Sexual Intimacy in First-time Mothers: Associations with Sexual and Relationship Satisfaction Across Three Waves

Natalie O. Rosen, Loriann Williams, Sarah A. Vannier & Sean P. Mackinnon

Archives of Sexual Behavior
The Official Publication of the
International Academy of Sex Research

ISSN 0004-0002

Arch Sex Behav
DOI 10.1007/s10508-020-01667-1

Springer

Archives of Sexual Behavior
https://doi.org/10.1007/s10508-020-01667-1

ORIGINAL PAPER

Sexual Intimacy in First-time Mothers: Associations with Sexual and Relationship Satisfaction Across Three Waves

Natalie O. Rosen[1,2] · **Loriann Williams**[1] · **Sarah A. Vannier**[3] · **Sean P. Mackinnon**[1]

Received: 25 February 2019 / Revised: 8 November 2019 / Accepted: 25 February 2020

Abstract

New mothers often experience significant declines in their sexual and relationship satisfaction compared to pre-pregnancy, yet there has been limited research examining protective factors. Intimacy—defined as the degree of disclosure and perceived partner responsiveness in a relationship—has been identified as contributing to the positive adjustment of individuals coping with novel life stressors, as well as to general sexual and relationship satisfaction. However, it is unknown whether sexual disclosure and/or partner responsiveness are reciprocally related to sexual and relationship satisfaction. This study examined the longitudinal associations between sexual intimacy—that is, intimacy in the context of sex—and sexual and relationship satisfaction in first-time mothers. First-time mothers ($N = 171$) completed online measures assessing disclosure and perceived partner responsiveness specific to their sexual relationship, sexual satisfaction, and relationship satisfaction at 3, 6, and 12 months postpartum. Analyses were conducted with path analysis using a longitudinal panel mediation model. Greater perceived partner responsiveness in relation to sex at a prior wave predicted increases in both sexual and relationship satisfaction at the subsequent wave. Sexual disclosure did not contribute to sexual or relationship satisfaction over time; the results did not support a reciprocal model of sexual disclosure and perceived partner responsiveness, nor indirect effects of these variables on outcomes. Perceived partner responsiveness in relation to sex is positively related, and temporally precedes sexual and relationship satisfaction in first-time mothers.

Keywords Perceived partner responsiveness · Transition to parenthood · Intimacy · Sexual satisfaction · Relationship satisfaction

Introduction

While welcoming a new baby is typically a time of great joy, many first-time parents experience significant declines in their sexual and relationship satisfaction compared to life before the baby was born (Doss & Rhoades, 2017; McBride & Kwee, 2017). New mothers' reduced sexual satisfaction (i.e., their subjective evaluation of the quality of the sexual relationship) likely relates to the many novel sexual concerns experienced during this period, such as increased discrepancies in sexual desire between partners, lack of time and energy for sexual activity, and changing body image; these concerns have been endorsed by over 90% of mothers in the first year postpartum (Schlagintweit, Bailey, & Rosen, 2016). Parents also report a steeper decline in relationship satisfaction compared to non-parents over the same relationship period (Keizer & Schenk, 2012). Although sexual function typically improves for new mothers over the first year postpartum, sexual and relationship satisfaction often remain low, and these deteriorations can persist longer term (De Judicibus & McCabe, 2002; Keizer & Schenk, 2012). Changing familial roles, increased stress, sleep deprivation, breastfeeding, less time alone together as a couple, and unequal division of household labor may further contribute to reduced sexual and relationship satisfaction (Ahlborg,

Electronic supplementary material The online version of this article (https://doi.org/10.1007/s10508-020-01667-1) contains supplementary material, which is available to authorized users.

✉ Natalie O. Rosen
nrosen@dal.ca

[1] Department of Psychology and Neuroscience, Dalhousie University, 1355 Oxford Street, P.O. Box 15000, Halifax, NS B3H 4R2, Canada

[2] Department of Obstetrics and Gynecology, IWK Health Centre, Halifax, NS, Canada

[3] Department of Psychology, St. Thomas University, Fredericton, NB, Canada

Published online: 13 March 2020

Dahlöf, & Hallberg, 2005; Doss & Rhoades, 2017; Leavitt, McDaniel, Maas, & Feinberg, 2017).

Given the robust positive correlation between sexual and relationship satisfaction (Fallis, Rehman, Woody, & Purdon, 2016), it is perhaps not surprising to see these similar patterns of decline. However, the sexual system is distinct from broader relational systems, and sexual and relationship satisfaction can, at times, have different predictors highlighting the importance of examining both of these important indices (Lorber, Erlanger, Heyman, & O'Leary, 2015; McNulty, Wenner, & Fisher, 2016; Smith & Pukall, 2011). Declines in the sexual and romantic relationship during the transition to parenthood are not inconsequential. Sexual and marital difficulties have negative implications for the individual (e.g., depressive symptoms) and couple (e.g., marital dissolution; Chivers, Pittini, Grigoriadis, Villegas, & Ross, 2011; McNulty et al., 2016). In turn, marital conflict negatively impacts the parent–child relationship, and the child's social, emotional, and behavioral development (Stroud, Meyers, Wilson, & Durbin, 2015; Yu, Pettit, Lansford, Dodge, & Bates, 2010). Such findings underscore the importance of identifying protective factors—especially those that may be modifiable by intervention—for new parents' sexual and relationship satisfaction.

Using longitudinal designs, researchers have found that psychological variables such as attachment style, anxiety, and communication affect new parents' relationship satisfaction (Doss & Rhoades, 2017). While postpartum sex research has emphasized physiological predictors of sexual function (e.g., breastfeeding, mode of delivery; McBride & Kwee, 2017), more recent cross-sectional studies have underscored the contribution of psychological factors such as parenting stress, body image, and attributions, and relational factors such as communication and empathy to new mothers' sexual and relationship satisfaction (Jawed-Wessel, Herbenick, & Schick, 2016; Leavitt et al., 2017; Muise, Rosen, Kim, & Impett, 2017). In one retrospective cross-sectional study, relational variables—such as feelings of closeness and partner support—were more influential to women's postpartum sexuality than non-relational factors (e.g., fatigue, stress; Hipp, Low, & van Anders, 2012). However, longitudinal studies examining relational predictors of the sexual satisfaction of new parents are rare; this limits researchers' ability to establish temporal precedence between the predictors and outcomes, which is necessary (but not sufficient) for causal inference. In this study, we aim to bridge these gaps by investigating the longitudinal associations between sexual intimacy (i.e., degree of disclosure and perceived partner responsiveness in the context of sex) and the sexual and relationship satisfaction of first-time mothers over the first year of parenthood.

Interpersonal Process Model of Intimacy

Researchers have identified intimacy in romantic relationships (i.e., relational intimacy) as contributing to the positive adjustment of individuals struggling with health conditions (Cano & Williams, 2010; Manne et al., 2004), including sexual problems (Bois et al., 2016; McCabe, 1997; Rosen, Bois, Mayrand, Vannier, & Bergeron, 2016a), as well as to general sexual and relationship satisfaction (Rubin & Campbell, 2012; van Lankveld, Jacobs, Thewissen, Dewitte, & Verboon, 2018). According to the Interpersonal Process Model of Intimacy (IPMI), intimacy develops through two interrelated processes: self- and partner-disclosure (i.e., sharing of personal information, thoughts, and feelings), and perceived partner responsiveness (i.e., partner responses that are perceived to be understanding, validating, and caring; Laurenceau, Barrett, & Pietromonaco, 1998; Reis & Shaver, 1988). In support of this model, daily experience and observational studies have found that greater disclosure and perceived partner responsiveness independently predict greater intimacy in romantic partners (Laurenceau et al., 1998; Laurenceau, Barrett, & Rovine, 2005; Mitchell et al., 2008). This process in turn influences both intrapersonal and interpersonal outcomes (Reis & Gable, 2015). Specifically, greater intimacy promotes pro-relationship cognitions and emotions (e.g., reduced defensiveness, gratitude), as well as relationship maintenance behaviors (e.g., doing one's share of responsibilities, prioritizing a partner's needs) that serve to strengthen the relationship (Finkel & Campbell, 2001; Kubacka, Finkenauer, Rusbalt, & Keijsers, 2011). Intimacy is also thought to enhance relationship satisfaction by satisfying basic needs for support, closeness, and a secure attachment (Mikulincer, Shaver, Bar-On, & Sahdra, 2014).

In a clinical sample of women experiencing pain during intercourse, greater perceived partner responsiveness was associated with higher sexual and relationship satisfaction for affected women and their partners, and greater self-reported disclosure (self and partner combined) was associated with women's higher sexual satisfaction (Bois et al., 2016; Rosen et al., 2016a). The latter findings suggest that relational intimacy, as defined by the IPMI, might contribute to maintaining or promoting satisfaction among individuals struggling with sexual problems, such as those experienced by new mothers.

Reis and Shaver (1988) further posited that the degree to which disclosure is associated with enhanced intimacy depends on perceptions of partner responsiveness to that disclosure. In other words, disclosure should temporally precede perceived partner responsiveness in the pathway toward intimacy, and subsequently satisfaction. A series of experience sampling and laboratory-based studies with community and clinical (i.e., those affected by cancer) couples

found that perceived partner responsiveness mediated the associations between self- and partner-disclosure and intimacy (Laurenceau et al., 1998, 2005; Manne et al., 2004, 2018). The IPMI also asserts that intimacy builds as a result of repeated interactions of disclosure and perceived partner responsiveness over time, suggesting a more dynamic and reciprocal relationship. Thus, based on principles of operant conditioning and positive reinforcement (Reynolds, 1975), it is also conceivable that greater perceived partner responsiveness could promote future disclosure, and subsequently enhanced satisfaction in the context of ongoing committed relationships. A reciprocal relationship between perceived partner responsiveness and disclosure has not been tested, to our knowledge. Longitudinal studies are necessary to tease apart the temporal order of these variables (Maxwell & Cole, 2007).

Sexual Intimacy

Clinical theories and models of sex therapy have long targeted intimacy—broadly defined as the level of closeness in one's romantic relationship—as central to establishing a fulfilling sex life (Basson, 2000; Metz & McCarthy, 2007); however, few studies have applied the IPMI to sexual intimacy. Greater sexual self-disclosure (e.g., sharing sexual likes and dislikes), and feelings of validation (a part of perceived partner responsiveness) have each been linked to greater sexual satisfaction in cross-sectional studies (Kleinplatz, Menard, Paradis, Campbell, & Dalgleish, 2013; MacNeil & Byers, 2009). There is evidence to suggest that sexual intimacy might differ from broader intimacy processes in the relationship. Sexual interactions, perceptions, and experiences play a unique and fundamental role in health and well-being, and exhibit different predictors and trajectories than relationship variables (Diamond & Huebner, 2012). For example, individuals report that communication about sexual topics provokes greater anxiety, perceived threat, and vulnerability, compared to other relationship topics (Rehman, Lizdek, Fallis, Sutherland, & Goodnight, 2017). In addition, some women are satisfied with their sex lives, but not their relationships, and the opposite can also be true (Apt, Hurlbert, Pierce, & White, 1996; Smith & Pukall, 2011).

In the only study to our knowledge to examine both sexual and relational intimacy as defined by the IPMI (i.e., self-disclosure and perceived partner responsiveness), Bois, Bergeron, Rosen, McDuff, and Gregoire (2013) found that sexual and relationship intimacy were moderately correlated ($r = .34$) in a cross-sectional sample of women experiencing pain during intercourse. Although women's sexual and relational intimacy were both positively correlated with women's sexual function, only women's greater sexual intimacy was associated with their own higher sexual satisfaction. It appears that when the woman is suffering from the sexual problem, as is more commonly the case in new mothers who have given birth, her subjective experience of sexual intimacy plays a crucial role in her sexual satisfaction. Bois et al. did not examine the unique role of sexual disclosure versus perceived partner responsiveness nor could they tease apart the temporal order of the sexual intimacy variables in women's satisfaction given the cross-sectional nature of the study. In sum, there is evidence to suggest that sexual intimacy processes are distinct from more global relational intimacy, and that sexual intimacy is relevant to the sexual and relationship satisfaction of new mothers.

Sexual Intimacy in the Transition to Parenthood

Sexual intimacy may be especially critical to effective management of novel sexual challenges—of which there are many in the transition to parenthood (Schlagintweit et al., 2016). Greater feelings of closeness and empathy for one's partner have been cross-sectionally linked to greater sexual and relationship satisfaction for mothers in the first year postpartum (Hipp et al., 2012; Rosen, Mooney, & Muise, 2016b). In line with the IPMI, greater self- and partner-disclosure and perceived partner responsiveness specific to sex may foster an environment that promotes pro-relationship thoughts, feelings, and behaviors related to sexuality. For example, greater sexual intimacy could lead to an environment that is more conducive to modifying sexual scripts and accepting each other's sexual needs—which have often changed in the transition to parenthood (Muise et al., 2017)—in turn, leading to greater sexual and relationship satisfaction. Taken together, examining the longitudinal associations between sexual disclosure and perceived partner responsiveness will help to refine intimacy models, and specifically as they apply in the transition to parenthood. Findings may inform more effective tailoring of prevention and intervention efforts during this vulnerable period in the lives of new mothers.

Current Study

The purpose of this study was to examine the longitudinal associations between sexual intimacy—disclosure (both self and partner) and perceived partner responsiveness in the context of sex—and sexual and relationship satisfaction in first-time mothers. We used a rigorous longitudinal panel design for our analysis, which allows for stronger causal inferences than cross-sectional data by controlling for initial (i.e., 3-month postpartum) levels of variables and testing for change over time (Cole & Maxwell, 2003). Based on the IPMI and prior literature, we hypothesized that: (H1) Greater disclosure and perceived partner responsiveness specific to the sexual relationship at one wave (i.e., 3, 6, or 12 months postpartum), would predict increases in sexual and relationship satisfaction at the subsequent wave; (H2): There would be a reciprocal relationship between perceived partner responsiveness and sexual disclosure, such that each variable would predict increases in

the other at a subsequent wave; (H3): Greater perceived partner responsiveness in the sexual relationship would mediate the association between sexual disclosure and subsequent satisfaction, and; (H4) Greater sexual disclosure would mediate the association between greater perceived partner responsiveness and future satisfaction.

Method

Participants

Participant characteristics are reported in Table 1. Participants were recruited during visits to a hospital ultrasound clinic for routine 18- to 20-week ultrasound appointments. The current study is part of a larger longitudinal investigation examining physical and psychosocial functioning in first-time mothers. One cross-sectional paper has previously been published from these data, focusing on new mothers' attributions for changes to their sexuality postpartum (Vannier, Adare, & Rosen, 2018). Inclusion criteria for the current study included: (1) 18–25 weeks pregnant with their first child at the time of recruitment, (2) uncomplicated, singleton pregnancy, (3) 18 years of age or older, (4) in a romantic relationship, (5) able to read and write in English, and (6) access to a personal e-mail for receiving surveys. Women were excluded if they self-identified as having a severe and unmanaged medical or psychiatric disorder.

Eligible participants were enrolled between April 2016 to January 2017. Figure 1 documents the flow of participants into the study. The final sample, $N = 171$, comprised women who contributed data to at least one of the three postpartum time-points. Specifically, 144 women (84.2%) had data at all three time-points; 21 women (12.3%) contributed data at two time-points; and 6 women (3.5%) had data at just one time-point.

Table 1 Sample characteristics ($N = 171$)

Variable	*M*	SD
Age (in years)	29.81	4.18
Length of relationship (in years)	6.41	3.66
Sexual orientation	%	*n*
Heterosexual	93.0	159
Bisexual	4.7	8
Other[a]	2.3	4
Relationship status		
Married	67.8	116
Living with a partner	22.8	39
Other committed relationship[b]	9.4	16
Education		
Less than high school	1.2	2
High school or GED	12.9	22
Community college	22.2	38
University	39.2	67
Masters/Ph.D.	15.8	27
Second university degree	8.8	15
Income (Canadian)		
< $19,999	2.3	4
$20,000–$39,999	7.6	13
$40,000–$59,999	11.7	20
$60,000–$79,000	14.6	25
$80,000–$99,999	21.1	36
> $100,000	41.5	71
Unreported	1.2	2
Cultural background		
English Canadian	83.0	142
French Canadian	2.3	4
African Canadian	2.3	4
Other [c]	10.5	18
Not captured above/unknown	1.8	3

Note. [a]Includes lesbian, gay, questioning, and pansexual. [b]Includes being engaged and dating one partner regularly. [c]Includes American, Asian, Australian, Middle Eastern, Western European, Eastern European, and Caribbean

Measures

Demographics Participants reported their age, education, income, cultural background, sexual orientation, and relationship status and duration. Women also reported on the proportion of their child's feedings in the past four weeks that were comprised of breast milk.

Sexual intimacy Sexual intimacy was assessed with an adapted version of a measure of relational intimacy as in prior research (Bois et al., 2013). Participants completed the 7-item measure, which assessed the general degree of self-disclosure (2 items), partner-disclosure (2 items), and perceived partner responsiveness (3 items) in their sexual relationship. See Table 4 (CFA results) for specific items. Items were presented on a 7-point Likert scale ranging from 1 (*not at all*) to 7 (*a lot*), such that higher scores indicate greater sexual intimacy. Previous research using this measure has found evidence of good internal consistency ($\alpha = .87$) and construct validity (Bois et al., 2013).

Relationship satisfaction The 4-item Couples Satisfaction Index-Short form (CSI-SF; Funk & Rogge, 2007) measured relationship satisfaction. Women rated their relationship in the last four weeks (e.g., happiness, warmth) on 5- and 6-point Likert scales. Scores can range from 0 to 21 and higher scores indicate higher relationship satisfaction. The CSI-4 has previously shown high internal consistency, and construct validity (Funk & Rogge, 2007).

Sexual satisfaction The well-validated Global Measure of Sexual Satisfaction (GMSEX; Lawrance & Byers, 1995) was used to measure sexual satisfaction. Participants evaluated

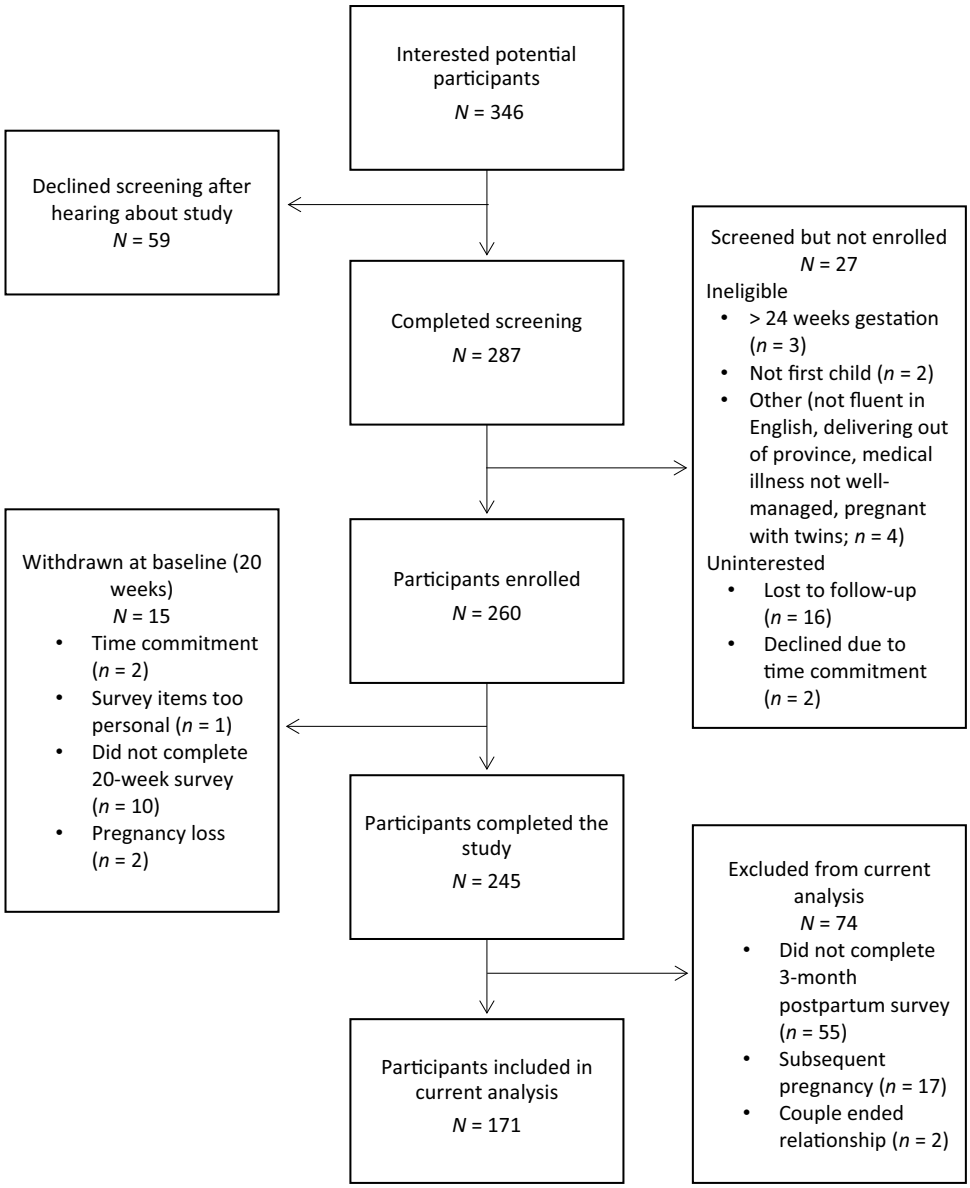

Fig. 1 Flow of participants for the current study

their sexual relationship on five 7-point bipolar scales (e.g., *good-bad*, *pleasant-unpleasant*). Scores can range from 5 to 35 and higher scores indicate greater sexual satisfaction. The GMSEX has demonstrated strong internal consistency ($\alpha = .94$), test–retest reliability (two-months, $r = .72$), and convergent validity (Lawrance & Byers, 1995).

Procedure

After providing informed consent, women completed a series of online questionnaires e-mailed to them individually at baseline (18- to 25-weeks pregnant) and at 3, 6, and 12 months postpartum. At each time-point, women were contacted by telephone 48 h after the survey was sent to ensure that they had received it and to answer any questions. If they had not yet completed a survey, they received a reminder e-mail one and two weeks later, and were given four weeks before the survey expired. Women provided their demographic information in pregnancy, and then completed standardized measures assessing their sexual intimacy, sexual satisfaction, and relationship satisfaction at the postpartum time-points. Participants received up to $130.00 (CAD) in Amazon gift cards for participating in the larger longitudinal study. This study was approved by our institution's ethical review board.

Data Analyses

All data and syntax for the analyses are available on an Open Science Framework (OSF) page: https://osf.io/nupxz/?view_only=1fc232f4292d448cb731bcee7619328b. Means, SDs,

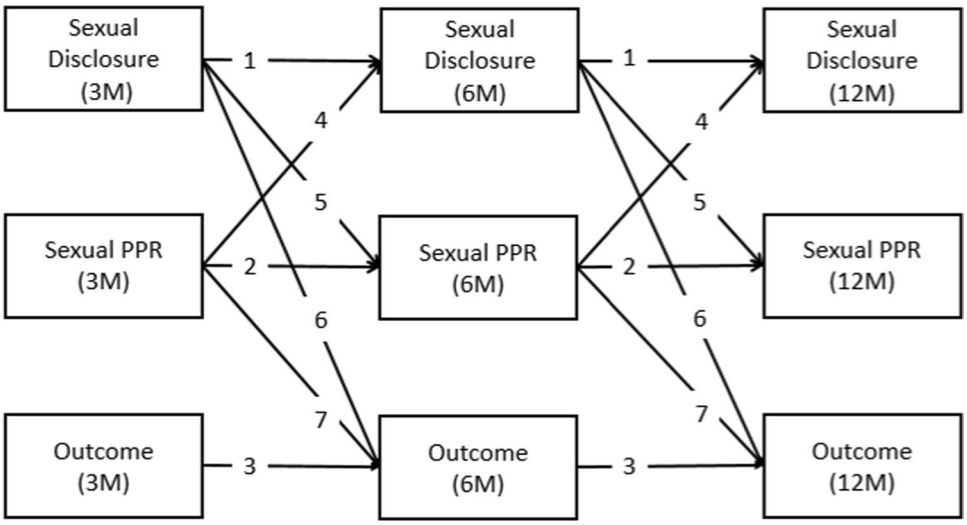

Fig. 2 Hypothesized cross-lagged panel model of mediation. Rectangles indicate measured variables at each of the three measurement occasions (3, 6, and 12 months). Arrows indicate paths. Paths sharing the same number were constrained to equality. The indirect effect of sexual disclosure on outcomes through perceived partner responsiveness was calculated by multiplying paths 5 and 7. The indirect effect of perceived partner responsiveness on outcomes through sexual disclosure was calculated by multiplying paths 4 and 6. Residual error terms and covariances among all variables at a given measurement occasion are not shown to reduce visual clutter. *PPR* perceived partner responsiveness

and rates of missing data for all subscales were calculated to describe the data. Hypotheses were tested using structural equation modeling (SEM) with robust estimator of standard errors (because it performs better if assumptions are violated, and is equivalent to the non-robust methods when not; Asparouhov (2005)) and fit indices (MLR estimation) in Mplus 8.1 (Muthén & Muthén, 1998–2017). We used a longitudinal panel mediation model as outlined by Cole and Maxwell (2003). Because the sample size was relatively small for SEM, path analysis without latent variables was used. However, as recommended for SEM, a confirmatory factor analysis (CFA) was conducted on the 3 month data to verify the factor structure prior to proceeding to the next steps. We conducted CFA on the 3-month data only because a CFA with all three waves of data entered simultaneously has 198 parameters, which is more than the number of participants. Fit indices and standardized factor loadings are reported for the CFA.

Fit indices, standardized path coefficients and R^2 values are reported for the path analysis. A well-fitting model was defined by a Confirmatory Fit Index (CFI) and Tucker–Lewis Index (TLI) around.95 or larger, Root Mean Square Approximation of Error (RMSEA) around .06 or smaller, and Standardized Root Mean Square Residual (SRMR) around .08 or smaller (Kline, 2011). Indirect effects were calculated by multiplying the a-paths (X to M) by the b-paths (M to Y, controlling for X). The significance of indirect effects were calculated using bootstrapping with 20,000 resamples (Hayes, 2018). When nested models were compared, ΔCFI of .01 was used as a criterion for model selection (Cheung & Rensvold, 2002). A graphical depiction of the models tested can be found in Fig. 2.

Results

Descriptive statistics are shown in Table 2. Overall, 8.8% of data were missing, with more data missing at month 12 (14.0–15.8%) than month 3 (2.3–8.8%). Missing data were handled using listwise deletion ($n = 122$) for descriptive statistics and bivariate correlations, and using a full information maximum likelihood approach for CFA and path analyses. Bivariate correlations are shown in Table 3. In general, all variables tended to be positively correlated with each other with small-medium to large effect sizes. We also explored relationships between study variables and key demographic variables (i.e., breastfeeding, age, education, income, and relationship duration) to assess whether they would be suitable covariates. Demographics were generally uncorrelated with variables in our model (Supplemental Tables 1–3; see OSF page). Thus we did not consider them further, and did not add any of these variables as covariates.

Confirmatory Factor Analysis

A four-factor CFA was run on the 16 questionnaire items that comprised the sexual disclosure (4 items), sexual perceived partner responsiveness (3 items), relationship satisfaction (4

Table 2 Means, SDs, and alpha reliabilities

Variable	Wave	*M* (range)	*SD*	Missing data (%)	*α*
Sexual perceived partner responsiveness	3 months	17.28 (3–21)	4.23	8.8	.92
	6 months	17.36 (3–21)	3.65	7.6	.92
	12 months	17.30 (3–21)	3.59	15.2	.89
Sexual disclosure	3 months	18.68 (4–28)	6.69	7.0	.94
	6 months	18.34 (4–28)	6.52	6.4	.95
	12 months	19.03 (4–28)	6.44	15.8	.94
Relationship satisfaction	3 months	16.34 (4–21)	3.36	2.3	.87
	6 months	15.98 (2–21)	3.14	3.5	.83
	12 months	15.81 (4–21)	3.51	14.0	.88
Sexual satisfaction	3 months	23.55 (5–35)	7.57	5.3	.95
	6 months	24.74 (5–35)	7.37	5.8	.96
	12 months	24.99 (5–35)	6.68	14.0	.95

Note. Means and SDs use listwise deletion ($n = 122$)

items), and sexual satisfaction (5 items) questionnaires, with all items loading on their respective factors with no cross-loadings (Table 4). This model fit the data well, $\chi^2(98) = 189.24$, $p < .0001$, CFI = .94, TLI = .93. RMSEA = .07, SRMR = .05. Factor loadings were all substantially large (from .64 to .94; Table 4). The 4-factor model fit better than a 3-factor model where both dimensions of sexual intimacy were combined into a single measure, $\chi^2(101) = 401.42$, $p < .001$, CFI = .81, TLI = .77. RMSEA = .13, SRMR = .11.

Path Analysis

Model 1*: Relationship satisfaction as outcome* The first model tested a cross-lagged panel mediation model as outlined in Fig. 2 with relationship satisfaction as the outcome. This model fit the data reasonably well, $\chi^2(20) = 36.45$, $p = .014$, CFI = .96, TLI = .93. RMSEA = .07, SRMR = .086. This model was compared to an unconstrained model with the equality constraints specified in Fig. 2 removed to assess whether these equality constraints were reasonable. The unconstrained model fit the data more poorly, ΔCFI = .014. Thus, the model with equality constraints was preferred, which had the added value of reducing the number of *p* values calculated (reducing Type 1 error) while also improving model fit. Path coefficients and R^2 values are shown in Fig. 3. Overall, the autoregressive paths were large and substantial, with standardized coefficients ranging from .40 to .58, suggesting that the measured constructs were relatively stable over time. However, of the four cross-lagged paths tested, only the path from sexual perceived partner responsiveness to relationship satisfaction was statistically significant. This significant path suggests that perceived

Table 3 Bivariate correlations

	3 months				6 months				12 months			
Variable	1	2	3	4	5	6	7	8	9	10	11	12
3 months												
1. Sexual PPR	–											
2. Sexual disclosure	.50	–										
3. Relationship satisfaction	.41	.30	–									
4. Sexual satisfaction	.42	.36	.48	–								
6 months												
5. Sexual PPR	.51	.37	.34	.35	–							
6. Sexual disclosure	.22	.49	.25	.26	.51	–						
7. Relationship satisfaction	.34	.29	.56	.47	.61	.42	–					
8. Sexual satisfaction	.34	.33	.30	.53	.63	.49	.52	–				
12 months												
9. Sexual PPR	.28	.23	.38	.19	.49	.22	.42	.27	–			
10. Sexual disclosure	.17	.45	.27	.18	.38	.55	.41	.38	.54	–		
11. Relationship satisfaction	.27	.21	.52	.22	.40	.21	.54	.27	.61	.41	–	
12. Sexual satisfaction	.30	.32	.31	.28	.39	.23	.43	.45	.47	.51	.41	–

Note. This matrix uses listwise deletion ($n = 122$). All correlations statistically significant at $p < .05$ except for the correlation between sexual perceived partner responsiveness (3 months) and sexual disclosure (12 months), $p = .055$, and sexual satisfaction (3 months) and sexual disclosure (12 months), $p = .054$. *PPR* perceived partner responsiveness

Table 4 Factor loadings for confirmatory factor analysis

Item	Factor loading	95% CI factor loading
Sexual perceived partner responsiveness "In general, during or immediately after a sexual activity with your partner…"		
How much did you feel your partner understands you?	.82	[.74, .91]
How much did you feel cared for by your partner?	.94	[.90, .99]
How much did you feel your partner accepted you?	.93	[.84, 1.02]
Sexual disclosure "With regard to your sexual relationship with your partner …"		
How much did your partner disclose his/her feelings about sex to you?	.86	[.75, .96]
How much did your partner disclose private sexual thoughts to you?	.89	[.79, .98]
How much did you disclose your feelings about sex to your partner?	.92	[.85, .99]
How much did you disclose your private sexual thoughts to partner?	.92	[.84, 1.00]
Relationship satisfaction		
Degree of happiness, all things considered, of your relationship	.64	[.50, .77]
I have a warm and comfortable relationship with my partner	.81	[.75, .87]
How rewarding is your relationship with your partner?	.93	[.90, .97]
In general, how satisfied are you with your relationship?	.91	[.86, .95]
Sexual Satisfaction "How would you describe your sexual relationship with your partner?"		
Very bad to Very good	.92	[.87, .97]
Very unpleasant to Very pleasant	.89	[.84, .94]
Very negative to Very positive	.87	[.78, .95]
Very unsatisfying to Very satisfying	.90	[.85, .94]
Very worthless to Very valuable	.85	[.78, .91]

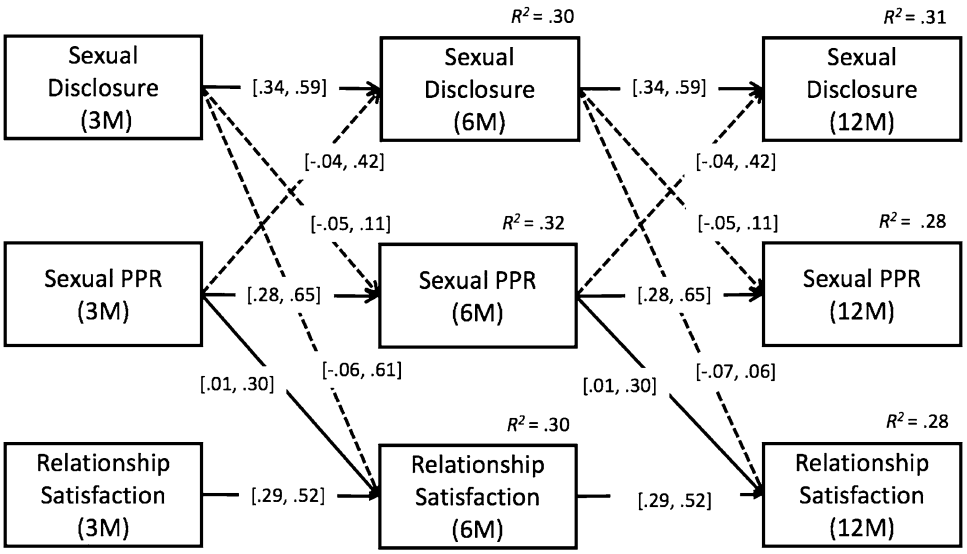

Fig. 3 Cross-lagged panel mediation model predicting relationship satisfaction. Rectangles indicate measured variables. Solid black arrows indicate statistically significant paths ($p < .05$). Dashed lines indicate nonsignificant paths ($p > .05$). Numbers on paths indicate 95% confidence intervals for standardized coefficients. Thus, to the extent that variances differ across waves, the standardized coefficients may vary slightly despite equality constraints. Numbers in top right hand corner indicate R^2 values. Residual error terms and covariances among all variables at a given measurement occasion are not shown. *PPR* perceived partner responsiveness. $N = 171$

partner responsiveness in the sexual relationship at a prior measurement occasion predicted increases in relationship satisfaction at a subsequent measurement occasion. However, all other cross-lagged paths were nonsignificant. Thus, the indirect effects with sexual perceived partner responsiveness as the mediator (95% CI B − 0.028, 0.011) and sexual disclosure as the mediator (95% CI B − 0.005, 0.019) were also nonsignificant.

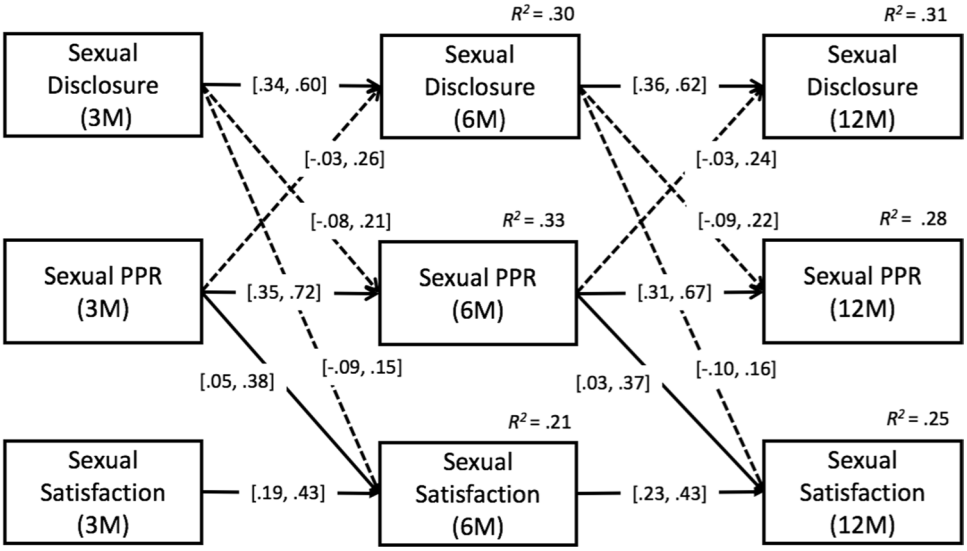

Fig. 4 Cross-lagged panel mediation model predicting sexual satisfaction. Rectangles indicate measured variables. Solid black arrows indicate statistically significant paths ($p < .05$). Dashed lines indicate nonsignificant paths ($p > .05$). Numbers on paths indicate 95% confidence intervals for standardized coefficients. Thus, to the extent that variances differ across waves, the standardized coefficients may vary slightly despite equality constraints. Numbers in top right hand corner indicate R^2 values. Residual error terms and covariances among all variables at a given measurement occasion are not shown. *PPR* perceived partner responsiveness. $N = 171$

Model 2: Sexual satisfaction as outcome The second model tested was identical to Model 1, except that the outcome variable was replaced with sexual satisfaction. Model fit was excellent, $\chi^2(20) = 20.19$, $p = .45$, CFI = .999, TLI = .999. RMSEA = .01, SRMR = .06. Model fit was slightly worse for the unconstrained model (ΔCFI = .006); however, the difference between the models was below the .01 cut-off suggested by Cheung and Rensvold (2002). Thus, the more parsimonious model with equality constraints was preferred. Path coefficients and R^2 values are located in Fig. 4. Overall, a similar pattern of results was observed. The autoregressive paths for sexual satisfaction were somewhat smaller in size relative to other variables, though they remained statistically significant. This suggests that sexual satisfaction is somewhat less stable over time, though it retains a core of stability over 9 months. As before, the only cross-lagged path to reach statistical significance was the path from perceived partner responsiveness in the sexual relationship to sexual satisfaction. Thus, perceived partner responsiveness related to sex at a prior wave predicted increases in sexual satisfaction at a subsequent wave. The indirect effects with perceived partner responsiveness as the mediator (95% CI B −0.019, 0.061) and sexual disclosure as a mediator (95% CI B −0.018, 0.043) were similarly nonsignificant.[1]

Discussion

This longitudinal study investigated the role of sexual intimacy—defined in terms of disclosure and perceived partner responsiveness in relation to sex—as a protective factor in the sexual and relationship satisfaction of first-time mothers. It is the first longitudinal investigation, to our knowledge, of protective factors associated with new mothers' sexual (and relationship) satisfaction. Greater perceived partner responsiveness in the sexual relationship predicted increases in both sexual and relationship satisfaction at the subsequent wave. Contrary to our hypotheses, sexual disclosure did not contribute to new mothers' sexual or relationship satisfaction over time, and the results did not support a reciprocal model of sexual disclosure and perceived partner responsiveness as mediators in the pathway toward satisfaction. Still, findings are in line with prior cross-sectional research in community and clinical samples that have shown greater intimacy to be associated with higher sexual and relationship satisfaction (Bois et al., 2016; Rubin & Campbell, 2012; van Lankveld et al., 2018), and that intimacy may buffer against the distressing consequences of sexual problems (Stephenson & Meston, 2010), which are common for new mothers (Schlagintweit et al., 2016).

[1] A reviewer asked if the results changed if we separated sexual disclosure into two subscales: Partner disclosure (Items 5 and 6) and self-disclosure (Items 7 and 8). Though this violates recommendations from our factor analysis, we analyzed data in this fashion as a supplementary exploratory analysis. Results were virtually identical to what we report here. Raw Mplus output for these analyses can be found on the study's OSF page: https://osf.io/nupxz/?view_only=1fc232f4292d448cb731bcee7619328b.

A key theoretical contribution of this study was examining the temporal order of sexual disclosure and perceived partner responsiveness in the pathway toward sexual and relationship satisfaction for new mothers. There was a positive correlation between sexual disclosure and perceived partner responsiveness, consistent with prior cross-sectional studies (Laurenceau et al., 1998, 2005; but see also Manne, Badr, & Kashy, 2012; Manne et al., 2004, 2018). However, our longitudinal results did not support the pathway proposed by the IPMI in which perceived partner responsiveness follows from disclosure (Reis & Shaver, 1988); moreover, the reverse order was also not supported. Though the present study failed to reject the null hypothesis for the cross-lagged paths between sexual disclosure and perceived partner responsiveness, the effects were in the expected direction. Thus, it is possible such a relationship exists, but is small in magnitude, or occurs only when the variables are assessed closer together in time (i.e., our time lags were too far apart). Disclosure of sexual thoughts and feelings was positively correlated with sexual and relationship satisfaction when examining cross-sectional correlations within any given wave, consistent with prior research (Bois et al., 2016; MacNeil & Byers, 2009). However, sexual disclosure did not predict sexual and relationship satisfaction at a subsequent wave, when controlling for perceived partner responsiveness and prior levels of satisfaction. Thus, we did not support the notion that sexual disclosure temporally precedes relationship and sexual satisfaction in a sample of new mothers. Expressing sexual changes or concerns to a partner seems to be less important for future satisfaction relative to feeling understood and cared for by one's partner in the context of the sexual relationship, when mothers may be feeling insecure and vulnerable. Such findings are in line with Reis (2012) more recent emphasis on perceived partner responsiveness as a core organizing principle for promoting well-being in couple relationships because it provides important validation to the self and leads to feelings of belonging, acceptance, and trust.

Greater perceived partner responsiveness in the sexual relationship predicted subsequent increases in both sexual and relationship satisfaction for new mothers. These results contribute to a growing body of literature on the central role of perceived partner responsiveness for health and well-being (Reis & Gable, 2015; Slatcher, Selcuk, & Ong, 2015), and demonstrate its relevance in the specific domain of sexuality in the transition to parenthood. Prior research has found that perceived partner responsiveness increases pro-relationship cognitive-affective (e.g., reduced defensiveness, gratitude) and behavioral (e.g., instrumental support) responses that serve to support and promote satisfaction (Reis & Gable, 2015). Such pro-relationship processes are especially important in times of stress and transition. New mothers report many sexual concerns that underscore potential changes in their sexual preferences and experience, and given that parents report receiving limited information about postpartum sexuality, these concerns are often unexpected and distressing (Guerra-Reyes, Christie, Prabhakar, & Siek, 2017; Schlagintweit et al., 2016). Perceiving a partner to be responsive to one's sexual needs and preferences may promote couples' adjustment of their expectations (e.g., for sexual frequency due to fatigue) and expansion of their sexual repertoire to incorporate new challenges (e.g., due to pain during intercourse, changing relationship with breasts while breastfeeding), in turn leading to greater sexual satisfaction and a more positive evaluation of the overall relationship. A recent study found that being more understanding of each other's sexual needs and expressing more empathic concern for a partner, were linked to greater sexual and relationship satisfaction for first-time parents (Muise et al., 2017; Rosen et al., 2016b).

The present study did not elucidate the mechanism by which perceived partner responsiveness leads to increases in sexual and relationship satisfaction. However, we can speculate on possible mechanisms by referring to theory and previous research. Perceiving one's partner to be understanding and validating in relation to sex may promote more effective emotion regulation and reduce negative affect (Cano & Williams, 2010; Linehan, 1997). Better regulation of negative emotion has been linked to greater relationship and sexual satisfaction in other populations (Bloch, Haase, & Levenson, 2014; Rellini, Vujanovic, Gilbert, & Zvolensky, 2012), and fewer depressive symptoms have been associated with greater sexual functioning postpartum (Chivers et al., 2011). It is also possible that repeated experiences of partner responsiveness may foster feelings of safety and security for new mothers, or mothers with more secure romantic attachments might initiate more intimate exchanges, helping them to maintain their sexual and relationship satisfaction despite heightened concerns and conflicts in these domains. The role of attachment style would be an interesting avenue for future research.

The current study has some notable strengths. It improved on past research with new mothers by examining a theoretically-based interpersonal predictor—sexual intimacy—of both sexual and relationship satisfaction using a rigorous longitudinal design. This study design also allowed us to examine the temporal order of the IPMI's core components, namely disclosure and perceived partner responsiveness, while extending the model to the realm of sexuality. Although the IPMI has been applied to community populations as well as limited clinical populations (Bois et al., 2016; Manne et al., 2004, 2018), longitudinal studies are rare, limiting causal inference regarding the impact of intimacy on sexuality, health and well-being.

The study also has limitations. Importantly, it focused on the experiences of first-time mothers, but did not include their partners. Fathers and co-parents also report sexual concerns and face similar novel stressors during this time (Fillo,

Simpson, Rholes, & Kohn, 2015; Schlagintweit et al., 2016). In addition, our sample was mostly heterosexual with post-secondary education. The results may not generalize to others' experiences. The study variables were interpersonal; a dyadic approach would provide a more nuanced understanding of how intimacy relates not only to one's own, but also to one's partner's sexual and relationship adjustment. The time lags in the present study were relatively long (i.e., 3, 6, and 12 months); shorter time lags (e.g., 1 week, 1 month) might have produced different results. Though our sample size was large for this population, it was still relatively small overall for our analytical approach. This reduces precision in the estimates of our effect size (i.e., relatively large confidence interval widths in Figs. 3 and 4). Moreover, the sample size limited our ability to incorporate potential covariates (e.g., depressive symptoms, breastfeeding) that might serve as confounding variables, as each time-varying covariate greatly increases model complexity in a cross-lagged panel model (e.g., adding one covariate adds three variables and 29 new paths/covariances). Nonetheless, an examination of the bivariate correlations between participant demographics and study variables (Supplemental Tables 1–3; see OSF page) suggested that they were unlikely to be highly influential, and thus would contribute little to the overall models. Finally, the current study did not include pregnancy or pre-pregnancy measures. Future studies might start with couples who are planning to become pregnant in order to more fully track interpersonal predictors of sexual and relationship satisfaction across this vulnerable period.

Conclusions

In the transition to parenthood, first-time mothers are faced with sexual and relationship concerns that they may not have experienced before, amidst the various other competing demands of becoming a parent. In this study, perceived partner responsiveness specific to sex emerged as an important determinant of subsequent sexual and relationship satisfaction for new mothers. Interventions aimed at promoting new parents' relationship and sexual satisfaction have been relatively modest in efficacy (Pinquart & Teubert, 2010). The current findings suggest that targeting partner responsiveness may enhance the efficacy of interventions designed to promote sexual and relationship satisfaction in mothers. Specifically, clinicians working with new parent couples could encourage the development of skills that focus on reflective listening, acceptance, and validation in the context of their sexual relationship. Such responsiveness may be conveyed verbally or non-verbally, and both during and outside of sexual activity. Preliminary results of intimacy-enhancing interventions with other clinical populations support this endeavor (Barsky Reese et al., 2014; Corsini-Munt, Bergeron, Rosen, Mayrand, & Delisle, 2014; Manne et al., 2011). In conclusion, supporting new parents in responding to each other with care and validation in their sexual relationship will help to promote their sexual and relational satisfaction during an already vulnerable period—the transition to parenthood.

Acknowledgements This research was supported by grants from the Canadian Institutes of Health Research and the Nova Scotia Health Research Foundation to Natalie O. Rosen. We are grateful to Gillian Boudreau, Kayla Mooney, Hannah Richardson, and Emily Coté for their assistance with data collection, and to the women who contributed to this work.

Compliance with Ethical Standards

Conflicts of interest The authors have no conflicts of interest

Human and Animal Rights All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

References

Ahlborg, T., Dahlöf, L. G., & Hallberg, L. R. M. (2005). Quality of the intimate and sexual relationship in first-time parents six months after delivery. *Journal of Sex Research, 42,* 167–174.

Apt, C., Hurlbert, D. F., Pierce, A. P., & White, L. C. (1996). Relationship satisfaction, sexual characteristics, and the psychosocial well-being of women. *Canadian Journal of Human Sexuality, 5,* 195–210.

Asparouhov, T. (2005). Sampling weights in latent variable modeling. *Structural Equation Modeling, 12,* 411–434.

Barsky Reese, J., Porter, L. S., Regan, K. R., Keefe, F. J., Azad, N. S., Diaz, L. A., Jr., & Haythornthwaite, J. A. (2014). A randomized pilot trial of a telephone-based couples intervention for physical intimacy and sexual conerns in colorectal cancer. *Psycho-Oncology, 23,* 1005–1013.

Basson, R. (2000). The female sexual response: A different model. *Journal of Sex and Marital Therapy, 26,* 51–65.

Bloch, L., Haase, C. M., & Levenson, R. W. (2014). Emotion regulation predicts marital satisfaction: More than a wives' tale. *Emotion, 14,* 130–144.

Bois, K., Bergeron, S., Rosen, N. O., Mayrand, M., Brassard, A., & Sadikaj, G. (2016). Intimacy, sexual satisfaction and sexual distress in vulvodynia couples: An observational study. *Health Psychology, 35,* 531–540. https://doi.org/10.1037/hea0000289.

Bois, K., Bergeron, S., Rosen, N. O., McDuff, P., & Gregoire, C. (2013). Sexual and relationship intimacy among women with provoked vestibulodynia and their partners: Associations with sexual satisfaction, sexual function and pain self-efficacy. *Journal of Sexual Medicine, 10,* 2024–2035. https://doi.org/10.1111/jsm.12210.

Cano, A., & Williams, A. C. (2010). Social interaction in pain: Reinforcing pain behaviors or building intimacy? *Pain, 149,* 9–11.

Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling, 9,* 233–255.

Chivers, M. L., Pittini, R., Grigoriadis, S., Villegas, L., & Ross, L. E. (2011). The relationship between sexual functioning and depressive symptomatology in postpartum women: A pilot study. *Journal of Sexual Medicine, 8,* 792–799.

Cole, D. A., & Maxwell, S. E. (2003). Testing mediational models with longitudinal data: Questions and tips in the use of structural equation modeling. *Journal of Abnormal Psychology, 112,* 558.

Corsini-Munt, S., Bergeron, S., Rosen, N. O., Mayrand, M., & Delisle, I. (2014). Feasibility and preliminary effectiveness of a novel cognitive-behavioral couple therapy for provoked vestibulodynia: A pilot study. *Journal of Sexual Medicine, 11,* 2515–2527. https://doi.org/10.1111/jsm.12646.

De Judicibus, M., & McCabe, M. (2002). Psychological factors and the sexuality of pregnant and postpartum women. *Journal of Sex Research, 39,* 94–103.

Diamond, L. M., & Huebner, D. M. (2012). Is good sex good for you? Rethinking sexuality and health. *Social and Personality Psychology Compass, 6,* 54–69.

Doss, B. D., & Rhoades, G. K. (2017). The transition to parenthood: Impact on couples' romantic relationships. *Current Opinion in Psychology, 13,* 25–28.

Fallis, E., Rehman, U. S., Woody, E. Z., & Purdon, C. (2016). The longitudinal association of relationship satisfaction and sexual satisfaction in long-term relationships. *Journal of Family Psychology, 30,* 822–831.

Fillo, J., Simpson, J. A., Rholes, W. S., & Kohn, J. L. (2015). Dads doing diapers: Individual and relational outcomes associated with division of childcare across the transition to parenthood. *Journal of Personality and Social Psychology, 108,* 298–316.

Finkel, E. J., & Campbell, W. K. (2001). Self-control and accomodation in close relationships: An interdependence analysis. *Journal of Personality and Social Psychology, 81,* 263–277.

Funk, J. L., & Rogge, R. D. (2007). Testing the ruler with Item Response Theory: Increasing precision of measurement for relationship satisfaction with the Couples Satisfaction Index. *Journal of Family Psychology, 21*(4), 572–583. https://doi.org/10.1037/0893-3200.21.4.572.

Guerra-Reyes, L., Christie, V. M., Prabhakar, A., & Siek, K. A. (2017). Mind the gap: Assessing the disconnect between postpartum health information desired and health information received. *Women's Health Issues, 27,* 167–173.

Hayes, A. F. (2018). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach* (2nd ed.). New York: The Guilford Press.

Hipp, L. E., Low, L. K., & van Anders, S. M. (2012). Exploring women's postpartum sexuality: Social, psychological, relational and birth-related contextual factors. *Journal of Sexual Medicine, 9,* 2330–2341.

Jawed-Wessel, S., Herbenick, D., & Schick, V. (2016). The relationship between body image, female genital self-image, and sexual function among first-time mothers. *Journal of Sex and Marital Therapy, 43,* 618–632.

Keizer, R., & Schenk, N. (2012). Becoming a parent and relationship satisfaction: A longitudinal dyadic perspective. *Journal of Marriage and Family, 74,* 759–773.

Kleinplatz, P. J., Menard, A., Paradis, N., Campbell, M., & Dalgleish, T. L. (2013). Beyond sexual stereotypes: Revealing group similarities and differences in optimal sexuality. *Canadian Journal of Behavioural Science, 45,* 250–258. https://doi.org/10.1037/a0031776.

Kline, R. (2011). *Principles and practice of structural equation modeling* (3rd ed.). New York, NY: Guilford Press.

Kubacka, K. E., Finkenauer, C., Rusbalt, C. E., & Keijsers, L. (2011). Maintaining close relationships: Gratitude as a motivator and a detector of maintenance behavior. *Personality and Social Psychology Bulletin, 37,* 1362–1375.

Laurenceau, J.-P., Barrett, L. F., & Pietromonaco, P. R. (1998). Intimacy as an interpersonal process: the importance of self-disclosure, partner disclosure, and perceived partner responsiveness in interpersonal exchange. *Journal of Personality and Social Psychology, 74,* 1238–1251.

Laurenceau, J.-P., Barrett, L. F., & Rovine, M. J. (2005). The interpersonal process model of intimacy in marriage: A daily diary and multilevel modeling approach. *Journal of Family Psychology, 19,* 314–323.

Lawrance, K., & Byers, E. S. (1995). Sexual satisfaction in long-term heterosexual relationships: The interpersonal exchange model of sexual satisfaction. *Personal Relationships, 2,* 267–285.

Leavitt, C. E., McDaniel, B. T., Maas, M. K., & Feinberg, M. E. (2017). Parenting stress and sexual satisfaction among first-time parents: A dyadic approach. *Sex Roles, 76,* 346–355.

Linehan, M. M. (1997). Validation and psychotherapy. In A. Bohard & L. S. Greenber (Eds.), *Empathy reconsidered: New directions in psychotherapy* (pp. 353–392). Washington, DC: American Psychological Association.

Lorber, M. F., Erlanger, A. C. E., Heyman, R. E., & O'Leary, K. D. (2015). The honeymoon effect: does it exist and can it be predicted? *Prevention Science, 16,* 550–559.

MacNeil, S., & Byers, E. S. (2009). Role of sexual self-disclosure in the sexual satisfaction of long-term heterosexual couples. *Journal of Sex Research, 46,* 3–14. https://doi.org/10.1080/00224490802398399.

Manne, S. L., Badr, H., & Kashy, D. A. (2012). A longitudinal analysis of intimacy processes and psychological distress amoung couples coping with head and neck or lung cancer. *Journal of Behavioral Medicine, 35,* 334–346.

Manne, S. L., Kashy, D. A., Zaider, T., Lee, D., Kim, I. Y., Heckman, C., & Virtue, S. M. (2018). Interpersonal processes and intimacy among men with localized prostate cancer and their partners. *Journal of Family Psychology, 32,* 664–675.

Manne, S. L., Kissane, D. W., Nelson, C. J., Mulhall, J. P., Winkel, G., & Zaider, T. (2011). Intimacy-enhancing psychological intervention for men diagnosed with prostate cancer and their partners: A pilot study. *Journal of Sexual Medicine, 8,* 1197–1209. https://doi.org/10.1111/j.1743-6109.2010.02163.x.

Manne, S. L., Ostroff, J., Rini, C., Fox, K., Goldstein, L., & Grana, G. (2004). The interpersonal process model of intimacy: The role of self-disclosure, partner disclosure, and partner responsiveness in interactions between breast cancer patients and their partners. *Journal of Family Psychology, 18,* 589–599. https://doi.org/10.1037/0893-3200.18.4.589.

Maxwell, S. E., & Cole, D. A. (2007). Bias in cross-sectional analyses of longitudinal mediation. *Psychological Methods, 12,* 23–44.

McBride, H. L., & Kwee, J. L. (2017). Sex after baby: Women's sexual function in the postpartum period. *Current Sexual Health Reports, 9,* 142–149.

McCabe, M. (1997). Intimacy and quality of life among sexually dysfunctional men and women. *Journal of Sex and Marital Therapy, 23,* 276–290.

McNulty, J. K., Wenner, C. A., & Fisher, T. D. (2016). Longitudinal associations among relationship satisfaction, sexual satisfaction, and frequency of sex in early marriage. *Archives of Sexual Behavior*, *45*, 85–97. https://doi.org/10.1007/s10508-014-0444-6.

Metz, M. E., & McCarthy, B. W. (2007). The "good-enough sex" model for couple sexual satisfaction. *Sexual and Relationship Therapy, 22,* 351–362.

Mikulincer, M., Shaver, P., Bar-On, N., & Sahdra, B. K. (2014). Security enhancement, self-esteem threat, and mental depletion affect provision of a safe haven and secure base to a romantic partner. *Journal of Social and Personal Relationships, 31,* 630–650.

Mitchell, A. E., Castellani, A. M., Herrington, R. L., Joseph, J. I., Doss, B. D., & Snyder, D. K. (2008). Predictors of intimacy in couples'

discussions of relationship injuries: An observational study. *Journal of Family Psychology, 22,* 21–29.

Muise, A., Rosen, N. O., Kim, J. J., & Impett, E. A. (2017). Understanding when a partner is not in the mood: Sexual communal motivation in couples transitioning to parenthood. *Archives of Sexual Behavior, 46,* 1993–2006.

Muthén, L. K., & Muthén, B. O. (1998-2017). *Mplus user's guide* (8th ed.). Los Angeles: Muthén & Muthén.

Pinquart, M., & Teubert, D. (2010). A meta-analytic study of couple interventions during the transition to parenthood. *Family Relations, 59,* 221–231.

Rehman, U. S., Lizdek, I., Fallis, E., Sutherland, S. E., & Goodnight, J. A. (2017). How is sexual communication different from non-sexual communication? A moment-by-moment analysis of discussions between romantic partners. *Archives of Sexual Behavior, 46,* 2339–2352. https://doi.org/10.1007/s10508-017-1006-5.

Reis, H. T. (2012). Perceived partner responsiveness as an organizing theme for the study of relationships and well-being. In L. Campbell & T. J. Loving (Eds.), *Interdisciplinary research on close relationships: The case for integration* (pp. 27–52). Washington, DC: American Psychological Association.

Reis, H. T., & Gable, S. L. (2015). Responsiveness. *Current Opinion in Psychology, 1,* 67–71.

Reis, H. T., & Shaver, P. (1988). Intimacy as an interpersonal process. In S. W. Duck (Ed.), *Handbook of personal relationships* (pp. 367–389). Chichester, England: Wiley.

Rellini, A. H., Vujanovic, A. A., Gilbert, M., & Zvolensky, M. J. (2012). Childhood maltreatment and difficulties in emotion regulation: Associations with sexual and relationship satisfaction among young adult women. *Journal of Sex Research, 49,* 434–442.

Reynolds, G. S. (1975). *A primer of operant conditioning*. Oxford, England: Oxford University Press.

Rosen, N. O., Bois, K., Mayrand, M., Vannier, S. A., & Bergeron, S. (2016a). Observed and perceived disclosure and empathy are associated with better relationship adjustment and quality of life in couples coping with vulvodynia. *Archives of Sexual Behavior*, *45*, 1945–1956. https://doi.org/10.1007/s10508-016-0739-x.

Rosen, N. O., Mooney, K., & Muise, A. (2016b). Dyadic empathy in the transition to parenthood: Associations with sexual, relationship, and psychological wellbeing. *Journal of Sex and Marital Therapy, 43,* 543–559.

Rubin, H., & Campbell, L. (2012). Day-to-day changes in intimacy predict heightened relationship passion, sexual occurrence, and sexual satisfaction: A dyadic diary analysis. *Social Psychological and Personality Science, 3,* 224–231. https://doi.org/10.1177/1948550611416520.

Schlagintweit, H., Bailey, K., & Rosen, N. O. (2016). A new baby in the bedroom: Frequency and severity of postpartum sexual concerns and their associations with relationship satisfaction in new parent couples. *Journal of Sexual Medicine, 13,* 1455–1465.

Slatcher, R. B., Selcuk, E., & Ong, A. D. (2015). Perceived partner responsiveness predicts diurnal cortisol profiles 10 years later. *Psychological Science, 26,* 972–982.

Smith, K. B., & Pukall, C. F. (2011). A systematic review of relationship adjustment and sexual satisfaction among women with provoked vestibulodynia. *Journal of Sex Research, 48,* 166–191. https://doi.org/10.1080/00224499.2011.555016.

Stephenson, K. R., & Meston, C. M. (2010). When are sexual difficulties distressing for women? The selective protective value of intimate relationships. *Journal of Sexual Medicine, 7,* 3683–3694. https://doi.org/10.1111/j.1743-6109.2010.01958.x.

Stroud, C. B., Meyers, K. M., Wilson, S., & Durbin, C. E. (2015). Marital quality spillover and young children's adjustment: Evidence for dyadic and triadic parenting as mechanisms. *Journal of Clinical Child & Adolescent Psychology, 44,* 800–813.

van Lankveld, J. J., Jacobs, N., Thewissen, V., Dewitte, M., & Verboon, P. (2018). The associations of intimacy and sexuality in daily life: Temporal dynamics and gender effects within romantic relationships. *Journal of Social and Personal Relationships, 35,* 557–576.

Vannier, S. A., Adare, K. E., & Rosen, N. O. (2018). Is it me or you? First-time mothers' attributions for postpartum sexual concerns are associated with sexual and relationship satisfaction in the transition to parenthood. *Journal of Social and Personal Relationships*, *35*, 577–599. https://doi.org/10.1177/0265407517743086.

Yu, T., Pettit, G. S., Lansford, J. E., Dodge, K. A., & Bates, J. E. (2010). The interactive effects of marital conflict and divorce on parent-adult children's relationships. *Journal of Marriage and the Family, 72,* 282–292.