



Daily Anxiety and Depressive Symptoms in Couples Coping With Vulvodynia: Associations With Women's Pain, Women's Sexual Function, and Both Partners' Sexual Distress

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Abstract: Vulvodynia is a idiopathic vulvovaginal pain condition that interferes with the sexual and mental health of affected couples. Research has underscored that psychological factors, such as anxiety and depression, are associated with its development and maintenance and related sexual impairment. However, the daily role of anxiety and depressive symptoms in the pain and sexuality outcomes of couples coping with vulvodynia is not well understood. Using a dyadic daily experience method, 127 women (mean age = 26.21, SD = 6.24 years) diagnosed with vulvodynia and their partners (mean age = 27.44, SD = 7.29 years) reported on anxiety and depressive symptoms, pain, sexual function, and sexual distress over a period of 8 weeks. Multilevel modeling was used to examine how daily deviations in anxiety and depressive symptoms from a participant's own mean were associated with pain, sexual function, and sexual distress. On days of sexual activity, when women reported higher anxiety and depressive symptoms (compared with their average), they reported greater pain and lower sexual function. On days of sexual activity, when women reported higher depressive symptoms, they reported greater levels of sexual distress, and when partners reported higher anxiety and depressive symptoms, women as well as partners reported greater levels of sexual distress. Results suggest that daily anxiety and depressive symptoms play a role in women's experience of vulvodynia-related pain, women's sexual function, and the couple's sexual distress. Targeting daily anxiety and depressive symptoms could enhance the efficacy of psychological interventions for vulvodynia.

Perspective: This article examines the daily associations between anxiety and depressive symptoms, women's pain, sexual function, and sexual distress among couples coping with vulvodynia. Findings contribute to refine the biopsychosocial model of pain, showing that daily affective factors are associated with pain and sexual well-being.

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Key words: Vulvodynia, anxiety, depression, pain, sexual function, sexual distress, daily experience methodology.

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Vulvodynia is a common idiopathic gynecological pain condition. With a prevalence of 8 to 12% in the general population,^{32,33,60} provoked vestibulodynia (PVD) is the most common subtype and is characterized by a burning pain elicited upon pressure to the vulvar vestibule.^{7,14,30} This intermittent pain significantly disrupts couples' sexuality.^{10,25,29,36,49,56} Controlled studies show that affected women report more sexual distress, poorer sexual function, and feelings of inadequacy as a sexual partner.^{4,8,29} As those who trigger and witness the pain during intercourse, partners are also negatively affected, with poorer erectile function and sexual satisfaction than partners of women without PVD.⁶⁶

The past decade of research has underscored that intrapersonal factors, such as anxiety and depression, and interpersonal factors, such as partner responses to pain,^{62,63} may play a role in the experience of PVD and related sexual impairment.^{34,43,54} Although epidemiologic research indicates that anxiety and depression are significantly more prevalent as antecedents as well as consequences of vulvodynia,⁴³ their role in the day-to-day fluctuations of women's symptomatology remains unknown. In addition, whereas partner's cognitions and their behaviors toward pain (eg, partner responses) are associated with women's pain and sexual difficulties,^{45,62} the role of partner affective factors, such as anxiety and depression, has not been investigated.

According to the biopsychosocial model of pain,²⁸ affective states modulate pain and disability. Specifically, several theoretical models have been proposed to explain the role of affective factors within the social context of chronic pain, including PVD.^{17,26,46,52} Interpersonal models also suggest that depressed individuals behave in ways that elicit rejection from others, which may in turn increase depression.^{15,20,27} Because anxiety and depressive symptoms are higher in women with PVD than in controls,^{29,43,54,64} and partners report that PVD takes a toll on their relationship and is a source of distress,⁶⁶ examining depressive as well as anxiety symptoms within a daily dyadic perspective may offer a more nuanced and ecologically valid understanding of the patterns between mood, pain, and sexual impairment among couples with PVD. Subclinical, day-to-day variations in mood, could play a role in these couples' pain experience and associated distress.

Extensive research has shown a strong link between depressive and anxiety symptoms and chronic pain,^{5,31,61,65,72} yet few studies have examined this association across time,^{18,47} and most used single-occasion measures.⁴⁷ Among individuals with rheumatoid arthritis, weekly reports of anxiety and depressive symptoms were associated with greater pain,⁶⁷ and greater negative mood and lower positive mood were associated with greater future pain among women with osteoarthritis and fibromyalgia.⁶⁵ In the field of sexuality, a 2-week daily diary study with a nonclinical sample of women showed that depressive symptoms were related to poorer same-day sexual desire, and anxiety symptoms were related to greater genitopelvic pain.³⁹ Although studies have shown that greater depression and anxiety were associated with more sexual impairment⁴⁴ and that depression may interfere with

women's sexual function,¹⁹ no research has examined how these daily affective symptoms map onto the sexuality and pain of couples with PVD.

An 8-week dyadic daily diary study was conducted to investigate within-person associations between anxiety and depressive symptoms, and pain, sexual function, and sexual distress, among couples coping with PVD. We hypothesized that on days of sexual activity when women or their partners reported feeling more anxious or depressed (compared with their average level), women would report greater pain, and both partners would report lower sexual function and greater sexual distress.

Methods

Participants

Participants for this study were recruited in 2 Canadian cities from February 2014 to April 2017. The inclusion criteria for women with PVD were the following: 1) pain during vaginal intercourse, which is subjectively distressing, occurs on 80% of intercourse attempts and has lasted for at least 6 months, 2) pain located in the vulvo-vaginal area (ie, at the entrance of the vagina), 3) pain limited to intercourse and other activities involving pressure to the vestibule (eg, bicycling), 4) involved in a committed romantic relationship for at least 6 months, and 5) in-person contact a minimum of 4 times per week with their romantic partner for at least 3 months, with a minimum level of sexual activity of once per month in the previous 3 months. Sexual activity could include sexual intercourse, manual, or oral stimulation, and did not need to consist of vaginal penetration. Exclusion criteria were: 1) unprovoked vulvar pain, 2) presence of one of the following: active infection previously diagnosed by a physician or self-reported infection, pregnancy, menopausal or postmenopausal status, and age younger than 18 or older than 45 years, and 3) currently receiving treatment for vulvo-vaginal pain. Couples were screened for eligibility via a structured interview and all women were examined and diagnosed with PVD by a physician. The diagnostic gynecological examination included a standardized and validated protocol using a dry cotton swab to palpate 3 locations of the vestibule (ie, 3, 6, and 9 o'clock), and women rated their pain intensity for each location on a scale of 0 (no pain) to 10 (worst pain ever).⁷

Procedure

The current study used data collected from a larger study of which 1 report has been published using a subset of the current sample and focusing on couples' interpersonal sexual motivations.⁵² First, a brief telephone structured interview was conducted with women to assess eligibility and to confirm whether their partners were willing to participate. Women meeting the initial selection criteria were scheduled for a standardized gynecological examination to confirm PVD diagnosis. Next, eligible couples attended an orientation session with a trained graduate-level research assistant in which they each provided informed consent, underwent a struc-

tured interview to assess demographic characteristics, gynecologic history, and self-reported pain during intercourse, and then completed online questionnaires individually that included self-reported measures not relevant to the present study. Couples were instructed to complete the online daily diaries for 8 consecutive weeks through secure links that were e-mailed to them individually each day at 5 PM. They were informed to complete diaries at the same time each evening (reflecting on the previous 24 hours) and independently from their partner. Several methods were used to ensure diary completion: 1) a research assistant called the participants twice a week as a reminder and to answer questions or to help couples attain their daily goal of completing a diary, 2) an automated reminder e-mail was sent if they did not complete that day's diary by 9 PM, and 3) a flyer to post in their home as a reminder was given to participants. Daily diary measures included variables not relevant for this study and a question about whether or not sexual activity had occurred in the past 24 hours. Both partners completed measures about their mood each day (ie, depression and anxiety symptoms) and on days when participants reported sexual activity, they completed measures about their sexual distress and sexual function, and women completed a measure of pain during intercourse. As compensation, women received \$20 for the gynecological examination, both partners received \$10 each for attending the orientation session, and up to \$96 each for completing the daily diary study (total of \$232 each couple, prorated on the basis of diary completion). At the end of the study, referral to local health professionals were provided to the couples. This research was approved by the institutional review boards of the 2 university health centers where the study was conducted.

Measures

Pain

Women's daily pain was assessed using a numeric rating scale, which consists of 1 single item. This item assessed the average intensity of pain experienced during intercourse since last completing a diary on a scale ranging from 0 (no pain) to 10 (worst pain ever). This measure correlates positively with other instruments assessing pain intensity^{23,59} and was used successfully in other daily diary studies of couples affected by PVD.⁶²

Anxiety and Depressive Symptoms

Both partners' daily anxiety and depressive symptoms were assessed using the Profile of Mood States.⁴⁸ The original questionnaire consists of 6 major scales assessing different affect states, but this measure was adapted for the daily context and only 2 subscales were used: anxiety and depression. These 2 subscales were composed of 4 items (each) assessing the extent to which the participant experienced anxious or depressive symptoms in the past 24 hours on a scale ranging from 0 (not at all) to 4 (extremely). Higher scores suggest greater

anxiety or depressive symptoms and total scores for each subscale can range from 0 to 16. The original Profile of Mood States has shown good psychometric properties.⁴⁸ Cronbach α in this sample was .84 for women and .86 for partners for the anxiety scale, and .85 for women and .88 for partners for the depression scale.

Sexual Function

Women's sexual function was assessed on days when participants reported sexual activity using the Monash Women's Health Program Female Sexual Satisfaction Questionnaire,²¹ which was specifically designed to assess daily sexual function. Partners' daily sexual function was measured using an adapted version of this scale.⁶³ The self-report scale consisted of 11 items assessing the nature and quality of a sexual experience that occurred in the past 24 hours, including elements such as sexual receptivity, ease of arousal, vaginal lubrication, degree of pleasure, and satisfaction. Higher scores suggest better sexual functioning and total scores for both partners can range from 5 to 54. The Monash Women's Health Program Female Sexual Satisfaction Questionnaire has been shown to be valid and reliable.²¹ Cronbach α in this sample was .88 for women and .89 for partners.

Sexual Distress

Both partners' sexual distress was assessed on days when participants reported sexual activity, using the Female Sexual Distress Scale. The original scale consists of 12 items assessing sexual distress over the previous month to which participants answered on a 5-point Likert-type scale ranging from 0 (never) to 4 (always). For the purpose of this dyadic daily experience study, only 3 items were included—those that correlated the most with the global score of the sexual distress scale ("How often did you feel: 1) distress about your sex life? 2) inferior because of sexual problems? 3) worried about sex?"). Higher scores reflect more sexual distress and total scores can range from 0 to 12. The original Female Sexual Distress Scale has good psychometric properties.²² Cronbach α in this sample for the 3 items was .89 for women and .87 for partners.

Data Analyses

As a framework for the analyses, the Actor-Partner Interdependence Model was adopted to model the nonindependence of the dyadic data.⁴² This model assumes that one person's independent variable can have an effect on their own dependent variable (ie, actor effect) or on their partner's dependent variable (ie, partner effect). Six Actor-Partner Interdependence Model models were tested. The models were estimated using a multilevel modeling approach. The multilevel analysis was implemented using mixed models in SPSS, version 24.0.0 (IBM Corp, Armonk, NY). Models included women's pain and both partners' sexual function and sexual distress as the dependant variables (ie, 1 dependent variable per model). Anxiety and depressive symptoms were entered separately (ie, 1 at a time) as the independent variables for each model. The effects of each

independent variable were tested concurrently at the within-person as well as between-person levels. At the within-person level, analyses examined the associations between women's and partners' daily affective states and their own outcomes (ie, actor effects) and the associations between women's and partners' daily affective states and their partner's outcomes (ie, partner effects); at the between-person level, the aggregate values over sexual activity days were used to examine the same associations. Only findings of the covariation of daily scores are discussed because this represents a more precise test of our hypotheses.

A 2-level cross model with separate random intercepts for both partners was tested in which persons were nested within dyads, and person and days were crossed to consider that both partners completed the diaries on the same days.⁴² To avoid confounding within- and between-person effects, independent variables were person-mean centered and entered as predictors of the outcomes such that coefficients represent associations between deviations from a person's mean score on depression and anxiety and each outcome measure. As such, these analyses account for between-person differences and assess whether the deviations of one person's score on a given day from the person's mean score across days are associated with changes in sexual distress, sexual func-

tion, and pain.¹³ The coefficients reported are unstandardized β values and are interpreted as the variation in each dependant variable for every 1-unit increase in the predictor variable. These coefficients estimate the effect size. Because outcomes were only assessed when sexual activity occurred, the analyses only included sexual activity days, except the analyses with women's pain, which only included vaginal intercourse days. Associations between sociodemographic characteristics and outcomes were examined before conducting the main analyses.

Results

Sample Characteristics and Intercorrelations Among Study Variables

A total of 127 women with PVD and their partners (n = 125 men; 2 women) were included in the study. Recruitment and participant flow are show in Fig 1. Site 1 recruited 87 couples and site 2 recruited 40 couples. Of the final sample of 127 couples, 91 (71.6%) were recruited through advertisements in newspapers, Web sites, universities, hospitals, and medical clinics, 18 (14.2%) through their participation in previous studies conducted by the authors (consented to being contacted for

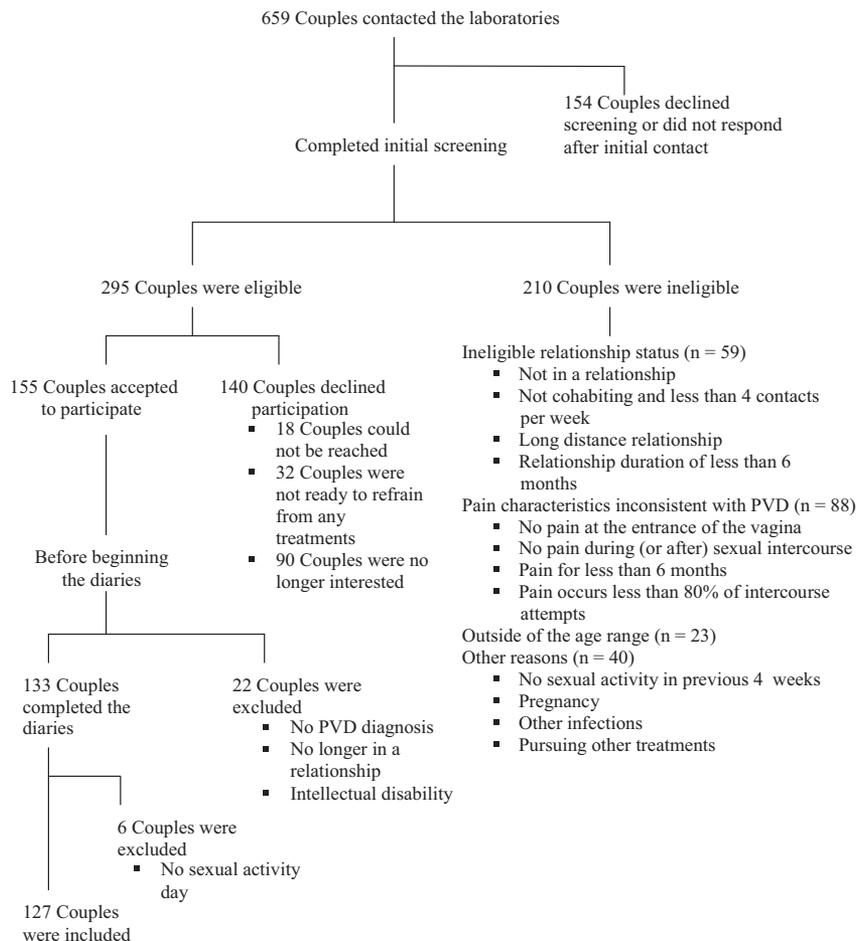


Figure 1. Recruitment and flow of participants throughout the study.

Table 1. Demographic Statistics of Women With PVD and Their Partners

VARIABLES	WOMEN WITH PVD (N = 127)	PARTNERS (N = 127)
Age, years	26.21 (6.24)	27.44 (7.29)
Pain duration, years	5.78 (5.43)	–
Education level, years	16.20 (2.52)	15.39 (2.70)
Marital status, %		
Cohabiting	51.97	–
Married	18.11	–
Not living together, but see each other >4 times per week	29.92	–
Relationship length, years	4.33 (3.71)	–
Couple's annual income, %	26.77	–
\$0 to 19,999	14.96	–
\$20,000 to 39,000	18.11	–
\$40,000 to 59,000	40.16	–
>\$60,000		

NOTE. Percentage values are % of total sample; other values are mean (SD).

future projects), 10 (7.9 %) were referred by a physician, and 8 (6.3%) by a friend or unknown. Table 1 presents sociodemographic characteristics of the sample and Table 2 presents the mean (M), SD, and correlations for each daily measure, aggregated within-person across all diaries. As shown in Table 2, daily anxiety and depressive symptoms were not strongly related to pain, sexual function, and sexual distress when examined at the aggregate level. We assessed subclinical daily anxiety and depressive symptoms, which could explain the small correlations. Intraclass correlations for all our dependent and independent variables have a range of .41 to .72 (see third column of Table 2), indicating that significant proportions of variance in daily scores were due to person characteristics (within-level).

A set of preliminary analyses was conducted to examine intercorrelations between study variables and to evaluate the need to control for sociodemographic covariates. Participants' age, income, relationship status, relationship length, and women's pain duration were correlated with our key variables at <.30 and when tested as covariates, the pattern and significance of the results remained the same, thus no sociodemographic variables

were included as covariates in subsequent analyses. We also tested whether our findings were influenced by recruitment site. We conducted independent t-tests comparing couples recruited from each city on all study variables. Results revealed that partners recruited from city 1 (M = 3.48, SD = 2.25) reported higher scores on sexual distress compared with those from city 2 (M = 1.80, SD = 1.93, $t_{33} = 2.07$, $P < .05$). Consequently, we conducted another set of analyses with recruitment site as a covariate. The pattern and significance of the results remained the same and thus, only the most parsimonious models are presented. The total rate of diary completion was 86.04% for women (48 diaries of a possible 56) and 82.61% for partners (46 diaries of a possible 56). Couples reported a mean of 13.21 (SD = 6.93; range = 1–30) sexual activity days over the course of the study.

Pain

As shown in Table 3, on days when women felt less depressed (compared with their average level across all days), they reported lower levels of pain during sexual intercourse. Moreover, on days when women felt less anxious, they also reported experiencing less pain during sexual intercourse. The cross-partner paths were not significant for anxiety or depressive symptoms, indicating that partners' depressive and anxiety symptoms were not associated with women's pain. To provide increased confidence in the direction of the effects, we tested the association between women's pain during sexual intercourse and next day's depressive or anxiety symptoms while controlling for depressive or anxiety symptoms on the day of sexual activity. No significant associations were found, indicating that women's pain on one day was not associated with women's and partner's depressive or anxiety symptoms on the next day.

Sexual Function

As shown in Table 4, on days when women felt less depressed, they reported better sexual function. Moreover, on days when women felt less anxious, they also reported better sexual function. No significant associations

Table 2. Descriptive Statistics and Within-Person Correlations Among Key Study Variables for Women With PVD and Their Partners

	M	SD	ICC	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Anxiety (W)	2.65	3.16	.46	–	.13**	.64**	.11**	–.14**	–.02	.25**	.01	.11**
2. Anxiety (P)	2.08	3.06	.56		–	.11**	.74**	–.04	–.19**	.11**	.29**	.002
3. Depression (W)	2.01	2.94	.43			–	.17**	–.13**	–.08*	.30**	.07*	.08*
4. Depression (P)	1.49	2.76	.55				–	–.01	–.24**	.12**	.29**	.01
5. Sexual Function (W)	33.47	11.64	.40					–	.17**	–.32**	–.23**	–.22**
6. Sexual Function (P)	44.21	8.53	.61						–	–.31**	–.14**	–.04
7. Sexual Distress (W)	4.29	3.22	.58							–	.27**	.29**
8. Sexual Distress (P)	2.56	2.51	.72								–	.01
9. Pain	3.84	2.51	.41									–

Abbreviations: ICC, intraclass correlation; W, women's reports; P, male partner's reports.

* $P < .05$.

** $P < .01$.

Table 3. Within-Person Effects of Day-to-Day Variations in Anxiety and Depressive Symptoms From a Participant’s Own Mean on Women’s Pain During Intercourse

EFFECTS	B (SE)	DF	T	P	95% CI
Model 1: depressive symptoms					
Intercept	4.08 (.17)	110.20	23.67	.001	3.74 to 4.42
Actor, W	.08 (.03)	658.57	2.34	.017	.01 to .14
Partner, W	-.02 (.04)	658.55	-.58	.56	-.09 to .05
Model 2: anxiety symptoms					
Intercept	4.08 (.17)	110.28	23.70	.001	3.73 to 4.42
Actor, W	.09 (.03)	653.45	2.62	.009	.02 to .16
Partner, W	-.01 (.04)	651.98	-.22	.83	-.09 to .08

Abbreviations: SE, standard error; CI, confidence interval; W, women.
NOTE. β values are unstandardized coefficients.

were found between partners’ anxiety or depressive symptoms and their own sexual function. The cross-partner paths were not significant, indicating that women’s and partners’ anxiety or depressive symptoms were not associated with the sexual function of the other person. To provide increased confidence in the direction of the effects, we tested the associations between both partners’ sexual function and the next days’ depressive or anxiety symptoms while controlling for depressive or anxiety symptoms on the day of sexual activity. No significant associations were found, indicating that both partners’ sexual function on one day were not associated with women’s and partner’s depressive or anxiety symptoms on the next day.

Sexual Distress

As shown in Table 5, on days when women felt less depressed, they reported lower sexual distress. On days when

Table 4. Within-Person Effects of Day-to-Day Variations in Anxiety and Depressive Symptoms From a Participant’s Own Mean on Sexual Function of Women With PVD and Male Partners

EFFECTS	B (SE)	DF	T	P	95% CI
Model 1: depressive symptoms					
Intercept, W	32.69 (.62)	202.76	52.68	.001	31.46 to 33.91
Intercept, P	44.00 (.54)	125.21	81.73	.001	42.94 to 45.07
Actor, W	-.65 (.16)	766.65	-3.98	.001	-.97 to -.33
Actor, P	-.19 (.11)	675.08	-1.70	.09	-.40 to .29
Partner, W	-.32 (.21)	765.44	-1.53	.13	-.73 to .09
Partner, P	-.79 (.83)	670.51	-.96	.34	-.24 to .83
Model 2: anxiety symptoms					
Intercept, W	32.76 (.62)	202.52	53.01	.001	31.54 to 33.98
Intercept, P	44.02 (.54)	124.80	82.17	.001	42.96 to 45.08
Actor, W	-.72 (.15)	767.52	-4.81	.001	-1.02 to -.43
Actor, P	-.14 (.09)	680.08	-1.48	.14	-.33 to .05
Partner, W	.01 (.18)	767.71	.04	.97	-.35 to .36
Partner, P	-.11 (.08)	689.35	-1.35	.18	-.26 to .05

Abbreviations: SE, standard error; CI, confidence interval; W, women; P, male partner.
NOTE. β values are unstandardized coefficients.

Table 5. Within-Person Effects of Day-to-Day Variations in Anxiety and Depressive Symptoms From a Participant’s Own Mean on Sexual Distress of Women With PVD and Male Partners

EFFECTS	B (SE)	DF	T	P	95% CI
Model 1: depressive symptoms					
Intercept, W	4.71 (.21)	152.79	22.70	.001	4.30 to 5.12
Intercept, M	2.92 (.19)	119.30	15.03	.001	2.54 to 3.31
Actor, W	.18 (.04)	748.54	4.55	.001	.10 to .26
Actor, M	.15 (.03)	630.36	4.99	.001	.09 to .21
Partner, W	.13 (.05)	748.02	2.52	.012	.03 to .23
Partner, M	.04 (.02)	633.69	1.70	.09	-.01 to .08
Model 2: anxiety symptoms					
Intercept, W	4.71 (.21)	152.79	22.70	.001	4.30 to 5.12
Intercept, M	2.95 (.20)	119.40	14.96	.001	2.56 to 3.34
Actor, W	.07 (.04)	760.95	1.96	.051	-.0002 to .14
Actor, M	.10 (.03)	644.87	3.77	.001	.05 to .15
Partner, W	.10 (.04)	761.72	2.28	.02	.01 to .19
Partner, M	.04 (.02)	652.67	1.94	.052	-.0004 to .08

Abbreviations: SE, standard error; CI, confidence interval; W, women; M, male partner.
NOTE. β values are unstandardized coefficients.

partners felt less depressed, women as well as partners reported lower sexual distress. Moreover, on days when partners felt less anxious, women as well as partners experienced less sexual distress. No significant association was found between women’s anxiety symptoms and their own sexual distress. The cross-partner paths for partners were not significant for anxiety and depressive symptoms, indicating that women’s anxiety or depressive symptoms were not associated with the sexual distress of their partners. To provide increased confidence in the direction of the effects, we tested the associations between both partners’ sexual distress and next day’s depressive or anxiety symptoms while controlling for depressive or anxiety symptoms on the day of sexual activity. No significant associations were found, indicating that both partners’ sexual distress on one day were not associated with women’s and partner’s depressive or anxiety symptoms on the next day.

Discussion

This study examined the daily associations between anxiety and depressive symptoms, and pain, sexual function, and sexual distress in women with PVD and their partners. Findings indicated that on days of sexual activity, when women reported higher anxiety and depressive symptoms (compared with their average), they reported worse pain and lower sexual function. When women reported higher depressive symptoms, they reported greater sexual distress whereas when partners reported higher anxiety and depressive symptoms, women as well as partners reported greater sexual distress. These associations were significant above and beyond the effects of the other member of the couple’s affective symptoms. Findings contribute to refine the biopsychosocial model of pain²⁸ as applied to PVD, showing that women’s

daily affective states are associated with their pain and sexual function, and both partners' daily affective states are associated with both partners' sexual distress.

Consistent with our hypotheses, women's daily anxiety and depressive symptoms were both correlated with their own higher pain intensity during intercourse on that day. These daily results corroborate those from cross-sectional studies in chronic pain populations showing an association between depression, anxiety, and higher pain intensity.^{5,31,61,65,72} Recent epidemiologic research indicates that women with vulvodynia report more anxiety and depression as antecedent conditions and as consequences of their vulvodynia compared with healthy controls,⁴³ suggesting anxiety and depression may be associated with the development and maintenance of this pain condition. Findings of the present study showed that daily anxiety and depressive symptoms—not only disorders—appear to be associated with the pain experience. From a biological perspective, neuropathic mechanisms are theorized to be involved in the pathophysiology of PVD. It is thought that women with PVD have a reduced pain receptor threshold, which is associated with peripheral and central sensitization⁷⁰ leading to allodynia and hyperalgesia. Anxiety and depression may be associated with neuroplastic changes in the central nervous system. Thus, it is possible that this could lead to central sensitization, which in turn could cause greater pain.⁷⁰ Furthermore, research has shown that depression, anxiety, and pain share common cortical regions, neurobiological networks, and neurotransmitters (eg, serotonin and noradrenaline).^{11,53,58}

Results regarding associations between women's anxiety and depressive symptoms and their own sexual function extend previous findings concerning the psychosocial aspects of chronic pain, which show an association between depression, anxiety, and pain-related disability⁴⁷ as well as sexual dysfunction.⁴⁴ However, most previous studies were on the basis of single-occasion measures and cross-sectional designs^{38,40} involving nonclinical samples.³⁹ Recently, Kalmbach et al³⁹ examined how depressive and anxiety symptoms were temporally linked to sexual function in nonclinical samples of premenopausal women. Their findings showed that depressive symptoms were related to poorer sexual desire, whereas anxiety symptoms were related to poorer subjective sexual arousal, more difficulty maintaining and producing vaginal lubrication, and greater vaginal pain. Barlow's model of sexual dysfunction⁶ suggests that individuals with sexual dysfunction are likely to engage in sexual activities with negative affects and expectancies, and with their attentional focus oriented toward nonerotic stimuli such as external stressors or the consequences of poor sexual performance. Accordingly, anxiety and depressive symptoms reported by women with PVD may create a negative cognitive bias, such that they find it difficult to engage mindfully in sexual activity, which is reflected in their lower sexual functioning.

Consistent with our hypotheses, women's depressive symptoms as well as partners' depressive and anxiety symptoms were correlated with their own greater levels of sexual distress. Moreover, partners' anxiety and de-

pressive symptoms were correlated with women's greater levels of sexual distress. Sexual distress is a common negative consequence of PVD, because women and their partners struggle to maintain a satisfying sex life despite the pain, yet experience feelings of discouragement and inadequacy.^{3,4,9,12,55} These findings are important, because identifying an affective factor relevant to the everyday life of women with PVD and their partners, which can be targeted in psychological interventions, may help reduce couples' distress. These daily results corroborate those from cross-sectional studies in chronic pain populations, showing an association between pain and psychological distress.^{61,72}

Several mechanisms may explain these findings regarding sexual distress. Attributional styles are important determinants of adjustment to chronic pain, sexual dysfunction, and relationship distress.^{2,16,35,71} The uncertain etiology of PVD may lead couples to engage in a search for causal attributions and to adopt a more negative attributional style, which in turn can generate more depressive symptoms.^{1,37,41,50,51,57} The combination of pain and more negative appraisals may lead couples to be more aware of, and focused on, their sexual impairment, thus eliciting more sexual distress. Consistent with our results, one study showed that partners of women with PVD who attributed the pain to internal causes (eg, his personal responsibility) had higher levels of psychological distress.³⁶ It is possible that the associations between both partners' depressive symptoms and their sexual distress can result from their shared expectations about what sex should be like and how they are not able to reach these expectations.

In addition, according to the fear-avoidance model,^{68,69} a behavior (eg, sexual intercourse) is avoided because of fear and anxiety related to pain, which results in more distress and pain. Studies have shown that higher levels of fear of pain and pain catastrophizing are associated with higher pain intensity and related sexual impairment in PVD, such as sexual distress.^{23,24} Thus, our result showing associations between partners' anxiety symptoms as well as the trend in the expected direction for women's anxiety symptoms and their own sexual distress could be interpreted through the lens of the fear-avoidance model, because anxiety symptoms reflect affective expressions of catastrophic thinking and may stimulate fear-avoidance pathways and its associated disabilities.

This study has some limitations. First, the correlational design implies that causal inferences cannot be drawn. Consequently, it is important to highlight that empirical research showed that anxiety and depression were both antecedents and consequences of PVD.⁴³ Thus, it is possible that the relationship between the present affective factors, pain, and sexuality outcomes are bidirectional. Second, couples were asked to not engage in any PVD treatment during their participation in the study to ensure internal validity. However, it is possible that our sample represents couples with lower levels of psychological distress and sexual impairments because they were willing and able to refrain from treatment for 2 months. Thus, couples with mood disorders or more severe

symptoms of anxiety and depression may have been less likely to participate in the study. Moreover, because it was a study of couples, single women with PVD may experience more affective symptoms and distress, preventing them from being in a relationship.

Despite these limitations, this study adds to the growing body of research showing day-to-day associations between affective factors and chronic pain conditions.^{18,39,47,67} First, investigating the associations between daily anxiety and depressive symptoms, on the one hand, and sexual distress, sexual function and pain, on the other, in couples coping with PVD, is a novel contribution to the area of affective states and chronic pain. Also, the use of a daily diary methodology allowed participants to report their experiences in a time closer to the time of occurrence and better capture in a more natural context the variations of affective symptoms than would cross-sectional or longitudinal designs with retrospective evaluations. Further, the study design allowed the reduction of recall biases. Finally, the dyadic nature of this study allowed us to assess

the interaction of both partners' affective symptoms, indicating that feeling anxious or depressed not only had consequences for one's own sexual well-being, but for the partner's as well.

Conclusions

Our findings showed that daily depressive and anxiety symptoms were differentially associated with women's pain and both partners' sexual well-being at the event level. Targeting daily anxiety and depressive symptoms could enhance the efficacy of psychological interventions for women with PVD and their partners.

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