



# Discrepancy in Dyadic Sexual Desire Predicts Sexual Distress over Time in a Community Sample of Committed Couples: A Daily Diary and Longitudinal Study

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## Abstract

In long-term relationships, sexual desire discrepancy (SDD) occurs frequently between partners. For many, this discrepancy is persistent and significant, and a source of distress. However, the dynamics of SDD in couples and, specifically, its implications for sexual distress have received scant empirical attention. This study examined the associations between SDD and sexual distress from one day to the next and over a 12-month span, in a community sample of 229 same-sex/gender and mixed-sex/gender couples. Two datasets were collected: A 35-day daily diary and a 12-month longitudinal survey. In both, dyadic sexual desire and sexual distress were measured, and SDD was calculated as the absolute value of the difference in sexual desire between partners. Directional associations between SDD at one time point and sexual distress at the next time point were assessed using multilevel, 2-pane autoregressive cross-lagged models, controlling for within-variable changes, dependencies between partners, and partner age. Results were consistent with the study's hypotheses: Couples' SDD on one day predicted sexual distress on the next day. Similarly, SDD at baseline predicted sexual distress 12 months later. Participant gender, partner gender, and couple type did not significantly moderate these associations, nor did differentiating partners based on higher and lower average sexual desire. The reverse associations (i.e., sexual distress predicting SDD) were non-significant. The associations' directionality and the fact that they remained significant over days and months were consistent with the proposal that SDD is a precursor of sexual distress. The present study provides support for dyadic conceptualizations of sexual desire. Clinically, findings suggest that therapeutic approaches should address issues with sexual desire and sexual distress by focusing not on the individual, but on the couple.

**Keywords** Sexual desire · Sexual desire discrepancy · Sexual distress · Dyadic daily diary study · Longitudinal study

## Introduction

Sex occurs most frequently in the context of committed relationships (Lindau et al., 2007), and is an important contributor to each partner's health and well-being (Heiman et al., 2011; McNulty et al., 2016; Scott & Sprecher, 2000; Sprecher, 2002). Sadly, committed couples often report sex to be unsatisfying, or

even a source of distress (Byers, 2005; Dunn et al., 2000; Jasso, 1985; Klusman, 2002; Laumann et al., 1996). Among the sexual issues most frequently reported by couples is sexual desire discrepancy (SDD), that is, differences in sexual desire between partners (Dewitte et al., 2020; Mark, 2015). Such discrepancies occur frequently in long-term relationships (Herbenick et al., 2014). However, for some, these may be persistent and significant, and therefore come to be perceived as a sexual difficulty in its own right. Indeed, SDD is recognized by clinicians as one of the most frequent motives for seeking sex and couple therapy, one of the most challenging issues to treat, and a source of considerable distress for many couples (Dewitte et al., 2020; Kleinplatz et al., 2018; McCarthy & Opliger, 2019; McCarthy & Ross, 2018). It is thus surprising that the repercussions of SDD in committed couples have received little empirical attention to date (Mark, 2015).

Despite the paucity of available data, there are good reasons to think that SDD may be strongly associated with sexual

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distress (i.e., the negative affect and thoughts attributed to one's sexuality; Derogatis et al., 2002). For example, SDD has been linked to lower sexual satisfaction (Mark, 2015), which in turn is negatively associated with sexual distress (Stephenson & Meston, 2010). Similarly, the observation that women with low sexual desire (e.g., sexual arousal/interest disorder, hypoactive sexual desire disorder) tend to report greater sexual distress when they are in a relationship than when they are single suggests that relational factors such as SDD may be associated with their sexual distress (Hendrickx et al., 2016; Meana, 2010).

Elucidating the putative association between SDD and sexual distress may be of considerable value, both conceptually and clinically. Indeed, according to general population surveys in the U.S., as many as 22% to 25% of women report clinically significant levels of sexual distress (Bancroft et al., 2003; Shifren et al., 2008). Since our current knowledge of SDD derives in large part from clinical impressions, there is limited empirical understanding of how it relates to variability and persistence in sexual distress over time.

There is evidence that sexual distress is strongly associated with relational factors (Burri & Spector, 2011; Dennerstein et al., 2008; Hendrickx et al., 2016), and authors such as Dewitte (2014) have advocated for a greater dyadic focus in sex research. Recently, dyadic models of sexuality have been proposed, including the Interpersonal Emotion Regulation Model (IERM) of women's sexual dysfunction (Rosen & Bergeron, 2019). According to the IERM, couples coping with sexual problems tend to engage in less optimal emotion co-regulation strategies, leading both partners to experience poorer sexual outcomes, such as sexual distress. For example, in the case of couples struggling with sexual desire issues, lower-desire partners may avoid touching the other partner for fear that they would try to initiate sex, leading to fewer occasions for intimacy in the couple (McCarthy & Farr, 2012). Over time, such repeated experiences could lead to persistent patterns of ill-adapted behaviors in couples (e.g., sexual avoidance), resulting in greater sexual distress in both partners. Specifically, one would expect that in couples' everyday experiences, daily changes in SDD (i.e., greater than the couples' average level) should precede, and therefore predict, changes in sexual distress. Similarly, one would expect that over longer periods, a greater discrepancy in sexual desire between partners would also predict higher sexual distress. The present study examined whether in committed couples, greater discrepancy in sexual desire predicted greater sexual distress, both proximally (from one day to another), and more distally (over a 12-month span).

### Sexual Desire and Sexual Desire Discrepancy

Sexual desire has been defined generally as an interest in sexual activity (Spector et al., 1996), and is understood to be a multi-factorial construct with biological, emotional and cognitive components (Levine, 2002). Although research to date has often

focused on sexual desire as an intra-individual phenomenon, there is increasing evidence that in committed couples, sexual desire is associated with relational factors (Brotto et al., 2016; Hogue et al., 2019; Mark et al., 2019; Meana, 2010; Raposo et al., 2019). Hence, there are strong grounds for studying the interpersonal or dyadic aspects of sexual desire in committed couples.

SDD is a dyadic aspect of sexual desire. Sexual desire is known to vary (Ridley et al., 2006). Differences in sexual desire between partners should therefore not be unexpected. Indeed, Vowels et al. (2018), based on spectral and cross-spectral analysis of daily diary data collected over 30 days from 133 mixed-sex couples, reported that although variations in sexual desire are generally synchronous between partners (i.e., low or negligible SDD), patterns of larger SDD were also observed. SDD does appear to be an issue for many couples all the more, if one includes couples consulting therapists for one partner's low sexual desire (McCarthy & Farr, 2012; McCarthy & Opliger, 2019; McCarthy & Ross, 2018). Indeed, Herbenick et al. (2014), working with qualitative responses from 179 women in mixed-sex relationships, noted that women in long-term relationships found SDD to be a problem. However, for many of the women surveyed, SDD remained an unresolved issue in their relationship.

Although SDD has been discussed in the clinical literature for over four decades (Zilbergeld & Ellison, 1980), the first empirical studies of this issue were published significantly later (Davies et al., 1999), and remain rare. Much of the work to date has focused on the associations between SDD and sexual satisfaction and/or relationship satisfaction. In a cross-sectional survey of 72 mixed-sex dating couples, Davies et al. reported that SDD was associated with lower sexual and relationship satisfaction, with sexual satisfaction fully mediating the association between SDD and relationship satisfaction. Similar results were later obtained for gay and heterosexual men (Pereira et al., 2019), women in same-sex relationships (Bridges & Horne, 2007), and for both partners in a sample of 255 mixed-sex new parents (Rosen et al., 2018). Further, in a 30-day diary study of 87 mixed-sex couples, greater SDD was associated in the women partners with poorer quality of sexual experience on the same day (Mark, 2014). Although one would intuitively expect an association to exist between SDD and sexual distress, no studies to our knowledge have examined this question.

Despite being sparse and recent, research on SDD has already used more than one operational definition, making comparisons between studies difficult (Mark, 2015). One early approach is intra-individual, and measures SDD by asking respondents to evaluate the difference in sexual desire between themselves and their partner (Bridges & Horne, 2007; Davies et al., 1999; Pereira et al., 2019; Sutherland et al., 2015). This measure is based on the participant's perception of their partner, and therefore is likely biased. Indeed, guessing one's partner's feelings or thoughts is influenced by confounding factors

such as relationship quality, self-perception, and mood (Gagné & Lydon, 2004). To limit this bias, a second approach is to measure the couple's SDD directly, by subtracting one partner's sexual desire score from the other partner's (Mark, 2012; Reece, 1987; Sutherland et al., 2015; Willoughby et al., 2014). This yields a signed value (e.g., positive for the higher-desire partner and negative for the lower-desire partner), which may be appropriate in differentiated couples, where partners can be reliably differentiated by a criterion such as sex/gender (e.g., mixed-sex/gender couples). However, such measures may also emphasize the difference between partners and make it difficult to identify phenomena associated solely with the magnitude of SDD, regardless of the direction. Further, a signed measure may not be appropriate for undifferentiated (e.g., sex/gender diverse and nonclinical) samples of couples. As a result, some studies including the present one have taken the approach of measuring SDD as the absolute value of the difference between the two partner's self-reported sexual desire (Mark et al., 2014). This approach disregards the direction of the difference and focuses solely on the magnitude of the discrepancy.

In sum, most studies on SDD have used cross-sectional approaches and focused on intra-individual or signed measures. Further, the SDD literature has largely excluded same-sex/gender couples, non-heterosexual participants, trans men and women, and participants that identify outside of the gender binary (e.g., genderfluid, non-binary). In fact, only two studies to date have examined SDD in sexual minority couples or individuals (Bridges & Horne, 2007; Pereira et al., 2019) and none have included sex/gender minority individuals in their samples. As a result, our understanding of SDD's evolution from day to day and over time is very limited, particularly in diverse populations of couples (Dewitte et al., 2020).

## Sexual Distress

Sexual distress is associated with both individual (Rosen et al., 2009; Velten & Margraf, 2017) and relational factors (Blumensstock & Papp, 2017), and decreases with age and relationship duration (Hendrickx et al., 2015; Rosen et al., 2009). It is a necessary criterion in the diagnosis of both female and male sexual disorders (American Psychiatric Association, 2013). It is therefore surprising that the association between sexual function and sexual distress is not strong, particularly for low sexual desire (Meana, 2010; Shifren et al., 2008; Witting et al., 2008). Dewitte (2014) has suggested that in couples, partner interactions may determine whether someone with sexual difficulties experiences sexual distress, an outcome also predicted by relational models such as the IERM (Rosen & Bergeron, 2019). Hence, discrepancy in sexual desire between partners may be a source of sexual distress (Meana, 2010), and converging lines of evidence exist to support this hypothesis. For instance, in women reporting low sexual desire, the strongest predictor of sexual distress was

having a current partner (Rosen et al., 2009). Similarly, Bancroft et al. (2003) reported that in a sample of women in mixed-sex couples, the quality of the relationship and of the participant's well-being during sex were stronger predictors of sexual distress than indicators of sexual function (e.g., arousal, vaginal lubrication, orgasm). Taken together, these findings suggest that SDD may be significantly associated with sexual distress.

## Study Goals and Hypotheses

The goal of the present research was to examine the associations between SDD and sexual distress. The IERM suggests that both proximal and distal factors lead to greater sexual distress. Accordingly, this study worked with two time-based datasets collected from the same sample of committed couples. To study proximal associations between SDD and sexual distress, an online daily diary approach was chosen. This method minimizes recall bias and is ecologically valid, such that it is thought of as a "gold standard" in accuracy (Graham et al., 2003). The second, a 12-month longitudinal survey, allowed more distal associations to be observed.

It was expected that in both datasets, couples where the difference in sexual desire between partners was greater (i.e., greater magnitude of SDD) would report greater sexual distress. Further, the direction of associations over time was examined, and it was expected that in both datasets, values of SDD at one time point would predict values of sexual distress at a later time, but not vice-versa. It was expected that these results would hold even after controlling for age. It was also hypothesized that there would be same-day associations between SDD and sexual distress. This study also controlled for possible differences in the associations between SDD and sexual distress, depending on whether one is the higher- or lower-desire partner in the couple.

Finally, there are indications that sex/gender and couple type may play a role in associations between SDD and sexual well-being (e.g., Bridges & Horne, 2007; Mark & Murray, 2012; Mark et al., 2018). Thus, the present study investigated the moderating effects of participant's sex/gender, that of their partner, and the interaction between the two (i.e., couple type). Given the paucity of available results in the literature, this question remained exploratory.

## Method

### Participants

Working with the same sample of participants, two datasets were collected: A 35-day daily diary and a 12-month longitudinal survey.

A community sample of committed couples was recruited between March 2017 and February 2018 by advertising over

social media and using printed ads. Particular attention was paid to recruiting a diverse sample, and some of the advertisements were specifically targeted toward the LGBT+ community. Couples were contacted by telephone and screened for eligibility. Where possible, both partners were included in this initial contact, but it was considered acceptable for a single partner to speak for the couple during the initial screening. Inclusion criteria included having lived together for at least one year, being sexually active (at least once a month in the past 3 months), being 18 years of age or older, and speaking and reading English or French. Couples were excluded if one or both of the partners was pregnant or lactating, or had a condition that they reported significantly affected their sexuality, including serious mental or physical illness (e.g., recent cardiovascular events). The decision to exclude couples was taken by the research team on a case-by-case basis, informed by the selection criteria.

Of the 519 couples initially interested in participating in the study, 170 couples could not be reached for the telephone screening or did not agree to complete it, 68 couples were ineligible or did not agree to participate after screening, and 43 couples agreed during the screening but did not respond to the invitation to complete the first online survey. Thus, a total of 238 couples were enrolled into the study. Of these, eight couples were removed from the baseline survey due to failed attention checks or because they dropped out, and one asked that their data be removed from the study. As a result, the baseline sample contained completed records from 229 couples (458 matched participants).

### Sample Characteristics

**Participants at Baseline** At baseline, 59.2% of the 458 matched participants self-reported their sex assigned at birth as female, 40.4% as male, and 0.4% as intersex. Participants were aged 18 to 70 years ( $M = 30.4$  years,  $SD = 8.4$  years). Participants reported 16.71 years of education on average ( $SD = 2.84$ ), and 61.0% reported an average annual personal income of less than \$40,000 CAD ( $n = 265$ ). Seventy-five percent of the participants reported being born in Canada, 13% in the United States, 7% in Europe, 2% in Asia, 2% in Latin or South America, and 1% in Africa.

Participants self-defined their gender at baseline as: man (33.6%), woman (45.0%), trans man (1.1%), trans woman (0.2%), non-binary or gender fluid (3.9%), and agender (2.2%). Participants self-defined their sexual orientation as heterosexual (54.8%), bisexual (10.7%), gay/lesbian (18.6%), queer (9.2%), pansexual (4.1%), uncertain/confused (0.9%), asexual (0.2%) or “other” (1.5%). Participants reported having been in a relationship with their current partner on average 5.9 years ( $SD = 5.05$  years). Most couples reported being unmarried (71.4%), and most were without children (77.9%); those with children had between one and five children. Fifty-nine percent of the couples identified as mixed-gender (man-woman), 27%

as same-gender (man-man, woman-woman), and 14% included at least one participant not identifying along the gender binary.

**Daily Diary** Of the 229 couples having completed the baseline survey, 11 couples dropped out before starting the daily diary or completed less than three diary days, and one couple was removed due to an error in data collection. Thus, the daily diary sample was composed of 217 couples and 13,134 daily diary entries (an 86% completion rate).

**Longitudinal Survey** Of the 229 couples who completed the baseline survey, 193 couples were enrolled in the longitudinal survey’s 12-month follow-up, 36 couples having dropped out in the intervening period. Five further couples did not complete this second survey. Hence, the final data sample contained 229 couples having completed  $T_0$ , of which 188 couples had completed both  $T_0$  and  $T_1$  (a 17.9% attrition rate). Participants having completed only  $T_0$  did not differ significantly from those having completed both  $T_0$  and  $T_1$  in age, gender, orientation, sexual desire or sexual distress (one-way ANOVA,  $p > .05$ ).

### Procedure

This procedure was approved by the ethics committees of both universities participating in the study. After independently providing their informed consent online, each participant completed an online longitudinal survey which included self-report questionnaires at baseline and at 12-months. The baseline questionnaire included three attention-testing questions, of which the respondents needed to answer at least two correctly to remain in the study. Immediately after the couples had completed their baseline questionnaires, they were then asked to complete an online 35-day daily diary survey: Participants were asked to complete their diaries individually everyday between 6 p.m. and 6 a.m., ideally at the same time every day, and at the same time as (but independent from) their partner. Daily diary entries were completed using an online survey application, which date- and time-stamped each entry. A research assistant contacted each participant weekly by telephone to answer any questions they may have about the survey, and to resolve any issue (e.g., technical) they encountered.

This protocol was intended to encourage high completion rates. For the longitudinal survey, couples were compensated \$20 per completed questionnaire, a maximum of \$60 per couple. For the daily diary survey, couples were compensated up to \$100 in total (\$50 each), in proportion to the number of diaries completed by each partner. Compensation was in the form of gift cards for a well-known online store.

## Part 1: Daily Diary Data

### Measures

#### Sociodemographic Measures

Age was measured at baseline with a single-item question. Following recommendations by Bauer et al. (2017) and Brousard et al. (2017), self-identified gender was measured with a non-obligatory checklist item, with an additional option to allow participants to provide their own choice to supplement the categories suggested (see Table 1).

#### Daily Measures

**Sexual Desire** Respondents' daily sexual desire was measured using 4 items adapted from the dyadic sexual desire subscale of the Sexual Desire Inventory-2 (SDI-2; Spector et al., 1996), see Table 1. Abridged measures are frequently used in daily diary studies, where completion time is important for participant retention (Wittenborn et al., 2013). Composite scores for this adapted scale ranged from 0 to 28, with higher scores indicating higher sexual desire. In the present sample, the Cronbach's  $\alpha$  for this abridged measure was 0.93.

**Sexual Desire Discrepancy (SDD)** Sexual desire discrepancy was calculated in this study as the absolute value of the difference between partners' sexual desire scores, using the above 4-item scale. This absolute value approach has been used previously (Mark et al., 2014) and was preferred here to other operational definitions (e.g., a signed subtraction of the two partners' self-reports of sexual desire Mark, 2012; Reece, 1987; Sutherland et al., 2015; Willoughby et al., 2014). SDD scores ranged from 0 to 28, with higher scores indicating greater discrepancy between the partners' reported sexual desire. Formal reliability (see Data Analytic Strategy, below) for this measure was 0.75.

**Sexual Distress** Participants' sexual distress was measured using a 3-item abridged form of the Female Sexual Distress Scale-Revised used in Part (FSDS-R; Derogatis et al., 2002; Santos-Iglesias et al., 2018), see Table 1. Composite scores for this abridged scale range from 0 to 12, with higher scores indicating higher sexual distress. This abridged scale has also been used previously in dyadic daily diary studies (Muisse et al., 2018), with good internal consistency. In the present sample, Cronbach's  $\alpha$  was 0.90.

#### Data Analytic Strategy

Univariate statistics and reliability tests were obtained using SPSS (IBM SPSS Statistics, v. 21.0). Note that reliability

**Table 1** 4-item abridged Sexual Desire scale.<sup>a</sup> 3-item abridged Sexual Distress scale.<sup>b</sup> Question and possible responses to the demographic variable gender<sup>c</sup>

<i>a</i>
1. How often did you have sexual thoughts today?
2. How often did you feel sexual desire today?
3. How often did you feel sexual desire for your partner today?
4. Did you initiate or express interest in sexual activity with your partner today?
<i>b</i>
1. How often did you feel distressed about your sex life
2. How often did you feel:—2. Inferior because of sexual problems
3. How often did you feel:—3. Worried about sex
<i>c</i>
What is the gender with which you most identify?
1. Man
2. Woman
3. Trans-identify as man
4. Trans-identify as woman
5. Agender
6. Other (specify if you wish)

<sup>a</sup>Items used a 7-point Likert scale, with responses ranging from 1 ("not at all") to 7 ("a lot")

<sup>b</sup>Items used a 5-point Likert scale, with responses ranging from 0 ("never") to 7 ("always")

<sup>c</sup>Responses for the "Other" category included: "genderqueer", "genderfluid" and "non-binary"

testing for SDD requires careful consideration. Indeed, as a difference measure, SDD neither assumes nor requires that the variables being compared be strongly correlated, and in fact, difference measures are in general more reliable when this correlation is low (Feldt, 1995; Rogosa & Willett, 1983). As a result, reliability tests such as Cronbach's  $\alpha$ , which assess the degree of internal consistency of the items composing the scale, are not generally appropriate for difference scores such as those computed to measure SDD. A more appropriate reliability test for difference scores is as follows (Feldt, 1995):

$$r_{1-2} = [1/2 (r_1 + r_2) - r_{1,2}] / (1 - r_{1,2}) \quad (1)$$

where  $r_{1,2}$  is the reliability of the difference measure;  $r_1$  and  $r_2$  the reliability of each component score; and  $\rho_{1,2}$  the correlation between the component scores. This reliability test was used in the present study.

Directional associations between SDD and sexual distress were assessed using two-pane autoregressive cross-lagged models (Hamaker et al., 2009; Selig & Little, 2012). These models test the associations between variables from one time point to another, controlling for within-variable changes. Associations between SDD on one day and sexual distress on the next day controlled for same-day associations between the two variables.

Following Laurenceau and Bolger (2012), daily diary variables were person-mean centered, and therefore represented deviations from the respondents' mean values. Person-centered measures of SDD and sexual distress were not significantly correlated with participants' age in this sample ( $p > .05$ ) and as a result, age was not included as a covariate in the final model.

Data dependencies between partners were controlled by using two-level (couple, partner) Structural Equation Modeling (SEM; Hox et al., 2002). As couples were undifferentiated, in that the partners could not be reliably differentiated (Laurenceau & Bolger, 2012), symmetrical paths were constrained to be equal.

The study controlled for possible differences in these associations between SDD and sexual distress, depending on whether one was the higher- or lower-desire partner in the couple. This was done by differentiating the partners in the couple by whether they reported higher or lower average desire at baseline (no couples in this sample reported the same level of desire), then re-executing the multi-level cross-lag model twice on this differentiated couple, first with parameters free, then with constrained to be equal (the *nested model*). Following (Kwan & Chan, 2011), the  $\chi^2$  fit characteristics of the constrained and unconstrained models were then compared and the probability that both models differed was estimated.

The study also controlled for moderating effects of the participant's gender, their partner's gender, as well as possible interactions between the two (i.e., couple type). This was done by re-executing the multi-level cross-lag model, including the gender variables and the interaction variables as between-level binary moderators. The gender measure in the baseline survey resulted in a large number of categories and correspondingly small number of participants in each category and was therefore difficult to use in statistical models. For the present analysis, a simplified three-value gender variable (man, woman, genderfluid/non-binary) was calculated from the original. Given the small number of participants identifying as genderfluid/non-binary in this sample, the study further focused only on participants identifying as men or women (this included trans-identified participants), resulting in a binary variable. The study's analyses were then re-executed using the same data analytic strategy as before (multilevel, two-pane autoregressive cross-lagged SEMs), and using the newly-defined participant gender and partner gender as between-level, binary moderators. Moderation tests were performed following recommendations by (Preacher et al., 2016; Vaillancourt-Morel et al., 2020).

Seven percent of the diary entries and 13% of the longitudinal dataset's Time 2 (12-month) entries had missing data for one of the partners. Missing data were handled directly by the Maximum Likelihood (ML) estimation technique used in the SEM analyses. Indeed, ML estimation has been shown to be robust to conditions where data are Missing At Random (MAR); no imputation was required in these analyses (Allison, 2003).

SEM analyses were performed in MPlus v7 (Muthén & Muthén, 2015). Model fit and parameter significance were assessed according to the following guidelines: Overall model fit was considered acceptable when Root Mean Square Error of Approximation (RMSEA)  $< 0.08$ , within Standardized Root Mean Square Residual (SRMSR)  $< 0.08$ , Tucker-Lewis Index (TLI)  $> 0.9$ , and individual standardized residuals ( $\sigma$ ) were small (Gefen et al., 2000; West et al., 2012). Parameter estimates were considered significant when their  $p$ -value was  $< .05$ . As MPlus does not support bootstrapping for multilevel models, these were calculated using the Delta method (Muthén & Muthén, 2015).

## Results

### Descriptive Statistics

In this sample, mean sexual desire was 10.93 ( $SD = 6.15$ ), mean sexual distress was 0.91 ( $SD = 1.92$ ), mean SDD was 5.39 ( $SD = 4.55$ ). SDD and sexual distress scores were left-skewed, with the majority being lower than the score's theoretical half-way point.

### Covariates

Participants' age was not associated with their daily measures of sexual distress ( $p > .05$ ) in this sample. On the same day, SDD at  $d_0$  was significantly and positively associated with sexual distress at  $d_0$  ( $b = -0.012$ ;  $p \leq .0001$ ; 95%  $CI = [0.006, 0.014]$ ).

### Sexual Desire Discrepancy Predicting Next-Day Sexual Distress

Associations between variations in SDD on one day and variations in sexual distress on the next day were modeled in a two-level (couple, day), two-panel cross-lagged SEM, controlling for age and same-day associations between the variables. The model converged normally and to acceptable fit (RMSEA = 0.013; SRMS [Within] = 0.007; CFI = 0.998). Deviations from average SDD on one day were positively and significantly associated with deviations from average in individual sexual distress on the next day ( $b = 0.009$ ;  $p = .004$ ; 95%  $CI = [0.004, 0.014]$ ), see also Fig. 1. Hence, higher dyadic SDD on one day was on average followed by significantly higher sexual distress for both partners on the next day. The converse associations, between individual sexual distress on one day and SDD on the following day, were not significant ( $p > .05$ ).

### Differentiating Partners, Based on Average Sexual Desire

The above analysis was re-executed, differentiating between the low- and high-desire partner. The model converged

normally and to acceptable fit (RMSEA = 0.020; SRMS [Within] = 0.013; CFI = 0.985). Associations between SDD and sexual distress were significant and of similar direction and magnitudes for both the high-desire partner ( $b = 0.009$ ;  $p = .041$ ; 95% CI = [0.002, 0.016]) and the low-desire partner ( $b = 0.011$ ;  $p = .009$ ; 95% CI = [0.004, 0.017]), and a comparison of models with and without equality constraints suggests that they do not differ ( $\Delta\chi^2 = 0.038$ ,  $\Delta df = 3$ ,  $p > .05$ ). Hence, high- and low-desire partners did not significantly differ in their associations between SDD and sexual distress.

### Moderating Effect of Participant and Partner Gender

Moderation effects for participant's gender, their partner's gender, and interactions between the two variables, were non-significant ( $p > .05$ ).

## Part 2: Longitudinal Data

### Measures

#### Sociodemographic

Measures for participant age, gender and partner gender were the same as in Part 1.

#### Longitudinal Measures

**Sexual Desire** The Dyadic Subscale of Sexual Desire Inventory-2 (SDI-2, (Spector et al., 1996) was used as a measure of sexual desire in Part 2. SDI-2 is a widely used measure of sexual desire, and has demonstrated excellent psychometric properties in other studies. The scale factors into a 9-item “dyadic” sexual desire subscale (sexual desire for a partner or attractive other person) and a 4-item “solo” sexual desire subscale (desire for masturbation). The present study used

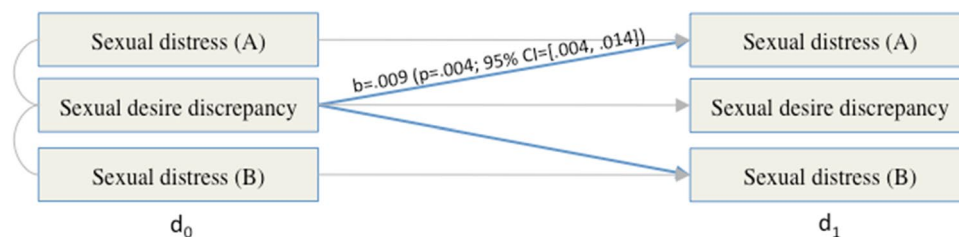
the former, this measure being more relevant in the context of sexual desire in committed couples. Composite scores for this subscale range from 0 to 81, with higher scores indicating higher sexual desire. In the present dataset, Cronbach's  $\alpha$  for this subscale was 0.79.

**Sexual Desire Discrepancy (SDD)** Sexual desire discrepancy was calculated as the absolute value of the difference between partners' SDI-2 scores (dyadic subscale). Composite scores range from 0 to 109, with higher scores indicating higher discrepancy between the partners' reported sexual desire. Formal reliability (see above Data Analytic Strategy section in Part 1 for details) for this measure was 0.82.

**Sexual Distress** The Female Sexual Distress Scale-Revised was used as a measure of sexual distress. This scale was originally proposed for women (Derogatis et al., 2002, 2008) and was subsequently validated for men (Santos-Iglesias et al., 2018). The items on the scale load onto a single factor regardless of gender and degree of sexual function (Santos-Iglesias et al., 2018). Composite scores for this scale range from 0 to 56, with higher scores indicating higher sexual distress. In the present dataset, Cronbach's  $\alpha$  for this measure was 0.92.

### Data Analytic Strategy

The data analytic strategy in this part was analogous to the strategy used in Part 1, with Part 2's longitudinal measures replacing Part 1's daily measures. In particular, missing data were handled directly using Maximum Likelihood (ML) estimation. In Part 2, variables were not person-mean centered, and therefore represented deviations from the sample's mean values.



**Fig. 1** Associations between the Couples' SDD and each Partner's Sexual Distress on One Day ( $d_0$ ) and the Next Day ( $d_1$ ). Note: Light arrows represent autocorrelations between variables from one time point to another, light curved lines represent same-day associations between SDD and sexual distress at  $d_0$ , both of which were controlled

for in this model. Dark arrows represent the significant associations observed between SDD on one day and sexual distress on the other, constrained to be symmetrical. The converse associations, between each partner's sexual distress on one day and the couples' SDD on the other, were not significant

## Results

### Descriptive Statistics

Means and standard deviations of variables of interest are presented in Table 2. SDD and sexual distress scores were left-skewed, with the majority being inferior to the score’s theoretical half-way point. In particular, 67.1% of participants reported sexual distress scores below the clinical cutoff score of 15.

### Covariates

Participant age was significantly and negatively associated with sexual distress at  $T_0$  ( $b = -0.067$ ;  $p = .0028$ ;  $95\% CI = [-0.117, -0.017]$ ). SDD at  $T_0$  was significantly and positively associated with sexual distress at  $T_0$  ( $b = -0.312$ ;  $p < .001$ ;  $95\% CI = [0.202, 0.422]$ ).

### SDD Predicting Sexual Distress Over 12 Months

Associations between SDD at baseline ( $T_0$ ) and sexual distress 12 months later ( $T_1$ ) were modeled in a two-level (couple, participant), two-panel cross-lagged SEM controlling for age and associations between the variables at baseline. The model converged normally and to acceptable fit (RMSEA = 0.067; SRMS [Within] = 0.069; CFI = 0.959). Associations between SDD at  $T_0$  and individual sexual distress at  $T_1$  were significant

and positive ( $b = 0.228$ ;  $p < .001$ ;  $95\% CI = [0.126, 0.329]$ ), see also Fig. 2. Hence, higher dyadic SDD at  $T_0$  was on average followed by significantly higher sexual distress for both partners 12 months later. The reverse association, between individual sexual distress at  $T_0$  and SDD at  $T_1$ , was not significant ( $p > .05$ ).

### Differentiating Partners, Based on Average Sexual Desire

The above analysis was re-executed, differentiating between the low- and high-desire partner. The model converged normally and to acceptable fit (RMSEA = 0.081; SRMS [Within] = 0.079; CFI = 0.985). Associations between SDD and sexual distress were significant and of similar direction and magnitudes for both the high-desire partner ( $b = 0.269$ ;  $p < .001$ ;  $95\% CI = [0.142, 0.396]$ ) and the low-desire partner ( $b = 0.176$ ;  $p = .024$ ;  $95\% CI = [0.048, 0.304]$ ), and a comparison of models with and without equality constraints suggests that they do not differ ( $\Delta\chi^2 = 0.788$ ,  $\Delta df = 3$ ,  $p > .05$ ). Hence, high- and low-desire partners did not significantly differ in their associations between SDD and sexual distress.

### Moderating Effect of Participant and Partner Gender

Moderation effects for participant’s gender, their partner’s gender, and interactions between the two variables, were non-significant ( $p > .05$ ).

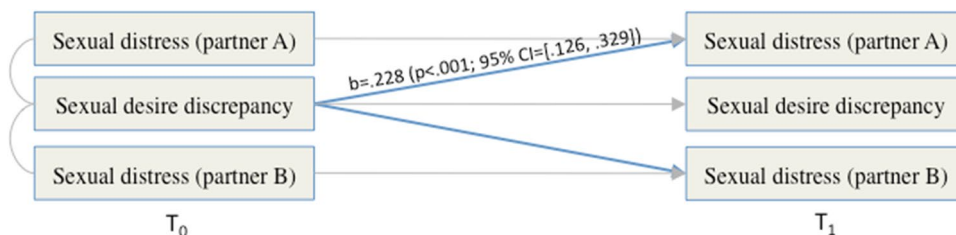
**Table 2** Means and SDs for 4-week retrospective measures at baseline ( $t_0$ ) and 12 months later ( $T_1$ )

	Dyadic Sexual Desire	SDD	Sexual Distress
Baseline ( $T_0$ )	44.01 (10.19)	16.46 (13.76)	12.27 (10.33)
12-month ( $T_1$ )	40.85 (11.77)	17.72 (14.99)	11.08 (9.89)

Standard deviations are presented in parentheses  
SDD Sexual Desire Discrepancy

## Discussion

Based on the proposal from both clinical and research literatures that in long-term relationships, greater SDD may lead to greater sexual distress in both partners, this study examined the associations between SDD and sexual distress at the daily level and over time. Two datasets were collected from the same inclusive sample of committed couples: a 35-day daily diary and a 12-month longitudinal survey. Results were



**Fig. 2** Associations between the couples’ SDD and each partner’s sexual distress at  $T_0$ , and 12 months later, at  $T_1$ . Note: Light arrows represent autocorrelations between variables from one time point to another, and light curved lines represent associations between SDD and sexual distress at  $T_0$ , both of which were controlled for in this

model. Dark arrows represent the significant associations observed between SDD on one day and sexual distress on the other, constrained to be symmetrical. The converse associations, between each partner’s sexual distress on one day and the couples’ SDD on the other, were not significant



consistent with the study's hypotheses. In Part 1, couples' higher-than-average SDD on one day predicted higher-than-average sexual distress on the next day. Similarly, in Part 2's longitudinal data, higher SDD at baseline predicted higher sexual distress 12 months later. The reverse associations (i.e., sexual distress at one time point predicting SDD at the next) were non-significant in both the daily diary and longitudinal studies.

Less adaptive patterns of interaction between partners have long been reported in emotion research (Butler & Randall, 2012; Dixon-Gordon et al., 2015; Karney & Bradbury, 1995; Zaki & Williams, 2013). More recently, proposals such as the IERM of women's sexual dysfunction (Rosen & Bergeron, 2019) have also formulated the hypothesis that a couple's sexual difficulties may lead to less optimal emotional co-regulation, resulting in lower individual and relational well-being. The IERM suggests that proximal and distal factors reciprocally influence the couples' emotion co-regulation strategies, which in turn affect individual outcomes such as sexual distress. Applied to SDD, this model suggests that proximal factors such as daily increases in SDD could lead the couple to engage in less adaptive dyadic emotion co-regulation strategies, such as avoidance or conflict, instead of more adaptive strategies such as greater communication (Herbenick et al., 2014). These less adaptive strategies would limit the couple's ability to regulate their sexual distress.

Findings from Part 1 indicated that daily changes in a couples' SDD predicted next-day changes in sexual distress. This result suggests that on days when the difference in sexual desire between partners is greater, couples may interact in ways that would promote higher-than-average sexual distress the next day. For example, the lower-desire partner may react negatively to their higher-desire partner's signs of sexual interest. Should this be the case, it is likely that such reactions would increase the sexual distress in the higher-desire partner, since the negative psychological impact of sexual rejection is well known (Dobson et al., 2020; Ford & Collins, 2013), particularly when this rejection is perceived as hostile (Kim et al., in press). This may also result in greater guilt and sexual distress for the lower-desire partner, given that low sexual desire has been associated with higher sexual guilt (Woo et al., 2011). Similarly, other scenarios, such as the low-desire partner engaging in sexual activity to avoid disappointing their partner, have also been associated with lower individual and relational well-being in both partners (Muisse et al., 2012) and may result in both partners experiencing increased sexual distress. Finally, negative sexual interactions surrounding SDD may compound over time (e.g., leading to more frequent conflicts) (Willoughby et al., 2014), further increasing both partners' sexual distress. In this way, daily variations in SDD may affect the couples' everyday interactions and lead to increases in sexual distress that remain observable on the following day. The observation

that associations between SDD and sexual distress are greater in lower-desire couples than in higher-desire couples is consistent with this scenario.

Part 2 showed that SDD at baseline predicted sexual distress 12 months later. To our knowledge, there are no other studies examining the impact of SDD over long periods of time. However, this result is consistent with the existing clinical literature, which reports sexual desire issues such as SDD to be persistent and difficult to address (McCarthy & Opplinger, 2019; McCarthy & Ross, 2018). Furthermore, the observation that the associations between SDD and sexual distress remain significant over both days and months suggests that the everyday impacts of SDD on the couples' interactions may result in longer-term effects. The IERM is also helpful in interpreting this second result, as it proposes that distal factors (here, SDD as measured longitudinally over 12 months) also affect the couples' ability to cope effectively.

This study's third result, that sexual distress did not predict SDD, argues against possible alternative hypotheses. Indeed, various inverse scenarios could be imagined whereby sexual distress could be responsible for greater SDD in the couple for example, that one partner's sexual distress may lead to their lower sexual desire whilst the other partner remains relatively unaffected, thereby resulting in greater SDD in the couple. This is a plausible scenario, given that in committed couples, sexual desire is known to be sensitive to individual factors such as mood and affect (Mark & Lasso, 2018). However, the fact that sexual distress does not significantly predict SDD over time suggests that such alternative interpretations may not reflect the experience of individuals in long-term relationships.

Hence, the directions of the associations found in this study are consistent with the hypothesis that SDD plays a causal role in sexual distress. More generally, these results support IERM's proposal that sexual issues such as SDD may impact couples' interactions, and eventually, affect the well-being of both partners. However, this study's design cannot exclude the possibility of an unknown common third factor simultaneously responsible for the increases in both SDD and sexual distress.

Finally, participant gender, partner gender, and couple type did not significantly moderate any of the study's results, nor did differentiating partners in the couple based on higher or lower sexual desire. This argues to the robustness and generality of the observed directional associations.

This research is novel in many respects. Firstly, this study provided the first empirical investigation into an area of great clinical importance (namely the associations between SDD and sexual distress), which has been neglected relative to its prevalence. Further, the results reported here stem from both a daily diary study and a longitudinal survey on the same sample of participants, which is helpful if we intend to better understand the bridge between proximal, everyday

interactions between partners and the more distal, longer-term phenomena that shape the couples' sexual relationship over time. From a methodological standpoint, these designs allowed us to extend prior research by examining the directionality of associations between SDD and sexual distress.

Study limitations include the use of online questionnaires. Although generally reported as an advantage by the participants, it is recognized that such an approach may have biased the sample (e.g., towards younger couples, or towards participants with higher education and financial status). Similarly, including in the study's inclusion criteria a requirement that couples be sexually active may have biased the study towards participants with a greater-than-average level of sexual activity (Catania et al., 1986). Another possible bias in this study is that repeated measurements during the daily diary survey may lead to measurement reactivity in some participants although the effects of such biases have been reported to be modest (Barta et al., 2012). Further, this research used abridged measures of sexual desire and sexual distress in the daily diary study. Although diary studies require questionnaires to be short to minimize attrition and maximize completion rates, such abridged measures warrant rigorous validation in future work. Furthermore, SDD is by nature a difference score, and whilst the variable's reliability was verified in the present study, the psychometric properties of this measure should be validated more extensively. Indeed, despite being widely used in the social sciences (Thomas & Zumbo, 2011), difference scores have been criticized, firstly on the basis that one cannot assume their validity simply because the variables they compare have themselves been validated (Cronbach & Furby, 1970), and secondly because they may overly simplify the phenomena under study (Edwards, 2001; Griffin et al., 1999). The analyses performed in this study were limited to two points of data, and thus could not identify patterns in SDD's variation over time; this would be an interesting avenue of future research. Finally, although this study tested for moderating effects of participant gender, partner gender and couple type, the sexual orientation measure used gave rise to responses that were too varied to support reliable statistical analysis; future studies would benefit from improvements in this regard.

Despite these limitations, the present study sheds light on a poorly researched yet important area, namely sexual desire discrepancy in committed couples. Despite being based on a non-clinical sample, these results are also aligned with recent clinical recommendations for addressing SDD in sexually distressed couples (Dewitte et al., 2020), which emphasize the importance of focusing on the couple and its dynamics, rather than focusing on and potentially pathologizing one of the partners. Furthermore, these results suggest that targeting SDD directly (e.g., by helping couples better synchronize their sexual desire, or by examining whether SDD is indicative of an underlying relationship issue), may be more

effective than attempting to minimize the partners' sexual distress.

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#### Declarations

**Conflicts of Interest** The authors declare they have no conflicts of interest or competing interests with respect to the content of this article.

**Ethics Approval** This study was approved by the Ethics committees of the Université de Montréal and Dalhousie University.

**Informed Consent** All participants in this study provided their informed consent.

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