

Partner Behavioral Responses to Pain Mediate the Relationship Between Partner Pain Cognitions and Pain Outcomes in Women With Provoked Vestibulodynia

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Abstract: Partner behavioral responses to pain can have a significant impact on patient pain and depression, but little is known about why partners respond in specific ways. Using a cognitive-behavioral model, the present study examined whether partner cognitions were associated with partner behavioral responses, which prior work has found to predict patient pain and depressive symptoms. Participants were 354 women with provoked vestibulodynia and their partners. Partner pain-related cognitions were assessed using the partner versions of the Pain Catastrophizing Scale and Extended Attributional Style Questionnaire, whereas their behavioral responses to pain were assessed with the Multidimensional Pain Inventory. Patient pain was measured using a numeric rating scale, and depressive symptoms were assessed using the Beck Depression Inventory–II. Path analysis was used to examine the proposed model. Partner catastrophizing and negative attributions were associated with negative partner responses, which were associated with higher patient pain. It was also found that partner pain catastrophizing was associated with solicitous partner responses, which in turn were associated with higher patient pain and depressive symptoms. The effect of partner cognitions on patient outcomes was partially mediated by partner behavioral responses. Findings highlight the importance of assessing partner cognitions, both in research and as a target for intervention.

Perspective: *The present study presents a cognitive-behavioral model to partially explain how significant others' thoughts about pain have an effect on patient pain and depressive symptoms. Findings may inform cognitive-behavioral therapy for couples coping with PVD.*

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Key words: *Provoked vestibulodynia, genital pain, female, cognitive-behavioral therapy, partner responses.*

Provoked vestibulodynia (PVD) is a chronic pain condition in which pain is elicited via pressure to the vulvar vestibule and is most often experienced during sexual intercourse. Because of the dyadic nature of the pain experience, significant others' behavioral responses to pain may have a particularly important

impact on patients' subsequent pain and depressive symptoms.^{13,37} Solicitous responses, which are demonstrations of sympathy and attention, and negative responses, which are demonstrations of hostility and frustration, have garnered the most research attention. In the context of PVD, an example of a solicitous response is when a partner suggests that the couple stop engaging in sexual activity; a negative response is when a partner expresses anger or disappointment. Both are associated with worse pain outcomes in cross-sectional and daily diary studies of musculoskeletal pain and PVD.^{4,5,29,31,33,34,38,40} Negative partner responding, more so than solicitous responding, has been shown to be related to patient depressive symptoms, which may be due to the perceived

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supportiveness of solicitous responses.^{4,31} Less is known about why partners respond in specific ways, but based on a cognitive-behavioral framework, partner cognition regarding pain may influence their subsequent behavior. The overall aim of the present study was to examine whether partner pain-related cognitive variables were associated with patient pain and depression and whether partner behavioral responses mediated this effect.

The pain communication model^{9,17} proposes that the pain messages sent by the encoder (woman with PVD) will be decoded by the receiver (her partner) through the receiver's cognitive and affective responses. How the partner (receiver) decodes this information will be dependent on his cognitions, and these pain-related cognitions may subsequently influence his behavioral responses to pain. In turn, the type of behavioral response the partner expresses will then have an impact on the pain and disability of the woman.^{22,27,32} The present study aimed to test the relationship between partner pain catastrophizing and pain attributions as cognitive associations of partner behavioral responses to pain. We also aimed to assess whether these behavioral responses mediated the relations among partner cognitions, pain, and depressive symptoms. Depressive symptoms have previously been shown to be more elevated in the PVD population and are important pain-related outcomes.^{19,39}

One such relevant partner cognition is catastrophizing. Greater spousal catastrophizing has been associated with more patient pain in chronic pain and PVD samples,²¹⁻²³ but the mechanism underlying this relationship has not been investigated. Previous findings regarding the effects of catastrophizing on partner behavioral responses have been mixed, and most studies have focused on patient catastrophizing only. In one study, patient catastrophizing predicted negative partner responses but not solicitous responses.^{4,32,34} One influence may be pain duration, as catastrophizing is related to negative responses over longer pain duration but solicitousness over shorter duration.^{5,21,32} This could indicate changes in partners' ability or desire to respond in positive ways as time goes on, suggesting that positive behavioral responding may take more self-regulation. One study showed that partner catastrophizing and self-efficacy partially mediated the association between higher partner solicitous responses and higher pain during intercourse in women with PVD, although only pain catastrophizing was a unique mediator.^{3,33}

The cognitive attributions that partners assign to the cause and controllability of pain may also be associated with their behavioral responses. A more negative attributional style, which consists of feelings of responsibility, global consequences, and immutability to change, has been associated with greater distress and lower dyadic adjustment in partners of women with PVD^{2,19} and less partner empathy in chronic pain samples.^{15,18} However, it is also worth noting that although partner attributions regarding PVD pain were related to partner distress, they were not related to patient pain,^{7,19} indicating that this relationship merits further

investigation. Moreover, when a partner responds negatively to pain, such behavioral responses lead to increased patient pain severity. Furthermore, patient pain behaviors are then increased, possibly as an interpersonal reaction to perceived criticism or due to increased pain levels, which in turn may promote more negative behavioral partner responses, leading to a downward spiral.^{6,7}

Previous work has demonstrated that each of the proposed cognitive variables (catastrophizing and attributions) and the behavioral variables (partner responses) are associated with worse patient outcomes. Some theories have gone beyond simply cognitions to explore a cognitive-motivational model^{1,13}; however, the present study aimed to better elucidate the cognitive factors at play. Hence, the aim of the present study was to assess whether partner cognitive variables operated through partner behavioral variables to influence patient outcomes, which would be consistent with a cognitive-behavioral treatment model. To do so, a path model was tested to assess whether the effect of partner cognitions on patient outcomes was mediated by partner behavioral responses in a cross-sectional examination of couples with PVD. It was hypothesized that, controlling for relationship satisfaction, 1) partner catastrophizing would be related to more solicitous and negative partner responses, 2) partner negative attributions would be related to more partner negative responses, and 3) type of responding would mediate the relationship between partner pain-related cognitive variables and patient outcomes, with partner negative responses being associated with increased patient pain and depressive symptoms and solicitous responses being associated with pain only.

Methods

Participants

Participants were 354 women with PVD and their male partners. Participants were recruited by collaborating gynecologists and other health professionals and through advertisements placed online and in local newspapers. Interested women were screened for eligibility via telephone or in person. Women and their partners were included if the following inclusion criteria were met: 1) pain experienced during intercourse causes subjective distress, occurs during at least 80% of intercourse attempts, and has been present for 12 months or longer; 2) pain is limited to intercourse/other activities that contribute to pressure to the vulvar vestibule; 3) severe pain is present at 1 or more vestibular locations during the cotton swab test, if recruited through a gynecologist; and 4) married, cohabiting, or in a committed monogamous relationship with a partner for 6 months or longer. Exclusion criteria included 1) vulvar pain that is not clearly linked to sexual intercourse or pressure applied to the vulvar vestibule or 2) the presence of 1 of the following: a) major medical and/or psychiatric illness, b) active infection, c) vaginismus (defined by the *Diagnostic and Statistical Manual of Mental Disorders, Fourth*

Edition, as a recurrent or persistent involuntary spasm or contraction of the musculature of the outer third of the vagina that interferes or prevents sexual intercourse, although the distinction between dyspareunia and vaginismus has now been removed in the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders*), d) dermatologic lesion, e) pregnancy, and f) age less than 18 years. These criteria allowed for the recruitment of a homogeneous sample of women suffering from PVD, as opposed to other forms of gynecologic pain. When women were recruited by a gynecologist, these criteria were verified in person during the examination and via our standardized screening interview administered by a research assistant. When they were recruited through advertisements, these criteria were verified over the telephone via the same standardized screening interview, but no gynecologic examination was performed. Partner participants were recruited if PVD participants met inclusion criteria, in which case a questionnaire package was sent to their home. Exclusion criteria for partner participants were 1) a major medical and/or psychiatric illness and 2) an age less than 18 years.

Procedure

This study was approved by the University of Montreal institutional review board, and all participants provided written informed consent. Women with PVD and their partners were asked to individually complete questionnaire packages and return them via post. Participants recruited in person by a gynecologist received their questionnaires from a research assistant at this time, whereas participants recruited via advertisements were mailed their questionnaires. Following receipt of their completed questionnaires, a research assistant provided a telephone consultation to couples, as a form of compensation for their time. This consultation included general information about PVD, written material, and a list of resources in their geographical area.

Measures

Partner Cognitive Variables

Partner pain catastrophizing. Catastrophizing about pain was measured using the Pain Catastrophizing Scale.^{25,38} This 13-item scale measures exaggerated negative perceptions and emotions regarding pain. Higher scores indicate higher catastrophizing (range = 0–52). The Pain Catastrophizing Scale has been tested for reliability and validity.^{29,38} The present study used the partner version, which has also been found to have good reliability and validity.^{9,35,36} The Cronbach's alpha in the present sample was .85.

Pain attributions. Partner attributions about the women's pain were measured with the Extended Attributional Style Questionnaire,^{3,12,27,41} adapted for use with partners of women experiencing pain during intercourse. The partner version has been used in a previous sample of PVD couples but has not been properly validated.¹⁹ The adapted Extended Attributional Style Questionnaire consists of 12 hypothetical

negative situations that occur within a genital pain context. Participants indicated major causes of the situation prompted by an open-ended question and then rated the cause for each of 4 attributions—internal, partner-related, global, and stable attributions—on a 7-point Likert-type scale. Internal attributions about pain indicate that the partner feels that the pain is his fault and that he has a responsibility for the cause of the pain. Partner-related attributions about pain indicate that the partner feels that the woman has a responsibility for the cause of the pain. Global attributions about pain indicate that the pain will have negative impacts on all areas of life. Stable attributions about pain indicate that the pain will always be present in similar situations. For the present study, scores for each of the 4 attribution styles were totaled. Therefore, a higher score indicates more internal attributions, more partner blame, more global attributions, and more stable attributions about the pain. The Cronbach's alpha for the total score in the present sample was .92.

Partner Behavioral Mediator Variables

Partner behavioral responses. The West Haven-Yale Multidimensional Pain Inventory (MPI)²¹ was used to assess spousal behavioral responses from the perspective of the partner, specifically solicitous and negative behavioral responses. Partner scales were taken from the original West Haven-Yale MPI and have previously been adapted and validated to be used in a PVD population.^{32,34} Various behaviors are rated on a 6-point Likert-type scale, with higher scores indicating more frequent behaviors. Solicitous behaviors include items like "hands me a lubricant, anaesthetic gel or other form of pain relief" and "comforts me," whereas negative behaviors include items like "ignores me" or "expresses frustration at me." Internal consistency analyses demonstrate alphas of .82 for the solicitousness subscale and .72 for the negative subscale, and the MPI has good reliability and validity.^{21,32}

Patient Outcome Variables

Pain. Pain was assessed using a numeric rating scale specific to vulvovaginal pain where 0 is no pain at all and 10 is the worst pain ever. This method for measuring pain has demonstrated a significant positive correlation with other pain intensity measures and can detect significant treatment effects, or changes in pain for women with PVD.³

Depressive symptoms. The Beck Depression Inventory–II is a widely used, sensitive, and validated measure of depressive symptoms in adults² and has been demonstrated to be a useful measure in the chronic pain population.¹⁸ Greater scores indicate greater depressive symptoms, with scores from 0 to 9 indicating minimal symptoms, 10 to 18 indicating mild to moderate symptoms, and 19 and higher indicating moderate to severe symptoms. The Cronbach's alpha in the present study was .92.

Covariates

Dyadic Adjustment Scale (DAS)–Partner. The revised DAS⁷ measures relationship satisfaction, with higher

scores indicating higher relationship satisfaction and scores under 50 indicating potential relationship distress. The original DAS shows good psychometric properties, and the revised scale is a shorter version that shows high correlation with the original.⁷ The Cronbach's alpha in the present study was .83.

Data analysis. Path analysis was used to examine the relations among partner pain-related cognitive factors, partner behavioral responses, and patient outcomes using a saturated model. We expected that partner behavioral responses would mediate the relation between partner pain-related cognitive factors and patient outcomes (Fig 1). Consistent with recommendations for exploring indirect effects,¹ paths were constructed from men's catastrophizing and attributions to women's pain and depressive symptoms (*c'* paths), from men's catastrophizing and attributions to men's negative responses and solicitous responses (*a'* paths), and from men's negative responses and solicitous responses to women's pain and depressive symptoms (*b'* paths). The covariances between independent variables as well as between mediator variables were estimated. Similarly, the residuals of the dependent variables were permitted to covary. Lastly, DAS was added as a covariate in the model to control for potential effects of relationship satisfaction on patient pain and partner behavioral responses. Analyses were conducted using the Mplus software package (version 7.1)²⁸ and the maximum likelihood estimator with standard errors that are robust to nonnormality of observations and to missing data. The indirect effects were examined using the bias-corrected bootstrapping method for computing confidence intervals (CIs)²⁵ based on 50,000 bootstrap iterations. An indirect effect is considered significant

at $\alpha = .05$ if its 95% CI does not include zero. The effect size of an indirect effect was calculated as the ratio of the indirect effect over the total direct effect.³⁰ Recent methodologic developments in mediational analysis suggest that the significance of the total effect (unmediated effect of the independent variable on the dependent variable) should not be taken as a condition for establishing that mediation exists.^{35,36}

Results

Sample Characteristics

A total of 354 women with PVD and their partners completed the questionnaires. The mean age of the women in the sample was 31.3 years (range = 18–79, standard deviation [SD] = 11.4). The mean pain duration was 5.5 years (median = 4.0, range = .5–43.8, SD = 6.0), and the mean pain intensity was 6.9/10 (range = 1–10, SD = 1.9). Pain numeric rating scale scores in the present sample were similar to those in previous studies of women with PVD, which range from 6.9 to 7.5/10.^{3,12,41} The mean relationship duration for the PVD couples was 6.9 years (range = .5–38.4, SD = 7.6). The majority (91.2%) identified culturally as Québécois and had at least completed high school (95.3%). A total of 50.4% were recruited directly from participating physicians and had a diagnosis of PVD, whereas the remaining women were recruited from nonphysician sources and were assessed for PVD at the study screening stage as described. There were no differences between recruitment groups on pain or Beck Depression Inventory–II scores, but women who were recruited from physicians reported significantly shorter duration of pain ($t = 2.79, P < .01$).

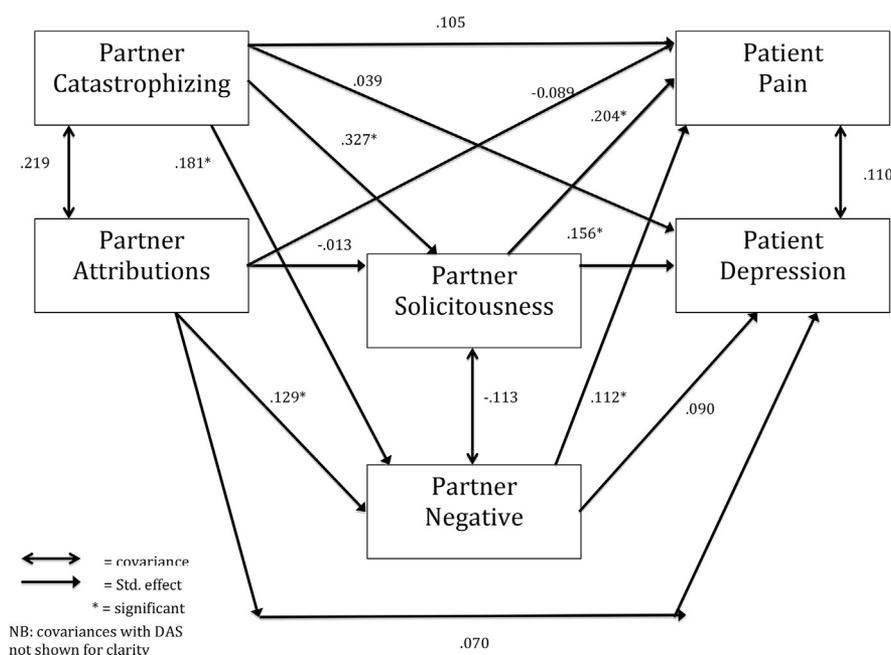


Figure 1. Mediation model of partner cognition and behaviors on patient pain and depression. Covariances with DAS are not shown for clarity.

Relationships Among Partner Cognitive Variables, Partner Behavioral Responses, and Patient Outcomes

Table 1 presents the bivariate correlations. There were significant correlations between certain patient outcomes, partner behavioral responses, and partner cognitive variables. Pain duration was correlated significantly only with partner solicitousness, with greater pain duration being related to less solicitousness. We examined the total effects of the 2 independent variables on women's pain and women's depression in a path model where relationship satisfaction was entered as a covariate. There was a significant total effect of partner catastrophizing on patient pain ($\beta = .041, P < .01$) but not on depression ($\beta = .081, P = .12$). There were no total effects of partner attributions on patient pain ($\beta = -.045, P = .18$) or depression ($\beta = .067, P = .61$).

We further examined our main hypotheses in a new path model in which we entered partner's solicitous and partner's negative responses as mediators of the effects of partner's catastrophizing and partner's attributions on women's pain and women's depression. We first examined the proportions of variance (R^2) in the dependent variables and mediator variables that were accounted for by the other variables in the model. In a second step, we entered relationship satisfaction as a covariate and 1) regressed both the dependent variables and the mediator variables on relationship satisfaction and 2) correlated the independent variables with relationship satisfaction. Table 2 and Fig 1 present the results of this full fitted model.

Significant portions of variance in women's pain ($R^2 = .08, P < .05$) and depressive symptoms ($R^2 = .05, P < .05$) were accounted for by the other variables in the model. In addition, significant proportions of variance in men's solicitous ($R^2 = .10, P < .01$) and negative responses ($R^2 = .10, P < .01$) were explained by men's catastrophizing and attributions.

Although a significant portion of variance in the dependent variables was explained by both the independent and mediator variables, none of the c' paths were significant. Specifically, no significant associations between men's catastrophizing and attributions and women's pain and depressive symptoms emerged. Three

out of the 4 a' paths were significant. Both men's attributions and catastrophizing were positively associated with men's negative responses. Only men's catastrophizing was positively related to men's solicitous responses. Thus, high-catastrophizing men reported higher levels of negative and solicitous responses than did low-catastrophizing men. Men who made more negative attributions about the pain reported higher levels of negative responses relative to men who made less negative attributions.

Three out of the 4 b' paths were significant. Specifically, both men's solicitous and negative responses were positively associated with women's report of pain, indicating that higher levels of partner negative and solicitous responses were associated with more intense pain in women. Only men's solicitous responses were positively associated with women's report of depressive symptoms, suggesting that higher levels of partner solicitous responses were associated with higher levels of depressive symptoms in women.

The effects of men's catastrophizing and attributions on women's pain and depressive symptoms were in part accounted for by men's negative and solicitous responses (Table 3). Greater partner catastrophizing and negative attributions were associated with more partner negative responses; in turn, more partner negative responses were associated with greater reports of pain in women (indirect effect of catastrophizing on pain = .004, 95% CI = .001-.011, effect size = 10%; indirect effect for negative attributions on pain = .007, 95% CI = .000-.021, effect size = 16%). Lastly, greater partner catastrophizing was associated with increased partner solicitous responses, which in turn were associated with reports of greater pain and depressive symptoms in women (indirect effect of catastrophizing on pain = .014, 95% CI = .007-.025, effect size = 34%; indirect effect of catastrophizing on depression = .047, 95% CI = .013-.090, effect size = 58%). Results suggest that overall, the effects of partner cognitions on patient outcomes were in part mediated by partner behavioral responses.

Discussion

The aim of the present study was to test a mediation model to examine whether partner pain-related cognitive factors were associated with partner behavioral responses to pain and whether these in turn were associated with patients' pain and depressive symptoms in a sample of couples coping with PVD. Indeed, it was found that, controlling for relationship satisfaction, results from our path model suggested that the associations between partner catastrophizing and pain attributions and patient pain and depressive symptoms were in part mediated by partner responses to pain. In sum, partner cognitions about pain may impact the patient through the partners' behavioral reactions to pain.

Partner catastrophizing was associated with both partner negative and solicitous responses. One possible reason for this may be that partners' catastrophic thinking about pain indicates a generally heightened

Table 1. Correlations Between Predictor, Mediator, and Outcome Variables

	DEP	NEG	SOL	ATT	CAT	DUR	DAS
Pain	.16**	.11	.21**	-.04	.17**	.02	-.04
DEP		.17**	.10	.12*	.12*	-.05	-.25**
NEG			-.11	.25**	.24**	.01	-.35**
SOL				-.02	.29**	-.11*	.23**
ATT					.22**	.10	-.28**
CAT						-.03	-.12
DUR							-.02

Abbreviations: DEP, depression; NEG, negative responses; SOL, solicitous responses; ATT, attributions; CAT, catastrophizing; DUR, duration.

* $P < .05$.

** $P < .01$.

Table 2. Mediation Model Predicting Behaviors and Patient Outcomes With Partner Responses

<i>PATH</i>	<i>STANDARDIZED EFFECT (SE)</i>	<i>UNSTANDARDIZED EFFECT (SE)</i>	<i>95% CI FOR EFFECT† (LOWER TO UPPER)</i>
<i>c</i> '1: CAT → PAIN	.101 (.066)	.022 (.014)	-.006 to .049
<i>c</i> '2: ATT → PAIN	-.104 (.066)	-.051 (.032)	-.155 to .012
<i>c</i> '3: CAT → DEPR	.022 (.058)	.020 (.054)	-.085 to .125
<i>c</i> '4: ATT → DEPR	.022 (.060)	.045 (.125)	-.200 to .290
<i>a</i> '1: CAT → NEG	.181 (.054)	.014 (.004)	.006 to .023***
<i>a</i> '2: ATT → NEG	.129 (.059)	.023 (.010)	.002 to .043*
<i>a</i> '3: CAT → SOL	.327 (.054)	.029 (.005)	.020 to .039***
<i>a</i> '4: ATT → SOL	-.013 (.060)	-.002 (.012)	-.026 to .021
<i>b</i> '1: SOL → PAIN	.204 (.052)	.493 (.130)	.238 to .749***
<i>b</i> '2: NEG → PAIN	.112 (.049)	.315 (.143)	.034 to .595*
<i>b</i> '3: SOL → DEPR	.156 (.059)	1.603 (.600)	.427 to 2.779**
<i>b</i> '4: NEG → DEPR	.090 (.060)	1.070 (.731)	-.363 to 2.502
Covariance			
PAIN with DEPR	.110 (.044)	1.758 (.731)	.524 to 3.428**
SOL with NEG	-.113 (.061)	-.057 (.031)	-.164 to -.034**
CAT with ATT	.219 (.056)	8.479 (2.280)	3.921 to 12.878***

Abbreviations: SE, standard effect; CAT, catastrophizing; ATT, attributions; DEPR, depression; NEG, negative responses; SOL, solicitous responses.

NOTE. The 95% CI values are based on the unstandardized path coefficients.

**P* < .05.

***P* < .01.

****P* < .001.

†These values are based on the unstandardized path coefficients.

degree of alarm about pain. Therefore, a catastrophic thinker may be more likely to respond to pain to a greater degree, independent of the type of response. This finding has been supported by research examining parental reactions to their child's pain, with parent catastrophizing being related to more parent distress.¹⁶ Partner responses may represent a behavioral coping mechanism for this distress, aimed at self-regulation. Thus, more catastrophizing may simply be associated with more responding, whereas other factors may be associated with the type of response.

Specifically, partner catastrophizing was associated with partner solicitousness, which may be understood using a cognitive-behavioral model, which posits that how one interprets a stimulus will influence how one behaves toward it. In the present case, an increased response to pain may be due to fears about its negative consequences for both the patient and the partner himself

or herself. If a patient is exhibiting pain behaviors, either verbal or nonverbal, these may serve a communicative function, such as to convey distress, and this is then interpreted by the receiver based on her or his own cognitive characteristics, as per the pain communication model.¹⁷ This communicative process may lead to partner catastrophizing, followed by a partner behavioral response (solicitousness). Unfortunately, despite the intended protective function of solicitous responses, the associations with pain appear to be negative, both in this sample and in other chronic pain conditions, which may be due to solicitousness encouraging patient pain avoidance behaviors.^{4,8,26,32} Future research using longitudinal models or daily diary studies may help clarify the relationship between solicitousness and avoidance.

In the present study, a more negative attributional style regarding the patient's pain was associated with more negative responding. More negative partner attributions may mean that they believe the pain is due to the patient, that it will remain stable, and that it will affect them in a more global manner, thus generating more distress. Attributions can also be conceptualized as a cognitive process on the part of the partner in response to a pain communication by the patient, which may influence subsequent partner behavior. Because partners might feel helpless about the patient's pain, or blame their partner for the pain, they may respond in a negative manner out of frustration or anger. It has been previously shown in women with PVD that the patient's own negative attributions about her pain are associated with greater distress as well as worse sexual function and dyadic adjustment.²⁰ According to the present data, negative partner attributions are also associated with patient pain, and this is mediated through their negative responses.

Table 3. Tests of the Indirect Effects Using Bias-Corrected Bootstrapped CIs

<i>INDIRECT EFFECT</i>	<i>UNSTANDARDIZED INDIRECT EFFECT</i>	<i>95% CI FOR INDIRECT EFFECT† (LOWER TO UPPER)</i>
CAT → NEG → PAIN	.004	.001 to .011*
ATT → NEG → PAIN	.007	.000 to .021*
CAT → SOL → PAIN	.014	.007 to .025*
ATT → SOL → PAIN	-.001	-.014 to .011
CAT → NEG → DEPR	.015	-.002 to .049
ATT → NEG → DEPR	.024	-.002 to .089
CAT → SOL → DEPR	.047	.013 to .090*
ATT → SOL → DEPR	-.004	-.051 to .035

Abbreviations: CAT, catastrophizing; NEG, negative responses; ATT, attributions; SOL, solicitous responses; DEPR, depression.

**P* < .05.

†These values are based on the unstandardized path coefficients.

Both partner solicitous and negative responses were associated with worse pain outcomes in women with PVD, which was expected. Unexpectedly, only solicitous responding was associated with depressive symptoms in our sample, whereas in previous research it has often been found that negative responses were associated with depressive symptoms,^{14,31} although only 1 study³¹ controlled for relationship satisfaction. One possible explanation for this finding is the use of relationship satisfaction as a covariate. Indeed, an inspection of the DAS and MPI measures suggests that there was a moderate item content overlap between the 2 measures, which may have resulted in higher shared variance in the DAS and MPI scores. In addition, from a theoretical standpoint, there is significant overlap between relationship satisfaction and partner behavioral responses; thus, once relationship satisfaction is controlled for, partner negative responses are not associated with Beck Depression Inventory-II scores. Further research is needed to tease out the interrelations among partner behavioral responses, relationship satisfaction, and depressive symptoms.

This study also adds potential information as to why some partners respond in different ways. Previous research has found that longer duration of pain is associated with negative responses, whereas shorter duration is associated with solicitous responses.⁵ This may have been the case in the present sample, as there was a significant negative correlation between solicitousness and pain duration. This may indicate a temporal change in one's behavioral response style. If solicitousness is at least in part an empathic response,¹⁵ over time, the partner may become less attuned to the patient's pain, or show a decrease in the cognitive and emotional resources to cope and show empathy toward the patient. It may also be worth examining if positive partner cognitions, such as self-efficacy, may be associated with positive behaviors, as this has been shown to be important in outcome for women with PVD.¹¹ There is also a need for more research on facilitative responding as a behavioral response style. An example of a facilitative response would be the partner expressing happiness that the woman is engaging in sexual activity. Facilitative responding has been shown to be associated with positive outcomes in women with PVD,³² and bolstering positive cognitions and behaviors, such as self-efficacy and facilitative responses, may facilitate alliance building and progress in therapeutic interventions. Finally, partner behavioral responses may be an emotion regulation strategy to cope with fear about the effects of pain on the partner (catastrophizing) or anger and frustration about the pain (attributions). By exhibiting negative or solicitous behaviors, partners may feel that they have some influence or control over the pain or their female partner. Nonetheless, it is likely that factors other than cognitions contribute to partner behavioral responses. It has been proposed that a cognitive-motivational model, which takes into account sexual, contextual, and motivational factors, may deepen our understanding of sexual pain and help identify some of the mechanisms at play in the complex interactions between the

thoughts, emotions, and behaviors of both the woman and her partner.¹³

The present study expands on previous research by identifying mediators of the relation between partner cognitions and women's outcomes of pain and depressive symptoms. The large sample and the inclusion of both members of the couple, with the partner rating his own cognitions and behaviors as opposed to the patient rating her perception of partner behavioral responses, are strengths of the study design. Past work has focused on interpartner associations of partner behavioral responses, such as pain communication and entitlement, and inpatient variables, such as catastrophizing and anxiety, to predict how a partner will react.^{4,5,10,17,19,22,23} Although this is important, the present study expands on these findings by examining intrapartner variables that may eventually interact with the interpartner variables to understand partner behavioral responses. Finally, results provide empirical support for the importance of receiver characteristics in the pain communication model¹⁷ and suggest that cognitions about another's pain have an important role in behavioral reactions toward them.

There are a number of limitations to the present study. First, the data are cross-sectional; hence, the temporal and causal effects of the reported relationships are not known. The use of multiple time points would help assess whether specific partner cognitive patterns lead to partner responses, followed by patient outcomes. Second, although PVD is a chronic pain condition, it may be unique because of the circumstances in which the pain is elicited and the extent of partner involvement. This may mean that dyadic aspects may not generalize to other pain conditions. Third, all participants were in a significant relationship and thus do not represent the full range of patients with PVD or chronic pain in general. Fourth, exclusion criteria in the nonclinical sample were based on self-report and were limited to patients' awareness and reporting of specific criteria when prompted. Fifth, this study was conducted only among women with a specific type of pain, and all partners were male. There may be important gender differences in behavioral response styles that do not generalize outside of this population. Finally, although measures of partner responses have been validated, they do not fully capture the richness of relationship interactions and likely leave out important information that could be important in the context of chronic pain.

The present research has implications for the psychological treatment of PVD. One is the need to involve the partner. It is apparent in this sample that partner behavioral responses to pain are associated with key patient outcomes such as pain and depressive symptoms. Although the importance of involving the partner is well accepted in cognitive-behavioral sex therapy, it is less common in traditional pain treatments. It may be particularly important to involve the partner in PVD treatment because they tend to be present during the pain-provoking situations, and communication between partners has been found to

impact their behavioral response styles.^{6,24} According to the present data, partner behavioral responses could be targets of intervention, but so could partner catastrophic thinking and attributional style. Indeed, catastrophizing and attributions may be important to address initially, as this may create a positive cascade in responses and

outcomes for couples coping with PVD. In addition, even if the partner is not directly involved in the treatment process, it may be important to help the woman improve communication regarding her pain experience and to negotiate changes in her partner's behaviors and cognitions regarding the pain.

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