

# Talking About Sex When Sex Is Painful: Dyadic Sexual Communication Is Associated With Women's Pain, and Couples' Sexual and Psychological Outcomes in Provoked Vestibulodynia

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Received: 27 July 2015 / Revised: 2 November 2015 / Accepted: 17 November 2015  
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**Abstract** Provoked vestibulodynia (PVD) is a recurrent vulvovaginal pain condition associated with psychological and sexual consequences for affected women and their partners, including lower quality of dyadic sexual communication compared to pain-free couples. Although greater sexual communication is associated with positive sexual and relational outcomes for both pain-free couples and couples experiencing painful sex, little is known about its role in women's pain and psychological outcomes, especially in a relational context. The present study examined associations between dyadic sexual communication and pain, sexual satisfaction, sexual functioning, and depressive symptoms in a sample of 107 couples in which the woman was diagnosed with PVD via a standardized gynecological assessment. Women completed a measure of pain intensity, and both members of the couple completed measures of their dyadic sexual communication, sexual satisfaction, sexual functioning, and depressive symptoms. Analyses were guided by the actor-partner interdependence model. Women and partners' own perceptions of greater dyadic sexual communication were associated with their own greater sexual satisfaction and sexual functioning, and lower depressive symptoms. Partners' perceptions of greater dyadic sexual communication were also associated with women's lower pain and greater sexual satisfaction. Results point to the impor-

tance of dyadic coping conceptualizations for both individual and interpersonal outcomes in PVD. Dyadic sexual communication may be a key treatment target for interventions aimed at improving the pain and psychological and sexual impairments of women with PVD and their partners.

**Keywords** Sexual communication · Provoked vestibulodynia · Couples · Vulvodynia · Pain

## Introduction

Provoked vestibulodynia (PVD), the most common subtype of vulvodynia, is a chronic vulvovaginal pain condition. PVD is the most prevalent cause of genito-pelvic pain and penetration disorder (American Psychiatric Association, 2013) among premenopausal women in the general population, with estimates indicating that it affects between 7 and 12% of women (Harlow et al., 2014; Harlow & Stewart, 2003). PVD is most often described as a burning or cutting pain (Bergeron, Binik, Khalifé, Pagidas, & Glazer, 2001) that is localized to the vulvar vestibule, and is elicited when pressure is applied to the area through both non-sexual (e.g., tampon insertion) and sexual activities (e.g., vaginal intercourse). The etiology of PVD is complex, with an array of biomedical, psychological, and social factors contributing to the onset and maintenance of the pain (Bergeron, Corsini-Munt, Aerts, Rancourt, & Rosen, 2015). In recent years, research has emphasized the influence of interpersonal factors in PVD (Rosen, Rancourt, Corsini-Munt, & Bergeron, 2014c); however, no studies to date have examined the role of couples' sexual communication on their multifactorial adjustment to this condition. The present study addresses this gap by examining associations between sexual communication and pain, sexual, and psychological outcomes in couples coping with PVD.

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Growing empirical evidence highlights the negative impact of PVD on women's and partners' sexual and psychological adjustment. In qualitative studies, women with PVD report avoidance of affectionate or sexual contact with their partners for fear that it will lead to painful intercourse, illustrating the degree to which PVD may disrupt couples' intimacy and shared sexuality (Ayling & Ussher, 2007; Marriott & Thompson, 2008). Both women with PVD and their partners are more likely than unaffected couples to experience reduced sexual satisfaction (Smith & Pukall, 2011, 2014). Controlled studies indicate that women with PVD report lower frequencies of intercourse and lower desire, as well as difficulties with arousal and orgasm (Masheb, Lozano-Blanco, Kohorn, Minkin, & Kerns, 2004), while male partners of women with PVD are more likely to experience erectile dysfunction (Pazmany, Bergeron, Verhaeghe, Van Oudenhove, & Enzlin, 2014; Smith & Pukall, 2014). In addition, both women with PVD and their partners experience increased symptoms of psychological distress, including depressive symptoms (Bergeron et al., 2015; Nylanderlundqvist & Bergdahl, 2003).

### Dyadic Context of Provoked Vestibulodynia

Among women with PVD in relationships, the pain is most commonly triggered through partnered sexual activity. Given this interpersonal context, couples' interactions may contribute to their ability to navigate the impact of PVD on their individual and shared lives. Several studies in PVD samples demonstrate that relational factors influence women's pain and couples' sexual and psychological functioning (for review, see Rosen et al., 2014c). For instance, greater facilitative partner responses to pain (i.e., encouraging adaptive coping) are associated with women's decreased pain and both partners' enhanced sexual satisfaction and functioning. In contrast, greater solicitous (i.e., sympathy or increased attention) and negative partner responses (i.e., expressing hostility or annoyance) are associated with women's increased pain and depressive symptoms and couples' less favorable sexual outcomes (Rosen, Bergeron, Glowacka, Delisle, & Baxter, 2012; Rosen et al., 2014a, b).

Dyadic approaches offer empirical and theoretical gains by allowing for a more nuanced understanding of relational processes in couples coping with PVD. Dyadic models of chronic health conditions underscore the adjustment and coping of individual partners as occurring in relation to one another (Reed, Butler, & Kenny, 2013). Specifically, the systems–transactional model indicates that when couples are faced with a stressor such as a partner's persistent health concern, partners may engage in both individual and dyadic level coping strategies, with each partner's coping efforts reciprocally influencing the other (Bodenmann, 1995). The developmental–contextual model of dyadic coping in chronic illness extends these transactions to capture broader systemic processes that may influence couples' dyadic coping and subsequent adjustment (e.g., time, prior coping

efforts, and qualities of the relationship; Berg & Upchurch, 2007). Applying this model to couples with PVD, it could be hypothesized that aspects of their relationship, such as the quality of their communication, may influence their dyadic coping and, in turn, women's pain and the couples' sexual and psychological adjustment.

### Sexual Communication

Sexual communication refers to couples' interactions concerning sexual matters (e.g., disclosures of sexual preferences or discussions of sexual problems; Mark & Jozkowski, 2013; Rehman, Rellini, & Fallis, 2011). Until recently, sexual communication has largely been neglected in PVD (Pazmany et al., 2014; Pazmany, Bergeron, Verhaeghe, Van Oudenhove, & Enzlin, 2015; Smith & Pukall, 2014). This is noteworthy, as an abundance of evidence points to open and effective sexual communication as being an important determinant of increased sexual satisfaction and function among men and women in committed relationships (Hurlbert, 1991; MacNeil & Byers, 2009; Mark & Jozkowski, 2013; Montesi, Fauber, Gordon, & Heimberg, 2011; Rehman et al., 2011).

Sexual communication may contribute to couples' sexual well-being via two pathways—one instrumental and the other expressive (MacNeil & Byers, 2009). Through the instrumental pathway, couples' communication about sexual preferences is thought to facilitate change in their performance scripts (i.e., sexual behaviors they enact together) such that each partner experiences more sexual likes and fewer dislikes, and subsequently, greater sexual satisfaction. Through the expressive pathway, couples' sexual communication is thought to enhance perceptions of intimacy, thereby contributing to greater sexual satisfaction. Evidence supports these pathways in community samples of men and women in relationships (MacNeil & Byers, 2005, 2009). Although the instrumental and expressive pathways predict how sexual communication contributes to sexual satisfaction, they could conceivably influence women's pain and associated impairments in couples' sexual function. If sexual communication facilitates change in sexual scripts via the instrumental pathway, in the context of PVD, this may involve focusing less on activities that elicit pain, and more on pleasurable activities that facilitate sexual desire and arousal. Via the expressive pathway, enhancing intimacy through sexual communication might contribute to couples' greater sexual response, lower depression, and women's lower pain through more effective emotion regulation and pain coping (Cano & Williams, 2010; Rosen et al., 2014c).

### Sexual Communication in Provoked Vestibulodynia

In vulvovaginal pain samples, uncontrolled studies indicate that a considerable proportion of women report poor sexual communication, or discomfort about discussing sex with their partners

(i.e., 49 and 36 %, respectively; Jelovsek, Walters, & Barber, 2008; Schover, Youngs, & Cannata, 1992). Similarly, women experiencing dyspareunia (i.e., pain during intercourse) and their partners report lower dyadic sexual communication—between-partner discussions of sexual topics—than unaffected couples (Pazmany et al., 2015; Smith & Pukall, 2014).

Opening the lines of communication about sex may assist couples in mitigating the impact of PVD on their psychological and sexual well-being. Applying the developmental–contextual model of coping, dyadic sexual communication may be a means by which couples can share and respond to one another’s sexual stressors and develop strategies for managing the pain as it intersects with their sexuality (Berg & Upchurch, 2007). In PVD, recent studies have examined constructs related to communication, such as greater intimate exchanges (Bois, Bergeron, Rosen, McDuff, & Grégoire, 2013), greater sexual assertiveness (Leclerc et al., 2014), and less ambivalence over emotional expression (Awada, Bergeron, Steben, Hainault, & McDuff, 2014), and have found that these constructs are associated with couples’ better sexual satisfaction and functioning and lower depressive symptoms. Together, these studies suggest benefits of PVD couples’ open and direct communication on their sexual and psychological adjustment.

### Dyadic Measurement of Sexual Communication

Although sexual communication in couple relationships necessitates the involvement of both members of the couple, prior studies have largely examined sexual communication as an intrapersonal phenomenon (e.g., sexual self-disclosure; MacNeil & Byers, 2009; Rehman et al., 2011). Additionally, prior studies have primarily examined associations between sexual communication and outcomes separately for men and women (e.g., MacNeil & Byers, 2009). Increasingly, couples’ research is turning to the use of dyadic data analytic approaches, such as the actor–partner interdependence model (APIM), which allow for the estimation of both intrapersonal and interpersonal effects while controlling for the non-independence of couple data (Kenny, Kashy, & Cook, 2006).

Only one study to date has employed dyadic methods to examine the association between sexual communication and outcomes in couples affected by pain during intercourse. In 38 women with dyspareunia and their partners, Pazmany et al. (2015) employed the APIM and found that women’s greater dyadic sexual communication was associated with their own greater sexual functioning and relationship adjustment, and lower sexual distress. Additionally, partners’ greater dyadic sexual communication was associated with their own greater relationship adjustment. The authors did not find an association between dyadic sexual communication and women’s pain. Women in this study did not undergo a standardized gynecological exam, and coupled with the self-reported nature of their dyspareunia symptoms, the heterogeneity of this sample limited the generalizability

of these findings to PVD couples. Moreover, the small sample size may have limited the authors’ power to determine statistically significant effects of a smaller magnitude (e.g., associations with pain). Finally, given the numerous adverse consequences associated with PVD, it is important to examine associations between dyadic sexual communication and other key outcomes, including sexual satisfaction and depression.

In summary, although empirical evidence demonstrates robust associations between sexual communication and the sexual well-being of individuals in community samples (e.g., Mark & Jozkowski, 2013; Montesi et al., 2011; Rehman et al., 2011), only one study has evaluated associations between sexual communication and sexuality in a clinical sample of couples afflicted by painful intercourse (Pazmany et al., 2015). In addition, to our knowledge, no research in PVD evaluates associations between sexual communication and other important domains of functioning, such as depressive symptoms. Moreover, prior studies have been atheoretical, and failed to take into account the dyadic context of sexual communication in its measurement, research design, and statistical methods.

### Objectives

The present study examined the associations between dyadic sexual communication and women’s pain intensity, as well as the sexual adjustment (i.e., sexual satisfaction and functioning), and psychological adjustment (i.e., depressive symptoms) of women with PVD and their partners. We hypothesized that women’s and partners’ perceptions of higher quality dyadic sexual communication would be associated with women’s lower pain. We also hypothesized that an individual’s perceptions of higher quality dyadic sexual communication would be associated with their own, as well as their partners’, greater sexual satisfaction, greater sexual functioning, and lower depressive symptoms.

### Method

#### Participants

Women and their romantic partners were recruited between July 2010 and November 2014 to participate in the present study. Two-hundred and seventy-three women contacted the laboratory and were provided with information about the study. Women were recruited through community print and online advertisements ( $N = 194$ ; 71 %), via referrals from local health care providers ( $N = 41$ ; 15 %), from previous participation in research studies conducted in our laboratory ( $N = 22$ ; 8 %), and unknown sources ( $N = 16$ ; 6 %). Of these initial contacts, 94 women (34 %) indicated that they were not interested in participating for various reasons (e.g., time commitment, childcare barriers, discomfort with study procedures, and lost to contact). Interested women ( $N = 179$ ) were screened for eligibility using a structured

telephone interview and were then asked to attend a diagnostic gynecological examination. Eligibility criteria included: (1) women experiencing pain during intercourse on 75 % of intercourse attempts for a minimum of 6 months; (2) women's pain elicited only by pressure to the vulvar vestibule (e.g., intercourse, tampon insertion); (3) women receiving a diagnosis of PVD from one of our collaborating physicians following a standardized cotton-swab test (i.e., randomized palpation to the vulvar vestibule at 3, 6, and 9 o'clock accompanied by women's self-reported pain ratings on a 0–10 scale; Bergeron et al., 2001); (4) couples being in a committed relationship for a minimum of 6 months; (5) couples cohabiting or having a minimum of four in-person contacts per week. Couples were ineligible if they met any of the following exclusion criteria: (1) age less than 18 years (women and partners) or greater than 45 years (women); (2) presence of an active vaginal infection (self-reported or diagnosed during the gynecological examination); (3) diagnosis of vaginismus (as defined by DSM-IV-TR) (American Psychiatric Association, 2000); (4) currently pregnant or planning a pregnancy. Following the screening interview, women were asked to confirm their partners' interest in participation. Seventy-two women (26 % of initial contacts) were deemed ineligible for the study for the following reasons: partner ineligible/not interested ( $N = 15$ ), the woman did not meet diagnostic criteria for PVD ( $N = 16$ ), ineligible relationship status ( $N = 24$ ), age ( $N = 6$ ), other ( $N = 11$ ). This study included a final sample of 107 women and their male partners.

## Procedure

Data for the present manuscript were collected from couples participating in two larger studies, both following the same recruitment protocol discussed above, and one of which is being conducted across two cities. The eligibility criteria and PVD diagnostic procedures were consistent across each study and city. Eighty-nine couples (83 %) participated in a daily diary study of PVD couples in city one only, whereas 18 couples (17 %) were entering a treatment study for PVD in cities one and two. Couples completed the current study measures as part of their baseline assessment *before* beginning the diaries or treatment. The majority of couples ( $N = 98$ ; 92 %) participated in city one. While portions of the data from the baseline assessments of the larger studies have been presented elsewhere (Boerner & Rosen, 2015; Rosen et al., 2012), this is the first study from this sample to examine associations between dyadic sexual communication and women's pain, and couples' sexual and psychological outcomes.

The institutions' research ethics boards approved each of the two larger studies. Following their eligibility assessment, couples attended an orientation session with a research assistant and provided their informed consent to participate. They then completed the online self-report measures on separate computers. Couples were instructed not to discuss the measures with one another. Couples were provided compensation in appreciation

of their participation, commensurate with the larger study that they participated in.

## Measures

### *Dyadic Sexual Communication*

Sexual communication was measured using the Dyadic Sexual Communication (DSC) scale (Catania, 1986), a 13-item measure that assesses couples' perceptions of their joint communication around their sexual relationship (e.g., "My partner and I can usually talk calmly about our sex life"). Each item is rated on a 6-point likert-type scale from 1 (strongly disagree) to 6 (strongly agree). Scores are summed, with total scores ranging from 13 to 78. Higher scores on the DSC scale are indicative of couples' higher quality of communication around sexual matters. The DSC scale has demonstrated good internal consistency, and items load onto a single factor of sexual communication (Catania, 2011). Cronbach's alpha for the present sample was 0.81 for women, and 0.84 for partners.

### *Pain*

Women's average pain intensity during intercourse during the last 6 months was assessed using a numerical rating scale (NRS) that ranged from "no pain" to "worst pain ever." Numerical rating scales are recommended for the assessment of clinical pain intensity, and correspond to other measures of pain intensity (e.g., Hjermstad et al., 2011). Of the present sample, 73 % of women ( $N = 78$ ) rated their pain on a 1–10 scale, and the remaining 27 % of women ( $N = 29$ ) rated their pain on a 0–10 scale. For the present analyses, scores were standardized so that all pain intensity ratings were on the same metric.

### *Sexual Satisfaction*

Satisfaction with the sexual relationship was measured using the 5-item Global Measure of Sexual Satisfaction (GMSEX; Lawrance & Byers, 1995). Each item is rated on a 7-point likert scale, with anchors representing bipolar adjectives (e.g., good-bad, satisfying-unsatisfying). Scores are summed, and total scores range from 5 to 35, with higher scores indicating greater sexual satisfaction. The GMSEX has demonstrated high internal consistency and construct validity (Lawrance & Byers, 1995). Cronbach's alpha for the present sample was 0.93 for women, and 0.94 for partners.

### *Women's Sexual Functioning*

Women's sexual functioning was measured using the Female Sexual Function Index (FSFI; Rosen et al., 2000), a 19-item self-report measure. The FSFI measures six domains of sexual functioning: desire, arousal, orgasm, lubrication, satisfaction, and

pain. Total scores range from 2 to 36, with higher scores indicating better sexual functioning. In several studies, the FSFI has demonstrated good internal consistency and construct validity (e.g., Rosen et al., 2000; Wiegand, Meston, & Rosen, 2005), and has shown evidence of discriminant validity in a sample of women with vulvodynia (Masheb et al., 2004). In the present study, only a subsample of 86 women (80 % of the full sample) were administered this measure and were included in relevant analyses. Cronbach's alpha in this subsample was 0.94.

### Men's Sexual Functioning

Men's sexual functioning was measured using the International Index of Erectile Function (IIEF; Rosen et al., 1997), a 15-item self-report measure that evaluates five domains of male sexual functioning, including erectile function, orgasmic function, sexual desire, intercourse satisfaction, and overall satisfaction. Scores are summed, with total scores ranging from 5 to 75, and higher scores indicating better sexual functioning. The IIEF has demonstrated high internal consistency, discriminant validity, and good construct validity (e.g., Rosen et al., 1997). Only a subsample of 86 men (80 % of the full sample) were administered this measure and were included in relevant analyses. Cronbach's alpha in this subsample was 0.89.

### Depressive Symptoms

Depressive symptoms were measured using the Beck Depression Inventory—II (BDI-II; Beck, Steer, & Brown, 1996), an established self-report measure that has demonstrated good construct validity and internal consistency in chronic pain populations (e.g., Harris & D'Eon, 2008). The BDI-II consists of 21 items measured on a scale of 0 (low intensity) to 3 (high intensity). Scores are summed, with total scores range from 0 to 63, and higher scores indicating greater depressive symptomatology. In this sample, Cronbach's alpha for women was 0.92, and for men was 0.90.

### Data Analyses

Of the 107 couples in this study, 86 couples had completed all study measures and were included in all analyses, whereas 21 couples were excluded from the sexual function analyses because they were not administered the FSFI and IIEF. Of the 107 couples, minimal data were missing for each measure (<3.5 % at the item-level). Expectation maximization was used to impute item-level missing data. This approach is indicated as a small amount of data were missing (<5.0 %) and data were missing completely at random (Scheffer, 2002), as indicated by a non-significant Little's (1988) MCAR test,  $\chi^2 = 460.29$ ,  $p = .65$ . *t*-tests were used to examine whether women and partners' dyadic sexual communication and outcome scores differed by study type (i.e., pre-diary or pre-treatment study). Pearson's correlations were

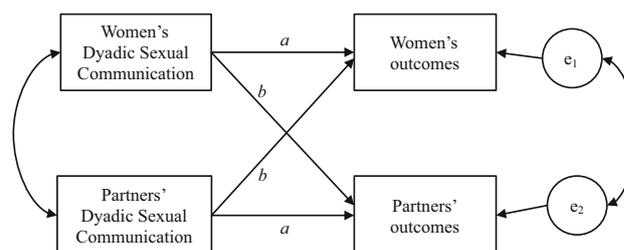
conducted to examine intercorrelations among study variables, and to evaluate the need to control for sociodemographic covariates in the primary analyses. Sociodemographic variables that were correlated with outcome variables at  $r \geq .30$  were included as covariates in the primary analyses (Frigon & Laurencelle, 1993). All preliminary analyses were conducted in SPSS version 22.

Given the non-independence of dyadic data (e.g., Kenny et al., 2006), we employed actor–partner interdependence models (APIMs) to examine the influence of dyadic sexual communication on women's pain and couples' sexual and psychological outcomes. APIMs examine the influence of intrapersonal (i.e., actor) and interpersonal (i.e., partner) effects while accounting for the non-independence of couple data. Thus, actor effects captured the influence of an individual's dyadic sexual communication on their own outcomes (paths labeled *a* in Fig. 1), and partner effects captured the influence of an individual's dyadic sexual communication on their partner's outcomes (paths labeled *b* in Fig. 1). APIMs were implemented using path analysis with robust maximum likelihood estimation. Consistent with published recommendations regarding the APIM, women and partners' predictors were grand-mean centered and were allowed to covary, and correlated errors were specified between women's and partners' outcomes (Kenny et al., 2006). To allow for an APIM to be modeled for the effect of dyadic sexual communication on women and men's sexual functioning, scores on the FSFI and the IIEF were independently standardized using z-scores so that they would be on the same metric. The effects of dyadic sexual communication on pain intensity were analyzed using path analysis, but an APIM was not modeled as only women gave ratings of pain intensity. All path analyses were conducted using Mplus 7.3 (Muthén & Muthén, 2014).

## Results

### Descriptive Statistics

Table 1 presents the descriptive statistics for the sociodemographic variables of this sample. All partners who participated



**Fig. 1** The actor–partner interdependence model. Actor effects are represented by the *a* pathways, and partner effects are represented by the *b* pathways. The terms  $e_1$  and  $e_2$  represent the unexplained variance in women's and men's outcome data, respectively. Single-headed arrows represent unstandardized regression coefficients and double-headed arrows represent covariances

in this study were male; therefore, for ease of comprehension, partners will be referred to as “men” from this point forward. Women entering the daily diary study reported more years of education ( $M = 17.61$ ;  $SD = 1.61$ ) than women entering the treatment study ( $M = 16.12$ ;  $SD = 2.93$ ),  $t(105) = 2.09$ ,  $p = .04$ . Table 2 presents the descriptive statistics for predictor and outcome variables in this sample. Both women and men entering the daily diary study reported significantly greater depressive symptoms (women:  $M = 16.07$ ,  $SD = 10.34$ ; men:  $M = 9.44$ ,  $SD = 7.67$ ) than those entering the treatment study (women:  $M = 9.23$ ,  $SD = 7.71$ ,  $t(105) = 2.64$ ,  $p = .01$ ; men:  $M = 4.67$ ,  $SD = 5.52$ ,  $t(105) = 2.51$ ,  $p = .01$ ). Thus, for the APIM on depressive symptoms, study type was included as a covariate. Women entering the treatment study also reported significantly lower dyadic sexual communication ( $M = 55.11$ ,  $SD = 11.90$ ) than women entering the daily diary study ( $M = 61.01$ ,  $SD = 10.49$ );  $t(105) = -2.13$ ,  $p = .04$ . Consequently, the APIMs were modeled while controlling for the effect of study type on dyadic sexual communication. When controlling for the influence of study type, the pattern and significance of the results remained the same as the APIMs conducted without study type. As a result, the most parsimonious models are presented.

**Table 1** Sociodemographic characteristics for the sample ( $N = 107$ )

Variable	<i>M</i> (range) or <i>n</i>	<i>SD</i> or %
Age		
Women <sup>a</sup>	28.27 (18–44)	6.14
Men	30.22 (19–50)	7.38
Education (years)		
Women	16.37 (11–27)	2.8
Men	16.09 (11–31)	3.21
Culture		
Women		
Canadian/American	100	93.46
European	5	4.67
Other	2	1.87
Men		
Canadian/American	95	88.79
European	5	4.67
Other	7	6.54
Couples' annual income		
\$0–19,999	9	8.41
\$20,000–39,999	21	19.63
\$40,000–59,000	18	16.82
>\$60,000	59	55.14
Relationship status		
Married	46	42.99
Relationship length (months)	74.36 (5–240)	59.3
Women's pain duration <sup>a</sup> (months)	75.33 (6–312)	58.13

<sup>a</sup>  $n = 106$

Preliminary analyses also examined correlations between sociodemographic characteristics and women's and men's outcome variables to assess for the need to include covariates in the primary analyses. Women's and men's age was negatively correlated with men's sexual functioning at or above .30, the criterion set for the inclusion of covariates (women:  $r = -.31$ ,  $p < .01$ ; men:  $r = -.30$ ,  $p < .01$ ); therefore, age was the only covariate included in the primary analyses, and only for the APIM on sexual functioning. The patterns and significance of the results remained the same when including age as a covariate in the model, and as such, the most parsimonious model is presented below.

## Bivariate Correlations

Table 3 shows the correlations between dyadic sexual communication, women's pain, and sexual and psychological outcomes for women and men (i.e., intrapersonal effects), and between women and men (i.e., interpersonal effects). Women's reported dyadic sexual communication was correlated positively with measures of their own sexual satisfaction and sexual functioning, and was correlated negatively with depressive symptoms. A similar pattern was evident for men. Interpersonal effects were present between dyadic sexual communication and all outcomes except depressive symptoms. While men's reports of dyadic sexual communication showed a negative correlation with women's pain intensity, women's reports of dyadic sexual communication showed no relation to pain intensity. The effects in Table 3 are generally larger within person than between persons.

Table 3 also shows correlations between women's and men's reports on the same measure (e.g., dyadic sexual communication).

**Table 2** Scores on study predictor and outcome measures for women with PVD and men ( $n = 107$ )

Variable	<i>M</i>	<i>SD</i>	Range	
			Min	Max
Dyadic sexual communication				
Women	60.02	10.91	32	78
Men	59.22	11.49	33	78
Women's pain intensity <sup>a</sup>	6.42	1.87	0	10
Sexual satisfaction				
Women	21.15	7.84	5	35
Men	23.5	7.38	6	35
Sexual function				
Women (FSFI) <sup>b</sup>	18.48	6.7	2.4	34.3
Men (IIEF) <sup>b</sup>	57.72	11.64	17	73
Depressive symptoms				
Women	14.93	10.23	0	43
Men	8.64	7.54	0	33

<sup>a</sup> Re-scaled scores for pain intensity (to be on 0–10 scale)

<sup>b</sup>  $n = 106$

Women's reports were all correlated with men's reports of the same measures, except for depressive symptoms. Finally, Table 3 shows that sexual satisfaction correlated with measures of sexual functioning within women, within men, and between women and men.

## Dyadic Sexual Communication and Pain Intensity

Figure 2 shows the path model for associations between women's and men's reported dyadic sexual communication and women's pain intensity. There was a significant, negative effect of men's

**Table 3** Bivariate correlations between predictor and outcome variables in women with PVD and men ( $n = 107$ )

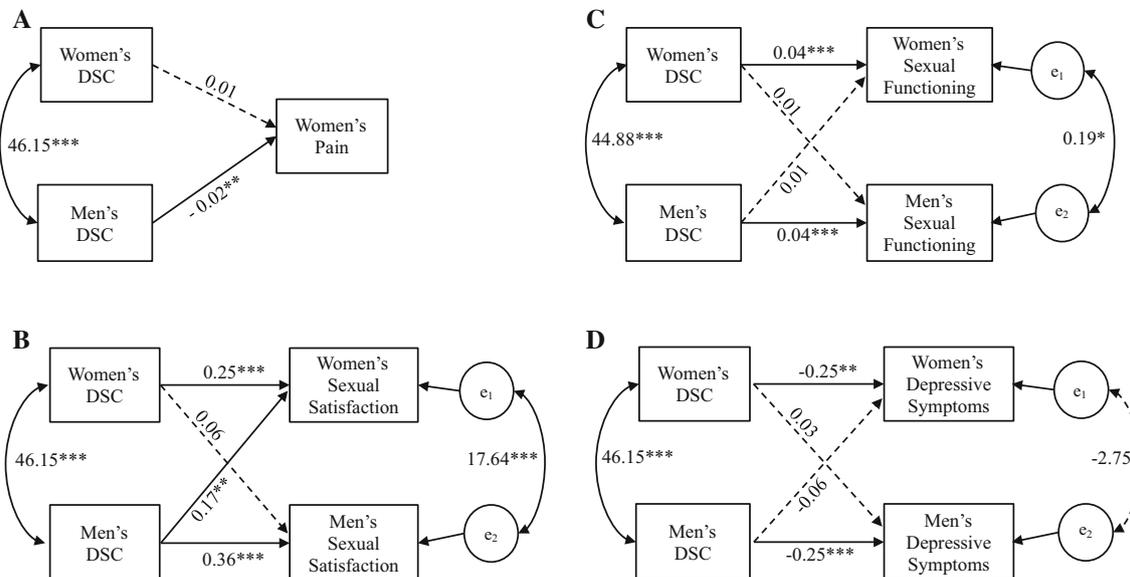
Scale	Source	Dyadic Sexual Communication		Pain	Sexual outcomes				Depression	
		DSC			NRS	GMSEX		FSFI <sup>a</sup>	IIEF <sup>a</sup>	BDI
		W	M	W		W	M			W
DSC	Women (W)	–	<b>.37**</b>	.03	.44**	<b>.30**</b>	.46**	<b>.29**</b>	–.23*	<b>–.05</b>
	Men (M)	–	–	<b>–.21*</b>	<b>.38**</b>	.60**	<b>.29**</b>	.47**	<b>–.18</b>	<b>–.38**</b>
NRS	Women (W)	–	–	–	–.15	<b>–.24*</b>	–.01	<b>–.11</b>	.26**	<b>.07</b>
GMSEX	Women (W)	–	–	–	–	<b>.56**</b>	.57**	<b>.28**</b>	<b>–.28**</b>	<b>–.08</b>
	Men (M)	–	–	–	–	–	<b>.36**</b>	.56**	<b>–.10</b>	<b>–.27**</b>
FSFI <sup>a</sup>	Women (W)	–	–	–	–	–	–	.38**	<b>–.32**</b>	<b>–.09</b>
IIEF <sup>a</sup>	Men (M)	–	–	–	–	–	–	–	<b>–.06</b>	<b>–.29**</b>
BDI	Women (W)	–	–	–	–	–	–	–	–	<b>.08</b>
	Men (M)	–	–	–	–	–	–	–	–	–

Bolded values represent between-partner correlations. A bivariate correlation in the range of .10 signifies a small effect size; a bivariate correlation in the range of .30 signifies a medium effect size; a bivariate correlation in the range of .50 signifies a large effect size

DSC dyadic sexual communication scale, GMSEX global measure of sexual satisfaction, FSFI female sexual functioning scale, IIEF international index of erectile functioning, BDI beck depression inventory, NRS pain intensity during intercourse (z-score)

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

<sup>a</sup>  $n = 86$



**Fig. 2** The effects of women and men's dyadic sexual communication (DSC) on women's pain intensity (a), and women and men's sexual satisfaction (b), sexual functioning (c), and depressive symptoms (d; controlling for study type). Single-headed arrows represent unstandardized

regression coefficients and double-headed arrows represent covariances. Non-significant paths are represented by dashed lines. \*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$

reported dyadic sexual communication on women's pain intensity ( $b = -.02, p < .01$ ; Fig. 2a), indicating that men's perceptions of greater dyadic sexual communication were associated with women's lower pain intensity. The effect of women's dyadic sexual communication on their own pain intensity was not significant.

### Dyadic Sexual Communication and Sexual Outcomes

Figure 2 also shows the APIMs for associations between women's and men's reported dyadic sexual communication and women's and men's sexual satisfaction and sexual functioning. For sexual satisfaction (Fig. 2b), there was a significant, positive actor effect for women ( $b = .25, p < .001$ ) and for men ( $b = .36, p < .001$ ), such that individuals' perceptions of greater dyadic sexual communication were associated with their own greater sexual satisfaction. There was also a significant, positive partner effect for women ( $b = .17, p < .01$ ), indicating that men's perceptions of greater dyadic sexual communication were associated with women's greater sexual satisfaction; the partner effect for men was non-significant. For sexual functioning (Fig. 2c), there were significant, positive actor effects for women ( $b = .04, p < .001$ ) and for men ( $b = .04, p < .001$ ), indicating that individuals' perceptions of greater dyadic sexual communication were associated with their own greater sexual functioning. The partner effects for dyadic sexual communication on sexual functioning were non-significant.

### Dyadic Sexual Communication and Depressive Symptoms

Figure 2d shows the APIM for women's and men's reported dyadic sexual communication predicting depressive symptoms, controlling for the effect of study type. Results revealed significant, negative actor effects for women ( $b = -0.25, p < .01$ ) and men ( $b = -.25, p < .001$ ), indicating that individuals' perceptions of greater sexual communication were associated with their own lower depressive symptoms. The partner effects for dyadic sexual communication on depressive symptoms were non-significant.

### Discussion

This study examined the associations between dyadic sexual communication and women's pain, and couples' psychological and sexual adjustment in a sample of women with PVD and their male partners. Findings indicated that women's and men's perceptions of greater dyadic sexual communication were associated with the individuals' own higher sexual satisfaction, enhanced sexual functioning, and lower depressive symptoms. Additionally, men's reported greater dyadic sexual communication

was associated with women's higher sexual satisfaction and lower pain intensity. These findings are in line with existing literature on the associations between sexual communication and sexual well-being in community and dyspareunia samples (e.g., Pazmany et al., 2015; Rehman et al., 2011), and extend to other important outcome domains in PVD, including women's pain and couples' depressive symptomatology.

Consistent with our hypotheses, men's report of greater dyadic sexual communication was associated with women's lower pain during intercourse. This finding stands in contrast to the lack of association found in the study by Pazmany et al. (2015). It is possible that our more homogeneous and larger sample provided greater power to find this statistically significant effect. In line with the developmental-contextual model of dyadic coping, when male partners perceive that the couple has more open communication about sex, it may help them appraise and respond to the pain in ways that positively influence the coping of the dyad (i.e., one or both members of the couple responding adaptively to the pain; Berg & Upchurch, 2007; Bodenmann, 1995). In this way, men perceiving greater sexual communication may act as a catalyst for couples' activation of individual or dyadic cognitive, behavioral, and emotional responses that positively influence women's pain. Specifically, men's perceptions of higher dyadic sexual communication may indicate a greater openness to discussing pain and ways to manage it. In turn, this may help couples to identify and enact coping strategies that reduce women's pain, such as facilitative partner responses to pain (e.g., expressions of affection), adapting sexual activities to include less painful or non-painful behaviors, and reducing avoidance—all factors that have been previously linked to women's lower pain during intercourse (Desrochers, Bergeron, Khalifé, Dupuis, & Jodoin, 2009; Rosen et al., 2012).

Surprisingly, we did not find an association between women's perceptions of dyadic sexual communication and their own pain. One explanation for this unexpected finding is that other relational variables, such as partner responses to women's pain (Rosen et al., 2012, 2014a, b), may be more salient to women's pain experience than their perceptions of the quality of sexual communication in their relationship. Alternatively, there are prior indications in the PVD literature of partner-reported variables better predicting women's pain intensity than women's own reports (Rosen, Bergeron, Leclerc, Lambert, & Steben, 2010). Given the paradoxical nature of this result, future research should attempt to replicate this finding, perhaps by examining whether it persists using alternative measures of sexual communication. Additionally, future research should examine the mechanisms by which partner-reported dyadic sexual communication impacts women's pain. Taken together with other recent reports in the literature of associations between partner variables and women's pain (Rosen et al., 2014c), our findings further suggest that the partner's perspective may sometimes be as important as the woman's own experience of PVD and highlight the relevance of studying this condition from a dyadic perspective.

As expected, women's and men's reports of greater dyadic sexual communication were associated with their own higher sexual satisfaction and sexual functioning. Men's reported greater dyadic sexual communication was also associated with women's higher sexual satisfaction. Applying the instrumental pathway linking sexual communication and sexual outcomes to PVD couples (MacNeil & Byers, 2009), dyadic sexual communication may increase couples' clarity around the impact of pain on their shared sexuality, thereby allowing them to modify their sexual script to accommodate the pain while also maintaining a mutually functional and satisfying sex life. In a qualitative study involving the intimate partners of cancer patients, couples' open and constructive sexual communication was identified as the predominant means by which they successfully renegotiated their sexual relationship in the context of cancer (Gilbert, Ussher, & Perz, 2008). In PVD, this renegotiation may involve couples redefining or diversifying their sexual script to focus less on sexual behaviors that elicit pain and more on those that facilitate pleasure. This shift in focus might enhance both partners' experiences of sexual desire and arousal, women's lubrication, and couples' overall sexual enjoyment. Open sexual communication may be particularly salient for women with PVD, as indicated by the partner effect of men's dyadic sexual communication on women's sexual satisfaction. When men perceive sexual communication to be higher, they may be more likely to express to women their willingness and interest in discussing sex and the pain. As women with vulvovaginal pain are reticent to communicate with their partners about sex (Jelovsek et al., 2008), this may promote feelings of validation and intimacy in women and limit their tendency to avoid these discussions, thereby positively influencing their sexual satisfaction (Bois et al., 2013).

Consistent with our expectations, actor effects indicated that women's and men's own perceptions of greater dyadic sexual communication were associated with the individuals' own lower depressive symptoms. These findings highlight the importance of an inherently interpersonal variable—dyadic sexual communication—not only for interpersonal experiences (e.g., sexual outcomes), but also for both partners' psychological adjustment, which is adversely affected by PVD (Bergeron et al., 2015; Nylander-lundqvist & Bergdahl, 2003). A number of studies have demonstrated the influence of relational variables on individual patients' and partners' adjustment to illness (Berg & Upchurch, 2007; Manne & Badr, 2008), emphasizing the importance of considering both the individual and relational levels of the couple, and how these two levels of the system interact (Bodenmann, 1995).

In couples affected by PVD, greater dyadic sexual communication may allow women and men to foster greater intimacy by conveying empathy to one another around the impact that pain is having on their sexual relationship. This experience of validation facilitates greater emotion regulation in couples (Leong, Cano, & Johansen, 2011), which may contribute to women and men experiencing fewer depressive symptoms. Sexual communication may also help couples become more accepting of the pain's

presence by allowing them to reflect together on the inherent value they place on their sexual relationship, thereby contributing to fewer depressive symptoms (Boerner & Rosen, 2015). Additionally, couples' greater sexual communication may allow women and men to discuss ways of addressing the impact of pain on their lives, thus building a sense of empowerment, togetherness and efficacy for coping with the pain. Enhanced intimacy and dyadic coping efforts may decrease the depressive symptoms often reported by women with PVD, such as isolation, hopelessness, shame, and inadequacy (Ayling & Ussher, 2007; Sheppard, Hallam-Jones, & Wylie, 2008).

This study has numerous strengths. This was the first study to examine associations between dyadic sexual communication and relevant sexual outcomes in couples in which the woman received a standardized, clinical diagnosis of PVD, leading to a homogeneous sample. Relative to Pazmany et al. (2015), this study included over twice as many couples, which increased our power to determine statistical significance of smaller effects. Additionally, given the growing use of dyadic models in studies of health and illness, the use of a dyadic design and analytic approach was a notable strength. In researchers' attempts to understand the onset and course of sexual problems, it is a relevant and critical extension to incorporate dyadic perspectives. From a theoretical standpoint, this study elaborates upon existing models of sexual communication (i.e., the instrumental and expressive pathways), which have only been studied in relation to community samples and have been restricted to sexual satisfaction outcomes.

The limitations of this study are also worth noting. First, the study sample was relatively homogeneous in terms of ethnicity, socioeconomic status, and sexual orientation. Additionally, our eligibility criteria required couples to be sexually active and therefore our sample might represent couples that are less avoidant, have less severe pain, or who are better managing the pain. While the characteristics of this sample are comparable to other PVD samples (Brotto et al., 2014; Smith & Pukall, 2014), they limit the generalizability of our findings to couples impacted by PVD or other forms of vulvovaginal pain that do not share these characteristics. Second, couples entering the treatment study reported lower depressive symptoms than couples entering the daily diary study. While this may suggest a sampling bias, far fewer couples in this report were drawn from the treatment study; thus, differences in sample sizes may have also influenced this finding. Third, this study employed a cross-sectional research design, meaning that alternative explanations for our results are possible. For example, higher sexual function and sexual satisfaction may facilitate couples' open sexual communication, which to our knowledge, is a potential pathway that has not yet been examined. Given the transactional nature of relational processes (Berg & Upchurch, 2007; Bodenmann, 1995), the associations between sexual communication and outcome variables may be reciprocal such that dyadic sexual communication both influences and is influenced by interdependent (e.g., sexual satis-

faction) and independent outcomes (e.g., depressive symptoms). As such, future longitudinal research is needed to improve our understanding of sexual communication processes in PVD.

In conclusion, this study examined the associations between couples' sexual communication, women's pain, and couples' sexual and psychological adjustment to PVD. Results demonstrated positive associations between women's and men's reported dyadic sexual communication and their sexual satisfaction and functioning, and negative associations between reported dyadic sexual communication and depressive symptoms. Moreover, results emphasize the importance of men's perceptions of dyadic sexual communication on women's pain and sexual satisfaction, underscoring the interdependent nature of couples' sexual experiences as they relate to pain. Given that dyadic sexual communication is lower in couples affected by vulvovaginal pain as compared to pain-free couples (Pazmany et al., 2014; Smith & Pukall, 2014), these results point to the value of targeting couples' sexual communication in interventions for PVD. Indeed, couples completing cognitive-behavioral couples therapy for PVD indicated that building communication skills was a highly valued aspect of the intervention (Corsini-Munt, Bergeron, Rosen, Mayrand, & Delisle, 2014). Findings suggest that integrating sexual communication skills training into treatments for PVD may have the capacity to positively influence multiple domains of couples' adjustment (i.e., biological, psychological, and sexual). Therefore, for couples coping with PVD, sexual communication may be one of their most important tools in navigating the stressors associated with the condition and reducing impairments.

**Acknowledgments** This study was funded by the Canadian Institutes for Health Research (CIHR; MOP-69063 and MOP-130298). The authors would like to thank Maria Glowacka, Alexandra Anderson, Kathy Petite, and Mylène Desrosiers for their assistance, as well as the couples who participated in this research.

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