

## ORIGINAL RESEARCH—PAIN

## Woman and Partner-Perceived Partner Responses Predict Pain and Sexual Satisfaction in Provoked Vestibulodynia (PVD) Couples

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### ABSTRACT

**Introduction.** Provoked vestibulodynia (PVD) is a highly prevalent vulvovaginal pain condition that results in significant sexual dysfunction, psychological distress, and reduced quality of life. Although some intra-individual psychological factors have been associated with PVD, studies to date have neglected the interpersonal context of this condition.

**Aim.** We examined whether partner responses to women's pain experience—from the perspective of both the woman and her partner—are associated with pain intensity, sexual function, and sexual satisfaction.

**Methods.** One hundred ninety-one couples (M age for women = 33.28, standard deviation [SD] = 12.07, M age for men = 35.79, SD = 12.44) in which the woman suffered from PVD completed the spouse response scale of the Multidimensional Pain Inventory, assessing perceptions of partners' responses to the pain. Women with PVD also completed measures of pain, sexual function, sexual satisfaction, depression, and dyadic adjustment.

**Main Outcome Measures.** Dependent measures were women's responses to: (i) a horizontal analog scale assessing the intensity of their pain during intercourse; (ii) the Female Sexual Function Index; and (iii) the Global Measure of Sexual Satisfaction Scale.

**Results.** Controlling for depression, higher solicitous partner responses were associated with higher levels of women's vulvovaginal pain intensity. This association was significant for partner-perceived responses ( $\beta = 0.29$ ,  $P < 0.001$ ) and for woman-perceived partner responses ( $\beta = 0.16$ ,  $P = 0.04$ ). After controlling for sexual function and dyadic adjustment, woman-perceived greater solicitous partner responses ( $\beta = 0.16$ ,  $P = 0.02$ ) predicted greater sexual satisfaction. Partner-perceived responses did not predict women's sexual satisfaction. Partner responses were not associated with women's sexual function.

**Conclusions.** Findings support the integration of dyadic processes in the conceptualization and treatment of PVD by suggesting that partner responses to pain affect pain intensity and sexual satisfaction in affected women. **Rosen NO, Bergeron S, Leclerc B, Lambert B, and Steben M. Woman and partner-perceived partner responses predict pain and sexual satisfaction in provoked vestibulodynia (PVD) couples. J Sex Med 2010;7:3715–3724.**

**Key Words.** Provoked Vestibulodynia; Dyspareunia; Pain; Sexual Satisfaction; Partner Responses; Vulvodynia

### Introduction

Provoked vestibulodynia (PVD) is the most common subtype of localized vulvodynia and, consequently, the most common cause of vulvovaginal pain in premenopausal women [1], with a prevalence rate of 12% in the general population

[2]. It is characterized by discomfort or a burning pain that is specific to the vestibule, and for which there are no relevant visible findings or clinically identifiable neurologic disorder [3]. PVD is a chronic, recurrent, vulvovaginal pain problem that is triggered mainly through sexual contact but also by other activities involving pressure to the

vulvar vestibule, such as tampon insertion and gynecological examination [4]. Women with PVD experience negative sexual and psychological repercussions. Specifically, they demonstrate impaired sexual functioning, including self-reported lower levels of sexual desire, arousal, sexual satisfaction, orgasmic capacity, and frequency of intercourse, compared to control women [1,5,6]. Researchers have shown that women with PVD also suffer from heightened anxiety, depression, fear of pain, cognitive salience of pain, hypervigilance, and catastrophizing compared to women without PVD [1,5,7–12].

Currently, little data exist regarding the psychosexual characteristics of partners of women with PVD, the role of relationship functioning, and the impact of the partner in women's pain experience. This neglect of the interpersonal context in which PVD pain occurs is significant, given strong evidence from the chronic pain literature indicating that expressions of pain to significant others may serve an important social purpose [13]. Specifically, an individual may express his or her pain in order to elicit support or intimacy [14] or to enable the patient to cope in certain ways (e.g., to avoid painful activities) [15]. Findings from the limited studies focusing on the partners of women with PVD suggest that they do not report greater psychological distress or impaired relationship or global sexual functioning compared to existing norms [16–18]. Furthermore, there appear to be no differences in self-reported dyadic adjustment among women with PVD compared to control women [1,5,8,19]. Until recently, Meana and colleagues [20] conducted the only study on the effect of relationship factors on vulvovaginal pain. In a subgroup of 33 women with PVD, they found that higher dyadic adjustment was associated with lower pain intensity, suggesting a role for dyadic variables in women's pain experience. However, conclusions drawn from this study are limited due to its small sample size and the absence of partner data. Moreover, recent studies in the domain of chronic pain and PVD specifically have found no relationship between dyadic adjustment and pain intensity in women with PVD [13,17].

Other chronic pain conditions have benefited from sound research on their dyadic associations (e.g., [13,21]); however, this important etiologic factor has been grossly neglected in PVD. According to Fordyce's [22] operant learning model, the partner, who is the primary witness to the patient's pain, may unknowingly reinforce and perpetuate the patient's pain experience, thereby contributing

to increased pain and disability. Several studies examining partner responses to patients' pain have supported this model in the chronic pain literature (e.g., [23,24]).

Chronic pain researchers have documented several types of partner responses to patients' pain, two of which include: (i) "solicitous responses" which are partner reactions of sympathy, attention, and support; and (ii) "negative responses" which refer to partner reactions that include critical remarks or demonstrations of hostility or avoidance. Although other types of partner responses (e.g., "facilitative responses") may improve patient functioning, prior research has focused more on the detrimental impact of the two types of partner responses described above. Specifically, researchers have found that greater patient-reported spouse solicitousness is associated with greater levels of patient pain and lower levels of activity [25–27]. They concluded that partner solicitousness may reinforce the patient's avoidance of activities, encourage passivity, and increase the likelihood that they will behave similarly in the future [24,28,29]. Likewise, greater patient-perceived negative responses to patient pain have been associated with greater pain, functional disability, and psychosocial problems [25,26,30,31]. Taken together, this chronic pain research suggests that dyadic factors and partner responses to pain, in particular, significantly impact patients' pain, disability, and psychosocial functioning.

In the only study that investigated partner responses and PVD, Desrosiers and colleagues [15] examined the relationship between woman-perceived partner responses and women's pain. The authors reported that greater partner solicitousness and greater levels of partner general hostility, which the authors used as an indicator of negative partner responses, were associated with higher levels of pain during intercourse. Presumably, in this context, partner responses to pain reinforce avoidance of sexual intercourse and/or contribute to catastrophic thinking about pain, heightened anxiety, and hypervigilance, factors that are all associated with maintaining and exacerbating vulvovaginal pain [7,10]. In contrast to findings in the chronic pain literature concerning disability, this study found no relationship between partner responses and women's global sexual functioning.

Conclusions drawn from the Desrosiers et al. [15] study are limited in several key ways. First, partner negative responses were assessed using a subscale from a psychological distress measure

rather than a questionnaire focusing specifically on spouse negative responses to pain. Second, the measure of partner solicitousness was not well validated. Third, the sample size was relatively small ( $n = 43$  couples), thereby limiting the generalizability of the findings. Furthermore, the researchers did not assess global sexual satisfaction separately from sexual functioning. Lawrance and Byers described sexual satisfaction as “an affective response arising from one’s subjective evaluation of the positive and negative dimensions associated with one’s sexual relationship” [32]. Although positively related, sexual satisfaction may be distinguished, in part, from sexual functioning which focuses on all aspects of sexual response including desire, arousal, lubrication, orgasm, pain/discomfort, as well as satisfaction [33]. Among healthy women, higher sexual satisfaction is associated with a higher frequency of intercourse [34], lower discrepancy in desire between partners [35], less cognitive distraction during sexual activity [36], and higher relationship satisfaction [32]. Furthermore, researchers have found that sexual satisfaction is lower in women with dyspareunia compared to pain-free control women [37,38]. In terms of partner responses, women may report higher sexual satisfaction when partners are solicitous because it is a marker for partner sensitivity to the woman’s pain [20], but solicitousness may simultaneously decrease sexual function because it may lead to pain-reducing behaviors such as avoidance.

Finally, previous PVD research has not taken into account the partner’s perception of his own responses to PVD pain. A study examining congruence between patient and partner perceptions of partner responses to patient’s musculoskeletal pain indicated substantial disagreement among individual couples [39]. Furthermore, some researchers have found that patient perceptions of partner responses are a better predictor of pain outcomes [40,41], whereas others have found that only the partners’ perception of his or her own responses predicted patient outcomes [27]. Although it seems plausible and indeed likely that women’s perceived partner responses would be better predictors of her own outcomes, it is essential to assess both patient and partner ratings of partner responses in order to clarify diverging results. In sum, the current study corrects the aforementioned limitations and furthers our understanding of the impact of dyadic factors in PVD by using validated questionnaires specifically designed to assess partner responses—from the

perspective of both the woman and partner—to predict women’s pain, sexual satisfaction, and functioning.

### Aims

The goals of the present study were to: (i) examine whether partner responses to women’s pain experience are associated with women’s pain intensity, sexual function, and sexual satisfaction; and (ii) compare the influence of women’s and partners’ perception of partner responses on outcome measures. We expected that greater perceived partner solicitousness would be associated with higher levels of pain and sexual satisfaction, but lower sexual function. We further hypothesized that greater perceived negative partner responses would be associated with lower sexual satisfaction and functioning. We did not have any specific hypotheses regarding the comparative influence of women’s vs. partners’ perception of partner responses on our outcome measures.

### Methods

#### Participants

Women were recruited during clinic visits to the study coinvestigator gynecologists or other health professionals (e.g., psychologists) and through advertisements in newspapers and relevant Internet web sites in a large metropolitan area. Women who agreed to participate were screened for eligibility (by telephone or in person) to retain only the women with PVD-like symptoms and who were married or cohabitating with their partner. Eligible women were asked whether their partners would be interested in participating. Of the 218 heterosexual couples who met eligibility criteria and who agreed to participate, 23 partners did not return their questionnaires and four couples had missing questionnaire data representing more than 10% of the questionnaires. The final sample size was comprised of 191 couples. Ninety-one women were recruited at visits to health professionals, 83 women were recruited through advertisements, and 17 women were recruited via participation in another PVD study.

To ensure a homogenous sample of women with PVD, the inclusion criteria were: (i) pain during intercourse which is: (a) subjectively distressing; (b) occurs(ed) on 80% of intercourse attempts; and (c) has lasted for at least 1 year; (ii) pain limited to intercourse and other activities involving pressure

to the vestibule (e.g., bicycle); (iii) when recruited through gynecology clinics, severe pain in one or more locations of the vestibule during the cotton-swab test, pain intensity of at least 5 on a scale of 0–10; and (iv) married or cohabitating with a partner for at least 6 months. Exclusion criteria were the following: (i) vulvar pain not clearly linked to intercourse or pressure applied to the vestibule; and (ii) presence of one of the following: (a) major medical and/or psychiatric illness; (b) active infection; (c) deep dyspareunia; (d) vaginismus; (e) dermatologic lesion; (f) pregnancy; and (g) age less than 18 or greater than 45 years. There were no additional inclusion criteria for partners. The only exclusion criteria were: (i) major medical and/or psychiatric illness; and (ii) age less than 18 years.

### **Procedure**

Women and their partners were provided with separate packages containing two consent forms (one to return and one to keep), a sociodemographic questionnaire, written instructions for completing the standardized questionnaires at home, and preaddressed and prestamped envelopes for returning the materials. Both members of the couple completed the measure of partner responses, while only the woman completed measures of dyadic adjustment, pain, sexual function, and sexual satisfaction. Couples were contacted every 2 weeks after receiving the questionnaires as a reminder to return them if they had not yet done so, up to a maximum of six telephone follow-ups. Once we received the questionnaires from both partners, the couple was scheduled for a 30-minute telephone psychological consultation session about their PVD condition, as a form of compensation for their participation. The present study was approved by our university and university health center's institutional review boards.

### **Measures**

#### **Partner Responses**

Women's perceived partner responses were measured with the Significant Other Response Scale, a subscale of the West Haven-Yale Multidimensional Pain Inventory [42]. This scale assesses the patient's perceived partner responses to pain including negative responses (4 items) and solicitous responses (6 items), and was adapted to the current population of PVD women. The questionnaire's reliability and validity have been well estab-

lished [42,43]. Partners completed the validated partner version of this scale [44]. Participants indicated the frequency of partner responses to the woman's pain during or after intercourse, on a scale ranging from 1 (never) to 7 (very frequently). Higher scores indicate greater frequency of partner responses. Following our adaptation for a PVD population, two items from the woman and partner solicitous subscales were deleted to improve the internal consistency of the scales. Although amenable to adaptation, these items were not representative of the typical solicitous behaviors of partners from a clinical standpoint (e.g., "suggests we turn on the TV"), and from a statistical standpoint, they did not load onto the solicitous subscale. In the present sample, Cronbach's alphas were 0.77 and 0.69 for the solicitous subscales and 0.84 and 0.77 for the negative subscales, for the woman and partner, respectively. Scores could thus range from 4 to 28 on each subscale.

#### **Dyadic Adjustment**

Dyadic adjustment was assessed with the Revised Dyadic Adjustment Scale [45]. Women indicated their responses to 14 items on a scale ranging from 0 (always disagree) to 5 (always agree). Higher scores indicate better adjustment and total scores can range from 0 to 70. This questionnaire has been shown to have excellent reliability and validity [45]. Cronbach's alpha for the current sample was 0.83.

#### **Depression**

Prior chronic pain research has established strong associations between pain intensity, disability, partner responses, and depression [25,31,46]. We therefore included depression as a covariate in our analyses in order to assess the unique contribution of partner responses to pain. Depressive symptoms were assessed with the Beck Depression Inventory-II (BDI-II [47]), which has shown good reliability and validity previously, and in chronic pain populations (e.g., [48]). The BDI-II consists of 21 items with single item scores ranging from 0 (low intensity) to 3 (high intensity). Higher scores indicate more depressive symptoms and total scores can range from 0 to 69. Cronbach's alpha for this sample was 0.90.

#### **Main Outcome Measures**

##### **Pain Intensity**

Women indicated their average level of pain during intercourse (in the last 6 months) using a

horizontal analog scale ranging from 0 (no pain) to 10 (worst pain ever). This measure has been shown to detect significant treatment effects in women with PVD [4] and positively correlates with other pain intensity measures [49].

### Sexual Functioning

Women's sexual functioning was measured with the Female Sexual Function Index (FSFI) [33]. This questionnaire consists of 19 items assessing five dimensions of global sexual functioning including: (i) desire and arousal; (ii) lubrication; (iii) orgasm; (iv) satisfaction; and (v) pain/discomfort. The FSFI has demonstrated excellent psychometric properties [50]. Items were reversed scored so that lower scores indicate greater dysfunction. Total scores range from 2 to 36 and Cronbach's alpha for the current sample was 0.94.

### Sexual Satisfaction

Women's sexual satisfaction was assessed with the Global Measure of Sexual Satisfaction scale, which has good psychometric properties [32]. This scale consists of five items to which participants respond on a 7-point Likert scale. Higher scores indicate greater satisfaction and total scores can range from 5 to 35. Cronbach's alpha was 0.89.

## Results

### Sample Characteristics

Table 1 presents the descriptive statistics for the sociodemographic, independent, and dependent variables in this sample. Couples whose partner did not return the questionnaires did not differ from study participants in any of the study variables, nor did they differ on any sociodemographic variables.

### Zero-Order Correlations

No significant correlations were found between woman- or partner-perceived partner responses and sociodemographic variables. Women's perceived dyadic adjustment was associated with age, indicating that better adjustment was associated with younger age in both women ( $r = -0.18$ ,  $P = 0.01$ ) and men ( $r = -0.20$ ,  $P = 0.01$ ). Higher levels of depression in women were also related to less years of education ( $r = -0.19$ ,  $P = 0.01$ ). Finally, greater sexual satisfaction in women was associated with lower income ( $r = -0.17$ ,  $P = 0.02$ ), pain duration in months ( $r = -0.20$ ,  $P = 0.01$ ), women's age ( $r = -0.16$ ,  $P = 0.03$ ), men's age ( $r = -0.15$ ,  $P = 0.05$ ), and being married ( $r = -0.21$ ,  $P < 0.01$ ).

**Table 1** Descriptive statistics of the sample

	M or N	SD or %
Characteristic		
Age (years)		
Women	33.28	12.07
Partner	35.79	12.44
Women's duration of pain (months)	78.03	83.97
Education level (years)		
Woman	16.03	2.91
Partner	15.63	3.24
Marital status		
Cohabiting	136	71.2
Married	55	28.8
Couple's annual income (N = 185)		
\$0–19,999	17	9.2
\$20,000–39,000	31	11.4
\$40,000–59,000	43	23.3
>\$60,000	104	56.1
Independent variables		
MPI solicitous		
Women	16.61	5.07
Partner	18.09	4.16
MPI negative		
Women	6.24	3.52
Partner	5.69	2.62
Women's Dyadic adjustment (DAS)	51.24	6.91
Dependent variables (Women)		
Pain intensity	7.27	1.59
Sexual satisfaction (GMSEX)	22.81	6.07
Sexual function (FSFI)	17.97	6.94
Depression (BDI-II)	13.44	9.76

Pain = pain intensity on scale of 0 to 10; FSFI = Female Sexual Function Index; GMSEX = Global Measure of Sexual Satisfaction; BDI-II = Beck Depression Inventory-II; MPI = Multidimensional Pain Inventory (S = Solicitous subscale; N = Negative subscale).

Table 2 presents the intercorrelations between partner responses, women's pain intensity, sexual satisfaction, and sexual function. Higher women's pain intensity was associated with higher depression and partner-perceived solicitous responses. Higher women's sexual function was associated with higher sexual satisfaction, and lower woman-perceived negative responses. Higher women's sexual satisfaction was associated with higher woman-perceived solicitous responses, lower negative responses from the perspective of both partners, and lower depression. Higher dyadic adjustment was associated with higher sexual satisfaction as perceived by women, and higher depression was associated with higher negative partner responses as perceived by both women and partners.

### Partner Responses as Predictors of Pain Intensity

Hierarchical regression analyses were conducted to examine the relative contributions of partner solicitous and negative responses to women's pain intensity during intercourse (Table 3). Analyses were conducted separately for woman- and

**Table 2** Correlations between partner responses, women's pain intensity, and psychosexual variables (N = 191)

	Sex function	Sex satisfaction	Depression	Dyadic adjustment (Woman)	Partner responses			
					Sollicitous (Women)	Negative (Women)	Sollicitous (Partner)	Negative (Partner)
Pain	-0.11	-0.09	0.15*	-0.07	0.12	0.03	0.29**	0.08
Sex function	—	0.44**	-0.23**	0.17	0.02	-0.16*	-0.05	-0.01
Sex satisfaction	—	—	-0.24**	0.29**	0.26**	-0.31**	0.05	-0.16*
Depression	—	—	—	-0.25**	-0.12	0.19*	0.07	0.19*
Dyadic adjustment (Woman)	—	—	—	—	0.36**	-0.44**	0.11	-0.30**

\* $P < 0.05$ , \*\* $P < 0.01$ .

Pain = pain intensity on scale of 0 to 10; Sex Function = Female Sexual Function Index (FSFI); Sex Satisfaction = Global Measure of Sexual Satisfaction (GMSEX); Depression = Beck Depression Inventory-II (BDI-II); Dyadic Adjustment = Revised Dyadic Adjustment Scale (R-DAS); Sollicitous = Multidimensional Pain Inventory-Sollicitous subscale (MPI-S); Negative = Multidimensional Pain Inventory-Negative subscale (MPI-N).

partner-perceived responses. In support of our hypothesis, after controlling for depression, higher solicitous partner responses were associated with higher levels of women's vulvovaginal pain intensity. This association was significant for partner's perception of his own responses ( $\beta = 0.29$ ,  $P < 0.001$ ) and for woman-perceived partner responses ( $\beta = 0.16$ ,  $P = 0.04$ ). The overall model for partner-perceived partner responses predicting pain was significant,  $F(3,187) = 7.41$ ,  $P < 0.001$ , accounting for 11% of the variance, with 9% accounted for by partner responses. The overall model for woman-perceived partner responses predicting pain was significant,  $F(3,187) = 2.82$ ,  $P = 0.04$ , and accounted for 4% of the variance in pain intensity, with 2% accounted for by partner responses.

**Table 3** Results of hierarchical regression analyses for woman-perceived and partner-perceived partner responses predicting women's pain intensity

	B	SE B	$\beta$
Woman-perceived			
Step 1			
Depression (BDI-II)	0.02	0.01	0.15*
Step 2			
Depression (BDI-II)	0.03	0.01	0.15*
Sollicitousness (MPI-S)	0.05	0.02	0.16*
Negative (MPI-N)	0.03	0.04	0.06
Partner-perceived			
Step 1			
Depression (BDI-II)	0.2	0.01	0.15*
Step 2			
Depression (BDI-II)	0.02	0.01	0.12
Sollicitousness (MPI-S)	0.11	0.03	0.29**
Negative (MPI-N)	0.06	0.04	0.09

\* $P < 0.05$ , \*\* $P < 0.01$ .Woman-perceived:  $R^2 = 0.02$  for Step 1;  $\Delta R^2 = 0.02$  for Step 2; Partner-perceived:  $R^2 = 0.02$  for Step 1;  $\Delta R^2 = 0.09$  for Step 2.

BDI-II = Beck Depression Inventory-II; MPI = Multidimensional Pain Inventory (S = Sollicitous subscale; N = Negative subscale).

### Partner Responses as Predictors of Sexual Function and Sexual Satisfaction

Hierarchical regression analyses were conducted to examine the relative contributions of partner solicitous and negative responses to women's sexual function and sexual satisfaction (Table 4). Analyses were conducted separately for woman- and partner-perceived responses. In support of our hypothesis, after controlling for sexual function, dyadic adjustment, and depression, woman-perceived greater solicitous partner responses ( $\beta = 0.16$ ,  $P = 0.02$ ) predicted greater sexual satisfaction. A trend was also observed in the direction of our hypothesis in that after controlling for sexual function, dyadic adjustment, and depression, lower negative partner responses predicted greater sexual satisfaction ( $\beta = -0.14$ ,  $P = 0.055$ ). The overall model for woman-perceived partner responses predicting sexual satisfaction was

**Table 4** Results of hierarchical regression analyses for woman-perceived partner responses predicting women's sexual satisfaction (GMSEX)

	B	SE B	$\beta$
Woman-perceived			
Step 1			
Sexual function (FSFI)	0.34	0.06	0.39**
Depression (BDI)	-0.06	0.04	-0.1
Dyadic adjustment (DAS)	0.17	0.06	0.19*
Step 2			
Sexual function (FSFI)	0.34	0.06	0.38**
Depression (BDI)	-0.05	0.04	-0.08
Dyadic adjustment (DAS)	0.07	0.06	0.08
Sollicitousness (MPI-S)	0.19	0.08	0.16*
Negative (MPI-N)	-0.24	0.12	-0.14***

\* $P < 0.05$ , \*\* $P < 0.01$ , \*\*\* $P = 0.055$ . $R^2 = 0.25$  for Step 1;  $\Delta R^2 = 0.05$  for Step 2.

GMSEX = Global Measure of Sexual Satisfaction; FSFI = Female Sexual Function Index; BDI-II = Beck Depression Inventory-II; DAS = Dyadic Adjustment; MPI = Multidimensional Pain Inventory (S = Sollicitous subscale; N = Negative subscale).

significant,  $F(5,185) = 15.66$ ,  $P < 0.001$ , and accounted for 30% of the variance in sexual satisfaction, with 5% of the variance accounted for by partner responses. Partner's perception of his own responses did not predict women's sexual satisfaction. In contrast to our hypothesis, partner responses were not associated with women's sexual function.

### Discussion

The purpose of this study was to examine whether partner responses to women's pain experience—from the perspective of both the woman and her partner—were associated with women's pain intensity, sexual function, and sexual satisfaction. Consistent with findings from the chronic pain literature, our results support the important role of relationship factors in the experience of pain [28,39]. In line with our hypotheses, partner responses, from the perspective of both the woman and partner, predicted women's pain intensity and sexual satisfaction. Specifically, after controlling for depression, higher woman-perceived and partner-perceived solicitous partner responses were associated with higher levels of women's vulvovaginal pain intensity. Furthermore, after controlling for sexual function, dyadic adjustment, and depression, woman-perceived greater solicitousness was associated with greater sexual satisfaction. We also found a trend in the direction of our hypothesis that, after controlling for the aforementioned variables, lower negative partner responses were associated with greater sexual satisfaction. Partner-perceived responses were not associated with women's sexual satisfaction. We did not find support for our hypothesis regarding the relationship between partner responses and women's sexual function. Our sample included women with PVD who were in stable, heterosexual relationships, which may not be reflective of the general population of women with PVD.

Our finding that greater solicitous partner responses are associated with higher vulvovaginal pain intensity is consistent with findings from the chronic pain literature (e.g., [25,26,29]) and with the only prior study to date examining partner responses to PVD pain [17]. This result supports Fordyce's [22] operant learning model, which suggests that partner solicitousness in response to pain—demonstrated by expressions of attention, support, and empathy—reinforces the patient's avoidant behaviors as well as negative appraisals of

pain. In the context of PVD, partner solicitousness may encourage avoidance of sexual intercourse and/or exacerbate vulvovaginal pain by heightening cognitive-affective factors such as catastrophizing, anxiety, and hypervigilance, which have been demonstrated to be associated with increased pain during intercourse (e.g., [7,10]). In other words, avoiding sexual intercourse may reinforce women's negative cognitive pain appraisals, which in turn may increase their pain during intercourse.

With respect to sexual satisfaction, both solicitous and negative partner responses, as perceived by the woman, influenced her level of sexual satisfaction. It is possible that higher solicitous partner responding could be interpreted as a greater sensitivity and understanding of the woman's pain during sexual activity, resulting in greater sexual satisfaction. In contrast, greater negative partner responses may signal a lack of sensitivity and create a negative interpersonal context for sexual activity [17], thereby decreasing sexual satisfaction.

Still, our finding that greater solicitousness is associated with higher pain but also greater sexual satisfaction is paradoxical: how should the partner respond so as to minimize the woman's pain intensity, but maximize her sexual satisfaction? We propose that a third type of partner response termed "facilitative" warrants further investigation as a possible solution to this dilemma. Facilitative responses refer to partner responses that encourage the patient's efforts at coping with the pain [51]. According to the operant learning model, partner responses, such as solicitousness and negativity, may positively or negatively reinforce a patient's avoidance of pain. The operant model implies that partner responses can also play a role in reinforcing more adaptive coping behaviors [22,52]. Indeed, Schwartz et al. [51] showed that facilitative responses to patient pain behaviors were associated with less patient disability in a chronic pain population, presumably by reducing avoidant behaviors. In the context of PVD, facilitative partner responses may encourage women's approach of sexual activity (whereas solicitous responses encourage avoidance) by, for example, focusing on less painful sexual activities or by expressing affection and pleasure during or after sexual activity. Although facilitative and solicitous responses may lead to different behavioral outcomes, they share some conceptual overlap in that both tap into partner sensitivity. Specifically, both response types are likely to be perceived by women in a positive light, that is, women may perceive

both types of responses as supportive. Thus, we would expect that facilitative and solicitous responses may decrease and increase pain, respectively, as described above; however, both would likely increase sexual satisfaction. Partner sensitivity to women's pain may translate into greater sexual satisfaction in women with PVD because, for example, couples may be more likely to focus on sexual activities other than penetration [53] or on the emotional benefits of sexual activity (e.g., intimacy, closeness). What constitutes facilitative partner responses to vulvovaginal pain and the impact of this response pattern on women's pain and psychosexual functioning is an important avenue for future research.

The finding that partner responses were associated with women's sexual satisfaction and not sexual function was surprising given that these two variables are positively correlated, but still, it is consistent with previous research [17]. This result provides evidence that these constructs are, in part, distinct, each capturing unique variance that cannot be accounted for by the other and should therefore be measured with separate, comprehensive inventories. One possible explanation for our finding is that for women, sexual satisfaction may be more dependent on the emotional, interpersonal, and relational aspects of sexual interaction, whereas sexual functioning focuses heavily on the physiological *intrapersonal* facets of sexual interaction [32]. Previously researchers have found that relational variables (e.g., communication, intimacy, affection) are better predictors of sexual satisfaction than individual variables (e.g., personality traits) [54] and even sexual function [55]. However, these studies did not compare the relative influence of relational predictors on sexual satisfaction vs. sexual function. Based on this theoretical explanation, a relational variable such as partner responses would be expected to predict sexual satisfaction and not sexual function. Our findings underscore the importance of assessing sexual satisfaction and sexual function separately not only to increase the power to make correct predictions in research, based on one's specific question, but also to promote a multidimensional view of sexuality.

The second goal of this research was to compare the influence of women's and partner's perception of partner responses on outcome measures. We found that both woman- and partner-perceived partner responses predicted women's pain intensity, which is consistent with the limited data on dyadic agreement in chronic pain couples [39]. However, only woman-perceived partner

responses predicted women's sexual satisfaction. That partner's perception of his own responses failed to predict women's sexual satisfaction is consistent with the single PVD study that assessed the impact of a cognitive variable from the perspective of both members of the couple on women's functioning. Specifically, Jodoin et al. found that partner-perceived attributions for PVD pain did not predict women's pain or sexual function [18]. Specifying whether the patients' or partners' perception of partner responding predicts, or is a better predictor, of patient outcomes may have implications for choosing appropriate measures in future research, depending on the goals of the study. Moreover, if partner responses are highly consistent, then we can be more confident that the behavior is being accurately measured by asking only one of the two partners [39]. The current study is only the second to take into account the perspective of both women and partners. Future studies may help clarify the diverging results regarding the influence of partner-perceived variables on women's pain. Our findings provide preliminary support for the contention that for some outcomes, such as sexual satisfaction, only the women's perception of partner responses is predictive, but for other outcomes such as pain intensity, either partner's perception may accurately predict outcomes.

Although our study selection criteria corresponded to a diagnosis of PVD, a portion of the participants were not diagnosed through a standardized gynecological examination, which represents a limitation of this study. The findings also may not generalize to other populations of women with vulvovaginal pain. In particular, our selection criteria required women to be subjectively distressed. Although women with PVD do not always score high on measures of general psychological distress, most women do report distress related to their condition [2]. Our sample of women included 48% recruited at visits to health professionals, 43% recruited through advertisements, and 9% recruited via participation in another PVD study, suggesting that our sample was indeed representative of women with PVD. In addition, this study, similar to prior research, cannot establish causal relations among the variables of interest. Future research should use prospective and experimental designs such as observational and experience processing methods to tease apart the temporal order of the associations among partner responses, pain, and psychosexual variables. Such studies will contribute to the development of more complex,



biopsychosocial, etiological models of PVD and will inform the development of treatment services involving both members of the couple. Future research should also examine the influence of partner responses on additional psychosocial outcomes such as anxiety; especially given the relatively robust finding of heightened anxiety in women with PVD [1,8,10,56]. Despite these limitations, the current study furthers our understanding of the role of dyadic factors in PVD by using validated questionnaires specifically designed to assess woman-perceived and partner-perceived partner responses to predict women's pain, sexual satisfaction, and sexual functioning, and by involving a large sample size.

### Conclusions

In summary, our results suggest that partner responses to women's vulvovaginal pain influence women's pain and sexual satisfaction. Specifically, greater partner solicitousness, from the perspective of the woman and partner, predicted greater pain intensity during intercourse. In addition, women's perceived higher partner solicitousness and lower negative responses predicted greater sexual satisfaction in women. Taken together, these findings support the integration of dyadic processes in the conceptualization of PVD and suggest specific factors that could be targeted in psychological couples' interventions.

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*Conflict of Interest:* None.

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