

# Post Sex Affectionate Exchanges Promote Sexual and Relationship Satisfaction

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**Abstract** The current research examined the role of post sex affection in promoting sexual and relationship satisfaction in ongoing romantic partnerships. Since romantic partners view the period after engaging in sex as an important time for bonding and intimacy, we sought to determine if and how the duration and quality of post sex affection might promote satisfaction in romantic relationships. In two studies, we tested the link between post sex affectionate behavior (e.g., cuddling, caressing, shared intimacy) and sexual and relationship satisfaction. In Study 1, a cross-sectional survey of individuals in romantic relationships ( $N = 335$ ), duration of post sex affection was associated with higher sexual satisfaction and, in turn, higher relationship satisfaction. In Study 2, a daily experience study of 101 established couples ( $N = 202$ ) with a 3-month follow-up, day-to-day changes in post sex affection duration and quality were associated with both partners' sexual and relationship satisfaction, and engaging in longer and more satisfying post sex affection over the course of the study was associated with higher relationship and sexual satisfaction 3 months later. In general, the pattern of results was consistent for men and women, but the association between the duration of post sex affection and relationship satisfaction was stronger for women than for men (Study 1) and women, but not men, felt more sexually satisfied when their partner reported higher quality post sex affection (Study 2). The findings suggest that the period after

sex is a critical time for promoting satisfaction in intimate bonds.

**Keywords** Post sex affection · Sexual satisfaction · Relationship satisfaction · Cuddling · Couples

## Introduction

Sexuality is a key factor in shaping happiness and satisfaction in romantic relationships (for review, see Impett, Muise, & Peragine, 2014). Both men and women report greater satisfaction with their sex lives when their frequency of sex is high (Laumann, Gagnon, Michael, & Michaels, 1994) and this association has also been documented in non-Western countries such as China (Cheung et al., 2008) and Iran (Rahmani, Khoei, & Gholi, 2009). Little is known, however, about the specific aspects of a sexual experience that contribute to high quality intimate bonds. Previous research indicates that romantic partners view the period of time after engaging in sex as important for bonding and intimacy (Hughes & Kruger, 2011; Kruger & Hughes, 2010); however, we do not yet know if and how the duration and quality of post sex affection influence sexual and relationship satisfaction in ongoing romantic partnerships.

In the context of established relationships, both men and women indicate a desire to engage in affectionate behavior, such as cuddling, caressing, and shared intimacy, with a partner after sex (Hughes & Kruger, 2011; Kruger & Hughes, 2010). In a recent study of individuals in committed relationships, two-thirds of participants reported that they expected, at least sometimes, to engage in cuddling after sex and one-third of their recent cuddling experiences occurred after sex (van Anders, Edelstein, Wade, & Samples-Steele, 2013). Given that the potential for bonding and intimacy may be at its peak after

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sex (Halpern & Sherman, 1979), in the current study, we tested the central prediction that people who report engaging in post sex affectionate activities for a longer duration and who feel satisfied with their post sex activities will report feeling more satisfied with their sex lives and, in turn, be more satisfied with their relationship. That is, we tested the prediction that sexual satisfaction mediates the association between post sex affection and relationship satisfaction.

### Affection and Satisfaction in Relationships

Affectionate behaviors in general have been shown to be an important aspect of relationship quality (Gulledge, Gulledge, & Stahmann, 2003; Heiman et al., 2011). In a sample of long-term couples, the frequency of cuddling and kissing was associated with higher sexual satisfaction for men and women and with overall relationship satisfaction for men (Heiman et al., 2011). Among college students, those who report more frequent physical affection, such as kissing, cuddling and hugging, also report greater relationship quality, including the ability to resolve relationship conflict more easily (Gulledge et al., 2003). Kissing is a prominent display of affection in romantic relationships that has been shown to have implications for relationship quality and physical health (Floyd et al., 2009; Gulledge et al., 2003). In new relationships, kissing may be used as a “mate assessment device” or a strategy that people use to assess whether they might be compatible with a potential partner (Hughes, Harrison, & Gallup, 2007). In both new and ongoing relationships, kissing is a way to initiate or increase the chances of having sex (Hughes et al., 2007), to increase and maintain emotional closeness (Hughes & Kruger, 2011; Hughes et al., 2007), and has been shown to relieve stress (Floyd et al., 2009). In one study, couples were randomly assigned to one of two groups. The first group was told to increase the frequency of kissing in their relationship and the other group was given no such instructions. The couples who increased their frequency of kissing reported higher relationship satisfaction 6 weeks later as well as lower levels of stress (Floyd et al., 2009).

Given that people in romantic relationships view the time period after sex as important for bonding and intimacy (Hughes & Kruger, 2011; Kruger & Hughes, 2010) and researchers have argued that post sex activities are an understudied aspect of a sexual experience that may contribute to sexual satisfaction (Halpern & Sherman, 1979), in the current research, we consider affectionate behaviors that occur in the specific time period after couples engage in sex. In one study, researchers considered a broad range of post sex activities and identified “intimacy and bonding” as one category that included cuddling, caressing, and intimate talk with a partner (Hughes & Kruger, 2011). In a recent study, cuddling was perceived as a nurturing act, but was also experienced as at least somewhat sexual (van Anders et al., 2013), suggesting that post sex

affection may be an important way that sexual experiences are linked to overall relationship quality. Therefore, in the current research, we consider whether people who engage in post sex affectionate activities for a longer duration and report being highly satisfied with these activities will report higher overall sexual and relationship satisfaction.

### Sexual Satisfaction and Relationship Satisfaction

A key component of relationship satisfaction concerns people’s feelings of satisfaction with the sexual aspects of their relationship (Byers, 2005; Sprecher, 2002). People who are the most satisfied with their sex lives are also the most satisfied with their relationships and this is true for both dating and married couples (Brezsnyak & Whisman, 2004; Regan, 2000; Sprecher, 2002). In a study of university students in dating relationships, changes in sexual satisfaction were positively associated with changes in relationship satisfaction over 4 years (Sprecher, 2002). Among individuals in long-term relationships, changes in sexual satisfaction occurred concurrently with changes in relationship satisfaction over an 18-month time period (Byers, 2005). Research has also shown that how one partner feels about their sex life impacts the other partner’s feelings. The extent to which one person perceives the sexual relationship as rewarding versus costly contributes to their romantic partner’s sexual satisfaction above and beyond the partner’s own reports of rewards and costs (for review, see Byers & Wang, 2004).

Both the frequency and quality of sexual interactions contribute to the quality of romantic relationships (Byers, 2005; Laumann et al., 1994; Sprecher, 2002). Men and women who report engaging in more frequent sex report higher sexual satisfaction (Laumann et al., 1994; Lui, 2003) and are less likely to break-up (Traeen, 2010; Yabiku & Gager, 2009). In addition, dating and married couples who report greater sexual satisfaction also report greater relationship satisfaction and stability (Brezsnyak & Whisman, 2004; Regan, 2000; Sprecher, 2002). In some research, however, physical intimacy and affection have been found to be more strongly associated with sexual and relationship satisfaction than sexual frequency (Gulledge et al., 2003; Heiman et al., 2011). Given this, we expected post sex affectionate behavior to contribute to people’s feelings of sexual satisfaction and this will be a key reason why people who engage in more post sex affection report higher relationship satisfaction.

### Gender Differences

The few empirical studies on after sex activities have been guided by evolutionary theory and have focused on gender differences in the importance that men and women place on engaging in a variety of post sex activities. Given that women are more limited in the number of children they can have and

invest more heavily in each child, they tend to be more selective in choosing sexual partners and place more emphasis on pair-bonding (Buss & Schmitt, 1993; Gangestad & Simpson, 2000; Trivers, 1985). After a first sexual experience, women are more likely to experience positive affective shifts, such as greater feelings of love, as a way to establish a longer-term, committed relationship (Haselton & Buss, 2001). In terms of post sex activities, in one study, men placed more importance on continuing sexual activity and other external rewards (e.g., eating, drinking or smoking) than women, particularly in short-term relationships. In contrast, women place more importance on affection and intimate talk after sex (Hughes & Kruger, 2011). In long-term relationships, however, there are fewer gender differences; both men and women value affection and intimacy with a long-term partner after sex (Hughes & Kruger, 2011). Although less pronounced in long-term compared to short-term relationships, in general, women value post sex affection more than men and report less satisfaction when their desired amount of after sex bonding is not realized (Kruger & Hughes, 2010).

#### Predictions of the Current Research

In two studies, we tested our central prediction that post sex affection—defined as shared intimacy during the time period after engaging in sex, such as cuddling, kissing, and intimate talk—would be associated with higher sexual and relationship satisfaction. In Study 1, a cross-sectional survey of individuals in romantic relationships, we predict that a longer average duration of post sex affection will be associated with higher sexual satisfaction and, in turn, higher relationship satisfaction. In Study 2, a daily experience study of established couples with a 3-month follow-up, we predicted that on days when couples engage in a longer duration of post sex affection and report higher quality post sex affection, they will report higher daily sexual satisfaction and, in turn, higher relationship satisfaction. Given that a person's feelings about a sexual experience impact their partner's feelings (for review, see Byers & Wang, 2004), in Study 2, we also predicted that one partner's reported quality of post sex affection would be associated with the other partner's daily sexual and relationship satisfaction. In addition, we predicted that engaging in more post sex affection and feeling more satisfied with post sex affection would be associated with both partners' feelings of sexual and relationship satisfaction over time. In both studies, we also tested the prediction that the association between post sex affection and sexual and relationship satisfaction is stronger for women than men. Finally we expected that post sex affection will be associated with sexual and relationship satisfaction above and beyond general affection and other aspects of the sexual experience, such as the frequency with which couples engage in sex as well as the duration of foreplay and sex.

## Study 1

In Study 1, we conducted a cross-sectional survey of individuals in dating relationships to determine whether the duration of post sex affection was associated with increased sexual and relationship satisfaction. We predicted that people who report engaging in post sex affection for a longer duration will report higher levels of relationship satisfaction. We also predicted that the reason why engaging in post sex affection for longer periods of time leads to increased relationship satisfaction is because people feel more satisfied with their sex lives overall. In addition, we tested gender as a moderator of these associations.

### Method

#### *Participants and Procedure*

Participants from the United States were recruited through Amazon's Mechanical Turk (MTurk). MTurk is an online "open marketplace" in which "requesters" (people who need a task done) post the task they need to be done on the site, where "workers" (people who do the task) can select a task to complete. Burhmester, Kwang, and Gosling (Burhmester et al., 2011) found that participants recruited through MTurk are as or more demographically diverse than those recruited from standard Internet samples or typical college samples and that data obtained from this source are at least as reliable as those obtained via traditional methods. People who accessed the survey were first taken to an online consent form and those who indicated agreement were allowed to continue with the survey. The Research Ethics Board (REB) at the University of Toronto approved this research.

To be eligible to participate in the online survey, participants had to be currently involved in a romantic relationship and pass an attention check in the survey (i.e., a question asking participants to select a certain response option to ensure he or she was paying attention). Sixteen participants (4 %) were not currently in a romantic relationship and an additional 44 participants (12 %) did not pass the attention check; therefore their data were not included in the current analyses. In the final sample ( $N = 335$ ), participants (138 men; 197 women) ranged in age from 18 to 64 years ( $M = 31.0$ ,  $SD = 9.1$ ) and comprised a diverse range of ethnic backgrounds; 65 % were European, 10 % were African American, 9 % were Asian, 4.5 % were Latino or Mexican, 2 % were Native American, 1.5 % were Indian, and 8 % self-identified as "other." Most participants were married or cohabitating (84 %) and the majority of participants (90 %) identified as heterosexual. Participants had been in their current relationship for between 4 months and 30 years ( $M = 7.5$  years,  $SD = 8.4$ ). Approximately 40 % of the sample had children ( $N = 133$ ) and of these, most (74 %) had one or two children. The majority of

participants (59.4 %) reported their annual household income as \$50,000 or less; 10 % of the sample reported over \$100,000 in annual household income. Each participant was paid \$.60 for completing the 30-min online survey.

### Measures

**Relationship Satisfaction** Relationship satisfaction was assessed with the 5-item Satisfaction subscale ( $\alpha = .97$ ,  $M = 6.94$ ,  $SD = 2.04$ ) of the Investment Model scale (Rusbult, Martz & Agnew, Rusbult et al., 1998). Items from this measure, such as “I feel satisfied with our relationship,” were rated on a 9-point scale (1 = *do not agree* to 9 = *agree completely*).

**Sexual Satisfaction** Sexual satisfaction was measured using the 25-item Index of Sexual Satisfaction (ISS) (Hudson, Harrison, & Crosscup, 1981). Items were assessed on a 7-point scale (1 = *none of the time* to 7 = *all of the time*) and included: “I think our sex is wonderful” and “Our sex life is monotonous (reverse scored)” ( $\alpha = .96$ ,  $M = 5.26$ ,  $SD = 1.19$ ).

**Duration of Post Sex Affectionate Behaviors** Participants responded to one item about their average duration, in minutes, of affectionate behaviors (e.g., cuddling, shared intimacy) after sex ( $M = 15.53$ ,  $SD = 20.28$ ).

**Duration of Foreplay** Participants responded to one item about their average duration of foreplay (e.g., touching, kissing and other sexual activities that occurred before sex) in minutes ( $M = 13.07$ ,  $SD = 14.58$ ).

**Duration of Sex** Participants responded to one item about their average duration of sex in number of minutes ( $M = 17.55$ ,  $SD = 15.84$ ).

**Sexual Frequency** Participants were asked to indicate, on average, how often they engaged in sex with their partner per month (1 = *less than a once a month* to 6 = *daily*;  $M = 4.03$ ,  $SD = 1.37$ ).

**General Affection** Participants were asked to respond to one item about the general frequency of affection (e.g., cuddling, kissing, caressing) in their relationship (1 = *never* to 7 = *daily*;  $M = 5.74$ ,  $SD = 1.67$ ).

### Statistical Analyses

We conducted all of our analyses using multiple regression in the SPSS 20.0 computer program. To test our mediation models, we constructed a 95 % confidence interval for the indirect effect using bootstrapping techniques with 5,000 resamples (INDIRECT SPSS macro) (Preacher & Hayes, 2008; Preacher & Selig,

2010). The indirect effect is significant when the confidence interval does not include zero. Finally, to test for moderation, we conducted simple slope analyses according to the principles of Aiken and West (1991).

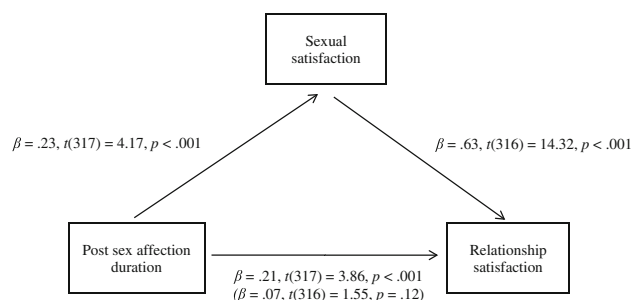
### Results

#### Post Sex Affection and Sexual and Relationship Satisfaction

Our first hypothesis was that the longer people report engaging in post sex affectionate behaviors, the more satisfied they will feel with their relationships. As expected, people who reported a longer duration of post sex affection reported higher relationship satisfaction,  $\beta = .21$ ,  $t(317) = 3.86$ ,  $p < .001$ . Next, we tested our prediction that people who reported a longer duration of post sex affectionate behaviors would report higher sexual satisfaction and this would account for the association between post sex affection and relationship satisfaction. As shown in Fig. 1, people who engaged in more affectionate behaviors after sex reported higher sexual satisfaction. When affectionate behaviors and sexual satisfaction were both entered as predictors of relationship satisfaction, sexual satisfaction was significantly associated with relationship satisfaction and the association between post sex affection and relationship satisfaction dropped to non-significance. Therefore, the results indicated that sexual satisfaction mediated the association between duration of after sex affectionate behaviors and relationship satisfaction ( $CI_{95\%} [.01, .03]$ ).

#### The Role of Gender

To test our hypothesis that post sex affectionate behavior would be more strongly associated with women’s sexual and relationship satisfaction than men’s, we tested gender as a moderator of our effects. The results indicated that gender was a marginally significant moderator of the association between duration of post sex affection and relationship satisfaction,  $\beta = .14$ ,  $p = .06$ . As depicted in Fig. 2, simple slope analyses revealed that post sex affectionate behavior was



**Fig. 1** Sexual satisfaction mediating the association between post sex affectionate behaviour duration and relationship satisfaction in Study 1

significantly associated with relationship satisfaction for women,  $b = .65$ ,  $t(315) = 3.91$ ,  $p < .001$ ; women who engaged in a longer duration of post sex affection reported having greater relationship satisfaction. However, for men, their duration of post sex affectionate behavior was not significantly linked to their relationship satisfaction,  $b = .23$ ,  $t(315) = 1.55$ . Gender did not, however, moderate the association between after sex affection and sexual satisfaction,  $\beta = .11$ .

Given that there were gender differences in the association between post sex affection and relationship satisfaction, we conducted the mediation analyses separately for men and women to determine if the model was significant for both the men and women in our sample. Our results indicated that the indirect effect between post sex affection and relationship satisfaction through sexual satisfaction was significant for both men ( $CI_{95\%} [.001, .02]$ ) and women ( $CI_{95\%} [.01, .04]$ ). Therefore, although there was not a significant direct effect between duration of post sex affection and relationship satisfaction for men, there was a significant indirect effect through sexual satisfaction. Men who reported a longer duration of post sex affectionate behavior reported higher sexual satisfaction and this, in turn, was associated with higher relationship satisfaction.

### Ruling Out Alternative Explanations

To bolster our confidence in our results, we conducted a series of additional analyses to rule out possible alternative explanations for our findings. First, it is possible that the associations between post sex affection and sexual and relationship satisfaction can be explained by general levels of affection in a relationship and are not specific to the time period after sex. Although general frequency of affection was associated with post sex affection duration,  $r = .23$ ,  $p < .001$ , all of our effects

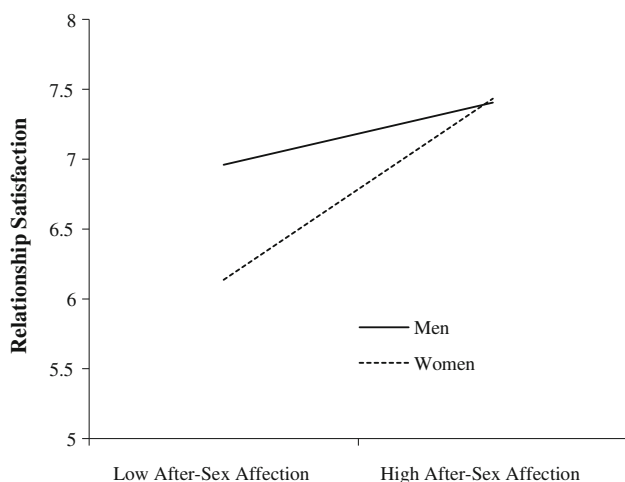
remained significant when we controlled for the general frequency of affection in the relationship.

Second, it is possible that the association between duration of after sex affection and relationship satisfaction can be explained by duration of sexual activities in general. However, we re-ran our analyses controlling for the duration of foreplay and sex and the association between after sex affectionate behavior duration and relationship satisfaction remained significant. In fact, when duration of foreplay, sex and post sex affectionate behavior were all entered as predictions, both foreplay ( $\beta = -.07$ ) and sex duration ( $\beta = .06$ ) did not significantly predict relationship satisfaction. In addition, after controlling for these factors, the association between the duration of post sex affection and sexual satisfaction, as well as the mediation analyses, remained significant.

Third, it is possible that people who report a longer duration of post sex affection engage in more frequent sex and this accounts for the association between after sex affection and sexual and relationship satisfaction. However, when we controlled for how frequently participants reported engaging in sex, all of our effects remained significant. Most critically, sexual frequency did not moderate the association between after sex affection and sexual satisfaction ( $\beta = .04$ ) or relationship satisfaction ( $\beta = -.02$ ). These findings suggest the duration of post sex affection is associated with sexual and relationship satisfaction regardless of how frequently people report engaging in sex with their romantic partner.

Next, we considered whether our effects were influenced by the presence of children in a relationship. Parents may have less time alone to engage in sexual activities compared to people who are childfree and this may reduce their duration of after sex affection. Indeed, parents reported a shorter duration of after sex affection ( $M = 13.46$  min,  $SD = 18.38$ ) compared to people without children ( $M = 16.94$  min,  $SD = 21.41$ ) but this difference was not significant,  $F(1, 320) = 2.28$ . We did, however, find that the presence of children in a relationship (0 = no children, 1 = one or more children) significantly moderated the association between after sex affection and sexual,  $\beta = .20$ ,  $p < .01$ , and relationship satisfaction,  $\beta = .17$ ,  $p = .01$ . Simple effects tests revealed that duration of after sex affection was a stronger predictor of sexual and relationship satisfaction for parents compared to those without children. For those who had children, duration of after sex affection was a significant predictor of sexual satisfaction ( $\beta = .46$ ,  $p < .001$ ) and relationship satisfaction ( $\beta = .40$ ,  $p < .001$ ) whereas, for people without children, duration of after sex affection was marginally associated with sexual ( $\beta = .11$ ,  $p = .09$ ) and relationship satisfaction: ( $\beta = .10$ ,  $p = .10$ ).

Finally, although our theoretical model suggests that after sex affection promotes relationship satisfaction via sexual satisfaction, it is also possible that people who feel more satisfied with their relationships are more likely to engage in post sex affection for a greater length of time and, in turn,



**Fig. 2** Gender moderating the association between post sex affection duration and relationship satisfaction in Study 1

report higher sexual satisfaction or that people who engage in a longer duration of post sex affection are more likely to report higher relationship satisfaction and, in turn, experience higher sexual satisfaction. Therefore, we conducted a series of reverse mediations to determine if an alternate mediation model could better explain the associations between after sex affection, relationship satisfaction, and sexual satisfaction. We found some support for the alternative models but the effects were relatively weaker (accounting for 5–23 % of the overall effect) compared to our hypothesized mediation model (accounting for 65 % of the overall effect).

## Discussion

Study 1 provided initial support for our prediction that people who engage in a longer duration of post sex affectionate behavior report higher sexual satisfaction and, in turn, feel more satisfied with their relationships in general. Duration of after sex affection predicted higher sexual and relationship satisfaction above and beyond the effects of duration of foreplay and sex and sexual frequency, all factors that have previously been linked to more satisfying sexual experiences (Call, Sprecher, & Schwartz, 1995; Colson, Lemaire, Pinton, Hamidi, & Klein, 2006; Mulhall, King, Glina, & Hvidsten, 2008; Smith et al., 2011). Duration of after sex affection also seemed to be particularly important for couples who have children. The associations between duration of after sex affection and sexual and relationship satisfaction were strongest for participants with children. Previous research has found that couples who have children report less frequent sex (e.g., Call et al., 1995), so it is possible that additional bonding time after sex is even more important for couples who may face challenges finding time for intimate connection.

Our mediation model worked similarly for men and women. For both men and women in our sample, engaging in post sex affectionate behavior for a longer length of time was associated with higher sexual satisfaction and, in turn, higher relationship satisfaction. However, for women, there was a direct link between after sex affection and relationship satisfaction whereas, for men, duration of after sex affection did not have a direct effect on their relationship satisfaction, but was associated with their relationship satisfaction indirectly through sexual satisfaction. Research on physical affection in general has found that, in a sample of older adult couples in long-term relationships, engaging in more frequent affection was associated with greater sexual and relationship satisfaction for men and greater sexual satisfaction for women (Heiman et al., 2011).

## Study 2

In Study 2, we conducted a 21-day daily experience study of romantic couples with a 3-month follow-up to extend the

results of our initial study in four key ways. First, the findings from Study 1 indicate that people who report a greater duration of post sex affection feel more satisfied with their sex lives and with their relationships in general. A critical goal of our second study was to extend these between-person findings to determine if within-person changes in duration of post sex affection are associated with increased daily sexual and relationship satisfaction. More specifically, we predicted that on days when people report engaging in post sex affectionate behavior for a longer duration than their average, they will feel more sexually satisfied and, in turn, more satisfied with their relationship. Second, the findings from Study 1 focus entirely on the duration of post sex affectionate behavior, so in our next study, we sought to also investigate people's feelings of satisfaction with these experiences. Third, whereas our first study included only one partner from romantic couples, our second study was dyadic in nature, allowing us to test novel research questions regarding the influence of one partner's feelings of satisfaction with post sex affection on the other person's sexual and relationship satisfaction. In particular, we predicted that on days when people feel more satisfied with their post sex affectionate behavior, both partners will report feeling greater sexual and relationship satisfaction. Finally, we asked both partners to report on their general sexual and relationship satisfaction 3 months after completing the diary study in order to consider how post sex affection duration and quality influences feelings of satisfaction with one's sex life and relationship over time. As in Study 1, we tested whether these associations would be stronger for women than for men.

## Method

### *Participants and Procedure*

Participants were recruited through online postings and classroom visits at a small Canadian university and through online postings on the websites Kijiji and Craigslist in the Greater Toronto Area for a "Couples Research Study." Participants were informed in the ads that the study included questions about sexuality. To be eligible to participate, both partners in a romantic relationship had to agree to take part in the study and be over the age of 18 years. Eligible couples also had to see their partner at least five times a week and be sexually active. Those who were interested in participating in the study emailed the researchers for more information about the study and all who met the eligibility criteria agreed to participate. After couples agreed to participate, each partner was emailed a unique link allowing them to access the online surveys. The University of Toronto REB approved this research protocol.

A total of 101 couples (202 people), predominantly heterosexual (95; 5 lesbian couples and 1 gay couple) and ranging in age from 18 to 53 years ( $M = 26$ ,  $SD = 7$ ) participated in the

study. Nearly half of the participants were cohabitating (29 %), married (17 %) or engaged (3 %); the remaining participants were in a committed relationship, but not living together. Only four couples in this sample had children. Participants reported being in their current relationship between 6 months and 22 years ( $M = 4.45$ ,  $SD = 3.76$ ) and identified as a diverse variety of ethnic backgrounds; 53.1 % were White (Caucasian), 15.2 % were European, 13.2 % were Asian, 10.4 % were Black (African-American), 4.7 % were South Asian, 3.3 % were Latin American, 2.8 % were South East Asian, and 1.4 % were Arab/West Asian. The total percentage for all the ethnic backgrounds exceeded 100 % because participants were able to select multiple ethnic identities.

On the first day of the study, participants completed a 30-min background survey. Then, each day for 21 consecutive days, participants completed a 5 to 10-min daily survey ( $M = 17$  diaries,  $SD = 3$ , range = 2–21). Participants were asked to begin the study on the same day as their romantic partner and to not discuss their responses until the study was completed. A total of 168 (83 %) of these participants completed a 10-min follow-up survey 3 months after the completion of the daily diary study. Each participant was paid up to \$40 CAD (via gift cards) for their participation in the background and daily surveys; payment was pro-rated based on the number of daily diaries completed. Participants were paid an additional \$10 for participating in the follow-up survey.

#### Person-Level Measures

**Relationship Satisfaction** Relationship satisfaction was assessed at both background and follow-up using the 5-item Satisfaction subscale from the Investment Model scale (Rusbult et al., 1998). Items were rated using a 7-point scale (1 = *strongly disagree* to 7 = *strongly agree*) and included “I felt satisfied with my relationship with my partner today” (background:  $\alpha = .94$ ,  $M = 5.97$ ,  $SD = 1.06$ ; follow-up:  $\alpha = .96$ ,  $M = 5.74$ ,  $SD = 1.27$ ).

**Sexual Satisfaction** Sexual satisfaction was assessed at both background and follow-up using the 5-item Global Measure of Sexual Satisfaction (GMSEX) (Lawrance & Byers, 1995). Each item was assessed on 7-point bipolar scale: good-bad, pleasant-unpleasant, positive-negative, satisfying-unsatisfying, valuable-worthless (background:  $\alpha = .94$ ,  $M = 29.63$ ,  $SD = 5.38$ ; follow-up:  $\alpha = .93$ ,  $M = 29.50$ ,  $SD = 6.24$ ).

#### Daily-Level Measures

In each daily survey, participants were asked to report their daily relationship satisfaction and indicate whether they engaged in sex with their partner on that day. On days when

sex occurred, the participants reported their daily sexual satisfaction, duration of their after sex affectionate behaviors, and their daily satisfaction with after sex affection. Participants engaged in sex an average of four times over the course of the 3-week diary study (range = 1–14;  $M = 4.12$ ,  $SD = 2.83$ ). We used measures with only a few items or a single item in the diary study to increase efficiency and minimize participant attrition (Bolger, Davis, & Rafaeli, 2003).

**Relationship Satisfaction** Daily relationship satisfaction was assessed using the 5-item Satisfaction subscale from the Investment Model scale (Rusbult et al., 1998). Items were rated using a 7-point scale (1 = strongly disagree to 7 = strongly agree;  $\alpha = .90$ ,  $M = 5.67$ ,  $SD = 1.27$ ).

**Sexual Satisfaction** Daily sexual satisfaction was measured using the 5-item Global Measure of Sexual Satisfaction (GMSEX) (Lawrance & Byers, 1995;  $\alpha = .92$ ,  $M = 31.78$ ,  $SD = 4.46$ ).

**Post Sex Affection** Duration of post sex affection was measured using three items that assessed the duration of different types of post sex affectionate behaviors (cuddling/caressing/spooning, kissing, and intimate talk). On the days the participants reported engaging in sex with their partner, they reported, in minutes, how long they engaged in post sex cuddling, caressing and spooning ( $M = 25.91$ ,  $SD = 54.4$ ); post sex kissing ( $M = 10.36$ ,  $SD = 18.99$ ); and post sex intimate talk, such as professing love ( $M = 11.66$ ,  $SD = 17.68$ ). A composite of the three items was used as the measure of post sex affection ( $\alpha = .72$ ,  $M = 15.91$ ,  $SD = 24.41$ ).

**Satisfaction with Post Sex Affection** On days when participants engaged in sex with their partner they responded to one item about their level of satisfaction with their post sex behavior on a 7-point scale (1 = *not at all satisfied* to 7 = *very satisfied*;  $M = 5.91$ ,  $SD = 1.44$ ).

**Duration of Foreplay** On days when participants engaged in sex with their partner, they indicated how long, in minutes, they engaged in foreplay ( $M = 24.24$ ,  $SD = 134.57$ ).

**Duration of Sex** On the days participants had sex, they responded to one item about the number of minutes they spent having sex with their partner ( $M = 26.58$ ,  $SD = 24.35$ ).

**General Affection** On the first day of the diary study, participants responded to one item about how often, on average, they were affectionate (e.g. cuddling, kissing, caressing) with their partner (1 = *never* to 7 = *daily*;  $M = 5.36$ ,  $SD = .95$ ).

## Statistical Analyses

We analyzed the data with multi-level modeling using mixed models in SPSS 20.0. We tested a two-level cross model with random intercepts where persons are nested within dyads and person and days are crossed to account for the fact that both partners completed the daily surveys on the same days (Kenny, Kashy, & Cook, 2006). For the first set of analyses, we tested the association between duration of post sex affectionate behavior and daily relationship and sexual satisfaction. Duration of post sex affection was treated as a couple-level variable, since both partners can be seen as informants of their daily post sex affection duration. Partners' reports of after sex affection were significantly correlated ( $r = .63, p < .001$ ) and therefore we used the average of the partners' reported durations in our analyses. Since the after sex affection variable was positively skewed (skewness = 3.84, kurtosis = 19.22), a logarithmic function (LG10) was performed to normalize the variable before analyses.

The second set of analyses considered the link between satisfaction with post sex affection and both partners' daily relationship and sexual satisfaction. The Actor Partner Interdependence Model (APIM) (Kenny et al., 2006) guided these analyses; models included actor post sex affection satisfaction and partner post sex affection satisfaction entered simultaneously as predictors. To avoid confounding within- and between-person effects, we used techniques appropriate for a multilevel framework, partitioning all the Level-1 predictors into their within- and between-variance components, which were person-mean centered and aggregated respectively (Raudenbush, Byrk, Cheong, & Congdon, 2004; Zhang, Zyphur, & Preacher, 2009). As such, in these analyses we report the within-person effects, how day-to-day changes from a participant's own mean (or for duration of post sex affection, a couple's own mean) were associated with changes in relationship and sexual satisfaction, while accounting for between-person differences. In our tests of mediation, we followed the guidelines for a multilevel mediation outlined by Zhang et al. and used the Monte Carlo Method of Assessing Mediation (MCMAM) (Selig & Preacher, 2008) with 20,000 resamples and 95 % confidence intervals (CIs) to test the significance of the indirect effects. The indirect effect is significant if the confidence interval does not include zero.

## Results

### *Duration of Post Sex Affection and Sexual and Relationship Satisfaction*

Our first set of predictions concerned the association between the duration of post sex affection and daily sexual and relationship satisfaction. On days when a couple engaged in a longer duration of post sex affection than their average,

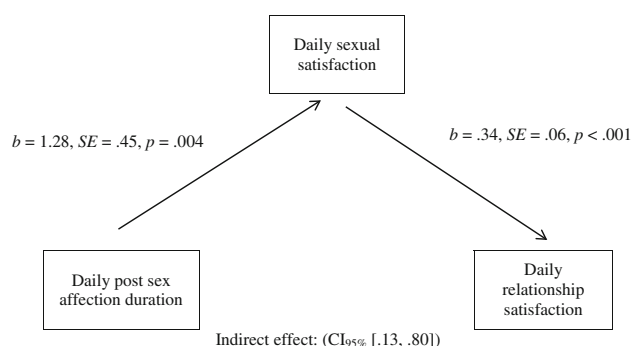
partners reported higher daily sexual satisfaction,  $b = 1.28, SE = .45, p = .004$ , but there was no direct association between daily post sex affection and daily relationship satisfaction,  $b = .04, SE = .10, p = .73$ . However, daily post sex affection had an indirect effect on daily relationship satisfaction through daily sexual satisfaction (CI<sub>95%</sub> [.13, .80]). As shown in Fig. 3, on days when a couple engaged in a longer duration post sex affection than their average, partners reported higher sexual satisfaction and in turn, higher relationship satisfaction.

### *Satisfaction with Post Sex Affection and Sexual and Relationship Satisfaction*

Our second set of predictions concerned the association between quality of post sex affection and the daily sexual and relationship satisfaction of both partners. On days when people reported feeling more satisfied with their post sex affection more than they typically did across the study, they were more satisfied with their sex lives,  $b = 1.03, SE = .21, p < .001$ , and with their relationship in general,  $b = .14, SE = .043, p = .001$ . Controlling for their partner's own feelings of satisfaction with post sex affection, on days when a person reported higher quality post sex affection, their partner reported greater sexual satisfaction,  $b = .36, SE = .18, p = .05$ , and relationship satisfaction,  $b = .15, SE = .043, p < .001$ . Finally, we tested whether daily sexual satisfaction mediated the association between satisfaction with post sex affection and daily relationship satisfaction, but the mediation was not significant (CI<sub>95%</sub> [-.001, .001]).

### *Post Sex Affection and Sexual and Relationship Satisfaction Over Time*

Our next set of predictions concerned the association between post sex affection duration and quality and sexual and relationship satisfaction over time. To test our hypotheses regarding the longitudinal effects of post sex affection, we used mixed models in SPSS 20.0. In these analyses, we focused on aggregate mea-



**Fig. 3** Daily sexual satisfaction mediating the association between post sex affection duration and daily relationship satisfaction in Study 2



asures of couples' post sex affection duration and both partners' satisfaction with post sex activities over course of the 21-day diary, as well as controlled for participants' sexual and relationship satisfaction at background. As expected, people who engaged in a longer duration of post sex affection over the course of the diary reported feeling more satisfied with their sex lives,  $b = .71$ ,  $SE = .19$ ,  $p < .001$ , and more satisfied with their relationship,  $b = .50$ ,  $SE = .16$ ,  $p = .002$ , at the 3-month follow-up. In addition, people who were more satisfied with their post sex affection over the course of the diary reported feeling more sexual satisfaction,  $b = .21$ ,  $SE = .09$ ,  $p = .02$ , and relationship satisfaction,  $b = .15$ ,  $SE = .07$ ,  $p = .04$ , 3 months later. Finally, the partners of people who were more satisfied with their post sex affection reported marginally higher sexual satisfaction,  $b = .15$ ,  $SE = .08$ ,  $p = .06$ , and higher relationship satisfaction,  $b = .22$ ,  $SE = .07$ ,  $p = .002$ , at follow-up.

### *The Role of Gender*

Our final set of predictions concerned gender differences in the association between post sex affection and daily sexual and relationship satisfaction. For the analyses concerning duration of post sex affection, we used a couple-level variable to assess duration. To consider whether there were gender differences in the association between post sex affection duration and a person's own daily sexual and relationship satisfaction, we tested gender as a moderator of these effects. However, gender did not significantly moderate the daily or longitudinal effects, suggesting that post sex affection duration is associated with daily sexual and relationship satisfaction for both men and women.

For the analyses concerning quality of post sex affection, we used mixed models in SPSS 20.0 and ran our model including both actor and partner effects with separate intercepts for men and women (Kenny et al., 2006). We specifically tested whether any of the effects differed by gender and the results revealed no significant gender differences in associations between post sex affection and relationship satisfaction. Given that in this dyadic study gender was confounded with sexual orientation, only heterosexual couples were included in these analyses. For both men and women, their own satisfaction with post sex affection was associated with their own daily relationship satisfaction and their partner's daily relationship satisfaction. In addition, for both men and women, their own satisfaction with post sex affection was associated with their own daily sexual satisfaction. However, there were significant gender differences in the association between a person's satisfaction with post sex affection and their partner's sexual satisfaction both daily and over time. On days when their partner reported experiencing

greater satisfaction with post sex affection, women reported significantly higher sexual satisfaction,  $b = .79$ ,  $SE = .21$ ,  $p < .001$ , but men did not,  $b = .09$ ,  $SE = .23$ ,  $p = .69$ . Similarly, when a partner reported greater satisfaction with post sex affection over the course of the diary, women reported significantly higher sexual satisfaction 3 months later,  $b = .63$ ,  $SE = .17$ ,  $p = .001$ , but men did not,  $b = .06$ ,  $SE = .10$ ,  $p = .57$ .

### *Ruling Out Alternative Explanations*

In order to strengthen our confidence in our results, we conducted a series of additional analyses to rule out possible alternative explanations for our findings. First, it is possible that our effects could be attributed to general levels of affection in the relationship. However, the frequency of general affection was not significantly associated with the duration ( $r = .10$ ) or quality ( $r = .14$ ) of post sex affection over the course of the diary and all of our effects remained significant when we controlled for these factors. Since very few couples in this sample had children, we were not able to test whether the presence of children moderates our effects.

Next, it is possible that couples who engage in a longer duration of post sex affectionate behavior also engage in foreplay and sexual activity for a longer duration and this might account for the associations between post sex affection and daily sexual and relationship satisfaction. Duration of foreplay was significantly associated with daily sexual satisfaction,  $b = .02$ ,  $SE = .01$ ,  $p = .01$ , and marginally associated with daily relationship satisfaction,  $b = .01$ ,  $SE = .01$ ,  $p = .07$ , and duration of sex was significantly associated with sexual satisfaction,  $b = .05$ ,  $SE = .01$ ,  $p < .001$ , and relationship satisfaction,  $b = .01$ ,  $SE = .01$ ,  $p = .001$ , but all of the associations between post sex affection and sexual and relationship satisfaction remained significant when controlling for duration of foreplay and sex.

Finally, although our theoretical model suggests that post sex affection promotes daily sexual and relationship satisfaction, it is also possible that higher levels of relationship satisfaction lead to more post sex affection or that post sex affection influences relationship satisfaction and, in turn, sexual satisfaction. To determine whether an alternative mediation model could better explain the association between after sex affection, sexual satisfaction, and relationship satisfaction, we conducted a series of reverse mediations. Some support was found for the alternative models (relationship satisfaction mediated the association between sexual satisfaction and after sex affection and sexual satisfaction mediated the association between relationship satisfaction and after sex affection), but the effects were relatively weak. The alternative models only accounted for 14 % of the overall effect compared to our model which accounted for 93–100 % of the overall effect.

## Discussion

In Study 2, we extended the findings from Study 1 regarding the association between post sex affection and sexual and relationship satisfaction to couples' daily lives. On days when couples reported engaging in a longer duration of post sex affection, they were more sexually satisfied and, in turn, more satisfied with their relationship. These findings suggest that day-to-day changes in post sex affection shape couples' sexual and relationship satisfaction. In addition to duration, we also found that day-to-day changes in people's satisfaction with post sex affection were associated with both partners' sexual and relationship satisfaction. On days when people reported experiencing higher quality post sex affection, both partners reported feeling more satisfied with their sexual experiences and with their relationship in general. In addition, longer post sex duration and higher quality post sex experiences over the course of the diary were associated with higher sexual and relationship satisfaction 3 months later.

The pattern of results was similar for men and women with one exception. When their romantic partners reported feeling more satisfied with post sex affection both daily and over time, women felt more sexually satisfied. In contrast, there was not a significant association between their partner's after sex affection satisfaction and men's sexual satisfaction. However, for both men and women, when their partner reported more satisfaction with post sex affection, they reported higher relationship satisfaction. Studies have shown that women exhibit positive shifts in mood, such as greater feelings of love, after engaging in sex and may initiate activities to promote bonding and gain commitment from a partner after sex (Haselton & Buss, 2001; Hughes & Kruger, 2011). Therefore, women might be more influenced by their partners' after sex affection satisfaction because they view their partners' level of satisfaction as a signal of bonding and commitment (Kruger & Hughes, 2010). However, these findings suggest that the quality of after sex affection has an important influence on the daily relationship quality of both men and women.

## General Discussion

In a cross-sectional study of individuals in romantic relationships and a daily experience study of both members of romantic couples with a 3-month follow-up, we found that engaging in a longer duration of post sex affection, both in general and at the daily level, was associated with higher sexual and relationship satisfaction. In both studies, we found support for our model that more post sex affection contributes to feeling more sexually satisfied and this, in turn, leads people to feel more satisfied with their relationships. Our findings were consistent with previous research that has identified the period of time after sex as important for bonding and intimacy (Halpern &

Sherman, 1979; Hughes & Kruger, 2011; Kruger & Hughes, 2010). More critically, using cross-sectional, daily experience, and longitudinal methods, we extended this work by showing for the first time that the duration and quality of after sex affection was linked with sexual and relationship satisfaction.

Previous research has found that more general affection, more frequent sex and a longer duration of foreplay and sexual activities are associated with higher sexual and relationship satisfaction (Call et al., 1995; Colson et al., 2006; Heiman et al., 2011; Mulhall et al., 2008; Smith et al., 2011). We replicated these findings in the current studies but, more critically, we showed that the duration and quality of post sex affectionate behavior were significant predictors of sexual and relationship satisfaction even after accounting for these other factors. In fact, in Study 1, once post sex affection was entered into the model with sex and foreplay duration, these variables became non-significant, suggesting that, in general, after sex affection may play a more important role in sexual and relationship satisfaction than foreplay and sex duration.

Our findings were consistent with social exchange theory linking sexual activities to sexual satisfaction and, in turn, overall relationship satisfaction. People tend to be the most satisfied with their sex lives when they experience greater sexual rewards (e.g., feeling closer to a partner) relative to sexual costs (e.g., engaging in sexual activities that they do not enjoy) (Lawrance & Byers, 1995). It seems that post sex affection tends to be a rewarding aspect of a sexual experience as it is linked to higher sexual satisfaction and, when people are satisfied with their sex lives, they also tend to be happier with their relationship overall (Byers, 2005).

Our pattern of findings across the two studies was similar for men and women, but in two cases we found support for our prediction that the links between post sex affection and sexual and relationship satisfaction would be stronger for women than for men. In previous research on general affection (not specific to the post sex context), Heiman et al. (2011) found stronger associations between affection and sexual and relationship satisfaction for men than for women. It may be that the period of time after sex is a particularly important time for intimacy and bonding for women (Haselton & Buss, 2001; Kruger & Hughes, 2010) or it may be that the role of affection in men's satisfaction changes over time. The sample in Heiman et al. included older adults in long-term relationships and research has shown that the importance of having a loving, affectionate relationship is more closely tied to men's sexual satisfaction than to women's in the 40–59 year age range (Carpenter, Nathanson, & Kim, 2009). Based on the findings of Study 2 that women, but not men, felt more sexually satisfied when their partner reported higher quality post sex affection, it is possible that these exchanges may signal their partner's commitment to the relationship and signals of a partner's commitment after sex have been shown to be more important for women than for men (Kruger & Hughes, 2010).

## Limitations, Implications, and Future Research Directions

One limitation of the current research was that the data were correlational and relied on self-report measures. The daily experience method used in Study 2 was useful for studying sexuality because participants reported on their experiences as close in time to when sex actually occurred. Nevertheless, participants still reported on their experiences retrospectively and their responses could have been influenced by other relationship events that day. In addition, given that the current data were correlational, we tested a series of reverse mediation models in both studies to bolster our confidence in our model. Although we found the strongest and most consistent support for our model, these alternative models did reveal some bidirectional associations between post sex affection, sexual satisfaction, and relationship satisfaction. As such, although post sex affection influenced feelings of satisfaction, people who were more satisfied may also be more likely to engage in affectionate exchanges with their partners after sexual experiences.

In addition, all possible activities that participants could engage in after sex were not captured in our study. Our primary goal in the current research was to assess the role of post sex affectionate exchanges in intimate relationships, so we chose to focus on behaviors identified in previous research as relevant to the post sex experience, including kissing, cuddling, and intimate talk (Hughes & Kruger, 2011). However, we do not know if these are the only behaviors that are important after sex; it is possible that other physically intimate behaviors, such as massages or falling asleep together, are important for satisfaction as well.

Despite these limitations, the current findings highlighted the importance of post sex affectionate behavior in promoting high-quality sexual and relationship experiences. More specifically, the within-person findings suggest that daily changes in post sex affection influence feelings of satisfaction in a relationship. Therefore, one way for couples to promote sexual and relationship satisfaction is to make time for shared intimacy, such as cuddling, kissing, and intimate talk, following their next sexual encounter. The findings also indicated the utility of considering more diverse sexual activities in future research on sexuality. Although sexual frequency has been associated with higher sexual and relationship satisfaction (for a review, see Impett et al., 2014), we know little about the role of sexual variety in the experience of satisfaction. Some previous research suggests that couples who engage in a greater variety of intimate behaviors experience greater satisfaction, especially over time. For example, in older adulthood, couples who are able to move beyond the notion that intercourse is the primary or only mode of sexual expression and whose sex lives incorporate a broader repertoire of sexual behaviors seem better able to maintain or

experience heightened sexual satisfaction (Hartmann, Philippsohn, Heiser, & Ruffer-Hesse, 2004; Hinchliff & Gott, 2008; Potts, Grace, Vares, & Gavey, 2006). In addition, one study of partnered individuals aged 57–85 demonstrated that although sexual frequency may decline with age, the frequency of non-coital sexual activities, such as kissing, caressing, and cuddling, was not associated with age (Waite, Laumann, Das, & Schumm, 2009). As such, and as the current study demonstrated, considering sexual behaviors beyond intercourse may provide important and unique insights into how couples can sustain feelings of sexual and relationship satisfaction in ongoing romantic relationships.

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