

Sexual and Relationship Intimacy among Women with Provoked Vestibulodynia and their  
Partners: Associations with Sexual Satisfaction, Sexual Function and Pain Self-Efficacy

**Keywords:** provoked vestibulodynia, dyspareunia, intimacy, couple, sexual satisfaction, sexual  
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Katy Bois, B.Sc., Ph.D. candidate  
Department of Psychology  
Université de Montréal  
C. P. 6128, succursale Centre-Ville  
Montréal, Québec, Canada, H3C 3J7  
Tel.: +1 (514) 343-6111 (37428)  
Fax: +1 514 343-2285  
E-mail: [katy.bois@umontreal.ca](mailto:katy.bois@umontreal.ca)  
[sophie.bergeron.2@umontreal.ca](mailto:sophie.bergeron.2@umontreal.ca)

Sophie Bergeron, Ph.D.  
Department of Psychology  
Université de Montréal  
C. P. 6128, succursale Centre-Ville  
Montréal, Québec, Canada, H3C 3J7  
Tel.: +1 (514) 343-6111 (5353)  
Fax: +1 514 343-2285  
E-mail:

Natalie O. Rosen, Ph.D.  
Department of Psychology  
Dalhousie University  
Halifax, Nova Scotia, Canada

Pierre McDuff, M.Sc.  
Department of Psychology  
Université de Montréal  
Montréal, Québec, Canada

Catherine Grégoire, BA  
Université du Québec à Montréal  
Montréal, Québec, Canada

## **Abstract**

**Introduction.** Provoked vestibulodynia (PVD) is the most frequent subtype of vulvodynia.

Women report negative consequences of PVD on their sexual and romantic relationships.

Researchers have recently highlighted the importance of examining interpersonal factors such as intimacy, and of including both women and their partners in study designs.

**Aim.** The aim of this study was to investigate sexual and relationship intimacy as defined by the Interpersonal Process Model of Intimacy and their associations with sexual satisfaction, sexual function, pain self-efficacy and pain intensity among women with PVD and their partners.

**Methods.** Ninety-one heterosexual women ( $M$  age = 27.38,  $SD$  = 6.04) diagnosed with PVD and their partners ( $M$  age = 29.37,  $SD$  = 7.79) completed measures of sexual and relationship intimacy, sexual satisfaction, sexual function, pain self-efficacy and pain intensity.

**Main Outcome Measures.** Dependent measures were the (1) Global Measure of Sexual Satisfaction Scale; (2) Female Sexual Function Index; (3) Painful Intercourse Self-Efficacy Scale and (4) Visual analog scale of pain intensity during intercourse.

**Results.** After controlling for women's age, women's greater sexual intimacy ( $\beta$  = 0.49,  $P$  < 0.001) was associated with women's greater sexual satisfaction and higher pain self-efficacy ( $\beta$  = 0.39,  $P$  = 0.001), beyond the effects of partners' sexual intimacy. Also, women's greater sexual intimacy ( $\beta$  = 0.24,  $P$  = 0.05) and women's greater relationship intimacy ( $\beta$  = 0.54,  $P$  = 0.003) were associated with greater women's sexual function, beyond the effects of partners' sexual and relationship intimacy.

**Conclusions.** Women's self-reported sexual and relationship intimacy in the couple relationship may promote higher sexual satisfaction, sexual function and pain self-efficacy, as well as possibly foster greater sexual well-being among women with PVD. The authors discuss

implications for the inclusion of emotional and interpersonal aspects of the couple's dynamic in clinical interventions and future research in PVD.

## Introduction

With a prevalence of 12% in community samples, provoked vestibulodynia (PVD) is the most common subtype of vulvodynia and is characterized by a recurrent and burning pain experienced when pressure is applied to the vulvar vestibule, such as during intercourse or the insertion of a tampon<sup>1,2</sup>. Women with PVD are more likely to report lower sexual functioning and sexual satisfaction as well as more distress about their sexuality than women without PVD<sup>3-5</sup>, and a reduced quality of life<sup>6</sup>. Despite the fact that the pain of PVD occurs primarily during sexual activity, involves the partner in its onset, and partners also suffer negative repercussions<sup>7</sup>, there are very few published studies of interpersonal factors in the field of vulvo-vaginal pain<sup>8</sup>. Researchers who have conducted studies focusing on other women's health conditions suggest that intimacy between romantic partners is associated with a better prognosis and adaptation to the condition<sup>9,10</sup>. Yet to date they have not investigated intimacy in relation to dyspareunia or PVD, in which the partner is closely involved.

Researchers have established links between PVD and negative romantic and sexual consequences. For example, the way in which women perceive their condition seems to have an impact on how close they can be with their partner, and how difficult it can be to show affection to their partner<sup>11</sup>. Women's experience of PVD also has a detrimental effect on women's sense of being an adequate partner<sup>12</sup> and is associated with a fear of losing one's partner<sup>13</sup>. In terms of interpersonal factors modulating pain and sexuality outcomes in this population, recent empirical work has focused on partner responses to pain. Solicitous and negative partner responses were associated with higher pain intensity<sup>14</sup>, whereas facilitative responses were associated with lower pain intensity and higher sexual satisfaction among women with PVD<sup>15</sup>. The authors showed that the association between partner solicitous responses and pain intensity was found when

solicitousness was assessed from the perspective of both women and partners. Thus, the partners of women with PVD may play a role in their experience of pain and associated sexual difficulties and it is therefore important to include both members of the couple in the investigation of interpersonal factors in this population.

One criticism of studies focusing on the interpersonal aspects of PVD is their conceptualization of partner responses. In the last decade, researchers in the chronic pain field have mostly privileged a cognitive-behavioral model<sup>16</sup>. According to this model, partner responses and interpersonal factors more generally are thought to act as reinforcement, promoting or maintaining pain behaviors, resulting in increased pain intensity. In the study of PVD, this conceptualization has contributed to our understanding of partner *behavioral* reactions when the woman displays expressions of pain. However, this model excludes emotional aspects and broader characteristics of the relationship, such as intimacy. Although several researchers have stressed the importance of studying couple dynamics in sexual pain disorders<sup>e.g.8</sup>, only one group has indicated that avoidant attachment is more prevalent in women with PVD in comparison to controls<sup>17</sup>. Largely, the affective dimension of interpersonal factors in the romantic relationship and sexuality in these women has gone uninvestigated. Scientists have increasingly identified empathy and intimacy as potential contributors to the positive adjustment of individuals living with persistent pain<sup>16</sup>. Vulvo-vaginal pain is experienced primarily in a sexual and/or romantic relationship where affective dimensions are central, and in a context where expectations for pleasure predominate. In the present study, we will attempt to fill this gap by focusing on sexual and relationship intimacy from the perspective of women with PVD and their partners.

Intimacy is a central dimension of the relational context and is thought to be associated with sexuality and sexual difficulties<sup>19,20</sup>. Several definitions of intimacy have been proposed over the last few decades<sup>19,21</sup>. According to Schnarch's<sup>19</sup> clinical viewpoint, intimacy is "the recursive process of open self-confrontation and disclosure of core aspects of self in the presence of a partner [...] a multisystemic process – intrapersonal and interpersonal – involving both the discloser's relationship with the partner and his/her relationship with himself/herself". From a social psychology perspective, Reis and Shaver<sup>22</sup> have proposed the Interpersonal Process Model of Intimacy. In this model, the authors suggest that intimacy develops in a dynamic process whereby an individual discloses personal information, thoughts and feelings to a partner; receives a response from the partner; and interprets that response as understanding, validating and caring. This model has two key components (1) disclosure (self and partner-perceived disclosure) and (2) partner responsiveness and empathy. It has been used in several studies<sup>e.g.23</sup> and is empirically validated<sup>24</sup>. However, this model has not been studied in the context of sexuality. For this purpose, a subtype of intimacy - sexual intimacy, which refers to self and partner disclosure about sexuality and partner responsiveness and empathy during and following sexual interactions - was also included in the present study considering that the study aim is to examine sexual outcomes among women with PVD. Although positively correlated, both sexual and relationship intimacy are important and potentially distinct concepts. Indeed, there is clinical evidence to suggest that couples can have a different perception of their relationship satisfaction and sexual satisfaction<sup>25</sup>.

PVD is often conceptualized as a chronic pain condition<sup>26</sup> and researchers in the chronic pain field have highlighted the importance of studying intimacy among individuals with chronic pain conditions<sup>16,18</sup>. Furthermore, intimacy appears to be a relevant factor to individual and relationship well-being among couples who are facing sexual dysfunctions and health problems. First, among a sample of

men and women (no participant suffered from PVD) having a sexual dysfunction was associated with lower levels of intimacy in several aspects of a couple relationship<sup>27</sup>. Second, intimacy has been identified as an engine of sexual desire and arousal in women of several age groups<sup>28-30</sup>. More specifically, it has been suggested that the combination of intimacy and an environment conducive to sexual stimuli may allow women to move from a neutral state to a state of sexual desire and arousal<sup>30</sup>. Considering that pain is an aversive stimulus that is associated with decreased desire and arousal in women with PVD, studying intimacy in this population is relevant because this interpersonal factor could be associated with better overall sexual function and sexual satisfaction. Third, among women affected by cancer, higher intimacy and empathy as defined by Reis and Shaver's model were shown to be associated with higher marital satisfaction and lower distress<sup>10,31</sup>. Overall, intimacy may be a protective factor when a couple is facing persistent pain, health problems or sexual difficulties. Researchers have also demonstrated that intimacy is associated with greater sexual satisfaction among non-clinical couples in a long term relationship<sup>32</sup>. Moreover, when we look specifically at the treatment of women with PVD and their partners, interpersonal factors may act as facilitators for the couple's adaptation to the vulvo-vaginal pain. Indeed, the presence of vulvo-vaginal pain during penetration often forces partners to renegotiate their sexuality. The traditional sexual script purports that vaginal penetration should be the main goal of sexuality<sup>19</sup>. This view poses a problem for couples grappling with PVD because vaginal intercourse causes pain. The presence of greater intimacy could facilitate communication between partners and the exploration of different, more varied sexual activity<sup>33</sup>, and therefore has a positive impact in both areas most affected by PVD – sexual function and sexual satisfaction.

In addition to these key outcomes, pain self-efficacy is gaining increased attention from PVD researchers as an important target of intervention<sup>34</sup>. Pain self-efficacy can be defined as one's beliefs in one's ability to cope with and control the pain. Higher pain self-efficacy is associated with lower pain

during sexual intercourse and with better sexual function in women with PVD<sup>35</sup>. Also, higher pre-treatment levels of self-efficacy in this population are associated with improved sexual function at six-month follow-up after undergoing topical and psychological treatments<sup>36</sup>. Pain self-efficacy is therefore thought to be a robust predictor of the adjustment to vulvo-vaginal pain. It has been shown that social support and partner support promoted self-efficacy<sup>37-38</sup>. The subjective experience of intimacy in a romantic relationship could help one to feel supported and provide a positive context to increase self-efficacy, which is crucial in mobilizing women to engage in pro-active coping behaviors. For instance, partner social support is associated with higher self-efficacy in doing skin self-examination among people suffering from skin cancer<sup>39</sup>. According to Reis and Shaver<sup>1</sup>, empathic responding, which is an important form of emotional support, is a central aspect of intimacy. Emotional support appears to promote self-efficacy, which in turn is associated with lower depressive symptoms among people recovering from a surgery<sup>40</sup>. Another goal of the present study was to investigate whether intimacy is associated with pain self-efficacy in women with PVD.

While some studies about intimacy among individuals with persistent pain exist<sup>16,41</sup>, the investigation of associations between intimacy and pain intensity perceived by female patients is rare. Researchers have found that higher expressions of anger and contempt (which are believed to be the opposite of empathic responsiveness – an important dimension of intimacy) by both partners were associated with higher perceptions of pain intensity by partners, but not by patients<sup>42</sup>. However, in another study the association between couples' reciprocal invalidation (e.g. hostility) and more severe pain intensity was found in men, but not in women<sup>43</sup>. The association between sexual intimacy, relationship intimacy and pain intensity thus remains to be clarified and was investigated in the present sample of women with PVD and their partners.

## **Aim**

The goal of the present study was to investigate sexual and relationship intimacy as defined by the Interpersonal Process Model of Intimacy<sup>22</sup> among women with PVD and their partners, and their associations with sexual satisfaction, sexual function, pain self-efficacy and pain intensity. Including both members of the couple allows for the examination of the influence of one partner's intimacy above and beyond the effect of the other's. We hypothesized that greater woman sexual and relationship intimacy would be associated with higher levels of sexual satisfaction, sexual function and pain self-efficacy among women. We also hypothesized that greater partner sexual and relationship intimacy would be associated with higher levels of sexual satisfaction, sexual function and pain self-efficacy in women. Associations between sexual intimacy, relationship intimacy and pain intensity were examined in an exploratory manner, given the inconsistent findings reported to date in this area.

## **Methods**

### *Participants*

Women and their partners were recruited at regularly scheduled clinical appointments to gynecologists and through advertisements in newspapers, websites and on university campuses in two large metropolitan areas (referred to as 'site one' and 'site two'). Five percent of the study sample was recruited at visits to health professionals, 30% recruited through advertisements, 60% recruited via participation in another PVD study and four percent by word of mouth. Seventy-three percent of participants were recruited in site one and 27% were recruited in site two. Participants were screened for eligibility by a semi-structured interview and all participants were examined and diagnosed with PVD by a gynecologist. The inclusion criteria at both sites were the following: (1) pain during penetration which is subjectively distressing, occurs(ed) on 75% of intercourse attempts in the last 6 months, and had lasted for at least 6 months, (2) pain

located in the vulvo-vaginal area (i.e. at the entrance of the vagina), (3) pain limited to intercourse and other activities involving pressure to the vestibule (e.g., bicycling) and (4) involved in a committed romantic relationship for at least six months. Exclusion criteria were: (1) vulvar pain not clearly linked to intercourse or pressure applied to the vestibule, (2) absence of sexual activity (defined as manual or oral stimulation, masturbation, intercourse) with the partner in last month and (3) presence of one of the following: active infection previously diagnosed by a physician or self-reported infection, vaginismus (as defined by DSM-IV-TR), pregnancy, and age less than 18 or greater than 45 years. Of the 94 heterosexual couples that met eligibility criteria and agreed to participate, one partner had missing data representing more than 20% of a measure and two couples did not complete the measures, for a final sample size of 91 (97%) women and their partners. All participants completed all measures described below except for the sexual function questionnaire, which was completed by women at site one only ( $N = 66$ ).

## Measures

### *Relationship Intimacy*

Women's relationship intimacy and partners' relationship intimacy were measured based on Reis and Shaver's Model<sup>22</sup> using seven items concerning self-disclosure, perceived partner self-disclosure and partner responsiveness in general in the relationship on a 7-point Likert scale (1 = *not at all*; 7 = *a lot*). Examples of relationship intimacy items include *How much do you disclose your private thoughts to your partner?*; *How much does your partner disclose his feelings to you?*; *To what degree do you feel understood by your partner?* This instrument has good construct validity and reliability<sup>24</sup>. Higher scores indicate greater relationship intimacy and total scores can range from 7 to 49. Cronbach's alphas were respectively .91 and .92 for women and partners' relationship intimacy in this sample.

*Sexual Intimacy*

Women and partners' sexual intimacy were measured using the Sexual Intimacy Measure, developed by our team in line with Reis and Shaver's Model<sup>22</sup> and the Relationship Intimacy measure described above. The objective was to adapt the assessment of self-disclosure, perceived partner self-disclosure and partner responsiveness during and immediately following sexual activity. This self-report questionnaire has seven items on a 7-point Likert scale (1 = *not at all*; 7 = *a lot*). Examples of items include the following: *With regard to your sexual relationship with your partner, how much do you disclose your private sexual thoughts to your partner?* ; *With regard to your sexual relationship with your partner, how much does your partner disclose his or her feelings about sex to you?*; *During or immediately following sexual activity, how much do you feel your partner accepts you as you are?* Higher scores indicate greater sexual intimacy and total scores can range from 7 to 49. Cronbach's alphas were respectively .87 and .86 for women and partners' sexual intimacy in this sample.

## Main outcome measures

*Sexual satisfaction*

Women's sexual satisfaction was measured using the Global Measure of Sexual Satisfaction Scale composed of five items assessing whether or not sexual experiences are Good versus Bad, Pleasant versus Unpleasant, Positive versus Negative, Satisfying versus Unsatisfying, and Valuable versus Worthless on a 7-point Likert scale. Higher scores indicate greater satisfaction and total scores can range from 5 to 35. This measure has good psychometric proprieties<sup>44</sup>. Cronbach's alpha was .92 for this sample.

*Sexual function*

Women's global sexual functioning was assessed with the Female Sexual Function Index (FSFI). The FSFI is a 19-item self-report questionnaire assessing five dimensions of sexual function: desire, arousal, lubrication, orgasm, satisfaction, and pain. The FSFI has good psychometric properties<sup>45</sup>. Higher scores indicate better sexual functioning and total scores can range from 2 to 36. Cronbach's alpha was .94 for this sample.

#### *Pain self-efficacy*

Women's pain self-efficacy was measured with the Painful Intercourse Self-Efficacy Scale (PISES). The PISES is a 20-item questionnaire with three subscales (1) self-efficacy for sexual function, (2) self-efficacy for controlling other symptoms, and (3) self-efficacy for controlling pain during intercourse on a Likert scale of 0 (*very uncertain*) to 100 (*very certain*). Researchers have previously adapted this questionnaire from the Arthritis Self-Efficacy Scale for studies of women with PVD and found it to correlate with sexual function and pain intensity<sup>36,46</sup>. Higher scores indicate higher pain self-efficacy and total scores can range from 200 to 2000. Cronbach's alpha was .92 for this sample.

#### *Vulvo-vaginal pain*

Women's pain intensity was measured using a Visual Analog Scale assessing pain during intercourse in the last 6 months (0 = *no pain*; to 10 = *worst pain ever*). This measure is positively associated with other measures of pain in women with PVD<sup>47</sup>. In measuring several kinds of pain, the Visual Analog Scale showed good validity and reliability<sup>48</sup>.

#### Procedure

Participants at site one completed all the materials online and participants at site two completed the materials using paper-and-pen in the Laboratory. All participants completed consent forms, a sociodemographic questionnaire, questionnaires assessing sexual and

relationship intimacy. Women completed questionnaires assessing sexual satisfaction, sexual function, pain self-efficacy and pain intensity. As compensation, participants received financial compensation (\$20.00) for their participation as well as references to health professionals who specialize in vulvo-vaginal disease. The present study was approved by each of the two universities' and health centres' institutional review boards.

## Results

### *Sample characteristics*

Table 1 shows the descriptive statistics for the sample sociodemographics and provides the mean and standard deviation for each dependent and independent variable. Site two participants reported a moderately higher sexual satisfaction ( $M = 25.84$ ,  $SD = 6.81$ ) compared to site one participants ( $M = 21.81$ ,  $SD = 7.16$ ,  $t[89] = -2.42$ ,  $p = .02$ ,  $d = .57$ ) and higher pain intensity ( $M = 7.16$ ,  $SD = 1.25$ ) compared to site one participants ( $M = 6.38$ ,  $SD = 1.73$ ,  $t[88] = -2.04$ ,  $p = .04$ ,  $d = .52$ ). Participants did not differ on any of the other study variables by site.

### *Zero-Order Correlations*

As preliminary analyses, correlational analyses were conducted to examine the need for controlling for sociodemographic variables. Although, some correlations between participants' age, relationship duration, women and partners' education and outcome variables were significant, only women's age was included as a covariate in subsequent analyses because its correlation with sexual function was greater than .30 ( $r = -.37$ ,  $p < 0.001$ )<sup>49</sup>.

Table 2 presents the intercorrelations among the study variables. Women's sexual intimacy and partners' sexual intimacy were positively, but not highly, correlated. Higher women's sexual satisfaction was strongly associated with women's higher sexual intimacy and

moderately associated with partners' sexual intimacy, strongly correlated with sexual function and moderately associated with pain self-efficacy. Higher sexual function was strongly associated with women's higher sexual intimacy, moderately associated with women's relationship intimacy and strongly associated with pain self-efficacy. Higher pain self-efficacy was strongly associated with women's higher sexual intimacy, moderately associated with women's relationship intimacy, and weakly associated with lower vulvovaginal pain. Women's sexual intimacy, partners' sexual intimacy, women's relationship intimacy and partners' relationship intimacy were not significantly correlated with pain intensity. Consequently, pain intensity was not examined as an outcome in subsequent analyses.

#### *Intimacy as a Correlate of Women's Sexual Satisfaction*

A hierarchical regression analysis was conducted to assess associations between women's sexual and relationship intimacy, partners' sexual and relationship intimacy, and women's sexual satisfaction (Table 3). After controlling for women's age, women's greater sexual intimacy ( $\beta = 0.49, p < 0.001$ ) was associated with their greater sexual satisfaction, above and beyond the effects of partners' sexual intimacy. The overall model of women's sexual intimacy associated with sexual satisfaction was significant,  $F(5, 85) = 10.48, p < 0.001$  and accounted for 38% of the variance in sexual satisfaction, with 23% of the variance accounted for by women's sexual intimacy. Although partners' sexual intimacy was correlated with women's sexual satisfaction, neither of women's relationship intimacy and partners' sexual and relationship intimacy were uniquely associated with women's sexual satisfaction in the regression analysis.

*Intimacy as a Correlate of Women's Sexual Function*

A hierarchical regression analysis was also conducted to assess associations between women's sexual and relationship intimacy, partners' sexual and relationship intimacy, and women's sexual function (Table 3). After controlling for women's age, women's greater sexual intimacy ( $\beta = 0.24, p = 0.05$ ) and women's greater relationship intimacy ( $\beta = 0.54, p = 0.003$ ) were associated with their higher sexual functioning, above and beyond the effects of partners' sexual and relationship intimacy. The overall model was significant,  $F(5, 60) = 8.31, p < 0.001$ ) and accounted for 41% of the variance in sexual function, with 26% of the variance accounted for by women's sexual and relationship intimacy. Partners' sexual and relationship intimacy were not associated with women's sexual function.

*Intimacy as a Correlate of Women's Pain Self-Efficacy*

A hierarchical regression analysis was conducted to assess associations between women's sexual and relationship intimacy, partners' sexual and relationship intimacy, and women's pain self-efficacy (Table 3). After controlling for women's age, women's greater sexual intimacy was associated with their higher pain self-efficacy ( $\beta = 0.39, p = 0.001$ ), above and beyond the effects of partners' sexual intimacy. The overall model for women's sexual intimacy linked to pain self-efficacy was significant,  $F(5, 85) = 5.68, p = 0.001$ ) and accounted for 25% of the variance in pain self-efficacy, with 22% accounted for by women's sexual intimacy. Although women's relationship intimacy was associated with women's pain self-efficacy, this variable and partners' sexual and relationship intimacy were not uniquely associated with women's pain self-efficacy in the regression analysis.

## Discussion

Based on the Interpersonal Process Model of Intimacy<sup>22</sup>, the aim of the present study was to investigate the associations between sexual and relationship intimacy and sexual satisfaction, sexual function, pain self-efficacy and pain intensity among women with PVD and their partners. The hypothesis that sexual and relationship intimacy perceived by women would be associated with sexual outcomes and pain self-efficacy was supported, although there was no association between intimacy and pain intensity. Women's higher sexual intimacy was associated with their higher sexual satisfaction, sexual function and pain self-efficacy. Also, women's higher relationship intimacy was associated with their higher sexual function. The associations were significant above and beyond the effects of partners' intimacy. Findings support our contention that sexual and relationship intimacy are correlated with important indicators of sexual well-being among women with PVD.

Women's greater sexual intimacy was correlated with their greater sexual satisfaction. Considering that the authors of a recent systematic review showed that PVD is associated with decreased sexual satisfaction<sup>50</sup>, identifying an interpersonal factor that might protect this important dimension of sexuality in women who experience painful sex is important. This result is consistent with findings from a daily diary study: increased intimacy was associated with greater sexual satisfaction in non-clinical couples involved in a long-term relationship<sup>32</sup>. However, being empathic and engaging in self-disclosure in general in a relationship might not be enough to promote sexual satisfaction; intimacy specifically related to sexuality seems to be necessary. Kleinplatz et al.<sup>51</sup> identified "major components of great sex" using semi-structured interviews with couples and sex therapists who described having experienced greatly satisfying sexual encounters. One major component was deep sexual and erotic intimacy (e.g. caring,

acceptance, empathy and sharing of themselves in a sexual relationship), which is in line with our results. Moreover, findings from a national survey supported the assertion that the presence of an emotional relationship with the partner, especially during sexual activity, is associated with lower sexual distress<sup>52</sup>. Sexual intimacy appears to nurture the sexual satisfaction of women with PVD and although this finding is cross-sectional, it may be worthwhile to target the improvement of sexual intimacy to promote sexual satisfaction in this population.

As hypothesized, women's higher sexual and relationship intimacy were both associated with their higher sexual function. These results are consistent with those from a recent study conducted among people reporting sexual difficulties<sup>33</sup>. In this study, participants reported that positive communication, including the ability to communicate their sexual needs, in addition to a positive romantic relationship, are what helped them to renegotiate their sexuality. In another study, among women with a sexual dysfunction (excluding PVD), the level of dysfunction was predicted by the importance of intimacy in their couple relationship, such that decreased intimacy was associated with higher levels of dysfunction<sup>27</sup>. Sexual and relationship intimacy may be protective factors for individuals suffering from a sexual dysfunction; especially considering that intimacy moderated the association between some aspects of sexual functioning and distress, whereby low intimacy was associated with higher distress in people reporting low sexual desire<sup>53</sup>.

Moreover, many women with PVD report a loss of sexual desire, difficulties with sexual arousal and orgasms, as well as a reduced frequency of intercourse<sup>3-5</sup>. Recent theorizing and empirical evidence about sexual function has led researchers to suggest that sexual desire is concomitant to, rather than strictly an antecedent to, other phases of women's sexual response, and may reinforce other phases of the sexual response<sup>19, 54, 55-57</sup>. To this end, relational dynamics, of which intimacy is an integral part, have been proposed to be a major etiological factor in

women suffering from low sexual desire. It is possible that sexual and relationship intimacy may influence different aspects of the sexual response cycle through their effects on sexual desire. For example, Schnarch<sup>19</sup> proposed a clinical model of intimacy by which he demonstrated the complexity of intimacy dynamics in partners at different levels of differentiation, and their effects on sexual desire. Differentiation is defined as the balance between partners' attachment/connection to one another and individual self-regulation/autonomy. He argued that individuals with a lower level of differentiation have a higher need for reciprocity and a lower tolerance of intimacy, which is believed to have a detrimental effect on sexual desire. Sexual desire might be the linking mechanism for the association between intimacy and other facets of sexual function in women. The current study findings add to the growing body of literature showing the relevance of interpersonal factors such as intimacy in sexual function among women.

Women's higher sexual intimacy was associated with their higher pain self-efficacy. Although researchers have shown that self-efficacy – an important intra-individual predictor of persistent pain and related disability<sup>35, 36</sup> – is associated with several positive outcomes among women with PVD, such as lower distress, lower pain, higher sexual function, and more frequent attempts at intercourses, no interpersonal factors have been associated with higher pain self-efficacy to date. In other related areas however, social support helped individuals to cope with stress more efficiently<sup>38, 57</sup>. Women with PVD face a stress that is often characterized by fear, anxiety and catastrophic thoughts<sup>58</sup>. It is possible that validation (a form of empathic response) affects emotion regulation in a positive manner<sup>59</sup>. In the case of PVD, sexual intimacy might help women to better regulate the stress of pain via reciprocal disclosure and perceived empathic responding from their partner. As a result, women could have more emotional resources

available to cope with the pain and may feel more empowered in terms of engaging in sexual activities and controlling their pain and other symptoms.

We did not find support for our hypothesis regarding associations between women's relationship intimacy and their sexual satisfaction and pain self-efficacy. A greater global level of intimacy in a couple relationship (e.g. partners disclose and feel understood in their relationship in general) might not be enough to promote higher sexual satisfaction and pain self-efficacy. Sexual interactions involve increased vulnerability, therefore it seems essential to develop intimacy between partners around the highly sensitive context of sexuality in order to positively impact sexual satisfaction and pain self-efficacy. This result is in line with researchers and clinicians who have highlighted the importance of sex therapy with couples presenting with a sexual dysfunction, as opposed to focusing only on individual psychological difficulties or general relationship complaints of the couple<sup>19, 60-62</sup>.

Furthermore, partners' sexual intimacy was not significantly associated with women's outcomes. Associations between partners' sexual intimacy and women's outcomes above and beyond the effects of women's sexual intimacy were investigated. It is possible that any potential influence of partners' sexual intimacy was overshadowed by the more robust effect of woman-perceived intimacy. Still, the fact that there were no significant associations between partner intimacy and women's outcomes does not decrease the importance of the couple dynamic. Specifically, in the present study, greater women's sexual and relationship intimacy means that the women feel comfortable disclosing to their partner, perceive that the partner discloses to them, and that they receive an empathic response from him. The way intimacy is perceived by a woman seems to be more important to her sexual well-being than how intimacy is perceived by her partner. Our results are in line with those of Rosen et al.<sup>14</sup>, who showed that women-

perceived solicitous responses were associated with women's sexual satisfaction, but partner-perceived solicitous responses were not. Taken together, what seems crucial is the woman's subjective experience of the relationship dynamic.

Sexual and relationship intimacy were not associated with pain intensity. Apart from partner responses to pain, researchers have been challenged to identify relationship correlates of pain intensity, even more so among women. Some studies in the persistent pain field have been conducted to examine intimacy or empathy but no significant associations with pain were found in women, although some were found in men<sup>63</sup>. In the present study, two correlates of sexual function and one of sexual satisfaction were identified, but there were no correlates of vulvo-vaginal pain intensity. Even if sexual function and vulvo-vaginal pain are associated, they remain two distinct phenomena. Sexuality is an interpersonal experience and women's perception of a relationship with a partner is believed to influence their sexuality, for better or worse<sup>64</sup>. Intra-individual factors (e.g. fear, avoidance, self-efficacy) and partner responses, which are interpersonal factors but refer to specific partner behavioural reactions to pain, are correlates of pain intensity<sup>14, 16, 47</sup>. Given these findings, as well as our results, it seems as though broader interpersonal factors such as intimacy may not impact sexuality and pain in the same way. Considering that the investigation of interpersonal factors in PVD is in its infancy, future research is needed to understand the associations between interpersonal factors and women's experience of vulvo-vaginal pain and to delineate the respective contributions of intra-individual versus interpersonal factors.

As Ferreira, Narciso and Novo<sup>21</sup> reviewed and Schnarch<sup>19</sup> summarized past work on intimacy, this concept has been defined in multiple ways throughout the scientific and clinical literature. Two dimensions of intimacy have been confirmed as important, namely (1) self and

partner's disclosure and (2) partner responsiveness/empathy. We have demonstrated the relevance of both sexual and relationship intimacy as correlates of sexual well-being and pain self-efficacy in women with PVD. Given that emotional dimensions of couple dynamics are associated with sexual function, satisfaction, and pain self-efficacy, there is a clear need to study intimacy in couples living with a sexual dysfunction. To this effect, future research in which sexual dysfunction is the focus may need to move beyond a behavioural perspective to incorporate cognitive, affective and broader aspects of romantic relationships. Strengths of the present study include the fact that all participants were diagnosed with PVD via a standardized gynaecological examination, that the intimacy measures were consistent across the sexual and relationship domains, and were developed from a validated theoretical model of intimacy, which focuses on the couple dynamic. Finally, both partners of the couple relationship were the unit of analyses. Women's intimacy and partners' intimacy were both included as correlates in the analyses, so that, statistically, associations between women-perceived intimacy and women outcomes represent the part of intimacy that does not overlap with partner-perceived intimacy.

This study also has some limitations. The cross-sectional design implies that no causal inferences between the variables can be drawn. Future research using prospective designs is needed in order to verify the direction of the associations; the present design does not allow us to address whether intimacy positively impacts sexual well-being, whether sexual well-being enhances intimacy, or if the effects are reciprocal. The sample in the present study included women aged 18 to 45 years old who were involved in a committed heterosexual romantic relationship for at least six months. Future research is needed to determine whether the results are generalizable to all women suffering from PVD. Another limitation is the self-report methodology. Intimacy is a complex, dynamic, and multisystemic phenomenon that may only be

partly captured by self-report questionnaires. Developing and using more diverse measures of intimacy, such as observational and qualitative methodologies, may prove valuable to obtain a more complete picture of empathic responses and disclosure.

## **Conclusion**

In conclusion, investigating interpersonal factors is a promising area of research in women with PVD and their partners. Specifically, women's greater sexual intimacy is associated with their greater sexual satisfaction, sexual function and pain self-efficacy. Also, women's greater relationship intimacy is associated with their higher sexual function. Promoting intimacy in interventions could potentially be beneficial for decreasing the negative consequences associated with PVD and fostering the sexual well-being of afflicted women.

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**Table 1.** Descriptive statistics of the sample ( $N = 91$ ).

	<i>M</i> or <i>N</i>	<i>SD</i> or %
Characteristic		
Age (years)		
Women	27.38	6.04
Partner	29.37	7.79
Women duration of pain (years)	5.63	4.86
Education level (years)		
Women	15.96	2.68
Partner	15.66	2.81
Marital status		
Co-habiting	47	51.65
Married	34	37.36
Committed but not co-habiting	10	10.99
Duration of the relationship (years)	5.63	4.86
Couple's annual income		
\$0 – 19,999	8	8.79

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\$20,000 – 39,999	15	16.48
\$40,000 – 59,999	17	18.68
> \$60,000	49	53.85
Women's Cultural Background		
English Canadian	58	63.74
French Canadian	25	27.47
Other	8	8.79
Partners' Cultural Background		
English Canadian	53	58.24
French Canadian	25	27.47
Other	13	14.29
Independent variables		
Sexual intimacy		
Women	37.03	8.33
Partners	37.95	6.85
Relationship intimacy		
Women	38.30	8.79

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Partner	37.16	9.14
Dependent variables ( <i>N</i> = 91)		
Vulvo-vaginal pain	6.60	1.64
Sexual satisfaction (GMSEX)	22.92	7.25
Sexual function (FSFI) ( <i>N</i> = 66)	18.87	6.95
Pain self-efficacy (PISES)	1270.55	314.59

Vulvo-vaginal pain = pain intensity on a Visual Analogue Scale of 0 to 10; Sexual satisfaction = Global Measure of Sexual Satisfaction; Sexual Function = Female Sexual Function Index; Pain self-efficacy= Painful Intercourse Self-Efficacy Scale

**Table 2.** Correlations between sexual intimacy, relationship intimacy, sexual satisfaction, sexual function, pain self-efficacy and vulvo-vaginal pain (N = 91).

	Partners' sexual intimacy	Women's relationship intimacy	Partners' relationship intimacy	Sexual satisfaction	Sexual function	Pain self-efficacy	Vulvo-vaginal pain
Women's sexual intimacy	.28**	.34**	.06	.59**	.50**	.47**	-.01
Partners' sexual intimacy	-	.01	.29**	.30*	.20	.08	.06
Women's relationship intimacy	-	-	.69**	.24	.41**	.30**	.12
Partners' relationship intimacy	-	-	-	.09	.11	.08	.10
Sexual satisfaction	-	-	-	-	.57**	.40**	.04
Sexual function	-	-	-	-	-	.53**	.09
Pain self-efficacy	-	-	-	-	-	-	-.24**

\*\* $p < .01$ ; \*  $p < .05$

Vulvo-vaginal pain = pain intensity on scale of 0 to 10; Sexual satisfaction = Global Measure of Sexual Satisfaction; Sexual Function = Female Sexual Function Index; Pain self-efficacy = Painful Intercourse Self-Efficacy Scale

**Table 3.** Hierarchical regression analyses between sexual and relationship intimacy, and sexual satisfaction, sexual function and pain self-efficacy

	Women's sexual satisfaction			Women's sexual function			Women's pain self-efficacy		
	<i>B</i>	<i>SE B</i>	$\beta$	<i>B</i>	<i>SE B</i>	$\beta$	<i>B</i>	<i>SE B</i>	$\beta$
<b>Step 1</b>									
Women's age	-0.29	0.12	-0.24*	-0.38	0.14	-0.34*	-8.40	5.64	-0.16
Partners' sexual intimacy	0.26	0.11	0.25*	0.10	0.12	0.10	1.12	5.18	0.02
Partners's relationship intimacy	.00	.08	.00	.06	.08	.08	2.09	3.79	0.06
<b>Step 2</b>									
Women's age	-0.13	0.11	-0.11	-0.18	0.12	-0.17	-1.44	5.23	-0.03
Partners' sexual intimacy	0.16	0.11	0.15	.19	.12	.19	-0.30	5.34	-0.01
Partners' relationship intimacy	-0.05	.11	-0.06	-.22	.12	-.31	-3.87	5.38	-0.11

Women' sexual intimacy	0.42	0.09	0.49**	.19	.10	0.24*	14.60	4.40	0.39**
Women' relationship intimacy	0.08	0.12	0.09	.38	0.12	0.54*	8.73	5.75	0.24

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\*\* $p < .01$ ; \*\*  $p \leq .05$

Note. Women's Sexual Satisfaction  $R^2 = 0.14$  for Step 1;  $\Delta R^2 = 0.24$  for Step 2

Women's Sexual Function  $R^2 = 0.15$  for Step 1;  $\Delta R^2 = 0.26$  for Step 2

Women's Pain Self-Efficacy  $R^2 = 0.03$  for Step 1;  $\Delta R^2 = 0.22$  for Step 2

Sexual satisfaction = Global Measure of Sexual Satisfaction; Sexual function = Female Sexual

Function Index; Pain self-efficacy = Painful Intercourse Self-Efficacy Scale