


Understanding the Sexual Satisfaction of Women With Provoked Vestibulodynia and Their Partners: Comparison With Matched Controls

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Provoked vestibulodynia (PVD)—a recurrent, localized vulvar pain—interferes with couples' sexual relationships as evidenced by lower sexual satisfaction compared to controls. Little is known about what components of sexual satisfaction contribute to this lower satisfaction. Using the Interpersonal Exchange Model of Sexual Satisfaction (IEMSS), we compared the sexual exchanges (sexual rewards and costs, relative sexual rewards and costs, balance of sexual rewards and costs, balance of relative sexual rewards and costs, equality of sexual rewards and costs) and sexual satisfaction of 50 women with PVD and their male partners to 50 matched-control couples. We also compared women with PVD and their partners on these same components. Participants completed standardized measures of sexual exchanges and sexual satisfaction. Women with PVD and their partners reported lower relative sexual rewards, a less favorable balance of relative sexual rewards to costs, and lower sexual satisfaction than controls, although differences were larger for women. Women with PVD also reported lower levels of sexual rewards, higher levels of sexual costs, a less favorable balance of sexual rewards to costs, and lower equality of sexual costs, than control women. Findings identify IEMSS exchange components that may contribute to overall lower satisfaction in couples affected by PVD.

INTRODUCTION

Provoked vestibulodynia (PVD) has an estimated prevalence of 7% to 12% and is the most frequent cause of unexplained, vulvar pain in premenopausal women (Harlow et al., 2014; Harlow, Wise, & Stewart, 2001). This chronic pain is localized to the vulvar vestibule and is experienced during penetrative sexual activities as well as in nonsexual contexts that involve pressure to the area. The etiology and maintenance of PVD is multifactorial, involving an interplay of biologi-

cal, psychological, and interpersonal factors (Bergeron, Corsini-Munt, Aarts, Rancourt, & Rosen, 2015). The primary interference of PVD is to couples' sexual and intimate relationships, with both members reporting lower sexual satisfaction compared to pain-free controls or scale norms (Smith & Pukall, 2011, 2014).

Lawrance and Byers (1995) define sexual satisfaction as "an affective response arising from one's subjective evaluation of the positive and negative dimensions associated with one's sexual relationship" (p. 268). Although related, sexual satisfaction can be distinguished from sexual functioning—that is, from sexual response including desire, arousal, lubrication, orgasm, and pain (Rosen et al., 2000). In fact, individuals can experience sexual problems but nonetheless report high sexual satisfaction or vice versa (MacNeil & Byers, 1997). In randomized clinical trials for treatment of PVD, sexual functioning significantly improves, but typically remains above clinical thresholds regardless of the type of intervention (Bergeron, Khalifé, Glazer, & Binik, 2008; Masheb, Kerns, Lozano, Minkin, & Richman, 2009). Thus, more subjective measures, such as sexual satisfaction, have emerged as important outcomes and key targets for intervention. Although researchers have identified several predictors of sexual satisfaction in couples affected by PVD (e.g., partner responses to pain, intimacy; see Bergeron et al., 2015, and Rosen, Rancourt, Bergeron, & Corsini-Munt, 2014, for reviews), little is known about the components of the sexual relationship that are associated with their sexual satisfaction. We used the Interpersonal Exchange Model of Sexual Satisfaction (IEMSS) as a framework to enhance our understanding of the sexual satisfaction of couples with PVD (Lawrance & Byers, 1992).

The IEMSS considers sexual exchanges in the relationship—that is, sexual rewards and sexual costs (Byers & Wang, 2004). Sexual rewards are exchanges between partners that are positive and pleasurable; sexual costs are exchanges that cause physical or mental effort or pain, anxiety, or other negative affect (Lawrance & Byers, 1992; Thibaut & Kelley, 1959). Any sexual exchange (e.g., level of affection during sexual activity, use of sex toys, oral sex) can be experienced as a reward, a cost, neither a reward nor a cost, or both a reward and a cost depending on the nature of the interaction and the individual's appraisal of it (Lawrance & Byers, 1992, 1995). Furthermore, individuals differ in whether they find specific sexual exchanges to be rewarding and/or costly (Lawrance & Byers, 1995; Renaud, Byers, & Pan, 1997). However, the IEMSS proposes that an individual's sexual satisfaction is a result of his or her overall appraisal of all of the exchanges experienced as sexual rewards and costs rather than the individual's appraisal of any specific sexual exchange.

The IEMSS has been well validated in community samples (Byers, Demmons, & Lawrance, 1998; Byers & MacNeil, 2006; Byers & Nichols, 2014; Lawrance & Byers, 1995; Peck, Shaffer, & Williamson, 2005; Renaud, Byers, & Pan, 1997; Sánchez-Fuentes, Santos-Iglesias, Byers, & Sierra, 2015). It proposes that individuals in a romantic relationship are more sexually satisfied if: (1) they experience a more favorable balance of overall level of sexual rewards to level of sexual costs; (2) this balance compares favorably to their expected level of sexual rewards and sexual costs (i.e., relative sexual rewards and costs); and (3) they perceive greater equality between their own and their partner's sexual rewards and costs. These are referred to as the IEMSS sexual exchange components. The IEMSS also proposes that individuals who appraise the nonsexual aspects of the relationship more positively (i.e., experience higher relationship satisfaction) also report higher sexual satisfaction. Given that couples affected by PVD do not generally have lower relationship satisfaction than control couples (Smith & Pukall, 2011), based on the IEMSS, the lower sexual satisfaction in couples with PVD is a result of less positive functioning on one or more of the three IEMSS exchange components.

There is indirect evidence that couples coping with PVD experience a less favorable balance of sexual rewards to sexual costs than do control couples. Within a social exchange framework (Cropanzano & Mitchell, 2005), the woman's experience of pain during sexual activity typically constitutes a sexual cost for both members of the couple. Furthermore, pain may lead to other sexual costs such as sexual dysfunction, reduced sexual frequency, and negative affect. Indeed, compared to control couples, women with PVD report lower desire, arousal, and difficulty with orgasms (Brauer, ter Kuile, Laan, & Trimbos, 2008; Meana, Binik, Khalifé, & Cohen, 1997), and male partners experience higher rates of erectile dysfunction (Pazmany, Bergeron, Verhaeghe, Van Oudenhove, & Enzlin, 2014; Smith & Pukall, 2014). Moreover, in qualitative studies, women with PVD report feelings of inadequacy as a sexual partner and guilt over not meeting their partner's sexual needs to have intercourse (Elmerstig, Wijma, & Bertero, 2008).

Even less is known about whether couples with PVD experience lower sexual rewards. Oftentimes, couples collude in their avoidance of sexual activity as well as general displays of affection, for fear that this could lead to painful intercourse (Ayling & Ussher, 2008; White & Jantos, 1998). If so, couples' experiences of the overall level of sexual rewards in their relationship would likely be lower than that of control couples. Still, there is evidence that women with PVD and their partners experience sexual rewards. For example, they are similar to individuals unaffected by pain in their reports of engaging in sex to pursue positive outcomes, such as intimacy (Impett, Muise, & Rosen, 2015; Rosen, Muise, Bergeron, Impett, & Boudreau, 2015). It may be that couples who successfully adapt their sexual scripts away from painful activities experience their sexual interactions, including feelings of intimacy and connectedness, as sexual rewards. However, researchers have not compared couples affected by PVD to control couples in terms of their overall appraisal of the sexual exchanges in their relationship—that is, the IEMSS components.

The current study aimed to compare the IEMSS components (i.e., balance of sexual rewards and costs, balance of relative sexual rewards and costs, equality of sexual rewards and sexual costs between partners) as well as the sexual satisfaction of women with PVD and their partners to a matched-control group. We also examined group differences on the items used to calculate the IEMSS components in order to determine whether, for example, a less favorable balance of sexual rewards to costs is due to increased sexual costs, decreased sexual rewards, or both. Both Lawrance and Byers (1995) and Sánchez-Fuentes et al. (2015) have consistently found no gender differences in sexual satisfaction and/or in the IEMSS components in community couples. However, in the context of PVD in mixed-sex relationships, given that it is the female partner who is experiencing pain, it is likely that the women will report less favorable sexual exchanges as well as lower sexual satisfaction than will their male partners. We predicted that (1) both women with PVD and their male partners would report lower sexual satisfaction and less favorable sexual exchanges than would control women and partners, and (2) women with PVD would report lower sexual satisfaction and less favorable sexual exchanges than would their male partners. We did not expect to find gender differences in the control sample.

METHOD

Participants and Procedure

The studies were approved by the Research Ethics Boards of IWK Health Centre and University of New Brunswick, respectively.

PVD Sample

Women with PVD and their partners were recruited in two waves— from January 2013 to November 2013, and from March 2014 to June 2015—as part of a larger cross-sectional study. Data from the larger study have been published previously (Anderson, Rosen, Price, & Bergeron, 2016; Boerner & Rosen, 2015; Rosen et al., 2015), but did not examine the sexual exchanges of participants. Couples were recruited from online and print advertisements ($n = 30$; 60%), collaborating physicians ($n = 9$; 18%), participation in previous studies ($n = 7$; 14%), and word of mouth ($n = 1$; 2%). For three couples (6%), the recruitment source was not known. The eligibility of women with PVD was assessed by a structured telephone interview conducted by a trained research assistant. Women were subsequently diagnosed by a gynecologist via a standardized cotton-swab test (Bergeron, Binik, Khalifé, Pagidas, & Glazer, 2001). All eligible women met the following criteria: (1) pain during intercourse lasting six months and occurring on at least 75% of intercourse attempts; (2) pain limited to activities involving pressure to the vulvar vestibule; (3) cohabitating and/or in a committed relationship for at least six months with at least four in-person contacts per week; (4) currently sexually active with a partner (engaged in manual, oral, or intercourse sexual activities at least once in the previous four weeks); and (5) age between 18 and 45 years (i.e., premenopausal, due to the hormonal influences that may affect pain). Exclusion criteria included presence of an active yeast infection (temporary exclusion) or current pregnancy. Partners had to be over the age of 18. Of 146 interested women, 80 (55%) were ineligible at screening. Of the 66 women who were eligible after initial screening, nine (14%) did not receive a diagnosis of PVD from the gynecologist and seven (11%) withdrew after being deemed eligible (the most frequent reason being their relationship ended), resulting in a final sample size of 50 couples. All couples were in a mixed-sex relationship.

The women ranged in age from 19 to 41 years ($M = 27.36$, $SD = 5.83$) and the men ranged from 19 to 49 years ($M = 28.60$, $SD = 6.74$). Their average length of the relationship was 4.83 years ($SD = 3.76$; range 0.33–17). In terms of relationship status, 32% were married, 52% lived with their partner but were not married, and 16% were in a committed relationship but not living with their partner. They reported high relationship satisfaction ($M = 29.94$, $SD = 4.92$). The women reported that they had experienced pain for an average of 6.08 years ($SD = 4.74$), and that their average pain intensity in the last six months was 5.59 ($SD = 2.97$), on a scale ranging from 0 (*no pain at all*) to 10 (*worst pain imaginable*).

Women with PVD and their partners attended a laboratory session where they provided informed consent, and then completed a survey independently using separate computers. They received compensation that was commensurate with the requirements of the larger study.

Control Sample

The control sample consisted of 50 couples drawn from the sample of 104 heterosexual community couples used by MacNeil & Byers (2009) in a study of sexual behavior in long-term romantic relationships. Using MacNeil & Byers's (2009) original data set, we randomly selected 50 couples who fit within the same range of ages and relationship length as the PVD couples. The women ranged in age from 22 to 41 years ($M = 30.60$, $SD = 4.24$) and the men ranged from 24 to 48 years ($M = 32.34$, $SD = 5.56$). The average relationship length was 6.90 years ($SD =$

3.25; range 2–17). In terms of relationship status, 76% were married, 18% were living with their partner but not married, and 5% were in a committed relationship but not living with their partner. They reported high relationship satisfaction ($M = 28.98$, $SD = 5.93$).

In order to receive a questionnaire package, interested individuals were asked to send their name and address in confidence to an e-mail address or to a messaging system via a toll-free number. Each questionnaire package included a description of the study, two questionnaire booklets (one for each partner), and two smaller “privacy” envelopes (one for each partner’s completed booklet) to be returned together in a larger preaddressed, stamped envelope. The cover letter stressed anonymity and confidentiality and instructed participants not to discuss the questionnaire or their responses with their partner.

Measures

Demographics

Relevant demographics in each study included age, relationship status, and relationship duration. Women with PVD also reported their pain duration and average pain intensity during intercourse on a numerical rating scale from 0 (*no pain*) to 10 (*worst pain imaginable*). Participants completed the Global Measure of Relationship Satisfaction (Lawrance, Byers, & Cohen, 2011) as a measure of overall relationship satisfaction with the partner. Respondents rated their overall relationship on five 7-point bipolar scales (e.g., *very bad-very good*; *very unpleasant-very pleasant*). Scores range from 5 to 35, with higher scores indicating greater relationship satisfaction. Past research has demonstrated good reliability and validity (Lawrance et al., 2011). In the present study, Cronbach’s alpha was .91 for the PVD sample and .94 for the control sample.

Sexual Exchanges

Sexual exchanges were assessed using the 6-item Exchanges Questionnaire (Lawrance et al., 2011). In this questionnaire, sexual rewards are defined for respondents as things that are positive or pleasing (things they like about their sexual relationship), while sexual costs are defined as things that are negative or displeasing (things they don’t like about their sexual relationship). Item 1 assesses the overall level of sexual rewards (REW) on a scale ranging from *not at all rewarding* (1) to *extremely rewarding* (9): “Think about the rewards that you have received in your sexual relationship with your partner within the past three months. How rewarding is your sexual relationship with your partner?” Item 2 assesses relative level of sexual rewards in comparison to the expected level of rewards (CL_{REW}) on a scale ranging from *much less rewarding in comparison* (1) to *much more rewarding in comparison* (9): “Most people have a general expectation about how rewarding their sexual experience ‘should be.’ Compared to this general expectation, they may feel that their sexual relationship is more rewarding, less rewarding, or as rewarding as it ‘should be.’ Based on your own expectation about how rewarding your sexual relationship with your partner ‘should be,’ how does your level of rewards compare to that expectation?” Item 3 assesses the level of rewards in comparison to the level of rewards their partner receives on a scale

ranging from *my rewards are much higher* (1) to *my partner's rewards are much higher* (9): “How does the level of rewards that you get from your sexual relationship with your partner compare to the level of rewards that your partner gets from the relationship?” Parallel items are used to assess sexual costs (Items 4 through 6). Due to a clerical error, a 7-point rather than a 9-point scale was used in the questionnaire completed by the PVD participants. All responses were transformed to a 9-point scale so that responses in the two samples would be on the same metric. We used a linear transformation to convert this 7-point scale into the metric of the 9-point scale (Little, 2013). The transformed scale had the same endpoints and the midpoint as the 9-point scale and all the intermediate response categories were equally spaced along the response continuum.

The IEMSS components were computed based on these items. The overall balance of rewards and costs (REW-CST) was calculated by subtracting Item 4 from Item 1. Comparison level or relative sexual rewards and costs ($CL_{REW}-CL_{CST}$) were calculated by subtracting Item 5 from Item 2. In both cases, possible scores range from -8 to 8 , so that higher scores represent a more favorable balance of sexual rewards to sexual costs. Finally, for calculating the perceived equality of sexual rewards and sexual costs (EQ_{REW} and EQ_{CST} , respectively), Items 3 and 6 were recoded such that the middle point of the response scale (5), which represents perfect equality, was assigned a score of 4 and the endpoints were assigned a score of 0. Similarly, scores of 2 and 8 were recoded to a score of 1, scores of 3 and 7 were recoded to a score of 2, and scores of 4 and 6 were recoded to a score of 3. Thus, higher scores represent greater equality of sexual rewards and costs between partners. The IEMSS items and components have shown good test-retest reliability and validity (Lawrance et al., 2011; Sánchez-Fuentes et al., 2015).

Sexual Satisfaction

We used the Global Measure of Sexual Satisfaction (GMSEX; Lawrance et al., 2011) to assess global sexual satisfaction with the partnered sexual relationship. Respondents rate their sexual relationship on five 7-point bipolar scales: *very bad-very good*; *very unpleasant-very pleasant*; *very negative-very positive*; *very unsatisfying-very satisfying*; *worthless-very valuable*. Scores range from 5 to 35, with higher scores indicating greater sexual satisfaction. Past research has demonstrated good reliability and validity (Lawrance et al., 2011). In the present study Cronbach's alpha was .93 for the PVD sample and .95 for the control sample.

RESULTS

Means and standard deviations for all the IEMSS exchanges and IEMSS exchange components are reported in Table 1, separately for the PVD and control samples. We used a 2 (gender) by 2 (group) mixed MANOVA with gender as a within-subjects factor to compare the groups. The IEMSS sexual exchanges, IEMSS exchange components, and sexual satisfaction served as dependent variables. Partial eta-squared was used to quantify effect size. Following Cohen (1988), an effect size of .01 was considered small, .06 was considered medium, and .14 was considered a large effect size. We found a significant multivariate effect for group, $F(9, 90) = 5.51, p < .001, \eta_p^2 = .36$, and for the group by gender interaction, $F(9, 90) = 2.10, p < .04, \eta_p^2 = .17$. The main effect for gender was not significant, $F(9, 90) = 1.71, p = .10, \eta_p^2 = .15$.

TABLE 1
Mean, Standard Deviations for IEMSS (Interpersonal Exchange Model of Sexual Satisfaction) Components, Exchange Items, and Sexual Satisfaction for Couples Affected by PVD and Control Couples

| Variable | Group | <i>M</i> | <i>SD</i> | <i>F</i> | η_p^2 |
|-----------------------|---------|----------|-----------|----------|------------|
| REW | PVD | 5.43 | 2.36 | 7.17** | .07 |
| | Control | 6.65 | 2.10 | | |
| CL _{REW} | PVD | 4.19 | 2.51 | 20.31*** | .17 |
| | Control | 5.96 | 2.09 | | |
| CST | PVD | 4.89 | 2.17 | 22.16*** | .18 |
| | Control | 3.15 | 2.22 | | |
| CL _{CST} | PVD | 5.32 | 2.15 | 15.15*** | .13 |
| | Control | 4.07 | 2.06 | | |
| REW-CST | PVD | 0.53 | 3.75 | 17.09*** | .15 |
| | Control | 3.49 | 3.91 | | |
| CL _{REW-CST} | PVD | -1.12 | 3.85 | 24.80*** | .20 |
| CL _{CST} | Control | 1.89 | 3.47 | 9.39** | .08 |
| EQ _{REW} | PVD | 2.52 | 1.31 | | |
| | Control | 3.01 | 1.19 | | |
| EQ _{CST} | PVD | 2.42 | 1.38 | 14.64*** | .13 |
| | Control | 3.07 | 1.08 | | |
| GMSEX | PVD | 22.63 | 8.05 | 16.71*** | .15 |
| | Control | 28.32 | 6.24 | | |

Notes. *N* = 50 couples with PVD (provoked vestibulodynia) and 50 control couples. REW = level of sexual rewards; CL_{REW} = level of relative sexual rewards; CST = level of sexual costs; CL_{CST} = level of relative sexual costs; REW-CST = balance of sexual rewards and sexual costs; CL_{REW-CST} = level of relative sexual rewards and costs; EQ_{REW} = equality of sexual rewards; EQ_{CST} = equality of sexual costs; and GMSEX (Global Measure of Sexual Satisfaction) = sexual satisfaction.

p* < .01. *p* < .001.

Results of the follow-up analysis of variance (ANOVA) for the group effect showed that, in support of the first hypothesis, compared to control couples, couples affected by PVD differed on all the dependent variables: reported lower levels of sexual rewards and relative sexual rewards, higher levels of sexual costs and relative sexual costs, a less favorable balance of sexual rewards and costs and relative sexual rewards and costs, lower equality of sexual rewards and costs, and lower sexual satisfaction. The follow-up ANOVA for the gender by group interaction effect was significant for all of the dependent variables except for the relative level of sexual costs and the equality of sexual rewards (see Table 2). Mean comparisons showed that, consistent with the group main effect, both the men and the women with PVD reported lower relative sexual rewards, a less favorable balance of relative sexual rewards to costs, and lower sexual satisfaction than the controls, although the differences were larger for women with PVD. Thus, the interaction only qualified four effects such that, compared to the control couples, women with PVD (but not their male partners) reported significantly lower levels of sexual rewards (REW), higher levels of sexual costs (CST), a less favorable balance of sexual rewards and costs (REW-CST), and lower equality of sexual costs (EQ_{CST}).

In support of the second hypothesis, compared to their male partners, women with PVD reported significantly lower levels of sexual rewards (REW), higher levels of sexual costs (CST), a

TABLE 2
 Mean, Standard Deviations, Follow-Up ANOVAs, and Simple Effects Analysis for IEMSS (Interpersonal Exchange Model of Sexual Satisfaction) Components, Exchange Items, and Sexual Satisfaction for Men and Women Affected by PVD and Control Couples

| Variable/Group | Women | | Men | | Follow-Up ANOVA | |
|-----------------------|---------------------|-----------|---------------------|-----------|-----------------|------------|
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>F</i> | η_p^2 |
| REW | | | | | | |
| PVD | 5.19 _{ab} | 2.29 | 5.78 _a | 2.44 | 4.78** | .05 |
| Control | 6.76 _b | 1.98 | 6.42 | 2.23 | | |
| CL _{REW} | | | | | | |
| PVD | 3.88 _a | 2.59 | 4.59 _b | 2.43 | 4.69** | .05 |
| Control | 6.16 _a | 2.12 | 5.68 _b | 2.06 | | |
| CST | | | | | | |
| PVD | 5.68 _{ab} | 2.13 | 4.02 _a | 2.22 | 13.24*** | .12 |
| Control | 3.06 _b | 2.18 | 3.34 | 2.17 | | |
| CL _{CST} | | | | | | |
| PVD | 5.88 | 2.41 | 4.82 | 1.89 | 2.77 | .03 |
| Control | 4.14 | 2.29 | 3.94 | 1.83 | | |
| REW-CST | | | | | | |
| PVD | -0.50 _{ab} | 3.50 | 1.76 _a | 4.02 | 14.18*** | .13 |
| Control | 3.70 _b | 3.85 | 3.08 | 3.98 | | |
| CL _{REW-CST} | | | | | | |
| PVD | -2.01 _{ab} | 3.87 | -0.20 _{ac} | 3.84 | 5.99** | .06 |
| Control | 2.02 _b | 3.82 | 1.73 _c | 3.12 | | |
| EQ _{REW} | | | | | | |
| PVD | 2.24 | 1.45 | 2.73 | 1.17 | 0.51 | < .01 |
| Control | 2.92 | 1.27 | 3.16 | 1.11 | | |
| EQ _{CST} | | | | | | |
| PVD | 2.01 _{ab} | 1.54 | 2.76 _b | 1.22 | 4.36** | .04 |
| Control | 3.08 _a | 1.03 | 3.12 | 1.15 | | |
| GMSEX | | | | | | |
| PVD | 21.50 _{ab} | 8.34 | 24.18 _{ac} | 7.77 | 6.49** | .06 |
| Control | 28.42 _b | 6.30 | 27.81 _c | 6.19 | | |

Notes. For the outcome variables, means with the same subscript indicate a significant difference of $p < .05$. $N = 50$ couples with PVD (provoked vestibulodynia) and 50 control couples. REW = level of sexual rewards; CL_{REW} = level of relative sexual rewards; CST = level of sexual costs; CL_{CST} = level of relative sexual costs; REW-CST = balance of sexual rewards and sexual costs; CL_{REW-CST} = level of relative sexual rewards and costs; EQ_{REW} = equality of sexual rewards; EQ_{CST} = equality of sexual costs; and GMSEX (Global Measure of Sexual Satisfaction) = sexual satisfaction.

** $p < .01$. *** $p < .001$.

less favorable balance of sexual rewards to costs (REW-CST) and relative sexual rewards to costs (CL_{REW-CST}), lower equality of costs (EQ_{CST}), and lower sexual satisfaction (GMSEX).

Because past research has found that relationship satisfaction is associated with sexual exchanges and sexual satisfaction (Lawrence & Byers, 1995; Sánchez-Fuentes et al., 2015), and that age is associated with sexual satisfaction in couples affected by PVD (Rosen, Bergeron, Leclerc, Lambert, & Steben, 2010), we examined whether our effects were retained after controlling for these characteristics using a multivariate analysis of covariance (MANCOVA). The reported results held when we included relationship satisfaction and age as co-

variates, with one exception: The interaction was no longer significant for the equality of costs.

DISCUSSION

The goal of the current study was to use the IEMSS to enhance understanding of the sexual satisfaction of couples in which the woman has PVD. In keeping with previous research (Smith & Pukall, 2011, 2014), both women with PVD and their partners reported lower sexual satisfaction compared to control couples. We extended this literature by elucidating what aspects of the sexual relationship—that is, the IEMSS components—may contribute to this lower sexual satisfaction. Our results show that the IEMSS components are sensitive enough to capture differences between clinical (i.e., sexual dysfunction) and nonclinical groups.

Our findings indicated that some sexual exchanges are negatively impacted for both women with PVD and their male partners, whereas some are borne by the women alone. That both women with PVD and their partners reported adverse sexual consequences is consistent with prior studies (Brauer et al., 2008; Smith & Pukall, 2014). Specifically, both members of couples affected by PVD reported lower sexual satisfaction, lower relative sexual rewards, lower relative sexual costs, and a less favorable balance of relative sexual rewards to costs than did the control couples, although the differences were larger for women. Thus, for couples with PVD, their experience of sexual rewards and costs is not meeting their expectations. However, male partners of women with PVD did not report experiencing fewer sexual rewards or more sexual costs than did the men in the control group, suggesting that the actual experience of the male partner in the PVD couple during sexual activity was not negatively affected. For male partners, their unmet expectations for the sexual relationship may be because they expect their female partner to have pain-free and enjoyable sex, as well as because of the necessary adaptations to their preferred sexual script as a response to the woman's pain. Thus, the lower sexual satisfaction of male partners in the PVD couples may be a consequence of disappointment rather than of a less favorable balance of sexual rewards to costs.

Our findings suggest that the sexual experiences of the women with PVD were also not meeting their expectations. In addition, they reported less favorable sexual exchanges than did both their partners and women without PVD—that is, lower overall sexual rewards, higher levels of sexual costs, a less favorable balance of sexual rewards to costs, and lower equality of sexual costs. The women and men in the control sample did not differ in these aspects of their sexual relationship, underscoring that the observed differences were specific to women with PVD. Thus, women appear to be carrying the heavier burden of the impact of PVD on their sexual lives. It is possible that women with PVD have difficulty accepting the role of pain in their lives and its impact on their sexual relationship, which may increase the salience of sexual costs and reduce their ability to identify and experience sexual rewards. A recent study found that women's greater acceptance of pain in PVD—defined in terms of (a) an openness to experiencing pain sensations and giving up futile attempts to control the pain and (b) the pursuit of a satisfying sexual life despite having chronic pain—was linked to greater sexual satisfaction for both members of the couple (Boerner & Rosen, 2015).

Still, both women with PVD and their partners reported a high level of sexual rewards from their sexual relationship. This is an important finding because it highlights that positive aspects

of the sexual relationship are still present in couples struggling with this highly distressing pain condition. It might also help to explain why the majority of women with PVD continue to engage in vaginal intercourse on a regular basis (Reed et al., 2012). Prior controlled studies have suggested that women with PVD are more motivated for sex by mate guarding (i.e., to protect or keep their partner) and concerns about duty/pressure (Brauer, Lakeman, van Lunsen, & Laan, 2014). The current results suggest that the experience of sexual rewards might also reinforce their sexual motivation in an adaptive way.

The findings are limited by the correlational nature of the research, and we cannot state with certainty that any differences observed between groups are due to having (or having a partner with) PVD. It is also possible that there was a selection bias for the samples, given that both members of the couple were required to participate. Women and partners who are more distressed may be less willing to participate, or those with lower distress may see participation as less relevant. Although our procedure for matching couples to a control group attempted to minimize differences, the couples with PVD were still younger in comparison to the control couples. Future studies might attempt a comparison between more equivalent groups. Finally, our samples were fairly homogenous, and results may not generalize to couples in same-sex relationships, older adults, or those from more diverse cultural backgrounds.

Although overall sexual satisfaction (i.e., considering all of the positive and negative aspects of the sexual relationship together) was significantly reduced in the PVD sample compared to controls, it is possible for individuals who experience a specific sexual cost (e.g., pain) to still appraise their overall sexual relationship positively. This result is in a similar vein to how some people experience problems with their sexual functioning but nonetheless report high sexual satisfaction or vice versa (MacNeil & Byers, 1997). Future studies should examine the more specific sexual rewards and costs of couples with PVD in comparison to controls in order to identify what aspects of the sexual relationship (e.g., the emotional, physical, or behavioral) are particularly impacted. It would also be valuable to study the dyadic processes of these couples using observational or qualitative designs to investigate what couples with PVD actually do to enhance rewards and lower costs.

The results have important implications for interventions with couples in which the woman has PVD, whereby enhancing sexual satisfaction in the presence of pain is an important goal (Corsini-Munt et al., 2014). In addressing unmet expectations of these couples, clinicians should consider whether the expectations are realistic. When couples' realistic expectations are not being met, such as engaging in mutually satisfying sexual activities, clinicians should assist them in examining their sexual scripts and making adjustments (e.g., steering away from painful penetrative activities). When couples have unrealistic expectations, such as engaging in pain-free intercourse, clinicians will need to target the expectation itself. Acceptance-based approaches may be useful in helping couples identify their personal values related to the sexual relationship (intimacy, connectedness, pleasure) and encouraging continued engagement in valued sexual activities.

Another potential implication is that interventions should focus on increasing the salience of sexual rewards to assist couples in maintaining their sexual satisfaction despite pain. A recent experimental study showed that focusing on the positive outcomes associated with engaging in sexual activity (i.e., approach sexual goals such as feeling close to a partner or meeting a partner's sexual needs) resulted in more satisfying sexual experiences (Muise, Boudreau, & Rosen, 2016). Couples who are able to successfully negotiate their sexual scripts away from penetrative, painful

activities and toward ones that are mutually satisfying, and accept such new scripts into their expectations, are likely to experience more sexual rewards and fewer costs. In conclusion, this study enhances understanding of the sexual satisfaction of women with PVD and their partners by identifying IEMSS exchange components that may contribute to their overall lower levels of satisfaction.

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