (to control for any bias due to attrition) were all entered as covariates in the second level of the model. Additionally, a dummy code for study, a dummy code indicating whether or not the couple lived together prior to marriage, and a dummy code indicating whether or not couples reported having children by the end of the study were entered as covariates in the third level of the model. The non-independence of repeated assessments was controlled in the second level of the model, where all effects, except for time and the association involving prior levels of the dependent variable being controlled (e.g., initial marital satisfaction when subsequent marital satisfaction was the dependent variable), were allowed to vary across people, and the non-independence of husbands’ and wives’ data was controlled in the third level of the model, where the intercept of each random effect was allowed to vary across couples.

Supplemental analyses were conducted to examine whether any of the primary effects differed across men and women by entering the dummy code for participant sex into the second level of the model to account for variance in each key association (e.g., the association between initial sexual satisfaction and subsequent marital satisfaction). As detailed later, none of the tests of the primary predictions varied across participant sex, though one partner effect did vary across men and women. Additionally, supplemental analyses were also conducted to examine whether any of the key effects differed significantly across the two studies by entering the dummy code for study into the third level of the model to account for any variance in each key association. As detailed later, none of the tests of the primary predictions varied across the two studies.

Notably, HLM provides maximally efficient estimates for every individual in the sample, even individuals who are missing some data, by weighting individual estimates according to Bayes’s theorem (Box & Tiao, 1973). When the within-subject parameter for an individual can be estimated precisely, the final estimate relies heavily on the individual data. When the parameter cannot be estimated precisely due to missing data, the final estimate relies more heavily on the mean of the sample. Because the most precise estimates contribute more to the final estimated variance of the sample, variances estimated in this way tend to be more conservative than those obtained through traditional ordinary least squares methods.

## Results

Correlations among the variables assessed at each wave of measurement are shown in Table 2. As can be seen, own sexual satisfaction was positively associated with own marital satisfaction at every wave of data collection among both husbands and wives. Likewise, own reports of frequency of sex were positively associated with own sexual satisfaction at every wave of data collection among both husbands and

**Table 2** Correlations among independent variables

	Time 1			Time 2			Time 3			Time 4		
	1	2	3	1	2	3	1	2	3	1	2	3
Marital satisfaction (1)	<b>.32**</b>	.50**	.11	<b>.30**</b>	.32**	.10	<b>.36**</b>	.41**	.10	<b>.39**</b>	.50**	.16
Sexual satisfaction (2)	.42**	<b>.59**</b>	.34**	.28**	<b>.58**</b>	.24**	.42**	<b>.59**</b>	.25**	.37**	<b>.56**</b>	.30**
Frequency of sex (3)	.12	.31**	<b>.67**</b>	.09	.27**	<b>.93**</b>	.18*	.37**	<b>.59**</b>	.14	.34**	<b>.64**</b>
	Time 5			Time 6			Time 7			Time 8		
	1	2	3	1	2	3	1	2	3	1	2	3
Marital satisfaction (1)	<b>.34**</b>	.51**	.20*	<b>.39**</b>	.57**	.16	<b>.28**</b>	.38**	-.08	<b>.63**</b>	.69**	–
Sexual satisfaction (2)	.41**	<b>.54**</b>	.35**	.50**	<b>.53**</b>	.31**	.50**	<b>.47**</b>	.26*	.61**	<b>.61**</b>	–
Frequency of sex (3)	.07	.39**	<b>.72**</b>	.30**	.46**	<b>.76**</b>	.14	.18	<b>.51**</b>	–	–	–

Wives' correlations appear above the diagonals, husbands' correlations appear below the diagonals, and correlations between husbands and wives appear on the diagonals in bold

\*  $p < .05$ ; \*\*  $p < .01$

wives. Interestingly, correlations between frequency of sex and marital satisfaction were only occasionally positively correlated. All cross-spouse correlations were significant at every wave of data collection.

Descriptive statistics for marital satisfaction, sexual satisfaction, and frequency of sex at every assessment, as well as the number of spouses who completed reports at each assessment, are shown in Table 3. As would be expected among newlyweds, both husbands and wives reported relatively high levels of marital satisfaction, sexual satisfaction, and sexual activity in the initial stages of the study, on average. Nevertheless, among both husbands and wives, both types of satisfaction, as well as frequency of sex, appeared to decline over the course of the study on average, especially in the early stages of these marriages. Nevertheless, these means reflect the averages of only the participants who reported at each assessment, which may be biased by attrition.

To properly model the average levels of within-person changes in each variable, we tested for such change at the within-person level using three-level growth curve analyses with the HLM computer program. As noted earlier, these analyses use empirical Bayes procedures to estimate within-person parameters even for people with missing data, and thus estimate the average level of change for all participants who completed at least two measurement periods, which was all participants in both samples. Results of these analyses are shown in Table 4. As can be seen by the significant negative Time effects in Table 4, all three variables declined significantly over time. Nevertheless, as can be seen by the significant positive Time  $\times$  Time interactions in Table 4, the linear declines in all three variables were stronger in the beginning of the study compared to the end of the study. None of these changes varied by study (all  $ps > .26$ ), except that frequency of sex declined more steeply in Study 2 than in Study 1 ( $b = -5.27$ ,  $SE = 1.53$ ,  $t(205) = -3.45$ ,  $p < .001$ , effect size  $r = .23$ ), although frequency of sex did decline significantly in

Study 1 ( $b = -1.31$ ,  $SE = 0.56$ ,  $t(205) = -2.33$ ,  $p = .021$ , effect size  $r = .16$ ). None of these changes varied by participant sex (all  $ps > .15$ ).

#### Does Initial Sexual Satisfaction Predict Changes in Marital Satisfaction?

The first primary analysis tested the hypothesis that current sexual satisfaction predicts changes in marital satisfaction. This hypothesis was evaluated by estimating the following first-level equation of a 3-level model:

$$\begin{aligned}
 Y_{ij}(\text{Marital Satisfaction at Next Assessment}) &= \pi_{0j}(\text{Intercept}) + \pi_{1j}(\text{Time}) + \pi_{2j}(\text{Time} \times \text{Time}) \\
 &+ \pi_{3j}(\text{Own Marital Satisfaction at Previous Assessment}) \\
 &+ \pi_{4j}(\text{Own Sexual Satisfaction at Previous Assessment}) \\
 &+ \pi_{5j}(\text{Partner Marital Satisfaction at Previous Assessment}) \\
 &+ \pi_{6j}(\text{Partner Sexual Satisfaction at Previous Assessment}) \\
 &+ \pi_{7j}(\text{Frequency of Sex Reported at Next Assessment}) + e_{ij}
 \end{aligned} \quad (1)$$

where the Time  $\times$  Time interaction estimates the curvilinear nature of the change in marital satisfaction. Participant sex, neuroticism, and attrition were controlled in the second level of the model, and dummy codes for study, cohabitation, and children were controlled in the third level of the model.

The results of this analysis are shown in the first set of columns in Table 5. It can be seen that neuroticism was negatively associated with subsequent marital satisfaction and initial levels of marital satisfaction whereas number of assessments completed was positively associated with subsequent marital satisfaction. But controlling for those associations, as predicted, initial levels of sexual satisfaction were positively associated with subsequent levels of marital satisfaction. That is, in line

**Table 3** Mean marital satisfaction, sexual satisfaction, sexual frequency, across waves of measurement for men and women

	Time 1	Time 2	Time 3	Time 4	Time 5	Time 6	Time 7	Time 8
Marital satisfaction								
Husbands								
M	41.87	39.96	39.59	38.51	38.34	39.29	39.59	39.56
SD	4.32	6.13	6.97	7.82	7.47	5.84	5.27	6.05
N	207	180	154	148	135	126	95	115
Wives								
M	42.17	40.19	39.68	38.74	39.24	38.57	38.87	39.60
SD	4.06	7.14	6.97	7.43	6.35	7.19	7.52	5.98
N	206	183	157	151	135	126	98	115
Sexual satisfaction								
Husbands								
M	147.20	141.21	139.04	136.50	136.83	136.81	135.37	135.06
SD	21.81	22.64	23.21	24.75	25.38	23.73	22.54	25.02
N	206	170	142	143	132	114	99	114
Wives								
M	147.35	142.95	138.43	139.37	136.66	137.75	138.32	140.49
SD	22.56	22.54	25.15	23.68	23.40	24.86	23.29	24.42
N	207	174	147	148	135	114	98	114
Frequency of sex								
Husbands								
M	54.95	60.60	43.55	39.92	38.69	36.48	37.46	–
SD	52.87	86.39	46.17	43.26	34.56	33.29	34.15	–
N	189	163	146	132	126	112	93	–
Wives								
M	53.35	60.19	54.69	39.10	40.53	37.48	33.30	–
SD	41.12	83.04	91.77	35.07	37.97	34.44	28.27	–
N	183	172	143	139	131	111	91	–

**Table 4** Changes in marital satisfaction, sexual satisfaction, and frequency of sex

	Marital satisfaction			Sexual satisfaction			Frequency of sex		
	Effect size			Effect size			Effect size		
	<i>b</i>	<i>SE</i>	<i>r</i>	<i>b</i>	<i>SE</i>	<i>r</i>	<i>b</i>	<i>SE</i>	<i>r</i>
Intercept	39.35	0.42		138.74	1.54		44.22	2.69	
Time	–0.44***	0.06	.48	–1.27***	0.23	.36	–3.96***	0.90	.29
Time × Time	0.15***	0.02	.43	0.43***	0.08	.35	0.83*	0.32	.18

*df* = 206

\*\*  $p < .01$ ; \*\*\*  $p < .001$

with bottom-up processing, spouses' satisfaction with their sexual relationships at one assessment positively predicted changes in their overall satisfaction with the relationship from that assessment to the next. This association did not vary across the two studies,  $t(205) = 1.23$ . Partner marital satisfaction, partner sexual satisfaction, and frequency of sex did not significantly predict changes in marital satisfaction.

#### Does Initial Marital Satisfaction Predict Changes in Sexual Satisfaction?

The second primary analysis tested the hypothesis that current marital satisfaction predicts changes in sexual satisfaction. This hypothesis was evaluated by substituting subsequent sexual satisfaction for subsequent marital satisfaction in Eq. (1).



**Table 5** Predictors of changes in marital satisfaction, sexual satisfaction, and frequency of sex

	Subsequent marital satisfaction			Subsequent sexual satisfaction			Subsequent frequency of sex		
	Effect size			Effect size			Effect size		
	<i>b</i>	<i>SE</i>	<i>r</i>	<i>b</i>	<i>SE</i>	<i>r</i>	<i>b</i>	<i>SE</i>	<i>r</i>
Intercept <sup>a</sup>	38.68	0.36		139.22	1.04		39.23	2.22	
Study <sup>a</sup>	0.51	0.45	.08	3.12*	1.36	.17	4.19	3.00	.10
Children <sup>a</sup>	0.24	0.37	.05	3.31	1.31	.17	−3.22	2.69	.08
Cohabitation <sup>a</sup>	0.31	0.44	.05	−0.91	1.47	.04	−12.18***	3.24	.26
Number of assessments completed <sup>b</sup>	0.46***	0.13	.17	0.04	0.43	.00	1.86*	0.87	.10
Participant sex <sup>b</sup>	0.20	0.27	.04	3.02***	0.89	.17	0.46	1.67	.01
Neuroticism <sup>b</sup>	−0.95***	0.25	.19	−5.00***	0.77	.31	0.45	1.41	.02
Sexual frequency <sup>c</sup>	0.01	0.00	.13	0.11***	0.01	.47	0.25***	0.04	.35
Own current Marital Satisfaction <sup>c</sup>	0.20***	0.05	.20	0.39***	0.11	.25	−0.11	0.34	.02
Own current sexual satisfaction <sup>c</sup>	0.03***	0.01	.26	0.40***	0.03	.53	0.17***	0.05	.22
Partner current marital satisfaction <sup>c</sup>	0.00	0.04	.01	−0.26*	0.11	.17	−0.41*	0.20	.15
Partner current sexual satisfaction <sup>c</sup>	0.01	0.01	.08	0.08*	0.03	.17	0.17***	0.04	.29

<sup>a</sup>  $df = 203$ <sup>b</sup>  $df = 411$ <sup>c</sup>  $df = 206$ , except  $df = 371$  when predicting subsequent levels of the same variable\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ 

The results of this analysis are shown in the second set of columns in Table 5. It can be seen that initial levels of sexual satisfaction were positively associated with subsequent levels of sexual satisfaction, neuroticism was negatively associated with subsequent levels of sexual satisfaction, and participant sex was positively associated with subsequent sexual satisfaction. But controlling for those associations, as predicted, current levels of marital satisfaction were positively associated with subsequent sexual satisfaction. That is, in line with top-down processing, spouses' satisfaction with their marital relationships at one assessment positively predicted changes in their satisfaction with their sexual relationships from that assessment to the next. Notably, a direct test comparing the magnitude of this association to the magnitude of the association involving initial sexual satisfaction and changes in marital satisfaction, after standardizing each effect, indicated these two effects did not differ in magnitude,  $z = 0.47$ . Additionally, frequency of sex positively predicted changes in sexual satisfaction, indicating that spouses who engaged in more sex over two assessments reported being more sexually satisfied at the next assessment. Neither the association involving initial marital satisfaction nor the one involving frequency of sex varied across the two studies: for marital satisfaction,  $t(205) = -1.28$ ; for frequency of sex,  $t(205) = -1.19$ .

Controlling these associations, partner sexual satisfaction also positively predicted changes in own sexual satisfaction. That is, spouses with partners who were more sexually satisfied at one assessment tended to be more sexually satisfied themselves at the next assessment. Interestingly, controlling this and the other associations, partner marital satisfaction was negatively

associated with changes in own sexual satisfaction, suggesting that spouses with partners who were more satisfied with the marriage at one assessment tended to be less sexually satisfied at the next assessment. Neither association varied across the two studies: for partner sexual satisfaction,  $t(205) = 1.11$ ; for partner marital satisfaction,  $t(205) < 1$ .

#### Do Sexual and Marital Satisfaction Predict Changes in Frequency of Sex?

The third analysis examined whether initial marital and sexual satisfaction predicted changes in the frequency of sex. This analysis substituted subsequent reports of the frequency of sex for subsequent marital satisfaction in Eq. (1).

The results of this analysis are shown in the final set of columns in Table 5. It can be seen that current levels of sexual but not marital satisfaction were positively associated with future frequency of sex. That is, spouses' current satisfaction with their sexual relationships positively predicted changes in the frequency with which they engaged in sex from that assessment to the next. Controlling this association, partner sexual satisfaction also positively predicted changes in frequency of sex, suggesting that the extent to which the partner was sexually satisfied at one assessment independently predicted greater frequency of sex from that assessment to the next. Interestingly, similar to the effect of partner marital satisfaction on changes in sexual satisfaction, partner marital satisfaction was negatively associated with changes in frequency of sex, suggesting that, controlling all other effects, having a partner who was more satisfied with the marriage at one assessment was

associated with having less sex from that assessment to the next. None of these associations varied significantly across the two studies, although the effects were marginally different across the two studies for partner sexual and marital satisfaction: for own sexual satisfaction,  $t(205) < 1$ , for partner sexual satisfaction,  $t(205) = 1.90$ ,  $p = .06$ ; for partner marital satisfaction,  $t(205) = 1.78$ ,  $p = .08$ .

#### Does the Strength of the Associations Differ Across Men and Women?

Finally, given theoretical reasons why the association between initial marital satisfaction and changes in sexual satisfaction may be stronger among women whereas the association between initial sexual satisfaction and changes in marital satisfaction may be stronger among men, we tested whether any of the associations that emerged in the three prior analyses differed across men and women by entering a dummy code for participant sex (0 = man, 1 = woman) to account for between-person differences in those associations in the second level of each model. In other words, whereas the previous analyses merely controlled for the main effect of participant sex, these analyses estimate the cross-level interaction between participant sex and each time-varying independent variable (e.g., initial sexual satisfaction) and thus examine whether each key association reported in Table 5 varied across men and women.

Men and women did not differ in the extent to which sexual satisfaction predicted changes in marital satisfaction,  $b = -0.01$ ,  $SE = 0.02$ ,  $t(407) < 1$ , effect size  $r = .00$ . Likewise, men and women did not differ in the extent to which marital satisfaction predicted changes in sexual satisfaction,  $b = 0.31$ ,  $SE = 0.21$ ,  $t(407) = 1.46$ , effect size  $r = .07$ . Men and women also did not differ in the extent to which frequency of sex predicted changes in sexual satisfaction,  $b = -0.01$ ,  $SE = 0.02$ ,  $t(407) < 1$ , effect size  $r = .03$ , or the extent to which sexual satisfaction predicted changes in frequency of sex,  $b = -0.02$ ,  $SE = 0.10$ ,  $t(407) < 1$ , effect size  $r = .01$ . Of the significant partner effects, only the significant effect of partner sexual satisfaction on changes in own sexual satisfaction varied significantly across men and women,  $b = -0.10$ ,  $SE = 0.05$ ,  $t(407) = -2.09$ ,  $p = .04$ , effect size  $r = .10$ , such that the association was significant among men,  $b = 0.14$ ,  $SE = 0.04$ ,  $t(206) = 3.50$ ,  $p < .01$ , effect size  $r = .24$ , but not among women,  $b = 0.04$ ,  $SE = 0.04$ ,  $t(206) < 1$ , effect size  $r = .07$ . The other gender differences were not significant: for the effect of partner marital satisfaction on changes in sexual satisfaction,  $b = 0.03$ ,  $SE = 0.23$ ,  $t(407) < 1$ , effect size  $r = .01$ , for the effect of partner marital satisfaction on changes in frequency of sex,  $b = -0.05$ ,  $SE = 0.44$ ,  $t(406) < 1$ , effect size  $r = .01$ ; for the effect of partner sexual satisfaction on changes in frequency of sex,  $b = 0.07$ ,  $SE = 0.10$ ,  $t(406) < 1$ , effect size  $r = .03$ . Finally, none of the non-significant associations varied across sex.

## Discussion

Although sexual and relationship satisfaction have been connected in numerous cross-sectional studies (see Impett et al., 2014; Sprecher & Cate, 2004), prior research has been inconsistent in demonstrating the direction of that relationship. The two longitudinal studies described here used eight assessments of sexual and marital satisfaction from 207 newlywed couples that spanned the first several years of marriage to demonstrate that the association between sexual and marital satisfaction was bidirectional. Although marital satisfaction declined over the course of the study on average, these declines were muted by relatively higher levels of sexual satisfaction—that is, relatively higher levels of sexual satisfaction reported at one assessment positively predicted changes in marital satisfaction from that assessment to the next. Additionally, although sexual satisfaction also declined over the course of the study on average, these declines were muted by relatively higher levels of marital satisfaction—that is, relatively higher levels of marital satisfaction reported at one assessment positively predicted changes in sexual satisfaction from that assessment to the next.

Prior studies have not documented compelling evidence for this bidirectional association. The current studies join one other study (Yeh et al., 2006) in demonstrating that initial sexual satisfaction predicted changes in marital satisfaction and are the first ones of which we are aware to demonstrate that initial relationship satisfaction predicted changes in sexual satisfaction. These effects may have been more robust in these two studies, compared to previous studies, because the couples examined here were in the early stages of their marriages and because the combined analysis of these two eight-wave studies provided ample power. Notably, both effects emerged controlling for frequency of sex, time, neuroticism, participant sex, how many assessments participants completed, and whether spouses lived together prior to marriage and had children at any point during the study. Further, neither effect varied across men and women or across the two independent studies.

The current studies were also the first of which we are aware to demonstrate the role of the frequency of sex in changes in relationship and sexual satisfaction. Specifically, more frequent sex also appeared to offset the average declines in sexual satisfaction that occurred over the course of these studies—that is, the frequency of sex reported at one assessment positively predicted changes in sexual satisfaction from that assessment to the next. Interestingly, this association was bidirectional as well, such that the level of sexual satisfaction reported at one assessment also positively predicted changes in the frequency of sex from that assessment to the next. Controlling for this association, levels of marital satisfaction did not directly predict changes in frequency of sex and changes in frequency of sex did not directly predict changes in marital satisfaction.

Nevertheless, those two variables appear to be indirectly linked to one another through sexual satisfaction.

Finally, the current studies are the first of which we are aware to examine associations among partner sexual and relationship satisfaction and changes in own relationship and sexual satisfaction and frequency of sex. Initial levels of partner sexual satisfaction were unrelated to changes in own marital satisfaction. In contrast, controlling for initial levels of own sexual satisfaction, initial levels of partner sexual satisfaction were positively associated with changes in own sexual satisfaction among men but not women, and initial levels of partner sexual satisfaction were positively associated with changes in frequency of sex for both men and women. Interestingly, once these associations were controlled, initial levels of partner marital satisfaction were negatively associated with changes in both frequency of sex and own sexual satisfaction and this association did not vary across men or women or across the two studies. This association was not expected and we are hesitant to generate post hoc explanations for it. Nevertheless, one explanation is that spouses who are less satisfied with the marriage overall focus on the sexual aspects of the relationship, either in attempts to improve the relationship or maximize their current benefits, which leads to more frequent sexual activity and higher levels of sexual satisfaction for their partners. Future research may benefit by attempting to evaluate this speculative interpretation.

Only one significant gender difference emerged across all effects: the extent to which partner sexual satisfaction predicted changes in own sexual satisfaction was significantly stronger (and only significant) among men. This finding suggests that men may prioritize their partner's sexual satisfaction more than women do. Regarding the remaining non-significant gender differences, although existing theory suggests that young women may rely more strongly on their satisfaction with their relationships to evaluate their sexual relationships, because they tend to rely more heavily on such contextual factors when evaluating their sexual experiences (Baumeister, 2000; Diamond, 2003), current marital satisfaction predicted changes in sexual satisfaction to the same extent for men and women. Likewise, although research indicates that the sexual relationship may be more important to young men's overall evaluations of their relationships than to young women's (Ellis & Symons, 1990; Fletcher et al., 1999; Peplau, 2003), current sexual satisfaction and frequency of sex did not more strongly predict marital satisfaction among men than among women. Notably, the large majority of the effect sizes of these differences were close to zero, suggesting it was not due to a lack of power that effects for men and women did not significantly differ from one another. Instead, in a marital relationship, sexual and marital satisfaction may be equally tied together for men and women. Nevertheless, it is also possible that this is particularly or even only true in the early stages of such relationships. Some research suggests that sexual desire may decline more precipitously for

women than for men (Heiman et al., 2011), which suggests that gender differences may emerge in more established relationships.

### Theoretical and Practical Implications

The current findings have several notable implications. First, they highlight important processes that may be missing from existing theories of relationship development. Specifically, in contrast to this evidence that both top-down and bottom-up processing play a role in relationship development, some theories of relationships have emphasized one type of processing while neglecting the other. For instance, work on attachment theory (see Shaver & Mikulincer, 2002) tends to focus on how people's broader beliefs about their partners and relationships shape their perceptions of those partners and relationships. Although such work helps us understand how and why insecurely attached individuals may experience chronic negative evaluations of their relationships through top-down processing, it does not provide much insight into how bottom-up processing leads relationships to change over time—as the great majority do (see Karney & Bradbury, 1995b). In contrast, work from more behavioral perspectives (e.g., Thibaut & Kelley, 1959; Wills, Weiss, & Patterson, 1974) focuses on how partners' positive or negative experiences with one another ultimately shape their evaluations of one another. Although such work provides an understanding of how relationships may change through bottom-up processing, it provides little insight into how partners' existing beliefs may influence the way they perceive one another's behaviors through top-down processing. Ultimately, theories that incorporate aspects of both top-down and bottom-up processing, such as Fiske and Neberg's (1990) continuum model, may provide the most comprehensive description of relationship change and stability. Of course, the strength of all associations may vary across different types of people or people in different stages of their relationships. Future research may benefit by examining crucial moderators of these associations.

Additionally, the current findings have implications for interventions designed to treat and prevent relationship distress. Specifically, the reciprocal nature of sexual and relationship satisfaction suggests clients experiencing sexual problems may benefit from interventions that target their relationship quality and clients experiencing problems with their relationship quality may benefit from interventions that target their sexual relationship. Further, more broadly, the idea that evaluations of specific domains influence global evaluations of the relationship and vice versa suggests that both types of evaluations should be targeted in interventions: just as couples may develop more positive global evaluations to the extent that interventions improve their evaluations of the specific aspects of their relationships, they may develop more positive evaluations of the specific aspects of their

relationships to the extent that interventions improve their global evaluations.

### Strengths, Limitations, and Conclusion

Several strengths of this research enhance our confidence in the findings reported here. First, whereas the average rate of retention in prior longitudinal research on marriage is 69% (Karney & Bradbury, 1995b), analyses in the current study used empirical Bayes procedures to estimate within-person parameters of participants with missing data, which allowed us to include all the participants in both samples despite the fact that not everyone completed every assessment. Further, analyses controlled for the number of assessments each spouse completed, reducing the likelihood that the results may have been influenced by biases due to attrition. Second, the use of newlywed samples allowed us to study relationships at a time of significant change and adjustment, providing the opportunity to account for variance in both types of satisfaction. Third, the findings emerged after controlling for neuroticism, cohabitation prior to marriage, and whether or not the couple had children, reducing the likelihood that these results were due to third variables. Fourth, the trends over time that were observed in the current research were consistent with those that have been observed by others (e.g., Call et al., 1995; McNulty et al., 2008), suggesting the data from the current studies were similar to those used in other research and thus provided an adequate test of the study hypotheses.

Despite these strengths, several qualities of this research limit the extent to which some conclusions can be drawn until the findings are extended. First, although the newlywed samples provided a unique opportunity to study change, the results reported here may not apply to other samples, i.e., more established relationships, or more distressed couples. Indeed, although Yeh et al. (2006) also demonstrated that sexual satisfaction predicted changes in marital satisfaction in their sample of more established marriages, they were unable to detect a significant association between marital satisfaction and changes in sexual satisfaction. Second, despite the longitudinal design and the control of potential confounds such as neuroticism and whether or not the couple had children, these data are nevertheless correlational and thus causal conclusions should be made with caution. Third, our measure of frequency of sex required that intimates report how many times they had sex over the prior 6 months. Such estimates are likely difficult and thus may contain error that may have attenuated or even strengthened our effects. Future research may benefit by using more precise estimates of frequency of sex by obtaining them over a shorter interval or by using diary procedures to more reliably document sexual activity.

Despite the shortcomings, the strengths of this study have advanced our understanding of the relationships among relationship satisfaction, sexual satisfaction, and frequency

of sexual activity in the first years of marriage. These data provide some of the strongest evidence to data that sexual and relationship satisfaction are causally linked in a bidirectional manner that makes each variable uniquely important to relationship development.

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