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ORIGINAL PAPER

The More or the Better? How Sex Contributes to Life Satisfaction

Claudia Schmiedeberg[1] · **Bernadette Huyer-May**[1] · **Laura Castiglioni**[1] · **Matthew D. Johnson**[2]

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Abstract Much cross-sectional research documented associations between sexuality and life satisfaction, but very little longitudinal research on the topic has considered whether changes in sexuality and life satisfaction unfold together over time. Using data from 5582 individuals in partnerships surveyed across 5786 intimate relationships (providing 18,712 observations for analysis) during five waves of the German Family Panel (pairfam), this study examined whether intraindividual changes in sexual frequency and satisfaction were associated with corresponding intraindividual changes in life satisfaction. Fixed effects regression modeling results showed that individuals reported a greater increase (decrease) in life satisfaction when they also experienced a more substantial increase (decrease) in sexual frequency and satisfaction. This finding was consistent for men and women. This study contributes to the literature by documenting that naturally occurring increases in sexual frequency and satisfaction over time predicted corresponding increases in life satisfaction.

Keywords Life satisfaction · Sexual frequency · Sexual satisfaction · Fixed effect regression analysis

Introduction

The social sciences are replete with evidence that subjective well-being, comprised of the cognitive appraisals (e.g., life satisfaction) and affective responses (e.g., happiness) when evaluating one's life (Diener, Suh, Lucas, & Smith, 1999), is intertwined with work and relationship success, better health, and pro-social behaviors (Erdogan, Bauer, Truxillo, & Mansfield, 2012; Helliwell, Layard, & Sachs, 2013; Lyubomirsky, King, & Diener, 2005). As such, studies documenting the developmental course of subjective well-being (Galambos, Fang, Krahn, Johnson, & Lachman, 2015) and identifying factors that help promote positive affect and life satisfaction (e.g., Mogilner, 2010) are increasingly important. While research has long identified factors that enhance subjective well-being, such as income (Easterlin, 1974), relationship status (Glenn & Weaver, 1979), or religion (Ellison, Gay, & Glass, 1989), much less is known about the links between sexuality and subjective well-being. As our literature review in the next section illustrates, there are a considerable number of cross-sectional studies documenting associations between sexuality and well-being, but far less longitudinal or experimental research that is able to shed light on the intraindividual links between sex and life satisfaction over time.

The present study contributes to this literature by examining whether changes in sexual frequency and satisfaction are associated with changes in life satisfaction. This question is answered with fixed effect regression models and data from 5332 individuals surveyed annually for 5 years through the course of 5436 intimate partnerships (providing 18,362 total observations for analysis) in the German Panel Analysis of Intimate Relationships and Family Dynamics (pairfam) study. Hence, our analysis sheds light on associations between naturalistically occurring changes in sexuality with life satisfaction, while avoiding potential bias due to unobserved time-invariant individual or couple characteristics.

Associations between greater subjective well-being and both sexual frequency (Blanchflower & Oswald, 2004; Michael, Gagnon, Laumann, & Kolata, 1994; Muise, Schimmack, & Impett, 2016; Wadsworth, 2014) and sexual satisfaction (Brody & Costa, 2009; Davison, Bell, LaChina, Holden, & Davis, 2009; Woloski-

✉ Claudia Schmiedeberg
Claudia.schmiedeberg@soziologie.uni-muenchen.de

[1] Institute of Sociology, LMU Munich, Konradstraße 6, 80801 Munich, Germany

[2] Department of Human Ecology, University of Alberta, Edmonton, AB, Canada

Wruble, Oliel, Leefsma, & Hochner-Celnikier, 2010) in cross-sectional research have frequently been reported around the world (Cheng & Smyth, 2015; Laumann et al., 2006). Although many studies document similar results, these cross-sectional associations could be attributed to unobserved confounding factors. For example, individuals with certain personality traits or in relationships with certain favorable characteristics may be happier and also more sexually satisfied and sexual satisfaction may not actually contribute to subjective well-being. Cross-sectional studies typically control for numerous individual and relationship characteristics, but many potentially important variables remain unobserved. Longitudinal studies can handle this problem by examining intraindividual changes in dependent and explanatory variables over time and accounting for all time-invariant confounding factors. Alternatively, experimental studies also have the potential to shed light on causal relations by randomly assigning participants to control and treatment conditions, thereby reducing the likelihood of detecting only spurious associations. Nevertheless, the literature is largely limited to cross-sectional studies. We located only one longitudinal study and one experimental study.

Stephenson and Meston (2015) recruited 87 women experiencing sexual difficulties (e.g., low sexual desire or arousal, difficulty achieving orgasm) and assessed sexual and life satisfaction daily over 4 weeks. Using a hierarchical linear modeling approach, this study found that intraindividual changes in sexual satisfaction predicted changes in life satisfaction and the negative impact of low sexual satisfaction on life satisfaction was less pronounced for women in high-quality relationships and for those with low levels of attachment anxiety. This study provides strong evidence that sexual satisfaction may, in fact, precede life satisfaction, but the sample was comprised of only women who were experiencing sexual problems, limiting the extent to which these findings may be generalizable.

A second study sought to determine whether sexual frequency preceded happiness by employing experimental methods (Loewenstein, Krishnamurti, Kopsic, & McDonald, 2015). Couples were randomly directed to either not alter or double their sexual frequency for the 3-month duration of the study and provided daily reports of happiness and sexuality variables. The results were surprising; the couples who doubled their sexual frequency actually reported lower happiness and enjoyment of sex and reported less desire to have sex compared to the control group. Further analyses revealed these negative effects were not directly associated with sexual frequency, but were due to receiving the directive to double sexual frequency. The authors concluded the experimental manipulation affected couples' intrinsic motivation for sex and, thus, did not shed light on how sexuality impacts subjective well-being as both phenomena unfold in real life. Indeed, prior research found motivation for having sex plays a role in determining sexual satisfaction (Stephenson, Ahrold, & Meston, 2011). Thus, Loewenstein and colleagues' study allows conclusions to be drawn regarding artificially increased sexual frequency, but does not yield insight about in vivo changes in sexual frequency during the course of a relationship.

The literature provides some evidence that sexual satisfaction precedes life satisfaction among women experiencing sexual difficulties (Stephenson & Meston, 2015) and that telling people to have more sex will make them unhappy (Loewenstein et al., 2015), but we could locate no study to examine the link between sexual satisfaction and frequency and life satisfaction longitudinally over several years among a large, national sample of couples, as is done in the present study. Such an approach will generate important insight into how naturalistically occurring changes in sexuality, as opposed to experimentally induced changes, are associated with corresponding changes in life satisfaction among a general sample.

But why should we expect an association between sex and life satisfaction in the first place? It is commonly assumed that life satisfaction results from the accumulation of satisfaction across various domains (Cummins, 1996; Hooghe, 2012), such as with one's family life, career, and leisure time. Sexuality is undeniably an important aspect of human life; thus, a robust sex life may inform perceptions about whether life is satisfying or not. A more indirect effect may arise due to higher relationship satisfaction, as studies have documented that sexual experiences are linked to relationship satisfaction (for a review, see Impett, Muise, & Peragine, 2014).

An underlying assumption of the hypothesis of a positive association of sexual frequency with life satisfaction is that all individuals desire sex often. This implies that, if any external circumstances cause a decrease in sexual frequency from the (high) desired level, the result would be a lower life satisfaction. As Loewenstein et al. (2015) pointed out, if individuals are in a condition to have the optimal frequency of sex according to their individual preferences, then no relationship between sex and life satisfaction should be observed because even low sexual frequencies would reflect their preferences. But actual and desired sexual frequency may not always be congruent; it takes two to have sex and partners' desired sexual frequency may differ. For the partners who determine the sexual frequency for the couple, we should not find a link between sexual frequency and life satisfaction. For the partner who desires sex more or less frequently, there should be an association, but its direction depends on the desired sexual frequency. For those desiring sex more often, the association would be positive, whereas for those desiring sex less often, the association should be negative. We should, therefore, not be able to detect an average positive effect in our data unless we assume that disagreements on the ideal sex frequency within the couple are settled by compromising at the lower desired sexual frequency (i.e., they have sex only if both partners desire it). If this compromise is found at a relatively high sexual frequency, the partner with a stronger sexual drive is unlikely to be far from his or her ideal frequency. Furthermore, reduced sexual desire due to adaptation in the course of the relationship and individuals' difficulties in bridging emotional

states (Loewenstein, 1996) may lead people to engage in sex less often than would be happiness maximizing for them.

The Present Study

Drawing on five waves of pairfam data from 5582 individuals who provided 18,712 total observations as they were followed through 5786 intimate unions (some participants had more than one intimate relationship over the duration of the study, so there are more relationships than individuals), the present study examined longitudinal links between changes in sexual satisfaction and frequency with corresponding changes in life satisfaction. We also examined whether these associations are consistent for men and women.

We calculated relationship fixed effects regression models to answer our research question to account for any relationship-specific effects. This approach compares individuals' observations only when the partner remains the same. A new relationship defines a new unit of analysis and ensures changes in our focal variables are not attributed to changes in one's partner. Fixed effects regression analysis partitions the variance into between- and within-person variance across the study variables and, thus, captures all time-invariant sources of heterogeneity in the between-person variance (e.g., previous sexual experiences), so it is not necessary to include time-invariant control variables. Time-varying covariates, on the other hand, must be included to account for their influence on changes observed in the key variables of interest.

We included a number of time-varying control variables that have demonstrated associations with our focal variables (sexual satisfaction and frequency and life satisfaction). The most important time-varying covariates for this study are variables assessing the quality of participants' intimate relationships, as relationship quality is strongly linked longitudinally with sexual frequency and satisfaction (McNulty, Wenner, & Fisher, 2014) and life satisfaction (Heller, Watson, & Ilies, 2004). As such, we included a number of variables indicative of relationship quality: relationship satisfaction, whether the participant is considering a separation or divorce, conflict behaviors, and perceptions of intimacy. In addition, relationship status was included because being married is associated with higher subjective well-being (Galambos et al., 2015). We also included three variables related to children (whether participants were expecting a child, the age of participants' youngest child, and whether the couple was trying to become pregnant), as being a parent is linked with life satisfaction (Myrskylä & Margolis, 2014; Pollmann-Schult, 2014) and the presence of children affects couple sexuality (e.g., Johnson, Galambos, & Anderson, 2016; Schmiedeberg & Schröder, 2015; Schröder & Schmiedeberg, 2015). Finally, self-reported health, self-esteem, satisfaction with household finances, and employment status were also included as covariates because each of these variables has demonstrated important associations with one or more of the focal variables (Blanchflower & Oswald, 2004; Galambos et al., 2015; Johnson et al., 2016).

Method

Participants

For the current analysis, we used data from 2416 men and 3166 women taken from Waves 2 through 6 of the pairfam study, release 6.0 (Brüderl et al., 2015a). The German Family Panel (pairfam) is an ongoing panel study which started in 2008 and collects data annually from a sample of individuals across Germany in three birth cohorts: Adolescents born between 1991 and 1993, young adults born between 1981 and 1983, and adults nearing midlife born between 1971 and 1973. In the first panel wave, addresses were randomly drawn from the local population registers of 343 randomly selected German municipalities (see Brüderl et al., 2015b). Initial sample size across the three cohorts was over 12,000. In the sixth wave of the panel about 6000 participants were still in the panel. Attrition analyses have shown that nonresponse patterns were similar to other panel studies and that bias due to selective attrition can be assumed as small (Müller & Castiglioni, 2015). Survey data were collected through personal interviews (CAPI) of about one-hour duration which includes a self-interview part for sensitive questions (CASI), in which the interviewer handed the computer over to the participant to read the questions and enter answers directly. The questions on sex as well as those about relationship quality were asked in the CASI section. More detail about pairfam is available in the study's concept paper (Huinink et al., 2011).

We used Waves 2 through 6 of the panel study because the question on sexual frequency was not included in Wave 1. We restricted our sample to 2416 men and 3166 women who reported the same partner in at least two consecutive waves. Cases with missing data on any of the dependent and independent variables were excluded from the sample, resulting in 12 % of all cases being lost due to missing values. Missing data may be a source of bias if item nonresponse is selective. If selectivity is person-specific (i.e., due to interindividual differences regarding the willingness to disclose sensitive information), however, it is implicitly controlled in the fixed effects model. On the other hand, a reason for selective nonresponse may be that participants were reluctant to provide information that indicated possible sexual dysfunction, such as extremely low frequency of intercourse. Our analyses of item nonresponse showed that participants tended to react consistently over time to the questions on sex: They either persistently offered a valid answer or persistently declined the questions on sexual frequency and sexual satisfaction. When this was not the case, the most common pattern was that participants did not answer the question in the first waves but started answering them in later waves. These analyses suggested that item nonresponse was largely related to time-invariant factors, which are controlled in our fixed effect models (Wooldridge, 2010).

Table 1 Descriptive statistics for study variables

	Percent/M (SD)[a]	Between[b]	Within[c]
Life satisfaction (range 0–10)	7.78 (1.51)		72.81
Sexual frequency (per month)			
Never had sex	0.53	1.42	0.97
Not in the past 3 months	5.60	11.58	9.87
Once per month or less	12.37	23.54	21.22
2–3 times per month	23.42	43.36	38.42
Once per week	24.27	45.96	40.30
2–3 times per week	24.95	46.70	36.50
More than 3 times per week	8.86	19.84	14.86
Sexual satisfaction (range 0–10)	6.63 (2.55)		80.66
Relationship satisfaction (range 0–10)	7.85 (2.17)		74.61
Conflict style (range 1–5)	2.08 (0.57)		89.65
Intimacy in communication (range 1–5)	3.85 (0.76)		75.63
Considered separation or divorce	13.58	27.48	21.76
Pregnant	4.67	13.48	13.15
Trying to conceive a child			
No	83.14	88.61	7.24
For less than 1 year	11.08	16.75	11.13
For 1 year or more	5.78	7.73	6.03
Health status past 4 weeks (range 1–5)	3.72 (0.96)		68.22
Self-esteem (range 1–5)	3.92 (0.82)		79.47
Satisfaction with finances (range 0–10)	6.57 (2.39)		79.62
Relationship status			
Living apart together	23.64	37.56	12.43
Cohabiting	23.34	32.87	17.65
Married	53.01	49.41	8.68
Children in the household			
No children	43.47	53.98	8.12
Youngest child younger than 1 year	6.40	17.97	17.68
Youngest child 1 or 2 years old	12.92	24.37	23.33
Youngest child 3 years or older	37.20	41.89	16.61
Age	31.85 (7.65)		90.56
Labor force status			
In education	11.00	19.62	10.80
Not employed	13.78	24.33	18.44
Employed	75.22	83.62	24.49
Wave			
Wave 2	16.12	52.13	51.76
Wave 3	19.00	61.44	60.94
Wave 4	22.33	72.23	71.66
Wave 5	21.96	71.02	69.93
Wave 6	20.59	66.59	60.87
Number of individuals	5582		
Number of unions	5786		
Number of observations	18,712		

[a] Percentage are given in case of dichotomous variables, means and standard deviations in case of metric variables; values are calculated across all panel variables

[b] Percent of participants in the group in at least one wave

[c] Percent of participants with change between waves

Table 1 contains demographic data for the sample, as well as descriptive information for all study variables. Women provided 57 % of the observations analyzed. Mean age at the beginning of the observation period (the second wave of the panel study) was 30.39 years (SD = 7.36) for women and 31.23 years (SD = 6.94) for men. More than half of the observations were provided by those who were married (men: 51.3 %, women: 54.3 %), 24.2 % of the men and 22.7 % of the women were cohabiting, and the remaining 24.6 % men and 23.0 % women were living apart together with their partner. Participants were childless in more than 40 % of observations (men: 48.0 %, women: 40.1 %), one child was reported in about 21 % of observations (not shown in Table 1), two children were reported 26 % of the time, and 13 % of reports indicated participants had three or more children.

Measures

All measures were assessed at every wave of data used in this study (Waves 2 through 6).

Life Satisfaction

A single item assessed life satisfaction: "All in all, how satisfied are you with your life at the moment?" Responses ranged from 0 = very dissatisfied to 10 = very satisfied. This and similar one-item measures of subjective well-being are frequently used in the literature (Blanchflower & Oswald, 2004; Veenhoven, 1984).

Sexual Frequency

Participants were asked how often they had sexual intercourse with their current partner, on average, during the past 3 months, Response categories were coded 0 = never had sex, 1 = not in the past 3 months, 2 = once per month or less, 3 = 2–3 times per month, 4 = once per week, 5 = 2–3 times per week, 6 = more than 3 times per week. Given that this is a categorical variable, we included each response category as a binary variable in our analysis. This nonparametric approach allows for maximum flexibility in the model, since it neither superimposes a metric nor makes any assumptions regarding the shape of the relation (linear or curvilinear).

Sexual Satisfaction

One item asked: "How satisfied are you with your sex life?" Responses ranged from 0 = very dissatisfied to 10 = very satisfied.

Control Variables

A number of time-varying control variables were included. Relationship type was coded into two dummy variables for marriage and cohabitation, with living apart together relationships serving as the reference group. Relationship duration was included in the form of categories spanning 6-month intervals in the 1st year and yearly intervals afterward to capture the "honeymoon effect" of newly formed relationships. Relationship quality was captured by four variables. First, a dummy variable indicated whether the participant had considered a separation or a divorce in the period since the last interview (0 = did not consider separation or divorce and 1 = did consider separation or divorce). Second, a variable for negative conflict behaviors was constructed from a 12-item scale with participants' ratings of their own and their partner's conflict styles in the relationship across the same six items (e.g., frequency of yelling at the partner, remaining silent, or insulting the partner when having a disagreement). Responses ranged from 1 = almost never to 5 = very frequently. Third, we included a two-item scale assessing intimacy adapted from the Network of Relationships Inventory (Furman and Buhrmester, 1985). Participants reported how often they "tell your partner what you are thinking?" and "share your secrets and private feelings with your partner?" Responses range from 1 = never to 5 = always. Fourth, relationship satisfaction was assessed with one question: "All in all, how satisfied are you with your relationship?" Responses ranged from 0 = very dissatisfied to 10 = very satisfied.

Three variables were included assessing fertility and children in the household. A dummy variable assessed whether the female partner was pregnant (0 = not pregnant and 1 = pregnant) and a categorical variable assessed whether the participant and his or her partner were trying to conceive a child. Responses were 0 = no, 1 = yes, for less than 1 year, and 2 = yes, for 1 year or more. A variable for the age of the youngest child in the household was also included. Responses were 0 = no children in the household, 1 = youngest child was less than 1 year old, 2 = youngest child was 1 or 2 years old, and 3 = youngest child was 3 years or older.

A final set of control variables assessed individual characteristics and demographic information. Self-esteem was measured with three items: "Sometimes I believe that I'm worthless (reversed)," "I like myself just the way I am," and "All in all, I am pleased with myself" (see Thönnissen, Wilhelm, Fiedrich, Alt, & Walper, 2015). Responses ranged from 1 = not at all to 5 = absolutely. Satisfaction with finances was assessed by the question "How satisfied are you, generally, with your household's financial situation?" and responses ranged from 0 = *very dissatisfied* to 10 = *very satisfied*. We also controlled for participant age, perceived health in the past 4 weeks, and labor force status (enrolled in an educational program, not employed, and employed).

Analytic Plan

We performed a fixed effects regression analysis to determine whether changes in participants' sexual frequency and satisfaction were associated with changes in their life satisfaction. As fixed effects estimation is based on intraindividual changes across panel waves, we do not make comparisons between individuals with different levels of sex and life satisfaction, but only consider within-person changes over time. Such an approach allows for the exam-

ination of associations between sexuality and subjective well-being through "naturalistically occurring" changes over time, as Loewenstein et al. (2015) identified as an important aim for future research. In contrast to cross-sectional analyses, unobserved heterogeneity in time constant characteristics, such as sexual experiences prior to the current partnership, does not bias estimation in this approach (for details about fixed effects regression [see Brüderl & Ludwig, 2014; Wooldridge, 2010]). Models were estimated with cluster-robust standard errors in Stata 12. The Hausman test was significant (χ^2 [37] = 446.78, $p < .001$), indicating that the fixed effects model was preferable over a random effects specification. In addition, it can be seen from Table 1 that there was substantial intraindividual variation over time in the variables. It is also important to note that, although our focus is on understanding the life satisfaction of individuals, the unit of analysis is actually intimate partnerships. This means that participants are included twice in the analysis if they changed partners during the study (provided at least two observations were available for each union). Using partnerships as the unit of analysis, in conjunction with the fixed effect modeling approach, ensures that time constant characteristics of both partners, as well as the relationship, are completely controlled. As average relationship duration in our sample is 8.7 years, the number of participants included with two different partners is low (72 men and 132 women). This may be the reason that models with individual fixed effects, which we also tested, did not yield substantially different results.

We tested the possibility of gender differences in the associations between sexual frequency and satisfaction with life satisfaction. Although rarely examined, some cross-sectional findings indicated associations between sexual satisfaction and subjective well-being are quite consistent across men and women (Brody & Costa, 2009; Cheng & Smyth, 2015), but sexual frequency was associated with happiness only for men in one study (Cheng & Smyth, 2015; but see Muise et al., 2016), suggesting the potential for gender differences. We tested a model with interaction terms computed between gender and the sex variables to determine whether gender significantly moderated the sexuality/life satisfaction associations (available from the authors on request). This analysis showed no significant gender differences, so we report only the pooled results for the entire sample (men and women combined).

Results

The full fixed effects regression results are displayed in Table 2. In Model 1, the effect of changes in sexual frequency on changes in life satisfaction was estimated without accounting for sexual satisfaction. We then added sexual satisfaction in Model 2 to ascertain whether changing sexual frequency was still associated with concurrent changes in life satisfaction once changing sexual quality was also considered.

The significant coefficients in model 1 demonstrate that intraindividual increases in sexual frequency predicted increases in life satisfaction. These coefficients represent the amount of change in life satisfaction that can be attributed to changes in the independent variables over time, accounting for all time-invariant sources of heterogeneity and changes in the included time-varying covariates. Coefficients must be interpreted as differences to the reference group who reported not having sex in the past 3 months. For example, the unstandardized coefficient of 0.16 for sex once per week implies that increasing sexual contact to one encounter per week was linked with a corresponding increase in life satisfaction by 0.16 points on the 11-point scale as compared to when the participant did not have sex in the previous 3 months. Looking at effect sizes of the binary variables, the association between sexual frequency and life satisfaction appeared to increase monotonically. The category "never had sex" was not significantly different from the reference category. However, few participants reported never having had sex before (i.e., virginity) in these data.

When adding sexual satisfaction (Model 2), the effect of sexual frequency decreased in magnitude and remained significant only for the highest two categories and marginally significant for the categories "once per week" and "2–3 times per week." Changes in sexual satisfaction, however, predicted increases in life satisfaction. Given that sexual frequency and satisfaction are associated with each other (27 % of variance of sexual satisfaction can be explained by sexual frequency in a univariate regression analysis using OLS), it is not unexpected that part of the effect of sexual frequency on life satisfaction disappears when accounting for sexual satisfaction. This result indicates participants are not more or less satisfied with life at lower frequencies of sexual intercourse, as long as their sexual satisfaction remains constant. It is quite striking, however, that experiencing a change into having sexual contact multiple times per week was still uniquely linked with increased life satisfaction, even when sexual satisfaction was also considered in the model.

While we do not narratively detail results for the covariates (they are all presented in Table 2), it is worth noting that these substantive associations between sexual frequency and satisfaction were evident when controlling for several important aspects of relationship quality. Thus, changes in sexual satisfaction and sexual frequency were associated with changes in life satisfaction even when relationship quality (negative conflict behaviors, intimacy, and relationship stability and satisfaction) was held constant. These measures of relationship quality were intertwined with life satisfaction in the expected directions: Increases in relationship satisfaction and intimacy were associated with increased life satisfaction, while heightened negative conflict behaviors and considering divorce or separation were linked with declining life satisfaction.

Discussion

The aim of the current study was to examine how sexual satisfaction and frequency are associated with life satisfaction among coupled individuals using data from a large, randomly sampled

Table 2 Fixed effects regression results predicting life satisfaction

	(1)	(2)
Sexual frequency[a]		
Never had sex	0.32^{+}	0.27^{+}
	(1.96)	(1.71)
Once per month or less	0.10	0.08
	(1.64)	(1.42)
2–3 times per month	0.14*	0.11^{+}
	(2.41)	(1.76)
Once per week	0.17**	0.12^{+}
	(2.69)	(1.77)
2–3 times per week	0.23***	0.16*
	(3.50)	(2.32)
More than 3 times per week/daily	0.29***	0.21*
	(3.65)	(2.56)
Satisfaction with sex life		0.03***
		(4.36)
Relationship status[b]		
Cohabitation	0.05	0.06
	(1.11)	(1.20)
Marriage	0.04	0.04
	(0.55)	(0.57)
Age	−0.02^{+}	−0.02
	(−1.65)	(−1.60)
Pregnant	0.24***	0.23***
	(5.96)	(5.78)
Children in the household[c]		
Less than 1 year	0.37***	0.37***
	(5.51)	(5.52)
Less than 3 years	0.06	0.07
	(0.97)	(1.10)
3 years and older	0.08	0.09
	(1.14)	(1.19)
Trying to conceive a child[d]		
Less than 1 year	0.00	−0.00
	(0.02)	(−0.07)
1 year and longer	0.04	0.03
	(0.41)	(0.33)
Seriously considered separation/divorce	−0.22***	−0.21***
	(−5.76)	(−5.64)
Conflict styles and conflict behavior	−0.20***	−0.19***
	(−6.77)	(−6.49)
Intimacy	0.10***	0.10***
	(5.02)	(4.88)
Satisfaction with relationship	0.06***	0.05***
	(9.14)	(7.40)
Health status past 4 *weeks*	0.19***	0.18***
	(14.05)	(13.98)
Self-esteem	0.23***	0.23***
	(11.98)	(11.88)
Satisfaction with finances	0.15***	0.15***
	(19.99)	(19.82)
Labor force status[e]		
Not employed	0.07	0.07
	(1.16)	(1.14)
Employed	0.03	0.03
	(0.54)	(0.58)
Dummies relationship duration	*included*	*included*
Number of observations	18,712	18,712
Number of unions	5786	5786
R^2	0.15	0.15

[a] Not in the last 3 month is the reference category

[b] Living apart together is the reference category

[c] No children is the reference category

[d] Not trying to conceive is the reference category

[e] Currently enrolled in an educational program is the reference category

T statistics in parentheses

$^{+}$ $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

longitudinal German study. Our results provide evidence that naturally occurring increases in sexual frequency and satisfaction over time are linked with corresponding increases in life satisfaction and these linkages are consistent for men and women. This association persisted in the face of our rigorous analytic approach that statistically held all time-invariant confounds constant (such as effects attributed to ethnicity, family background, or one's prior sexual history), included a large number of important time-varying covariates, and considered sexuality in all the participants' intimate relationships over the 5-year duration of this study. Indeed, these associations between sexuality and life satisfaction cannot merely be attributed to unmeasured demographic or personality characteristics of the sample; changes in relationship quality, fertility and childrearing, and various intrapersonal characteristics; or the sexual relationship among only continuously partnered individuals. While this work represents a rigorous test of the sexuality/life satisfaction link, this contribution cannot definitively answer the question of causality. Although we controlled for a wide range of potential intervening factors, we cannot rule out the possibility that other unobserved time-varying events or characteristics induced changes in both life satisfaction and sexual frequency and satisfaction.

It is also important to keep in mind that the magnitude of the effects from the sexuality variables to life satisfaction was relatively small, especially when considering the coefficients observed for getting pregnant, which increased life satisfaction by 0.23 points, or seriously considering divorce, which was linked with a corresponding decrease in life satisfaction by 0.21 points. Yet, given that changes in sexual frequency or satisfaction pale in comparison with the impact of expecting a child or the intention to terminate one's

intimate partnership, even small associations between sex and life satisfaction are remarkable. The small magnitude of our effects also aligns with findings from prior cross-sectional work (e.g., Blanchflower & Oswald, 2004; Muise et al., 2016). We would like to underline that not only frequent sex affects life satisfaction. In addition, the shift from having no sex at all to having infrequent sex is associated with an increase in life satisfaction. When it comes to understanding what makes for a satisfying life, sex is certainly not the whole story, but the available evidence suggests it is an important chapter, at least.

While our results demonstrate direct links between sexual satisfaction and frequency and life satisfaction, there are likely mediators underlying these associations. This is an exciting aim for future research. Relationship characteristics may serve as potential mechanisms linking sexuality and subjective well-being. Muise et al. (2016) found cross-sectional evidence suggesting relationship satisfaction might mediate the sexual satisfaction/life satisfaction association, representing one potentially fruitful variable for future longitudinal research to examine.

Results of the present research need to be considered in light of several study limitations. We tested within-time associations between variables that captured intraindividual changes over time. In other words, the models link changes in sexual frequency and satisfaction between Wave t and Wave $t+1$ to changes in life satisfaction between Waves t and Wave $t+1$. This strategy does not enable us to detect the temporal ordering of these changes, particularly regarding associations between sexual satisfaction and life satisfaction. Sexual frequency was reported for the past 3 months, and the judgment on life satisfaction was made at the interview, so the temporal ordering of these two variables may be clearer. Nevertheless, a critical direction for future work is to examine links between sexuality and subjective well-being as they coevolve over time. Next, we used survey data from only one partner within a relationship. This fails to capture changes in the life of one's partner, although such changes may affect the desire for sex within the couple, ultimately impacting sexual frequency. In this regard, future work based on dyadic data would be valuable to provide a more comprehensive understanding. A final limitation is the relatively small number of sex variables included in our analysis, which is due to the limited number of variables in the data set. It would, for instance, be interesting to analyze whether sexual function might be the reason for the association between sex and life satisfaction. Thus, further research should focus on these associations.

Despite these limitations, this study represents an important addition to understanding the link between sex and life satisfaction. Drawing on longitudinal data from a random population sample, we found naturally occurring increases in sexual frequency and satisfaction over time predicted corresponding increases in life satisfaction. While sexuality certainly is not the sole determinant of subjective well-being, we are reasonably confident suggesting that those in committed relationships may experience increases in life satisfaction by "turning up the heat" in the bedroom.

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Compliance with Ethical Standards

Conflict of interest All authors declare that they have no conflict of interest.

Ethical Approval Compliance with ethical standards for German social research and data protection laws was secured throughout the study. Informed consent was obtained from all individual participants included in the study.

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