Sexual distress mediates the associations between sexual contingent self-worth and well-being in women with genito-pelvic pain: A dyadic daily experience study

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The Journal of Sex Research

October 2018

Abstract

Provoked vestibulodynia (PVD), a common cause of women's genito-pelvic pain, is associated with poorer psychological and sexual well-being in affected couples. Greater sexual contingent self-worth (CSW)—defined as self-esteem that is dependent on the perceived success or failure of a sexual relationship—has been linked to poorer well-being in a cross-sectional study of couples coping with PVD. This study aimed to examine whether daily sexual distress mediated the associations between greater sexual CSW and lower sexual satisfaction and greater anxiety, depressed mood, and women's pain in affected couples. Women (N = 125) diagnosed with PVD and their partners completed the Sexual CSW Scale, and then online daily surveys for eight weeks measuring sexual distress, sexual satisfaction, anxiety, depressed mood, and women's pain during intercourse. Multilevel analyses were based on the Actor-Partner Interdependence Model. For women who had higher sexual CSW (compared to lower sexual CSW), on sexual activity days when their sexual distress was higher, they reported lower sexual satisfaction and greater anxiety, depressed mood, and pain (compared to their average level across all sexual activity days). Findings suggest that daily sexual distress may be one pathway between greater sexual CSW and poorer day-to-day well-being in women with PVD.

Sexual Distress Mediates the Associations Between Sexual Contingent Self-Worth and Well-being in Women with Genito-Pelvic Pain: A Dyadic Daily Experience Study

Sexual dysfunctions impact many aspects of an individual's life and are associated with lower self-esteem (Basson, 2005; Desrochers, Bergeron, Landry, & Jodoin, 2008). One prevalent sexual dysfunction in women is genito-pelvic pain/penetration disorder (GPPPD), which is characterized by one or more of the following symptoms: recurring genital or pelvic pain during intercourse or attempted penetration, significant fear or anxiety about pain or penetration, and/or tensing of the pelvic floor muscles during attempted penetration (American Psychiatric Association, 2013). A common cause of GPPPD is provoked vestibulodynia (PVD), which is genital pain that is triggered when pressure is applied to the vulvar vestibule (the vaginal entrance); thus, the pain is most often experienced during vaginal intercourse (Bornstein et al., 2016; Harlow, Wise, & Stewart, 2001). The most recent lifetime prevalence estimates suggest that PVD affects 7% to 8% of women in the general population under the age of 40 (Harlow et al., 2014).

Previous research has found that the impact of PVD extends to both members of a couple (Rosen, Rancourt, Corsini-Munt, & Bergeron, 2014 for review). Women with PVD and their partners report being less satisfied with, and more distressed about their sexual relationship, and affected women report greater anxiety and depressive symptoms than women unaffected by PVD (for review, see Bergeron, Corsini-Munt, Aerts, Rancourt, & Rosen, 2015). Some studies have found that partners of women with PVD experience more depressive symptoms, while other studies do not support these findings (Nylanderlundqvist & Bergdahl, 2003; Pazmany, Bergeron, Verhaeghe, Oudenhove, & Enzlin, 2014; Smith & Pukall, 2014). The cause of PVD is thought to be multifactorial and psychological factors (namely anxiety and depression) have been identified

as potential contributors to both the etiology and maintenance of PVD (Pukall et al., 2016). Relationship factors, such as partner responses to the pain, attributions for the pain, and sexual communication, among others, are associated with women's pain and couples' adjustment to PVD (Jodoin et al., 2008; Rancourt, Rosen, Bergeron, & Nealis, 2016; Rosen, Bergeron, Glowacka, Delisle, & Baxter, 2012; Rosen, Bois, Mayrand, Vannier, & Bergeron, 2016). In uncontrolled quantitative and qualitative cross-sectional studies, women with PVD reported low self-esteem, and both they and their partners reported a negative impact on their sense of self as a result of the PVD (Ayling & Ussher, 2008; Dalton, Haefner, Reed, Senapati, & Cook, 2002; De Jong, Lumen, Robertson, Stam, & Lammes, 1995; Sadownik, Smith, Hui, & Brotto, 2017). There is limited knowledge of how these experiences of low self-esteem relate to couples' sexual and psychological functioning. One novel variable that may influence the pain and couples' well-being is sexual contingent self-worth (sexual CSW).

Sexual CSW in Couples Coping with PVD

Sexual CSW refers to self-esteem that is dependent on the perceived success or failure of a sexual relationship (Glowacka, Rosen, Vannier, & MacLellan, 2017). The theoretical model of CSW states that basing one's self-worth on a particular life area affects a person's functioning based on the individual's perception of success or failure in the contingent domain (Crocker & Wolfe, 2001). Thus, when an individual believes that events in the contingent domain are going well, they experience better psychological and physical well-being. However, when an individual evaluates events in the contingent domain as negative, this is linked to their poorer well-being, such as greater depressed mood and interpersonal difficulties in their relationships (Crocker & Park, 2004; Crocker & Wolfe, 2001; Park & Crocker, 2005). In support of this theory, greater CSW in a particular domain (e.g., appearance CSW and friendship CSW) has been linked to

relevant negative consequences, such as a greater release of stress hormones, excessive alcohol use, disordered eating, and more depressive symptoms (Cambron & Acitelli, 2010; Crocker, 2002a; Crocker & Park, 2004; Park & Crocker, 2005; Sanchez, Moss-Racusin, Phelan, & Crocker, 2011).

Sexual CSW may be particularly relevant for couples affected by PVD because qualitative studies have found that both affected women and their partners report feelings of failure in the sexual relationship (Ayling & Ussher, 2008; Sadownik et al., 2017). Only one prior study to our knowledge has examined sexual CSW in couples coping with PVD. The researchers found that when women with PVD had greater sexual CSW, they experienced more sexual distress and greater pain intensity during intercourse. Similarly, when their partners had greater sexual CSW, partners reported lower sexual satisfaction and greater sexual distress, and women with PVD experienced greater depressive symptoms (Glowacka, Bergeron, Dubé, & Rosen, 2018). Thus, findings indicated that greater sexual CSW was linked to couples' poorer psychological and sexual well-being. The authors proposed that increased worry about problems in the sexual relationship might have explained these associations; however, they did not test this hypothesis. Examining the mediating role of sexual distress is important because it may clarify a pathway that links sexual CSW to sexual and psychological functioning in this population, which could inform treatments to improve the well-being of couples with PVD.

The Mediating Role of Sexual Distress

According to the theoretical model of CSW (as described above), when individuals have greater CSW they work so hard to validate their sense of self-worth, that any perceived rejection or failure results in substantial stress for the individual in the contingent domain (Crocker & Park, 2004). In turn, this increased distress negatively impacts their health and well-being

because individuals are more likely to emphasize negative aspects of the contingent domain, and use more maladaptive coping strategies when they are distressed (Crocker, 2002b; Crocker & Park, 2004; Lawrence & Williams, 2013; Park & Crocker, 2005; Tomaka, Morales-Monks, & Shamaley, 2012). For example, a study of individuals who recently experienced a romantic breakup found that when individuals had greater relationship CSW, they were more likely to experience emotional distress and, in turn, engage in more stalking behaviours toward their ex-partners (Park, Sanchez, & Brynildsen, 2011). Similarly, when people perceived failure in their romantic relationship, those with greater relationship CSW experienced more negative emotions, which subsequently was associated with lower self-esteem (Knee, Canevello, Bush, & Cook, 2008).

In line with CSW theory (Crocker & Wolfe, 2001), poorer well-being might occur because of the sexual distress (i.e., feelings of worry and frustration about the sexual relationship) that couples coping with PVD experience as a result of feeling that they have failed in the contingent domain on days of sexual activity (Ayling & Ussher, 2008; Donaldson & Meana, 2011; Sadownik et al., 2017). Thus, individuals with greater sexual CSW are likely to perceive PVD as a failure in the contingent domain (i.e., the sexual relationship), and experience more distress about the sexual relationship, and in turn, this distress may be linked to greater daily depressed mood, anxiety and lower sexual satisfaction for both members of the couple, as well as greater pain during intercourse for the woman with PVD.

The individual links between the specific components of the proposed mediational model in the current study (i.e., sexual CSW, sexual distress, pain, psychological and sexual well-being) have been examined in two previous studies of couples coping with PVD. In women with PVD, greater sexual distress has been linked to greater depressed mood, anxiety, pain, and lower

sexual satisfaction (Pazmany, Bergeron, Oudenhove, Verhaeghe, & Enzlin, 2013). In the cross-sectional study of sexual CSW in couples coping with PVD, women's greater sexual CSW was associated with their own greater sexual distress, and women's and partners' greater sexual distress was correlated with their own greater depressive symptoms and their own and their partners' lower sexual satisfaction (Glowacka et al., 2018). The previously established associations between sexual CSW, sexual distress, and the well-being of couples coping with PVD, together with the theoretical model of CSW suggests that greater sexual CSW in couples affected by PVD may be linked to poorer psychological and sexual well-being via enhanced sexual distress.

Further, the sexual relationship is an interpersonal experience and one partner's levels of sexual CSW and sexual distress could be associated with the other person's outcomes. Indeed, several studies of couples coping with PVD have documented this pattern (e.g., Rancourt et al., 2016; Rosen et al., 2016). When an individual has greater sexual CSW, their daily sexual distress could lead them to respond to their partner in a manner that impacts their partners' psychological well-being and sexual satisfaction (e.g., be more hostile toward the partner or avoidant of sexual activity). Greater sexual CSW in the partners of women with PVD was linked to women's greater depressive symptoms and lower relationship satisfaction (Glowacka et al., 2018). It is important to note that this study used single-occasion measures and a cross-sectional design, which did not capture day-to-day variations in couples' well-being.

Daily diary measures are important to examine daily variability in how couples coping with PVD adjust to the pain, and closer in time to their actual sexual experiences. Indeed, the sexual relationship is dynamic and could be impacted by relational and psychological factors that vary on a daily basis or across sexual interactions (Davison, Bell, LaChina, Holden, & Davis,

2008; Rosen, Bergeron, et al., 2014). Research supports that pain intensity, sexual satisfaction and distress, anxiety, and depressed mood vary daily in those couples struggling with PVD (Muise, Bergeron, Impett, Delisle, & Rosen, 2018; Pâquet et al., 2018; Rosen, Bergeron, Sadikaj, & Delisle, 2015; Rosen, Bergeron, et al., 2014; Rosen, Muise, Bergeron, Delisle, & Baxter, 2015). Although indices of pain and adjustment in PVD show daily variability, CSW is generally considered to be a trait (Crocker, Luhtanen, Cooper, & Bouvrette, 2003; Knee et al., 2008) and sexual CSW, specifically, has been found to remain relatively stable over a two-week timeframe (Glowacka et al., 2017). There is evidence that trait domains of CSW are associated with daily outcomes (e.g., depressed mood, emotional distress) because the actual perceived failures and successes in a contingent domain vary day-to-day (Crocker, Karpinski, Quinn, & Chase, 2003; Pachankis & Hatzenbuehler, 2013). Thus, in the case of PVD, individuals are likely to have a relatively stable level of sexual CSW, but how it relates to women's pain and couples' well-being may vary across days and sexual interactions due to the specific thoughts, feelings, and behaviours of the day. Evaluating the associations between sexual CSW and the daily well-being of couples coping with PVD could provide insight into whether basing self-worth on the sexual relationship is linked to how couples manage the daily issues that arise due to PVD.

Objective and Hypotheses

The objective of the current study was to examine whether greater sexual distress on days that couples engaged in sexual activity mediated the associations between greater sexual CSW (at baseline) and daily sexual satisfaction, depressed mood, anxiety, and pain (for women) in couples with PVD. We expected that when individuals had greater sexual CSW (compared to lower sexual CSW), they and their partners would report greater sexual distress on sexual activity days, which in turn would be associated with their own and their partner's daily lower

sexual satisfaction and greater anxiety and depressed mood, and women's greater pain during intercourse. Figure 1 depicts the proposed mediational model. Since sexual CSW is closely related to relationship CSW (basing self-esteem on the overall romantic relationship), we controlled for relationship CSW in all of our analyses to ensure that the observed effects of sexual CSW went above and beyond any effects of relationship CSW (Glowacka et al., 2018; Glowacka et al., 2017).

The current study was part of a larger study. Three prior cross-sectional studies have been published (Glowacka et al., 2018; Pâquet et al., 2016; Rosen, Muise, Bergeron, Impett, & Boudreau, 2015). One of these studies also used the sexual and relationship CSW measures as in the current study, but only examined associations with concurrent reports of pain and well-being, rather than daily experiences (Glowacka et al., 2018). Further, the mediational role of sexual distress was not tested in the previous study of CSW, which is an important theoretical advancement of the current study. Four diary studies have been published from this sample that did not examine CSW (Muise et al., 2018; Muise, Bergeron, Impett, & Rosen, 2017; Pâquet et al., 2018; Rosen et al., 2018).

Method

Participants

Participants were recruited in two Canadian cities via print and online advertisements, referrals from local health professionals, and by contacting couples that participated in past research in our laboratory. The following selection criteria were chosen to ensure a homogenous sample of premenopausal women diagnosed with PVD who were in a committed, sexually active relationship with a partner. Couples were eligible for the study if (1) they were in a committed relationship for three months or more (Regan, Levin, Sprecher, Christopher, & Gate, 2000), (2)

had face-to-face contact with each other at least four times per week, (3) engaged in sexual activity (i.e., vaginal penetration or oral or manual stimulation of the genitals) at least once per month in the last three months, (4) women were 18 to 45 years old and partners were at least 18 years old (Freedman, 2002; Nappi & Palacios, 2014), (5) women had genital pain on at least 80% of vaginal intercourse attempts (Bornstein et al., 2016), (6) the pain was triggered by pressure applied to the vulvar vestibule, (7) the pain was present for at least six months, and (8) women received a diagnosis of PVD from one of the study gynaecologists. During the gynaecological examination women underwent a cotton-swab test, which consisted of randomized palpations to the vulvar vestibule at 3, 6, and 9 o'clock (Bergeron, Binik, Khalifé, Pagidas, & Glazer, 2001). Women had to self-report a minimum average pain rating of 4 on a scale of 0 (*no pain*) to 10 (*worst pain ever*) during the cotton-swab test for a diagnosis of PVD. Couples were not eligible for the study if the woman was diagnosed with dermatological problems or an active vaginal infection during the gynaecological examination (although women could defer participation if the infection could be treated), was pregnant or within one year postpartum (Glowacka, Rosen, Chorney, Snelgrove−Clarke, & George, 2014), or if she was currently engaged in any treatment that targeted PVD pain.

One hundred ninety-eight couples from Halifax and 304 from Montréal were recruited and screened for eligibility via telephone by a research assistant. Of these couples, 229 (45.62%) were ineligible due to the following reasons: 91 did not meet pain criteria during screening, 16 did not meet diagnostic criteria for PVD during the gynecological examination, 15 were currently pursuing treatment for PVD, 68 did not meet the relationship eligibility criteria, seven couples were not sexually active in the past three months, and 32 for other reasons (e.g., did not meet age criteria, woman was pregnant). Of the couples who were deemed initially eligible at the

first step of screening, 146 decided that they were no longer interested in participating in the study or did not respond to subsequent contacts from the research team; thus, it was impossible to know if they would have been eligible following the gynaecological examination. Two couples were removed from the dataset after completing the study because they did not engage in sexual activity over the course of diary participation. The final sample size was 125 couples (40 from Halifax and 85 from Montréal; 250 individuals in total).

Measures

Baseline measures

Sociodemographics. Participants reported their age, gender, and country of origin. Women indicated how long they had experienced genital pain, as well as the couple's relationship status and length. Sexual frequency was calculated by summing the occurrences of sexual activity that the couples engaged in over the course of the eight weeks that they participated in the study (as reported by women with PVD).

Sexual contingent self-worth. The Sexual Contingent Self-Worth Scale (Glowacka et al., 2017) was used to measure the extent to which individuals base their self-worth on the perceived success or failure of the sexual relationship. The scale consists of eight items rated on a five-point Likert-type scale ranging from 1 (*Not at all like me*) to 5 (*Very much like me*) and includes items such as "I feel better about myself when it seems like my partner and I are getting along sexually". The potential range of scores is 8 to 40 and higher scores indicate greater sexual CSW. The scale has good convergent, discriminant, incremental, and known-groups validity, internal consistency, and test-retest reliability (Glowacka et al., 2017). Using a principle axis factor analysis with an oblique rotation, we replicated the factor structure reported in the development of the Sexual CSW Scale and which supported the use of a total score, in the current sample

(Glowacka et al., 2017). Cronbach's alphas for the current sample were 0.87 and 0.82 for women and partners, respectively.

Relationship contingent self-worth. The extent to which self-worth is based on events in the individual's overall romantic relationship was measured using the Relationship Contingent Self-Esteem Scale (Knee et al., 2008). On a five-point Likert-type scale ranging from 1 (*Not at all like me*) to 5 (*Very much like me*) participants rated 11 items, such as "An important measure of my self-worth is how successful my relationship is". The range of possible scores is 11 to 55 and higher scores indicate greater relationship CSW. The scale has been shown to have good convergent, discriminant, incremental, and predictive validity and internal consistency (Knee et al., 2008). In the current sample, Cronbach's alphas were 0.87 for both women and partners.

Daily measures

Sexual distress. Three items from the Female Sexual Distress Scale – Revised (FSDS-R; DeRogatis, Clayton, Lewis-D'Agostino, Wunderlich, & Fu, 2008) were used as a measure of daily sexual distress. To reduce participant burden, as is common and recommended in diary studies (Iida, Shrout, Laurenceau, & Bolger, 2012; Laurenceau & Bolger, 2005), three items from the original 13-item measure were selected based on high face validity and high factor loadings in the original measure. These three items of the FSDS-R have been used in prior research (Muise et al., 2018). Participants rated how often they felt distressed about their sex lives, inferior because of sexual problems, and worried about sex since they last completed a daily survey, on a scale from 0 (*Never*) to 4 (*Always*). The potential range of scores was 0 to 12, with higher scores indicating greater sexual distress. The FSDS-R has good discriminant validity, test-retest reliability, and internal consistency (DeRogatis et al., 2008). A recent study of men both with and without sexual dysfunctions examined the psychometric properties of the scale and

found support for the factor structure, content, construct, and criterion validity, and test-retest reliability for use of this measure in men (Santos-Iglesias, Mohamed, Danko, & Walker, 2018). Cronbach's alphas in the current sample were 0.89 for women and 0.87 for partners.

Sexual satisfaction. The Global Measure of Sexual Satisfaction (GMSEX; Lawrance & Byers, 1995) was used to measure participants' overall evaluation of the positive and negative aspects of their sexual relationship, adapted previously for the daily context (i.e., in reference to the time since they completed their last daily survey; Rosen, Muise, et al., 2015). The scale consists of five items rated on a scale from 1 to 7 and scores range from 5 to 35. Each item consists of a bipolar scale on which the participants rate the quality of their sexual relationship (e.g., *Valuable* vs. *Worthless*). Higher scores indicate a greater level of sexual satisfaction. The GMSEX has excellent test-retest reliability, internal consistency, and construct validity (Byers & MacNeil, 2006; Fisher, Davis, & Yarber, 2010). For the current sample, Cronbach's alphas were 0.94 and 0.95 for women and partners, respectively.

Anxiety and depressed mood. Anxiety and depressed mood were measured using items from the anxiety and depression subscales of the Short Form of the Profile of Mood States (POMS-SF; Shacham, 1983). To reduce participant burden, four items were selected from each of the subscales based on face validity (Iida et al., 2012; Laurenceau & Bolger, 2005). These same items were used in two previous daily experience studies of couples coping with PVD (Rosen, Bergeron, et al., 2015; Rosen, Bergeron, et al., 2014). On the anxiety subscale, participants rated four items in reference to the extent to which they felt on edge, uneasy, anxious, and nervous. For the depression subscale, participants reported the extent to which they felt sad, discouraged, hopeless, and worthless. All of the items are rated on a scale 0 (*Not at all*) to 4 (*Extremely*) and the instructions were previously adapted to be in reference to the time since

they completed their last daily survey (Rosen, Bergeron, et al., 2015). Scores range from 0 to 16 on each of the subscales, with higher scores indicating greater anxiety or depressed mood. The POMS-SF is widely used and has shown good face validity, construct validity and internal consistency (Curran, Andrykowski, & Studts, 1995; Shacham, 1983). In the current sample, the reliability for the anxiety subscale was 0.83 for women and 0.86 for partners, and 0.84 for women and 0.87 for partners for the depressed mood subscale.

Women's pain intensity. Women rated the average intensity of their genital pain during intercourse on a visual analogue scale ranging from 0 (*No pain*) to 10 (*Worst pain ever*). This type of scale is recommended for the assessment of pain intensity (Hjermstad et al., 2011) and this particular scale is commonly used and recommended as a measure of genital pain intensity in women with PVD (Pukall, Bergeron, Brown, Bachmann, & Wesselmann, 2017). There is also evidence that this scale has good convergent validity with other pain measures in PVD (Desrochers, Bergeron, Khalifé, Dupuise, & Jodoin, 2009).

Procedure

Couples who were interested in participating completed a structured interview with a research assistant over the telephone to determine if they were eligible for the study. If they were eligible, then women met with the study gynaecologist to confirm a PVD diagnosis (if they were not referred directly to the study following a diagnostic gynaecological exam). Eligible couples then met with a research assistant at the laboratory, provided informed consent, and completed a series of online questionnaires, which included sexual and relationship CSW. The research assistant also provided the couples with instructions on how to complete the daily surveys. Participants received the brief daily measures starting the following day and every day for eight consecutive weeks via links to a secure survey site that were emailed to each member of the

couple daily at 5:00 pm. The daily surveys expired at 2:00 am such that participants could no longer access that day's survey. Participants completed measures of anxiety and depressed mood every day, whereas they completed the measures of sexual distress and sexual satisfaction only on days that they reported engaging in sexual activity with their partner (defined as sexual caressing, foreplay, mutual masturbation, or vaginal intercourse), and pain (for women with PVD) only on days that they reported engaging in vaginal intercourse. Couples were instructed to complete all of the surveys independently of one another.

To promote diary completion, potential barriers to completing surveys were problem-solved during the laboratory session, couples were provided with a reminder card that they were asked to place in their homes, and a research assistant called couples twice per week, asking to speak to each person at least once a week. The daily surveys were completed at a rate of 83.23% (11,652 surveys of a possible 14,000). Thus, participants on average filled out 47 out of 56 possible daily surveys. Since we utilized dyadic data analyses for this study, we only included days when both members of a couple completed a daily survey. On average, couples engaged in sexual activity 9.28 times over the course of the study (*SD* = 6.13, Range 1– 32) and 69.29% of these days included vaginal intercourse (*M* = 6.72, *SD* = 5.03, Range 0 – 23; nine couples did not engage in vaginal intercourse).

Compensation was $20 for attending the laboratory session, $20 for women attending the gynaecologist appointment, and compensation for the daily surveys was prorated based on how many surveys couples completed, with a maximum of $96 (i.e., $12 per week) each for completing at least 85% of their diaries. Couples also received resources about PVD and references to local health professionals who specialize in PVD after they completed the study. Our institutions' ethical review boards approved the study procedure.

Data Analyses

Data were analyzed using SPSS 20.0. Bivariate correlations were used to examine the associations between the sociodemographic characteristics of participants and the study measures (as aggregates across all days). Multilevel modeling based on the Actor–Partner Interdependence Model (APIM) was used for the subsequent analyses. This approach accounted for the fact that data from romantic partners are not independent of each other (Kenny, Kashy, & Cook, 2006). Further, to account for both members of a couple completing the surveys on the same day, each APIM model utilized a two-level cross model with random intercepts where persons are nested within dyads, and person and days are crossed. Each dependent variable was analyzed in a separate APIM model, but all models included both sexual and relationship CSW. APIM models with anxiety or depressed mood as the dependent variable consisted of data from all diary days, the model with sexual satisfaction as the dependent variable only included days when couples engaged in sexual activity, and the model with women's pain intensity as the dependent variable only included days when couples reported engaging in vaginal intercourse. Since there were nine couples that did not engage in vaginal intercourse, they were not included in the pain analyses.

First, we examined the associations between an individual's level of sexual CSW at baseline and their own (i.e., actor effects) and their partner's (i.e., partner effects) daily sexual satisfaction, anxiety, depressed mood, and pain (for women), while controlling for the individual's and partner's level of relationship CSW at baseline. The coefficients are unstandardized betas, which are interpreted as the effect size. These coefficients represent the change in the outcome variable for every one-unit increase in sexual or relationship CSW.

Second, we examined sexual distress as a mediator of the associations between sexual CSW and couples' psychological and sexual well-being and women's pain, using methods that

were developed for the analysis of multilevel data (Zhang, Zyphur, & Preacher, 2009). We controlled for level of relationship CSW in these analyses. To examine the significance of the indirect effects, we used the Monte Carlo Method for Assessing Mediation with 20,000 resamples and 95% confidence intervals (Selig & Preacher, 2008). If the confidence interval did not cross zero, then this was indicative of significant mediation. Since sexual distress was a daily-level predictor, it was person mean-centered (i.e., to reflect deviations from a person's own mean score) to avoid confounding within- and between-person effects. This technique accounts for between-person differences in sexual CSW while assessing whether day-to-day changes from a person's own mean level of sexual distress were associated with daily changes in that person's and/or their partner's outcome. Given that sexual distress was only assessed when sexual activity occurred, the mediation analyses only included sexual activity days for all outcomes.

Results of an independent sample t-test showed that partners from Montréal (M = 29.27, SD = 5.46) reported greater sexual CSW than partners from Halifax (M = 28.65, SD = 4.86; t = 4.42, df = 6476, p < .001, 95% CI = .34 to .89), although no such differences were found for women. As such, we conducted a separate set of analyses controlling for study site, and we report any changes to the pattern of results.

Results

Participant Characteristics and Correlations

Table 1 reports the descriptive statistics of the sample and participants' mean and standard deviations for all study measures. The aggregate correlations between all study variables are provided in Table 2. Sociodemographic variables (e.g., age), relationship duration, sexual frequency, and pain duration were not significantly correlated with the study outcomes

above $r = 0.30$; thus, we did not control for them as covariates or consider them in further analyses (Frigon & Laurencelle, 1993).

Associations Between Sexual and Relationship CSW, Women's Pain and Couples' Well-being

The results for each outcome are reported in Table 3. For both women and partners, there were no significant direct associations between sexual and relationship CSW and sexual satisfaction, depressed mood, or women's pain intensity. When women had greater relationship CSW (compared to women with lower relationship CSW), they reported greater daily anxiety compared to their average level of anxiety across all days. When partners had greater relationship CSW, women reported lower daily anxiety. In contrast, partners' greater sexual CSW was associated with women's greater daily anxiety. Women's sexual CSW was not associated with their own or their partners' anxiety. When we controlled for study site, one effect became only marginally significant; women's greater relationship CSW was no longer associated with their own greater anxiety ($b = 0.05$, $SE = 0.03$, $t(124.13) = 1.94$, $p = .06$).

Mediating role of sexual distress

Only women's greater sexual CSW was significantly associated with their own greater sexual distress (see Table 4). As such, only women's sexual distress was examined as a mediator between women's sexual CSW and their own outcomes. We continued to control for relationship CSW. There was a significant indirect effect of women's greater sexual CSW on their own lower daily sexual satisfaction (indirect effect: 95% CI = [.01, .04]) and higher daily depressed mood (indirect effect: 95% CI = [.01, .05]), anxiety (indirect effect: 95% CI = [.01, .04]), and pain intensity during intercourse (indirect effect: 95% CI = [.01, .06]) through women's daily sexual distress. Thus, for women who had higher sexual CSW at baseline (compared to women with

lower sexual CSW), on sexual activity days when their sexual distress was higher, they in turn reported lower sexual satisfaction and greater anxiety, depressed mood, and pain during intercourse (compared to their average levels across all sexual activity days). All of the effects remained significant when we controlled for study site.

Discussion

This study aimed to examine daily sexual distress as a mediator of the associations between sexual CSW (at baseline) and daily sexual satisfaction, depressed mood, anxiety and women's pain intensity in couples coping with PVD. Results indicated that, on days that women engaged in sexual activity, women who had greater sexual CSW were more likely to report greater sexual distress compared to women with lower sexual CSW. In turn, on sexual activity days when their distress about the sexual relationship was higher (compared to their average level across all sexual activity days), women were less satisfied with their sexual relationship, experienced greater anxiety and depressed mood, and indicated a greater intensity of pain when they engaged in vaginal intercourse. These results contribute to the CSW and PVD literatures by identifying a pathway by which greater sexual CSW is linked to poorer psychological and sexual well-being on days that women with PVD engage in sexual activity. The findings are also consistent with the theoretical model of CSW, which states that perceived failures in a contingent domain result in an individual experiencing increased stress and, subsequently, poorer well-being (Crocker, 2002b; Crocker & Park, 2004; Lawrence & Williams, 2013; Park & Crocker, 2005; Tomaka et al., 2012). In particular, domains of CSW that rely on validation from others (e.g., romantic partners) are thought to be associated with poorer outcomes as a result of the emotional stress that individuals feel when they perceive rejection (Crocker, 2002).

In line with our hypotheses, for those women who relied more heavily on their sexual relationship to validate their sense of self-worth, on days when they engaged in sexual activity and reported greater sexual distress, they in turn also reported lower sexual satisfaction. These findings are consistent with results in the single-occasion, cross-sectional study of couples affected by PVD, which found that women's greater sexual CSW was associated with their own greater sexual distress, and lower sexual satisfaction (Glowacka et al., 2018). Problems or "costs" in the sexual relationship (e.g., pain or other negative aspects of the sexual encounter) might become more salient when women have greater sexual CSW. Indeed, in a community sample of men and women, sexual CSW was linked to being hyperaware of one's own sexual thoughts, feelings, and behaviours (Glowacka et al., 2017). Cognitive distraction about sexual performance and bodily appearance during sexual activity has been associated with lower sexual satisfaction in women (Dove & Wiederman, 2000). Further, the Interpersonal Exchange Model of Sexual Satisfaction (IEMSS) suggests that an individual's sexual satisfaction depends on their evaluation of sexual rewards (pleasurable experiences) and costs (experiences that demand physical or mental effort or cause pain, anxiety, or embarrassment), as well as how the sexual relationship fits with their expectations (Lawrance & Byers, 1995). Women with PVD who base their self-worth on their sexual relationship and view that relationship as failing, may be more likely to experience heightened sexual distress and in turn evaluate the sexual costs (e.g., pain) as outweighing the sexual rewards and judge their sexual relationship as below their expectations. In research with other types of CSW, those who are higher in CSW are more sensitive to perceiving failures in the contingent domain, and perceived successes in the domain are usually short-lived, while disappointments are longstanding (Crocker, 2002b; Crocker & Park, 2004). Thus, for women higher in sexual CSW, they might be more sexually distressed and

subsequently sexual costs may overshadow potential sexual rewards on days that they engage in sexual activity, resulting in less sexual satisfaction.

Our results also showed that there was a significant indirect effect of greater sexual CSW on women's pain through greater sexual distress: when women with PVD had greater sexual CSW, they reported greater sexual distress on sexual activity days and in turn, more pain when they engaged in vaginal intercourse. These findings are consistent with the biopsychosocial model of pain and PVD, which implicates psychological factors as one of the mechanisms that contribute to the maintenance of pain (Bergeron et al., 2015; Lumley et al., 2011). Recommendations for pain management have emphasized the importance of addressing both physical and psychological factors when treating pain conditions (Simonelli et al., 2010). Moreover, there is evidence that central sensitization plays a role in the experience of pain in women with PVD (Basson, 2012). That is, when women are faced with pain repeatedly, they may become increasingly sensitized to pain perceptions. Such changes within the central nervous system can be triggered by unpleasant emotions, such as sexual distress, as they occur in similar areas of the brain (Basson, 2012; Lumley et al., 2011). Further, chronic stressors could contribute to a change from processing pain in sensory areas of the brain to those areas of the brain that are associated with emotion (Basson, 2012). Thus, on days of greater sexual distress, women with PVD may experience more intense pain during intercourse because the distress activates the brain regions involved in pain processing. It is important to note that these associations may be bidirectional and cyclical. For example, greater pain may lead to greater sexual distress, which could in turn increase the tendency to base one's self-worth on the sexual relationship.

Consistent with our expectations, we found that when women with greater sexual CSW experienced more sexual distress on days that they engaged in sexual activity, they were in turn,

more anxious and depressed, in general on that day. In a previous cross-sectional study, distress about the sexual relationship was linked to greater anxiety and depressed mood in women with PVD (Pazmany et al., 2013). This finding is also consistent with the general CSW literature which has shown that perceived failure in a contingent domain is linked to stress about not performing well in that domain and generalizes to increased anxiety and stress overall (Crocker, 2002a; Crocker & Park, 2004; Crocker & Wolfe, 2001; Park & Crocker, 2005). People with greater CSW are also more vulnerable to depression since their self-esteem is negatively impacted by any perceived failures in the contingent domain (Crocker, 2002b). For women who have greater sexual CSW, they may be even more likely to ruminate about failures in the sexual relationship and perceive themselves as an inadequate sexual partner on days that they have greater sexual distress, and in turn experience greater feelings of worthlessness and hopelessness. One study found that individuals with greater friendship CSW ruminated about negative events in their friendship and searched for cues of negative feedback from their friends, which were qualities that maintained their depressive symptoms (Cambron & Acitelli, 2010). Thus, for women with greater sexual CSW, they may experience greater sexual distress on days that they are involved in sexual activity and be more attentive to feedback that confirms their beliefs of failure and inadequacy, which in turn could be associated with them being more anxious overall and experiencing increased depressed mood.

An unexpected finding in the current study was that greater sexual CSW in partners of women with PVD was not associated with their own greater sexual distress on days that they engaged in sexual activity, despite these variables being significantly positively correlated in a prior cross-sectional study of couples with PVD (Glowacka et al., 2018). It is possible that sexual CSW in partners may be associated with general feelings of sexual distress, but that their

experiences on days of sexual activity show a different pattern. Women with PVD tend to engage in sexual activity less frequently than women without pain and avoid other affectionate behaviours because of fear that such intimacy will lead to painful intercourse (Bergeron et al., 2015; Marriott & Thompson, 2008). In a qualitative study, partners of women with PVD reported that they mourned the intimacy in their relationship that had decreased due to the interference of PVD to their sex lives (Sadownik et al., 2017). Considering that partners may be eagerly awaiting sexual activity and the associated feelings of closeness with their partner, they may have greater sexual distress on days without sex, and less sexual distress on days that they do engage in sexual activity. Further, sexual distress may vary for women with PVD based on whether or not they engaged in sexual activity on that day. For example, women may report lower sexual distress on days without sex since they would not be anticipating pain. However, they may report greater sexual distress on days that they do engage in sex because of the opportunity for experiencing pain. Indeed, one study found that women with sexual problems were more likely to report negative affect in anticipation of touch from their partner (and to interpret a touch from their partner as having sexual intent) than women without sexual problems (Rancourt, MacKinnon, Snowball, & Rosen, 2017). Since the current study only measured sexual distress on days of sexual activity, which is an important limitation, we may not have adequately captured the links between sexual CSW and sexual distress. Future research should examine whether the findings in the current study differ on days where no sexual activity occurred.

We also planned to test whether sexual distress was a mechanism that explained associations between an individual's greater sexual CSW and their partner's poorer well-being. We were unable to examine these models because women's and partners' sexual CSW were not

significantly correlated with the other person's sexual distress on days that the couple engaged in sexual activity. In qualitative studies, both women with PVD and their partners have reported concerns that they are inadequate sexual partners and that they are themselves the root cause of problems in their sexual relationship (Ayling & Ussher, 2008; Marriott & Thompson, 2008; Sadownik et al., 2017). At the same time, greater CSW has been associated with a greater tendency to internalize problems (Ghoul, Niwa, & Boxer, 2013). Thus, individuals coping with PVD and greater sexual CSW may be more likely to blame themselves for a less than ideal sexual relationship, which could be linked to their own greater sexual distress, but not their partners' level of distress. Further research is needed to understand why we did not find a link between an individual's sexual CSW and their partners' daily sexual distress.

The current study had important strengths. To our knowledge, it was the first to examine the mechanism that links greater sexual CSW to poorer well-being in couples coping with PVD, while accounting for the interdependence of couples and controlling any effects of relationship CSW. Further, the daily experience design of this study captured how women who base their self-worth on the sexual relationship to varying degrees experience different consequences of PVD in the natural context of their day-to-day lives. This greater ecological validity of the daily experience design reduces the recall bias associated with self-report measures. There were also some limitations to the current study. Due to the constraints of a daily experience design, only a subset of scale items was used to measure sexual distress, anxiety, and depressed mood. Although the effect sizes that we observed were small (Kenny et al., 2006), such effects could have practical implications and may be cumulative, producing large effects over time (Prentice & Miller, 1992). The results are correlational so we could not determine causality or directionality. However, we interpreted the findings based on the theoretical model of CSW and previous

research, which supported the directions of the associations that we reported. To empirically confirm the directionality of the associations, future research should use longitudinal and experimental study designs. Another potential concern is that the daily experience design may be burdensome for participants. A final limitation was that our sample consisted of pre-menopausal women and couples who were primarily Canadian and in mixed-gender, committed, and cohabiting relationships. Further, since only two same-gender couples participated in our study, we could not determine whether these relationships differed from those from the mixed-gender couples that participated. We conducted a separate set of analyses where we excluded same-gender couples, and all results remained significant. We did not measure sexual orientation and consequently could not examine how this factor may relate to our results. Thus, our findings may not generalize to other types of couples, such as those in casual or same-gender dating relationships, or women who are post-menopausal or from other countries of origin.

Conclusions

The current study examined sexual distress as an explanatory mechanism of the associations between greater sexual CSW and poorer sexual and psychological well-being on days that couples coping with PVD engaged in sexual activity. Among women with greater sexual CSW, on days that they engaged in sexual activity and experienced greater sexual distress (compared to their average across all sexual activity days), they also reported lower sexual satisfaction and greater anxiety, depressed mood, and pain during intercourse. These results suggest that it may be important to target sexual CSW and sexual distress in treatments that are aimed at reducing the pain that women with PVD experience, along with the psychological and sexual consequences that are often associated with PVD. Potential interventions may include challenging or reducing perceptions of inadequacy as a sexual partner (e.g., through cognitive

behavioural or acceptance-based methods) in order to enhance sexually satisfying interactions despite pain (Niiya, Crocker, & Bartmess, 2004). Treatment may also involve cultivating self-compassion, which entails treating oneself kindly even in the face of perceived failures, to improve how women emotionally cope with PVD and the associated consequences (Albertson, Neff, & Dill-Shackleford, 2015). Indeed, greater self-compassion has been linked to lower sexual distress, anxiety, and depressed mood in women with PVD (Santerre-Baillargeon et al., 2017). Reduced sexual CSW and sexual distress may reduce pain and psychological and sexual impairment in women with PVD.

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