



# Sex-Differentiated Changes in Sexual Desire Predict Marital Dissatisfaction

James K. McNulty<sup>1</sup> · Jessica A. Maxwell<sup>1</sup> · Andrea L. Meltzer<sup>1</sup> · Roy F. Baumeister<sup>2</sup>

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## Abstract

Sex is critical to marriage. Yet, there are several reasons to expect spouses to experience declines in the desire for sex over time, and the rates of any declines in sexual desire may differ for men and women. We used two multi-wave, longitudinal studies to test whether male and female members of newlywed couples experienced different rates of change in sexual desire, whether any such changes were accentuated by childbirth, and whether any such changes had implications for marital satisfaction. In both studies, spouses provided multiple reports of sexual desire, marital satisfaction, and childbirth. Results demonstrated that women's sexual desire declined more steeply over time than did men's sexual desire, which did not decline on average. Further, childbirth accentuated this sex difference by partially, though not completely, accounting for declines in women's sexual desire but not men's. Finally, declines in women's but not men's sexual desire predicted declines in both partners' marital satisfaction. These effects held controlling depressive symptoms and stress, including stress from parenthood. The current findings offer novel longitudinal evidence for sex-differentiated changes in sexual desire and therefore suggest an important source of marital discord.

**Keywords** Marriage · Sexual desire · Sex differences · Gender differences · Sexuality · Passion

## Introduction

Marriage can be difficult. People frequently form romantic bonds with one another that they expect to last a lifetime (see McNulty & Karney, 2004). But people and circumstances change. Indeed, many spouses struggle to remain satisfied with their marriage (Meltzer, McNulty, Jackson, & Karney, 2014; VanLaningham, Johnson, & Amato, 2001), and marital dissolution rates in many Western countries range between 30 and 50% (Amato & James, 2010; Schoen & Canudas-Romo, 2006). The ubiquity of marital discord is particularly troubling in light of robust data, indicating that quality close relationships are a significant source of mental and physical health (Holt-Lunstad, Smith, & Layton, 2010; Proulx, Helms, & Buehler, 2007; Robles, Slatcher, Trombello, & McGinn, 2015). Here, we offer novel empirical evidence for an underexplored predictor

of marital discord—sex-differentiated changes in couple members' sexual desire.

Sexual behavior is a defining feature of romantic relationships (Fisher, 1998; Hazan & Zeifman, 1994), and thus, it is not surprising that sex has critical implications for both relational and individual well-being (McNulty, Wenner, & Fisher, 2016; Meltzer et al., 2017; Schmiedeberg, Huyer-May, Castiglioni, & Johnson, 2017; Yeh, Lorenz, Wickrama, Conger, & Elder, 2006; for review, see Maxwell & McNulty, 2019). For instance, in a pair of multi-wave, longitudinal studies spanning several years, sexual satisfaction at one assessment significantly predicted changes in marital satisfaction from that assessment to the next (McNulty et al., 2016). High levels of sexual satisfaction may be easier to sustain in monogamous relationships in which the two partners demonstrate strong and equal levels of sexual desire (e.g., Day, Muise, Joel, & Impett, 2015). Nevertheless, instances in which couple members desire sex consistently throughout a relationship are rare (e.g., Baumeister & Bratslavsky, 1999; Herbenick, Mullinax, & Mark, 2014; Risch, Riley, & Lawler, 2003). Instead, the frequency of sexual intercourse appears to decline sharply over the early years of mixed-sex marriages (Ard, 1977; James, 1981; McNulty et al., 2016). It is possible that such declines reflect circumstances that equally impact both partners' conscious desire for sex, in

✉ James K. McNulty  
mcnulty@psy.fsu.edu

<sup>1</sup> Department of Psychology, Florida State University, 1107 W. Call St., Tallahassee, FL 32306, USA

<sup>2</sup> School of Psychology, University of Queensland, St. Lucia, QLD, Australia

which case they may not result in much resentment or conflict. But it is also possible that men and women demonstrate different trajectories of sexual desire, in which case members of mixed-sex relationships may risk experiencing conflict and relationship dissatisfaction over time.

### Emerging Mismatch?

There are competing perspectives regarding whether men and women on average experience different rates of changes in sexual desire over the early years of marriage. There are some reasons to expect both men and women will experience similar rates of decline. The early years of marriage are known to be stressful generally (see Neff & Karney, 2004, 2009), and any transition to parenthood likely increases such stress. Given that stressors tend to decrease sexual desire (Bodenmann, Ledermann, Blattner-Bolliger, & Galluzzo, 2006; Laumann, Paik, & Rosen, 1999), increased stress from career and housework demands are likely to decrease sexual desire over the course of a new marriage (Sims & Meana, 2010).

But there are also reasons to expect declines in sexual desire to be sex-differentiated. One such reason suggests declines in sexual desire may be more pronounced among men. First, some have argued that novelty is more central to male than female sexual response (i.e., the Coolidge effect; Buss & Schmitt, 1993; Wilson, Kuehn, & Beach, 1963). Therefore, the loss of novelty in marriage may affect husbands more strongly than wives. Second, testosterone tends to decrease among committed men (Booth & Dabbs, 1993; Mazur & Michalek, 1998; McIntyre et al., 2006), and correlational and experimental research suggests that decreased testosterone is associated with decreased sexual desire (Anderson, Bancroft, & Wu, 1992; Bancroft, 2002; Buster et al., 2005; Pfäus, 2009). Nevertheless, there are at least two reasons to question whether decreases in testosterone lead to greater decreases in sexual desire among men compared to women. First it remains unclear whether women experience corresponding—or even more substantial—declines in testosterone over the course of committed relationships that may be associated with similar or even steeper declines in sexual desire. Second, the association between testosterone and sexual desire has faced serious challenges (van Anders, 2012, 2013).

In fact, there are several reasons to expect *women* to demonstrate steeper declines in sexual desire compared to men. First, there is some evidence that numerous challenges associated with marriage, not the least of which is birth and child rearing (Twenge, Campbell, & Foster, 2003), often burden women more than men (Hochschild, 1989; Lachance-Grzela & Bouchard, 2010). Given that stress and decreased psychological well-being can undermine sexual desire particularly strongly among women (Bodenmann et al., 2006; Maas,

McDaniel, Feinberg, & Jones, 2018; Milhausen, Graham, Sanders, Yarber, & Maitland, 2010), women may experience steeper declines in sexual desire over time than do men. Second, sexual desire may function differently for men and women for reproductive reasons, and these differences may lead women's sexual desire to decline more sharply over the first several years of a relationship compared to men's. Although a primary function of sexual desire is reproduction, women are more limited than men in the number of offspring they can produce. Given that women have a higher level of obligatory investment in producing offspring (e.g., gestation, birth; Trivers, 1972) and often play a more significant role in childrearing tasks (Dush, Yavorsky, & Schoppe-Sullivan, 2018; Wood & Eagly, 2002; Yavorsky, Kamp Dush, & Schoppe-Sullivan, 2015), the finite amount of time and energy they devote to reproducing more offspring may naturally shift toward other goals once pregnancy is achieved. This is not to say women should have no desire for sex following successful reproduction; they may simply show declines in their sexual desire upon achieving pregnancy. Given that men can produce numerous more offspring with little investment, their sexual desire may not wane as much.

Moreover, there is reason to expect women's sexual desire may decline more than men's over the early years of marriage even in the absence of any offspring. Although the primary function of sexual desire may be reproduction, a secondary function is to promote pair bonding (Birnbaum, 2018; Meltzer et al., 2017). In fact, humans are exceptional in their tendency to engage in sex outside the fertile window, known as extended sexuality (Thornhill, 2007; Thornhill & Gangestad, 2008), and this tendency may be driven, at least in part, by the role of sexual behavior in pair bonding. Indeed, recent perspectives suggest that extended sexuality functions to help women gain and maintain investment from men (Grebe, Gangestad, Garver-Apgar, & Thornhill, 2013; Rodríguez-Gironés & Enquist, 2001; Thornhill, 2007; Thornhill & Gangestad, 2008). Consistent with such perspectives, recent research suggests that women are more likely to engage in sex outside of their fertile window when they perceive that their partners are relatively low in their investments into the relationship (Grebe et al., 2013). It is thus possible that women's sexual desire functions in part to secure investment from the partner through sexual behavior. If so, this perspective also suggests women's desire may decline more than men's as interdependence deepens over time (Finkel, Hui, Carswell, & Larson, 2014; Le & Agnew, 2003; Rusbult, 1983), such as with the birth of children, because it may be less critical for women to maintain high levels of sexual desire as men grow more invested over time.

## Existing Research

There is some indirect evidence consistent with the idea that women do in fact show steeper declines in sexual desire over the course of committed mixed-sex relationships compared to men (Arndt, 2009; Benedictus & Raeside, 2014; Byers & Lewis, 1988; Graham et al., 2017; Hawton & Catalan, 1986; Klusmann, 2002; Murray & Milhausen, 2012; Rosen & Leiblum, 1989; Sutherland, Rehman, Fallis, & Goodnight, 2015; for review, see Baumeister, Catanese, & Vohs, 2001). For example, studies of marital and sex therapy find that couples struggle more frequently with a lack of sexual interest among wives than among husbands (Hawton & Catalan, 1986; Rosen & Leiblum, 1989). Likewise, in a recent study of heterosexual couples, men had higher sexual desire in 59% of cases, compared to only 11% in which women had higher desire (Sutherland et al., 2015). Additionally, Byers and Lewis (1988) found that half the couples in their study disagreed at least once per month about sex, and all disagreements involved women refusing some sexual act desired by their male partner. Finally, cross-sectional studies have found that women report less sexual desire than do men, and these discrepancies are positively correlated with duration of the relationship (Graham et al., 2017; Klusmann, 2002; Murray & Milhausen, 2012).

Of course, these sex differences could have emerged due to cohort effects and environmental changes, and so, none of them confirms that a discrepancy in sexual desire emerges and grows as a typical part of marriage over time. Only longitudinal studies can address this possibility. Although several longitudinal studies have examined the impact of sexual satisfaction and changes in sexual satisfaction on changes in marital satisfaction (McNulty et al., 2016; Yeh et al., 2006), we are aware of no longitudinal studies that have specifically examined changes in sexual desire. Further, we are aware of no research that has examined whether the birth of children accentuates any sex-differentiated declines in sexual desire over early marriage. Finally, although there are several studies that have shown how discrepancies in partners' sexual desire are related to sexual and relationship functioning (e.g., Mark, 2015; Rosen, Bailey, & Muise, 2018), we are aware of no studies that have directly addressed whether changes in men's and women's sexual desire over the course of early marriage predict changes in relationship satisfaction, which is a conceptually different question with different theoretical implications.

We used two samples of mixed-sex newlywed couples who reported on their sexual desire, childbirth, and marital satisfaction every 6–8 months, as part of broader studies. (All data were collected, but not analyzed, before these hypotheses were formulated.) Based on the fact that existing data appear more consistent with the theoretical perspective that suggests steeper declines in sexual desire for women, we specifically predicted that wives would show a steeper decline in sexual desire over time than would husbands and we further

expected this difference to be exacerbated by the birth of children. Further, we expected wives' declining desire could lead to lower perceived marital quality for both spouses. Our study provides an important initial investigation into sexual desire trajectories (and potential sex differences in these trajectories), which can lay the groundwork for future research into potential mechanisms for such declines.

## Method

### Participants

We drew from two existing independent, multi-year, multi-wave longitudinal studies of newlywed couples. Participants in Study 1 were 144 members of 72 newlywed couples recruited from a community in north-central Ohio; participants in Study 2 were 270 members of 135 newlywed couples recruited from a community in eastern Tennessee. 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 study of newlyweds. The second was to send invitations to eligible couples who had completed marriage license applications in counties near each study location. All couples responding to either 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). Eligible couples were scheduled for an initial laboratory session and mailed a packet of questionnaires.

Notably, 44 couples (61.1%) in Study 1 and 40 couples (29.6%) in Study 2 reported having children by study completion. Although this suggests that a higher proportion of couples in Study 1 had children over the course of the study compared to Study 2, it is important to note that 14 husbands and 13 wives in Study 1 reported having children at the start of the study, which we controlled for in all analyses involving birth.

### Procedure

Procedures were nearly identical in each study. As part of the broader aims of each study, spouses completed a packet of questionnaires at home that they brought to a subsequent laboratory appointment. This packet included self-report measures of demographics, sexual desire, and marital satisfaction, as

well as a letter instructing spouses to complete all questionnaires independently of one another and bring their completed questionnaires to their laboratory session. We compensated couples \$80US in both studies for this initial phase.

Seven times in each study, at approximately 6- to 8-month intervals subsequent to the initial assessment, we re-contacted couples by phone and again mailed them measures of marital satisfaction, a measure assessing whether the wife had given birth since the previous assessment, a letter of instruction reminding spouses to complete the surveys independently, and a postage-paid return envelope. In Study 1, the first 6 of these assessments contained the same measure of sexual desire, leading to 7 assessments of sexual desire (including the initial assessment); in Study 2, the first 2 of these assessments contained that measure, leading to 3 assessments of sexual desire (including the initial assessment). In both studies, we mailed couples a \$50 US check for completing each follow-up assessment. 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 baseline assessment. Study 1 spanned approximately 4.5 years and Study 2 spanned approximately 4 years. Regarding attrition, 86% of participants reported on sexual desire at least twice and 70% of participants reported on sexual desire at least three times. The number of participants reporting at each wave is given in Table 3, and supplemental analyses controlled for the number of waves completed.

## Measures

### Demographic Information

Participants reported their age, the number of years of their education, whether or not they were employed (and if so full versus part time), whether they were in school (full versus part time), their median yearly income, and their ethnicity. We did

not directly ask participants their sexual orientation or gender identity, but at the time of each study, marriages were only granted to mixed-sex couples. Demographic information is shown in Table 1.

### Sexual Desire

Although there are numerous ways to operationalize sexual desire, we chose to examine self-reported sexual desire because differences in such reports may be most likely to challenge marital harmony. Specifically, we assessed spouses' desire for sex with their partner using the 25-item Hurlbert Index of Sexual Desire (Apt & Hurlbert, 1992). Specifically, spouses indicated how frequently 25 statements were true for them, using a 5-point scale (1 = Never, 5 = All of the time). It is worth noting that 13 items of these items assessed desire for sex with "my partner" specifically (e.g., "I enjoy thinking about having sex with my partner"), whereas 12 items did not mention the partner specifically and thus assessed desire for sex generally (e.g., "I have a strong sex drive"). Given we had no strong reasons to expect differences, our primary analyses relied on the average of all items (as the scale is intended to be scored; Hurlbert, 2011), after reverse scoring the necessary items so that higher scores reflected greater sexual desire. Nevertheless, given the potential interest to readers, we also conducted some supplemental analyses to examine whether similar results emerged using the general and partner-specific items as separate measures ( $r = .78$  for both husbands and wives). 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 for the entire measure, at least .85 for the general items, and at least .80 for the partner-specific items.

### Children

At all follow-up assessments, wives indicated whether they had given birth since the previous assessment. We formed a dummy code to indicate whether wives gave birth over the course of the

**Table 1** Sample demographics

	Study 1		Study 2	
	Husbands	Wives	Husbands	Wives
Age (in years)	24.92 (4.39)	23.54 (3.85)	25.90 (4.57)	24.21 (3.59)
Years of education	14.15 (2.48)	14.72 (2.24)	15.69 (2.38)	15.74 (2.22)
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%

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

study, such that 0 represented not giving birth to a child at any assessment and 1 represented having given birth to a child at a minimum of one assessment. We also formed an additional dummy code used in analyses of Study 1 and the two studies combined such that 0 represented no children at the start of the study and 1 represented having at least one child at the start of the study.

### Marital Satisfaction

We assessed spouses' marital satisfaction using two established measures. The first measure was a version of the semantic differential (Osgood, Suci, & Tannenbaum, 1957) that required spouses to rate their perceptions of their marriage on 7-point scales between 15 pairs of opposing adjectives (e.g., *bad-good*, *dissatisfied-satisfied*, *unpleasant-pleasant*). This version yields scores from 15 to 105, with higher scores reflecting higher marital satisfaction (for husbands,  $M=91.14$ ,  $SD=13.50$  across waves in Study 1 and  $M=94.99$ ,  $SD=10.91$  across waves in Study 2; for wives,  $M=90.73$ ,  $SD=14.88$  across waves in Study 1 and  $M=95.07$ ,  $SD=11.91$  across waves in Study 2). The second measure was the Quality Marriage Index (Norton, 1983), which required spouses to indicate their level of agreement with five items that describe the general quality of their marriage (e.g., "We have a good marriage") using a 7-point scale (1 = Very strong disagreement, 7 = Very strong agreement), and to rate their overall marital quality on a 10-point scale (1 = Very unhappy, 10 = Perfectly happy). We summed these six items, and thus, scores could range from 6 to 45; higher scores reflect higher marital satisfaction (for husbands,  $M=39.77$ ,  $SD=5.66$  across waves in Study 1 and  $M=41.31$ ,  $SD=4.55$  across waves in Study 2; for wives,  $M=39.43$ ,  $SD=6.44$  across waves in Study 1 and  $M=41.30$ ,  $SD=5.06$  across waves in Study 2). Reliability of each scale was high (all  $\alpha \geq .90$ ). Given strong conceptual and empirical overlap (in Study 1,  $r=.92$ ; in Study 2,  $r=.89$ ), we standardized and averaged across these two measures for each spouse.

### Stress and Depressive Symptoms

Given that one perspective on changes in sexual desire suggests women's sexual desire may decline more steeply than men's because women experience greater stress and decreased psychological well-being over the first few years of marriage, we assessed intimates' chronic stress and depressive symptoms at baseline and all follow-up assessments. Participants reported their level of stress experienced in each of 13 life domains thought to be inclusive of the most common sources of stress as identified by the UCLA Life Stress Inventory (Hammen et al., 1987; for other research using this scale, see Neff & Broady, 2011; Neff & Karney, 2007): the marital relationship,

relationships with family, relationships with in-laws, relationships with friends, experiences at school, experiences at work, experiences as a homemaker, unemployment, finances, living conditions, own health, spouse's health, and, perhaps most importantly, parenthood, using a 9-point scale (1 = Not at all stressful, 9 = Extremely stressful). We averaged participants' responses; higher scores reflect greater stress (for husbands,  $M=3.66$ ,  $SD=1.28$  across waves in Study 1 and  $M=3.64$ ,  $SD=1.38$  across waves in Study 2; for wives,  $M=3.65$ ,  $SD=1.18$  across waves in Study 1 and  $M=3.65$ ,  $SD=1.29$  across waves in Study 2). We also conducted a more precise test of whether the primary effects held controlling stress from parenthood alone by using only the single item that assessed stress in that domain, where people without children were assigned a 1 (before non-parents were assigned a 1, husbands,  $M=4.25$ ,  $SD=2.33$  across waves in Study 1 and  $M=3.95$ ,  $SD=2.85$  across waves in Study 2; for wives,  $M=4.30$ ,  $SD=2.21$  across waves in Study 1 and  $M=5.40$ ,  $SD=2.95$  across waves in Study 2; after non-parents were assigned a 1, husbands,  $M=2.12$ ,  $SD=2.03$  across waves in Study 1 and  $M=1.19$ ,  $SD=1.02$  across waves in Study 2; for wives,  $M=2.13$ ,  $SD=2.02$  across waves in Study 1 and  $M=1.17$ ,  $SD=0.97$  across waves in Study 2).

We assessed depressive symptoms at all eight assessments in Study 2 using the 20-item Center for Epidemiologic Studies Depression scale (Radloff, 1977), which assesses the extent to which individuals experienced depressive symptoms (e.g., "I felt depressed") over the past week (0 = None of the time, 3 = All of the time). We averaged participants' responses such that higher scores reflect greater depressive symptoms (for husbands,  $M=7.36$ ,  $SD=5.93$  across waves; for wives,  $M=8.54$ ,  $SD=7.06$  across waves). Internal consistency was adequate ( $\alpha \geq .82$  for husbands and wives at all assessments).

### Sexual Satisfaction and Sexual Frequency

These couples also reported on the frequency of their sexual behavior and their sexual satisfaction. Though change in these reports, as well as their associations with one another and with marital satisfaction, has been reported elsewhere (McNulty et al., 2016), we conducted several supplemental analyses to examine the associations between these variables and sexual desire. The frequency of sex was assessed by asking spouses to estimate the number of times they "had sex with [their] partner" in the past 6 months every 6 months of the study. We averaged across couple members' reports at each wave because we assumed it would be a more accurate estimate of behavior than either partner's reports alone. Sexual satisfaction was assessed with the 25-item Index of Sexual Satisfaction (Hudson, 1998). Reliability and descriptive information is reported in McNulty et al. (2016).

## Results

### Descriptive Statistics and Preliminary Analyses

Descriptive statistics for husbands' and wives' sexual desire at each assessment, as well as the number of spouses who completed reports at each assessment, are shown in Table 2. As would be expected among newlyweds, both couple members reported moderate to high levels of sexual desire in the initial stages of the studies, on average. Notably, consistent with the idea that women show greater flexibility (i.e., plasticity) in their sexual desire (Baumeister, 2000), there was greater within-person variability in wives' sexual desire (Study 1:  $SD = 0.31$ ; Study 2:  $SD = 0.34$ ) than in husbands' (Study 1:  $SD = 0.26$ ; Study 2:  $SD = 0.18$ ; Study 1:  $t[65] = 2.00, p = .049$ ; Study 2:  $t[110] = 6.33, p < .001$ ).

### Trajectories of Husbands' and Wives' Sexual Desire

We used growth curve modeling (Bryk & Raudenbush, 1987) to estimate within-person change in spouses' sexual desire across the first several years of marriage. Specifically, we estimated the following first level of a 2-level model using the Hierarchical Linear Modeling 7.01 computer program (Raudenbush, Bryk, & Congdon, 2013), in which we estimated husbands' and wives' parameters separately but simultaneously using a multivariate technique suggested by Raudenbush, Brennan, and Barnett (1995):

$$Y_{ij}(\text{sexual desire}) = \pi_{1ij}(\text{dummy code for husbands}) + \pi_{2ij}(\text{dummy code for wives}) + \pi_{3ij}(\text{husbands' time of assessment}) + \pi_{4ij}(\text{wives' time of assessment}) + e_{ij}, \quad (1)$$

where (1) time represents wave of assessment and was coded from 0 to 7 (so that the intercepts represented initial sexual desire for husbands and wives, respectively), (2) the autocorrelation from repeated assessments was controlled in the second level of the analysis, and (3) all Level 2 estimates were allowed to vary randomly. We used restricted maximum likelihood estimation and placed no restrictions on the autoregressive error structures. For these and all other analyses, we estimated our model three times: once using the data from Study 1, once using the data from Study 2, and once collapsing across the two studies.

Results are presented in Table 3 and depicted in Fig. 1. According to all three analyses, husbands and wives reported initial sexual desire that was at or slightly above the midpoint of the scale. Nevertheless, as given in the last two columns of Table 3, direct tests revealed that husbands reported higher initial levels of sexual desire than did wives in all three analyses. Moreover, husbands experienced stable sexual desire over time in Study 1, some decline in sexual desire over time in Study 2, and stable sexual desire over time in the most powerful combined analysis. Wives, in contrast, demonstrated significant declines in all three analyses with moderate to large effect sizes. Most importantly, as can be also seen in the last two

**Table 2** Descriptive statistics of husbands' and wives' mean sexual desire at each wave of assessment

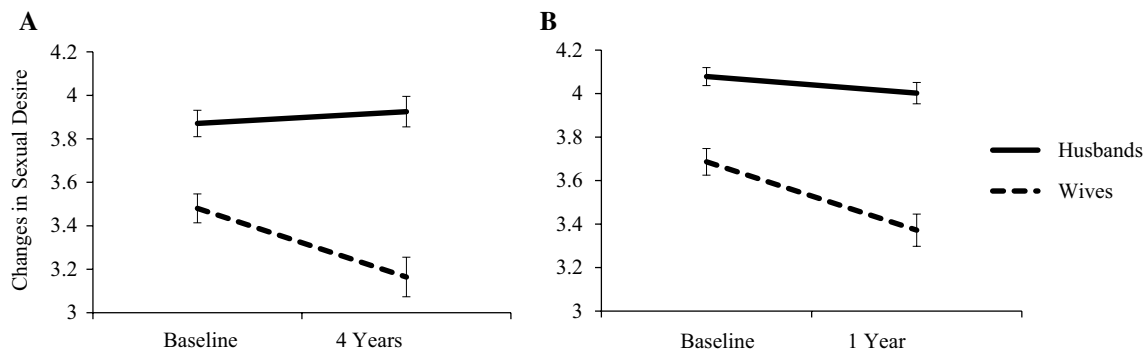
	Time 1	Time 2	Time 3	Time 4	Time 5	Time 6	Time 7
Study 1							
Husbands							
<i>M</i>	3.90	3.82	3.87	3.94	3.84	3.87	3.94
<i>SD</i>	0.53	0.56	0.57	0.54	0.56	0.53	0.57
<i>N</i>	72	63	56	55	52	51	36
Wives							
<i>M</i>	3.50	3.47	3.31	3.28	3.26	3.18	3.17
<i>SD</i>	0.58	0.60	0.62	0.66	0.66	0.76	0.67
<i>N</i>	72	66	60	58	54	51	37
Study 2							
Husbands							
<i>M</i>	4.08	4.05	4.04	–	–	–	–
<i>SD</i>	0.49	0.49	0.51	–	–	–	–
<i>N</i>	135	106	83	–	–	–	–
Wives							
<i>M</i>	3.70	3.50	3.46	–	–	–	–
<i>SD</i>	0.73	0.75	0.72	–	–	–	–
<i>N</i>	135	108	86	–	–	–	–

**Table 3** Husbands' and wives' sexual desire trajectories in each individual study and collapsing across studies

	Husbands			Wives			Sex difference	
	$\pi$	SE	$r$	$\pi$	SE	$r$	$\chi^2$	$p$
Study 1								
Initial desire	3.87***	0.06	–	3.48***	0.07	–	16.89	<.001
Changes in desire	0.01	0.01	.10	–0.05***	0.01	.42	13.33	<.001
Study 2								
Initial desire	4.08***	0.04	–	3.69***	0.06	–	29.84	<.001
Changes in desire	–0.04*	0.02	.18	–0.16***	0.03	.40	11.41	.001
Combined analysis								
Initial desire	3.99***	0.03	–	3.60	0.05	–	49.93	<.001
Changes in desire	0.00	0.01	.00	–0.09***	0.01	.40	28.92	<.001

In Study 1,  $df=71$ . In Study 2,  $df=134$ . In combined analysis,  $df=205$  for intercepts and 206 for slopes. Effect size  $r$  is reported

\* $p < .05$ , \*\*\* $p < .001$



**Fig. 1** Husbands' and wives' trajectories of sexual desire across the first several years of marriage in Study 1 (a) and Study 2 (b)

columns of Table 3, direct tests revealed that husbands' (lack of) change in sexual desire statistically differed from wives' significant decline in sexual desire in all three analyses. Both sex differences remained significant in all three analyses when we controlled for the number of waves completed (i.e., differential attrition) (Study 1: initial desire,  $\chi^2[1]=16.48$ ,  $p < .001$ , change in desire,  $\chi^2[1]=10.35$ ,  $p < .001$ ; Study 2: initial desire,  $\chi^2[1]=45.83$ ,  $p < .001$ , changes in desire,  $\chi^2[1]=45.96$ ,  $p < .001$ ; initial desire,  $\chi^2[1]=29.68$ ,  $p < .001$ , changes in desire,  $\chi^2[1]=4.93$ ,  $p = .025$ ).

These analyses were based on the full measure of sexual desire, which enjoys the intended psychometric qualities of the measure. However, after conducting these analyses, we noted the potential theoretical importance of distinguishing between sexual desire in general and sexual desire specifically for one's spouse and thus examined the general and partner-specific items in separate analyses. These analyses provided some insight into whether wives lost desire to have sex with their husbands specifically and/or whether they lost the desire for sex generally. Likewise, these analyses enabled us to examine whether husbands maintained desire for sex with their wives specifically and/or whether they maintained

desire for sex more generally. Results are reported in Table 4 and show the same pattern across the two measures. That is, men demonstrated higher initial desire and less steep declines in desire compared to wives, both generally and with specific reference to the spouse. Given the nearly identical pattern of effects across the two measures, we relied on only the full measure for the remaining analyses.

### Does the Birth of Children Account for Changes in Husbands' and Wives' Sexual Desire Over Time?

Next, we examined whether the birth of children during the first several years of marriage accounted for changes in husbands' and wives' sexual desire over the course of each study. To estimate these associations, we re-estimated Eq. 1 but included at Level 2 the dummy code of whether wives reported giving birth at any follow-up assessment and the interactions between those dummy codes and husbands' and wives' time of assessment. Further, given the birth of children is consistently linked to marital satisfaction, a potential confound, we controlled marital satisfaction in these analyses as a time-varying covariate. We allowed all Level 2 estimates to vary across individuals. We

**Table 4** Husbands' and wives' general and partner-specific sexual desire trajectories in each individual study and collapsing across studies

	Husbands			Wives			Sex difference	
	$\pi$	SE	$r$	$\pi$	SE	$r$	$\chi^2$	$p$
Study 1								
General sexual desire								
Initial desire	3.76***	0.07	–	3.26***	0.07	–	23.88	<.001
Changes in desire	0.02	0.01	.20	–0.04*	0.01	.29	11.11	.001
Partner-specific sexual desire								
Initial desire	3.97***	0.06	–	3.68***	0.07	–	9.32	.003
Changes in desire	–0.00	0.01	.03	–0.07***	0.01	.49	12.73	<.001
Study 2								
General sexual desire								
Initial desire	4.01***	0.05	–	3.53***	0.07	–	35.29	<.001
Changes in desire	–0.01	0.02	.06	–0.16***	0.03	.36	12.39	<.001
Partner-specific sexual desire								
Initial desire	4.14	0.04	–	3.83***	0.06	–	20.17	<.001
Changes in desire	–0.06**	0.02	.24	–0.16***	0.03	.42	8.14	.005
Combined								
General sexual desire								
Initial desire	4.07***	0.03	–	3.76***	0.05	–	30.89	<.001
Changes in desire	–0.01	0.01	.09	–0.10***	0.01	.43	24.02	<.001
Partner-specific sexual desire								
Initial desire	3.91***	0.04	–	3.41***	0.05	–	66.06	<.001
Changes in desire	0.01	0.01	.08	–0.07***	0.02	.33	26.31	<.001

In Study 1,  $df=71$ . In Study 2,  $df=134$ . In combined analysis,  $df=205$  for intercepts and 206 for slopes. Effect size  $r$  is reported

\* $p < .05$ , \*\*\* $p < .001$

once again estimated this model three times: once to examine the effect in Study 1 only, once to examine the effect in Study 2 only, and once collapsing across the two studies. Given that having children prior to the marriage in Study 1 could have influenced initial sexual desire in that study, we used a dummy code to control for whether wives had children at the start of marriage in the analysis of the data from Study 1 and in the combined analysis. We also we controlled for idiosyncratic differences between the two studies in the combined analysis with a dummy code for study at the Level 2 intercept and time parameters.

Results are presented in Table 5. The birth of children did not predict declines in husbands' sexual desire in any of the analyses. In fact, in Study 2, the birth of children predicted *increases* in husbands' sexual desire. Nevertheless, this positive association should be interpreted with caution because it did not emerge in either Study 1 or the more powerful and reliable combined analysis. In contrast, the birth of children was significantly associated with declines in wives' sexual desire in all three analyses; that is, wives who reported giving birth during the first several years of marriage experienced steeper declines in sexual desire than did wives who did not report giving birth. Most importantly, direct tests demonstrated that the magnitude of this association between having children and

sexual desire was stronger for wives than for husbands (Study 1:  $\chi^2[1]=4.41$ ,  $p=.033$ ; Study 2:  $\chi^2[1]=8.44$ ,  $p=.004$ ; combined analysis:  $\chi^2[1]=6.69$ ,  $p=.010$ ); that is, having children was more strongly associated with wives' changes in sexual desire than husbands' changes in sexual desire, partially explaining the sex difference in changes in sexual desire. Nevertheless, and notably, the sex difference in changes in desire remained significant in all three analyses even once the birth of children was included in the model (Study 1,  $\chi^2[1]=12.45$ ,  $p<.001$ ; Study 2,  $\chi^2[1]=7.72$ ,  $p=.006$ ; combined analysis,  $\chi^2[1]=14.03$ ,  $p<.001$ ). In other words, the birth of children did not completely account for the sex difference in changes in sexual desire; it merely accentuated it.

We also tested whether stress and depressive symptoms accounted for these effects. Recall that one perspective on these sex differences suggests it may emerge due to increased stress or decreased mental well-being among women during early marriage (e.g., Hochschild, 1989; Lachance-Grzela & Bouchard, 2010), which can undermine sexual functioning (Laumann et al., 1999), particularly among women (e.g., Leavitt, McDaniel, Maas, & Feinberg, 2016; Maas et al., 2018). Accordingly, we tested whether these effects held controlling stress and depressive symptoms. In one set of analyses, we repeated all analyses controlling the stress at



**Table 5** Associations between birth of a child and husbands' and wives' changes in sexual desire in each individual study and collapsing across studies

	Husbands				Wives			
	$\pi$	SE	<i>df</i>	<i>r</i>	$\pi$	SE	<i>df</i>	<i>r</i>
Study 1								
Intercept	3.87	0.06	69		3.46	0.06	69	
Marital satisfaction	0.07*	0.03	71	.23	0.08**	0.03	71	.37
Children	0.17	0.14	69	.15	0.32 <sup>†</sup>	0.17	69	.22
Birth	-0.15	0.11	69	.15	0.07	0.12	69	.07
Time	0.01	0.01	70	.15	-0.04**	0.01	70	.37
Time × birth	0.01	0.02	70	.06	-0.05*	0.03	70	.24
Study 2								
Intercept	4.06	0.04	133		3.63	0.06	133	
Marital satisfaction	0.10***	0.02	134	.33	0.22***	0.06	134	.32
Birth	0.26	0.22	133	.10	-0.12	0.29	133	.04
Time	-0.01	0.02	133	.06	-0.10***	0.03	133	.31
Time × birth	0.13***	0.03	133	.31	-0.25 <sup>†</sup>	0.14	133	.15
Combined analysis								
Intercept	3.98	0.03	203		3.58	0.05	203	
Study	0.18*	0.08	203	.15	0.24*	0.10	203	.17
Marital satisfaction	0.08***	0.02	206	.25	0.14***	0.03	206	.35
Children	0.14	0.14	203	.07	0.35*	0.17	203	.14
Birth	0.00	0.11	203	.00	-0.01	0.11	203	.01
Time	-0.01	0.01	204	.03	-0.09***	0.02	204	.33
Time × study	-0.02	0.02	204	.07	-0.10**	0.03	204	.22
Time × birth	0.01	0.02	204	.03	-0.07**	0.03	204	.18

Effect size *r* is reported. The children variable represents whether couples had children at the start of the study (and was only relevant in Study 1). The birth variable represents whether wives gave birth to a child during the course of the studies

<sup>†</sup> $p < .10$ , \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

each assessment using the general stress measure that averaged across all domains, including stress due to parenthood. In another set of analyses, we controlled only stress from parenthood at each assessment using the single item that specifically assessed stress from parenthood. In the analyses that involved only the data from Study 2, we additionally controlled depressive symptoms at each assessment. When controlling the general stress measure, the childbirth × time interaction remained negative and significant for wives in the analysis of Study 1,  $t(70) = -2.23$ ,  $p = .029$ , and the combined analysis,  $t(204) = -2.80$ ,  $p = .006$ , and remained marginally significant and negative in the analysis of Study 2,  $t(133) = -1.97$ ,  $p = .051$ ; this interaction was not significant in these analyses for men in Study 1,  $t(70) = 0.60$ ,  $p = .552$ , or the combined analysis,  $t(204) = 0.63$ ,  $p = .531$ , and remained positive and significant in Study 2,  $t(70) = 3.57$ ,  $p < .001$ . When controlling the single item that assessed stress from parenthood specifically, the childbirth × time interaction remained negative and significant for wives in the analysis of Study 1,  $t(70) = -2.20$ ,  $p = .031$ , and the combined analysis,  $t(204) = -2.62$ ,  $p = .009$ , and remained marginally significant and negative in the analysis of Study 2,  $t(133) = -1.68$ ,

$p = .096$ ; this interaction was not significant in these analyses for men in Study 1,  $t(70) = -0.01$ ,  $p = .992$ , or the combined analysis,  $t(204) = 0.07$ ,  $p = .942$ , and remained positive and significant in Study 2,  $t(70) = 3.42$ ,  $p < .001$ . Notably, the sex difference in declines in sexual desire remained significant in all three analyses controlling these covariates when general stress was used (Study 1:  $\chi^2[1] = 12.86$ ,  $p < .001$ ; Study 2:  $\chi^2[1] = 9.42$ ,  $p = .003$ ; combined analysis:  $\chi^2[1] = 15.02$ ,  $p < .001$ ), and at least marginally significant in all three analyses when stress due to parenthood specifically was used (Study 1:  $\chi^2[1] = 2.82$ ,  $p = .089$ ; Study 2:  $\chi^2[1] = 6.99$ ,  $p = .008$ ; combined analysis:  $\chi^2[1] = 4.39$ ,  $p = .034$ ). Thus, neither differential stress nor depression nor children appeared to fully account for the emerging mismatch in sexual desire.

### Do Husbands' and Wives' Changes in Sexual Desire Have Implications for Their Subsequent Marital Satisfaction?

Finally, we examined whether changes in wives' sexual desire had implications for changes in spouses' marital satisfaction over the course of the studies as well as spouses' marital

satisfaction at the end of the studies—four and a half years later in Study 1 and 4 years later in Study 2. To do so, we first retained the empirical Bayes (EB) estimates of the components of the trajectory of both spouses' sexual desire from Eq. 1 using the data from the combined analysis of both studies. The EB estimates of the intercepts capture between-person differences in estimates of intimates' initial levels of sexual desire and the EB estimates of the slopes capture between-person differences in estimates of intimates' changes in sexual desire. We obtained estimates for Study 1 in a model in which the dummy code for study was coded such that 0 represented Study 1 and entered on the intercept and time parameters and we obtained estimates for Study 2 in a model in which the dummy code for study was coded such that 0 represented Study 2 and entered on the intercept and time parameters. We then used these estimates to account for the trajectory of intimates' marital satisfaction across the entire duration of each study by entering them to account for variance in the intercept and time parameters of the following first level of a 2-level growth model of marital satisfaction, again controlling for stress (and depressive symptoms in Study 2) to isolate the effects of changes in sexual desire:

$$\begin{aligned}
 Y_{ij}(\text{marital satisfaction}) = & \pi_{1ij}(\text{dummy code for husbands}) + \pi_{2ij}(\text{dummy code for wives}) \\
 & + \pi_{3ij}(\text{husbands' time of assessment}) + \pi_{4ij}(\text{wives' time of assessment}) \\
 & + \pi_{5ij}(\text{husbands' stress}) + \pi_{6ij}(\text{wives' stress}) \\
 & + \pi_{7ij}(\text{husbands' depressive symptoms in Study 2}) \\
 & + \pi_{8ij}(\text{wives' depressive symptoms in Study 2}) + e_{ij}.
 \end{aligned} \tag{2}$$

Importantly, because we were interested in whether changes in sexual desire predicted marital satisfaction at the end of the study, we coded time such that the final assessment was coded 0; thus, the intercept in this model represented husbands' and wives' marital satisfaction at the end of each study. Children and birth were controlled at Level 2. All Level 2 estimates were allowed to vary across individuals. We used restricted maximum likelihood estimation and placed no restrictions on the error structures. Again, we estimated this model three times: once to examine the effect in Study 1 only, once to examine the effect in Study 2 only, and once collapsing across the two studies but again including a dummy code of study at the level 2 intercept and time estimates.

Results are presented in Table 6. Changes in wives' sexual desire were positively associated with ending levels of both spouses' marital satisfaction in all three analyses; wives' who experienced steeper declines in sexual desire (1) reported lower levels of marital satisfaction four and four and a half years later and (2) had husbands who reported lower marital satisfaction four and four and a half years later. Further, changes in wives' sexual desire were also positively associated with changes

in wives' marital satisfaction in all three analyses (Study 1:  $\beta=0.82$ ,  $t[65]=2.58$ ,  $p=.012$ ; Study 2:  $\beta=1.06$ ,  $t[65]=2.50$ ,  $p=.014$ ; combined:  $\beta=0.86$ ,  $t[202]=3.82$ ,  $p<.001$ ). Finally, changes in wives' sexual desire were also positively associated with changes in husbands' marital satisfaction in all three analyses, though this association only reached significance in Study 2,  $\beta=0.96$ ,  $t(129)=2.07$ ,  $p=.040$ ; it was not significant in Study 1,  $\beta=0.08$ ,  $t(65)=0.55$ ,  $ns$ , but trended toward significance in the combined analysis,  $\beta=0.34$ ,  $t(199)=1.85$ ,  $p=.066$ . Notably, changes in husbands' sexual desire were not significantly associated with either component of the marital satisfaction trajectory for either spouse.

### Alternative Model

Although the previous analyses are consistent with our expectations that declines in wives' sexual desire have a negative impact on marital outcomes, and although the changes in sexual desire that were assessed in Study 2 occurred before much of the change in marital satisfaction in that study, it remains possible that the prior associations between changes in wives' sexual

desire and trajectories of husbands' and wives' marital satisfaction emerge because changes in marital satisfaction predict changes in wives' sexual desire. To evaluate this possibility, we re-estimated Eq. 2 but replaced reports of marital satisfaction with reports of sexual desire and replaced the between-person differences in trajectories of sexual desire with between-person differences in trajectories of marital satisfaction. Results demonstrated that husbands' and wives' initial marital satisfaction and changes in marital satisfaction were not significantly associated with husbands' or wives' ultimate sexual desire (at the end of each study; all  $ps \geq .208$ ).

In sum, compared to their husbands, wives demonstrated lower levels of initial sexual desire that (1) declined more steeply over time, (2) were partially, but not completely, attributable to the birth of children, even after controlling stress, including stress associated with parenthood, as well as depressive symptoms, and (3) ultimately predicted changes in marital satisfaction for both members of the couple (though somewhat less reliably for husbands) and thus lower levels of marital satisfaction at the end of the of the study for both members of the couple.

**Table 6** Associations between husbands' and wives' trajectories of sexual desire and marital satisfaction at the final assessment in each individual study and collapsing across studies

	Husbands				Wives			
	$\pi$	SE	<i>df</i>	<i>r</i>	$\pi$	SE	<i>df</i>	<i>r</i>
Study 1								
Intercept	-0.16	0.13	65		-0.39	0.17	65	
Initial husbands' sexual desire	0.21	0.19	65	.13	0.43	0.47	65	.11
Initial wives' sexual desire	-0.17	0.19	65	.11	-0.39	0.37	65	.13
Changes in husbands' sexual desire	1.79	2.90	65	.08	8.06	5.37	65	.18 <sup>†</sup>
Changes in wives' sexual desire	3.23	0.98	65	.38**	6.36	1.78	65	.41**
Study 2								
Intercept	-0.29	0.19	129		-0.06	0.15	129	
Initial husbands' sexual desire	1.06	0.46	129	.20*	1.28	0.35	129	.31***
Initial wives' sexual desire	0.02	0.25	129	.01	0.12	0.27	129	.04
Changes in husbands' sexual desire	30.08	15.94	129	.16 <sup>†</sup>	18.75	14.92	129	.11
Changes in wives' sexual desire	7.80	3.29	129	.20*	7.71	3.10	129	.21*
Combined analysis								
Intercept	-0.19	0.13	199		-0.16	0.11	199	
Initial husbands' sexual desire	0.49	0.22	199	.15*	0.81	0.27	199	.21**
Initial wives' sexual desire	-0.15	0.16	199	.06	-0.22	0.19	199	.08
Changes in husbands' sexual desire	4.25	3.75	199	.08	-5.96	5.40	199	.08
Changes in wives' sexual desire	3.86	1.22	199	.22**	6.92	1.65	199	.28***

Intercept represents marital satisfaction at the final assessment. Effect size *r* is reported. All covariates [children, birth, stress, depressive symptoms (in Study 2), and study (in combined)] and changes in marital satisfaction are excluded for the sake of brevity

<sup>†</sup>*p* < .10, \**p* < .05, \*\**p* < .01, \*\*\**p* < .001

### Do Other Sexual Processes Play a Role in the Association Between Changes in Wives' Sexual Desire and Changes in Marital Satisfaction?

As noted, these couples also reported on their marital satisfaction and the frequency of their sexual behavior. As reported elsewhere (McNulty et al., 2016), husbands and wives demonstrated declines in both processes, and unlike sexual desire, the extent of these declines did not differ across men and women. Although these declines and associations among them have already been described in other research (McNulty et al., 2016), the associations between these variables and sexual desire have not yet been examined, and thus, we conducted exploratory analyses to examine any such associations. In particular, we examined whether changes in sexual desire predicted changes in sexual behavior and/or changes in sexual satisfaction, as well as whether any such associations mediated the effects of changes in wives' sexual desire on changes in marital satisfaction. Given the exploratory nature of these data, as well as the fact that changes in sexual frequency and sexual satisfaction are described elsewhere, we used only the data combined from the two datasets to perform these analyses.

Both analyses resembled the analysis involving marital satisfaction. For the analysis of sexual frequency, we used

the average of husbands' and wives' reports of sexual frequency. Specifically, we used the EB estimates of changes in each spouse's sexual desire to predict change in couples' sexual behavior across the entire duration of the two studies by entering those estimates to account for variance in the intercept and slope of the following first level of a 2-level growth model:

$$Y_{ij}(\text{Frequency of Sex}) = \pi_{1ij}(\text{Intercept}) + \pi_{2ij}(\text{Time of assessment}) + e_{ij}.$$

According to this analysis, neither changes sexual desire reported by husbands,  $\beta = -9.79$ ,  $SE = 15.83$ ,  $t(201) = -0.62$ ,  $p = .537$ , nor wives,  $\beta = 7.28$ ,  $SE = 10.22$ ,  $t(201) = 0.71$ ,  $p = .477$ , predicted changes in the frequency of sex reported by the couple.

To examine whether changes in sexual desire predicted changes in sexual satisfaction, we used the EB estimates of changes in each spouse's sexual desire to account for the trajectory of each person's sexual satisfaction estimated by the following Level 1 model, controlling for the dummy code for study on the Level 2 intercept and slope parameters. :

$$Y_{ij}(\text{sexual satisfaction}) = \pi_{1ij}(\text{dummy code for husbands}) + \pi_{2ij}(\text{dummy code for wives}) \\ + \pi_{3ij}(\text{husbands' time of assessment}) \\ + \pi_{4ij}(\text{wives' time of assessment}) + e_{ij}.$$

According to this analysis, changes in wives' sexual desire were positively associated with changes in sexual satisfaction for both husbands,  $\beta = 15.55$ ,  $SE = 3.28$ ,  $t(201) = 4.75$ ,  $p < .001$ , and wives,  $\beta = 24.09$ ,  $SE = 4.66$ ,  $t(201) = 5.18$ ,  $p < .001$ . To the extent that wives demonstrated steeper declines in sexual desire, both husbands and wives demonstrated steeper declines in sexual satisfaction. Changes in husbands' sexual desire were positively associated with changes in their own sexual satisfaction,  $\beta = 26.60$ ,  $SE = 8.47$ ,  $t(202) = 3.14$ ,  $p = .002$ , but not changes in wives' sexual satisfaction,  $\beta = 17.81$ ,  $SE = 11.44$ ,  $t(202) = 1.56$ ,  $p = .121$ .

Finally, we examined whether the link between changes in wives' sexual desire and changes in both partners' sexual satisfaction explained the previously described association between wives' sexual desire and both partners' marital satisfaction. To address this issue, we regressed participants' reports of their own marital satisfaction at each assessment onto their own reports of sexual satisfaction at that assessment, controlling for time of assessment, using the following Level 1 model:

$$Y_{ij}(\text{marital satisfaction}) = \pi_{1ij}(\text{dummy code for husbands}) + \pi_{2ij}(\text{dummy code for wives}) \\ + \pi_{3ij}(\text{husbands' time of assessment}) + \pi_{4ij}(\text{wives' time of assessment}) \\ + \pi_{5ij}(\text{husbands' sexual satisfaction}) + \pi_{6ij}(\text{wives' sexual satisfaction}) + e_{ij},$$

controlling for the EB estimates of changes in sexual desire and a dummy code for study in the second level of the model. According to that analysis, sexual satisfaction was positively associated with marital satisfaction for both husbands,  $\beta = 0.02$ ,  $SE = 0.00$ ,  $t(206) = 11.87$ ,  $p < .001$ , and wives,  $\beta = 0.02$ ,  $SE = 0.00$ ,  $t(206) = 10.90$ ,  $p < .001$ . Finally, we used the RMediation tool (Tofighi & MacKinnon, 2011) to estimate the indirect effect of changes in wives' sexual desire on changes in marital satisfaction through sexual satisfaction, which was significant for both husbands,  $b = 0.30$ ,  $SE = 0.07$ ,  $CI_{95\%} = 0.17, 0.44$ , and wives,  $b = 0.51$ ,  $SE = 0.11$ ,  $CI_{95\%} = 0.30, 0.73$ . Indeed, once own sexual satisfaction was controlled, changes in wives' sexual desire were no longer associated with marital satisfaction for either husbands,  $\beta = -0.07$ ,  $SE = 0.11$ ,  $t(202) = -0.67$ ,  $p = .502$ , or wives,  $\beta = 0.09$ ,  $SE = 0.11$ ,  $t(202) = 0.80$ ,  $p = .422$ .

Taken together, these exploratory analyses suggest that changes in wives' sexual desire predicted changes in both partners' marital satisfaction, not because they predicted change in couples' sexual frequency, but because they predicted changes in their sexual satisfaction.

## Discussion

### Summary and Implications

Maintaining a satisfying marriage is important for physical and psychological health (Holt-Lunstad et al., 2010; Proulx et al., 2007; Robles et al., 2015), yet notoriously difficult (Amato & James, 2010; Meltzer et al., 2014; Schoen & Canudas-Romo, 2006; VanLaningham et al., 2001). Here, we provide novel evidence for an explanation that partially accounts for common declines in marital satisfaction—desire for sex dwindles among newly married women but not men. Indeed, these declines in wives' sexual desire were linked to a decline in marital satisfaction for both spouses as many as four and a half years later through declining sexual satisfaction among both husbands and wives. Interestingly, changes in sexual desire were not linked to changes in the frequency of sex reported by these couples, suggesting some couples may engage in sex despite changes in wives' desire. Nevertheless, the fact that sexual satisfaction

mediated the link between declines in wives' sexual desire and marital satisfaction suggests that any sex that occurs despite declines in wives' sexual desire may be unsatisfying for both men and women. Future research may benefit from examining the potential role of people's motivation for sex in these associations (Kim, Muise, & Impett, 2018).

Although other longitudinal research demonstrates that marital and sexual satisfaction are bidirectionally linked (McNulty et al., 2016), other studies have failed to document such links (Yeh et al., 2006), and we did not find evidence that changes in marital satisfaction predicted subsequent declines in sexual desire. Loss of sexual desire led to subsequent marital dissatisfaction but not vice versa. It may be that various specific sexual processes have stronger implications for marital outcomes than vice versa, a possibility that is consistent with how people evaluate their sexual and relationship experiences (see Maxwell & McNulty, 2019).

The transition to parenthood appeared to exacerbate the decline in wives' sexual desire, and this was not explained by depressive symptoms or stress, including stress from parenthood. Notably, however, the transition to parenthood did not fully account for declines in wives' sexual desire—the

decline in sexual desire, and corresponding sex difference, was observed among childless couples as well. In other words, having children does not appear to be the main or only source of the sex-differentiated declines in sexual desire observed here. Finally, our measure of desire included both sexual desire toward one's partner and sexual desire generally—and the effects were essentially identical. Newlywed husbands continue to desire sex with their spouse and sex in general, while wives demonstrated declines in both.

These findings should be considered in light of several limitations. First, although the data described here are longitudinal, they are ultimately correlational (i.e., non-experimental), and thus, causality cannot be inferred with confidence. Although we were able to provide some confidence in the temporal sequence of the psychological variables examined here through our longitudinal design, as well as help rule out some third variables, causal interpretations should be made with caution. Further, the measure of stress used was the average of numerous single items that assessed stress in a variety of domains. A more comprehensive measure of stress would have served as a more stringent test. Second, both samples were drawn from today's U.S. and consisted of mostly Caucasian newlyweds, so generalization to other cultures and historical periods is unwarranted (see Laumann, Gagnon, Michael, & Michaels, 1994). It would be valuable to learn whether similar patterns occur in different cultural contexts. Third, we did not specifically ask participants about their gender identity. Although marriages in the study locations at the time of each study were limited to couples comprised of a man and a woman, we cannot assume that all couples identified this way. Future research may benefit from including measures of gender identity to help dissociate effects driven by biological sex from those driven by gender identity. Fourth, our studies were limited to newlyweds. Although the newlywed period is worth studying because it is a time of transition and change, particularly with respect to the birth of children as examined here, we cannot know whether these findings would generalize to other phases of the relationship. Indeed, sexual desire is known to vary across various relationship stages (Birnbaum, 2018), and fluctuate often (Vowels, Mark, Vowels, & Wood, 2018), and thus, different effects may emerge in newer or older relationships. In particular, it is possible that any implications of childbirth are temporary, and our short-term longitudinal designs may have missed any eventual rebounded sexual desire among women.

It is also worth noting that it would be unwarranted to conclude that any associations observed here explain all differences between men and women in sexual desire, that all women necessarily experience such declines, or that all men do not; there was variability in the trajectories of both men's and women's sexual desire and the differences we observed were averages. Indeed, sometimes women desire more sex than men (Mark, 2015)—including following the transition to parenthood (Rosen et al., 2018). Nevertheless, like other

sex-differentiated effects on established relationships (e.g., Meltzer et al., 2014), this research highlights the importance of differences between men and women to mating and relationship functioning, which is valuable (see Buss, 1989, 2016; Buss & Schmitt, 1993; Haselton & Buss, 2000). Specifically, understanding average differences in the needs, desires, and preferences of men and women can inform researchers and practitioners alike about potential sources of tension between men and women in mixed-sex relationships. Future research may benefit from examining individual differences that can buffer against these sex-differentiated declines in desire, such as having sex for approach goals, being more willing to meet a partner's sexual needs, believing that sex takes work, and expecting desire to fluctuate (see reviews by Mark & Lasslo, 2018; Muise, Kim, McNulty, & Impett, 2016).

### Implications and Future Directions

As with most studies, this research also raises additional questions. Most notably, these findings raise questions about the specific psychological mechanisms of the observed effects; why do wives appear to have lower sexual desire at the start of marriage and lose sexual desire at a faster rate than husbands? Consistent with perspectives on extended sexuality (Grebe et al., 2013; Thornhill, 2007; Thornhill & Gangestad, 2008), one could adopt a functional perspective and speculate that women experienced heightened sexual desire as a functional response to facilitate courtship. In line with this perspective, the decline during the newlywed years may stem in part from the diminished need to secure a partner's investment. This possibility is consistent with the observation that the birth of children, independent of stress and depressive symptoms, accentuated but did not fully account for the effects that emerged here. Indeed, children are a strong deterrent to divorce for both partners (Wagner & Weiß, 2006), and men's increased investment from becoming a new father may quell the need for women to maintain high levels of sexual desire (Grebe et al., 2013; Thornhill, 2007; Thornhill & Gangestad, 2008). Likewise, even men's mere investment of time spent in the relationship may serve to signal enough commitment (see Rusbult, 1980) to quell this source of women's sexual desire, which may explain the sex-differentiated declines in sexual desire that occurred among childless couples. Consistent with these ideas, as noted, Grebe et al. (2013) demonstrated that women were more likely to initiate sex outside their fertility window (during the luteal phase) when they perceived less investment from their male partners. Of course, it is important to keep in mind that such a functional perspective does not imply any differences between men and women are absolute.

Despite the novelty of this interpretation, our findings are consistent with other perspectives that highlight the sensitivity of female sexual desire. In particular, numerous others have

documented that female sexual desire is highly sensitive to social and biological factors (see Baumeister, 2000; Diamond, 2008; Peplau, 2003), including culture, cognition, relationship quality, and hormonal fluctuations (Diamond, 2008). Consistent with these perspectives, we documented greater variability in women's sexual desire compared to men's in the current research. But the novelty of the current findings lies in the fact that the variability in wives' sexual desire was such that their desire became systematically lower over time. Indeed, if female sexual desire does serve, at least in part, to help ensure men's investment, it would need to respond to environmental cues and change quickly. And hormonal and cognitive factors that coincide with such change may be the proximal mechanisms through which such change occurs. In other words, our view does not challenge other perspectives but merely situates them within a broader explanatory framework. Nevertheless, future research may benefit by directly testing whether women's perceptions of men's investments account for the effects observed here.

Of course, it is also possible that these effects do not stem from any particular functional differences between men and women but instead reflect the different norms and/or experiences faced by men and women. From this perspective, the differences that emerged here may reflect differences in women's and men's gender identities, which were not measured. Accordingly, although we controlled for stress from parenthood, other environmental and cultural factors may explain these effects. For example, women may report lower levels of sexual desire that decline more substantially over time because they may conform to stereotypes that women desire sex less compared to men (see Dawson & Chivers, 2014a).

Along these lines, it is worth noting that some authors have suggested that more in the moment, responsive measures of sexual desire may be preferable to self-report, trait-like measures because sex differences in sexual desire may be exaggerated by reporting bias (e.g., social desirability, gender norms), noting that men and women may experience desire similarly when presented with sexual cues (see review by Dawson & Chivers, 2014a). For example, after viewing sexual stimuli, men and women did not differ in their degree of desire for sex with a partner, or desire to masturbate (Dawson & Chivers, 2014b). There is also evidence that the concept of sexual desire is multifaceted and men and women may interpret the concept of sexual desire differently (for example, when asked *what* in particular they desire when they say they experience sexual desire women are more likely to report desiring intimacy and emotional closeness than men [Mark, Herbenick, Fortenberry, Sanders, & Reece, 2014; see also Regan & Berscheid, 1996]; although the role of relationship factors in female's desires may be overstated; Sims & Meana, 2010). Although these issues are indeed important, we contend that even the self-report measures used here have merit. First, we examined within-person deviations from one's own levels of sexual

desire, which reduces the possibility that gender differences in reporting biases are driving the effects. Furthermore, our questions were specifically focused on trait-like sexual desire in long-term relationships—how much one spontaneously desires sex with one's partner. We do not deny that women may experience sexual desire in a similar way to men when it arises, but are instead focused on average frequency and intensity in the motivation to have sex with one's partner. Indeed, and perhaps more importantly, declines in sexual desire had implications for self-reported marital satisfaction. These issues aside, however, future research may benefit from integrating these findings into the broader literature by examining whether these findings extend to other, more in the moment, responsive measures of sexual desire.

Finally, future research may also benefit from examining whether men and women in same-sex relationships demonstrate trajectories of sexual desire that are more similar, and whether any such similarities benefit the relationship. Much of the research highlighting differences between heterosexual relationships and same-sex relationships suggests some differences, such as stigma and lack of familial and society support, that can make such relationships more challenging (Peplau & Fingerhut, 2007). Yet, particular to sexual desire, some evidence suggests those in same-sex relationships may be similar, or even higher in their levels of desire (Holmberg & Blair, 2009), and women in same-sex relationships are not necessarily perturbed if their partner differs in desire levels (Bridges & Horne, 2007). Finding that same-sex couples experience similar—or even milder—declines in sexual desire would highlight a novel benefit such couples experience relative to members of heterosexual relationships. Of course, any role of reproduction in these findings may minimize whether similar effects would manifest in such relationships, at least from a biological standpoint. That said, even showing such effects do not extend to such relationships would offer important insights and suggest potential mechanisms. Likewise, future research could benefit from construing gender in a more nuanced, non-binary fashion (such as by examining gender role expectations; Hyde, Bigler, Joel, Tate, & van Anders, 2019; Mark & Lasslo, 2018), which could provide additional insight into mechanisms driving declines in sexual desire.

## Conclusion

Most couples embark on marriage with the intention and expectation that it will be permanent (McNulty & Karney, 2004), yet divorce rates are high. Making a lasting marriage is apparently a formidable challenge. The wedding vows are not enough to guarantee success, and frequent ongoing adjustments may be required. Here, we provide novel empirical evidence that one source of declining marital satisfaction is that wives' sexual desire declines over the early years of marriage, while husbands' sexual desire remains relatively high and stable.

Although childbirth predicted declines in women's but not men's sexual desire and thus accentuated these sex-differentiated declines, even couples who remained childfree over the course of the study showed a divergence of sexual desires. We suspect many couples see this as a sign that their marriage has serious problems, for which they may blame themselves and each other. Insofar as neither couple member anticipates this issue, both may come to feel that the partner is changing the rules. Our findings might reassure some couples that the emerging mismatch in marital sexual desire is normal and typical (see Herbenick et al., 2014). It is thus possible that greater societal recognition of the typical emerging mismatch in spousal sexual desire may lead to greater acceptance and understanding for some couples (see Jacobson & Christensen, 1996), and therefore a reduction in marital discord. Of course, what is typical is not necessarily good, especially when one considers the role of individual differences in relationship processes (see McNulty, 2016). And couples who remain distressed by mismatches in sexual desire may benefit from interventions that specifically address this issue (e.g., Brotto, Basson, & Luria, 2008; Kleinplatz et al., 2018; McCarthy & Wald, 2015).

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