Fear-avoidance and pelvic floor muscle function are associated with pain intensity in women with vulvodynia

Authors:

Justine Benoit-Piau, MPT, School of Rehabilitation, Faculty of Medicine and Health Sciences, Université de Sherbrooke, Research Center of the Centre hospitalier universitaire de Sherbrooke, Sherbrooke, QC, Canada;

Sophie Bergeron, PhD, Department of Psychology, Université de Montréal, Montréal, QC, Canada;

Audrey Brassard, PhD, Department of Psychology, Université de Sherbrooke, Sherbrooke, QC, Canada;

Chantale Dumoulin, PT, PhD, School of Rehabilitation, Faculty of Medicine, Université de Montréal, Research Center of the Institut Universitaire de Gériatrie de Montréal, Montréal, QC, Canada;

Samir Khalifé, MD, Jewish General Hospital and Royal Victoria Hospital, Health Center of McGill University, Montréal, QC, Canada;
Guy Waddell, MD, Department of obstetrics and gynecology, Faculty of Medicine and Health Sciences, Université de Sherbrooke, Research Center of the Centre hospitalier universitaire de Sherbrooke, Sherbrooke, QC, Canada;

Mélanie Morin, PT, PhD, School of Rehabilitation, Faculty of Medicine and Health Sciences, Université de Sherbrooke, Research Center of the Centre hospitalier universitaire de Sherbrooke, Sherbrooke, QC, Canada;

Correspondence:
Mélanie Morin, PT, Ph.D.
Associate Professor
School of Rehabilitation, Faculty of Medicine and Health Sciences, Université de Sherbrooke
3001, 12e Avenue Nord, Sherbrooke J1H-5N4 QC, Canada
Research Center of the Centre hospitalier universitaire de Sherbrooke
Phone: 819 346-1110, extension 13818
Fax: 819 820-6864
Melanie.M.Morin@usherbrooke.ca

Sources of support:
Canadian Institutes of Health Research
Abstract

**Objective:** To investigate the association between fear-avoidance variables, pelvic floor muscle (PFM) function and pain intensity in women with provoked vestibulodynia (PVD) as well as the moderator effect of partner support.

**Methods:** A total of 173 women diagnosed with PVD participated in the study. Fear-avoidance variables were evaluated with validated self-administered questionnaires: pain catastrophizing (Pain Catastrophizing Scale), pain-related fear (Pain Anxiety Symptoms Scale), and partner support (Partner Support Questionnaire). Pain intensity was evaluated using a numerical rating scale. PFM function, including maximal strength, speed of contraction, flexibility and muscle tone, was evaluated with a dynamometric speculum.

**Results:** Pain catastrophizing was significantly associated with pain intensity ($\beta=0.310$, $p<0.001$), as was partner support ($\beta=0.194$, $p=0.004$) and PFM flexibility ($\beta=-0.255$, $p<0.001$). Fear-avoidance, PFM variables and partner support explained 28.3% of the variance in pain during intercourse ($p<0.001$). The addition of PFM was of particular interest since it explained a significant addition of 9% in pain intensity. Partner support was found to moderate the association between pain intensity and catastrophizing. Among women with high partner support, catastrophizing was not significantly related to pain ($b=0.150$, $p=0.142$). When partner support was low, catastrophizing was significantly related to pain ($b=0.068$, $p<0.001$).

**Discussion:** Findings of this study support that the symptomatology of PVD can be explained partly by fear-avoidance variables and pelvic floor muscle function. This study supports the significant role of PFM function and its importance in the etiology pathophysiology of PVD. It also sheds light on the role of partner support and its moderating effect on pain catastrophizing.

**Key words:** Provoked vestibulodynia, fear-avoidance, partner support, pelvic floor muscles
Introduction

Vulvodynia, defined as vulvar pain without an identifiable cause, affects as many as 7-8% of premenopausal women (1,2). The most common subtype of vulvodynia is provoked vestibulodynia (PVD) which is pain located at the vulvar vestibule and triggered by the application of pressure or penetration attempt (3). This highly incapacitating condition affects women’s sexual function, relationship satisfaction and mental health (6-7). Despite the fact that its etiology remains unclear, many associated factors have been proposed: genetic, hormonal, inflammation, musculoskeletal, central and peripheral neurologic mechanisms, structural and psychosocial defects, including partner variables (1,3-4).

Fear-avoidance variables feature prominently among the most robust correlates of PVD (4,8–12). These variables include pain catastrophizing, self-efficacy, fear-avoidance, fear of pain, hypervigilance and anxiety as well as partner responses. In a scoping review including 30 studies, Desrochers et al. (13) reported that women with PVD have a higher rate of anxiety, fear of pain, hypervigilance and catastrophizing compared to asymptomatic women. In another study, Desrochers et al. (14) investigated the contribution of fear-avoidance and self-efficacy to pain intensity in women with PVD, observing that these variables could explain 15% of the pain intensity experienced. As opposed to previous studies evaluating the level of catastrophizing in women with PVD compared to controls (13), Desrochers et al. showed the involvement of catastrophizing in pain intensity (14). Regarding fear of pain’s contribution to pain intensity, most studies have compared PVD women to asymptomatic controls. However, few studies have evaluated its association to pain intensity (13–15).

Alterations in PFM function have also been reported to play a key role in PVD (16,17). Composed of a superficial and a deep layer of muscles, the PFM run from the pubic bone to the coccygeal bone. Available studies generally agreed that PFM function was altered in women with PVD (16,17). Næss et Bø (18) found that PVD patients had significantly higher vaginal resting pressure and lower PFM activity during contraction. Consistently, using a dynamometric speculum, Morin et al. (16) observed an increased general tone as well as a decreased strength, speed of contraction, endurance and coordination among women with PVD. Morin et al. (17) also found that women with PVD had alterations in PFM morphometry using transperineal ultrasound suggesting higher resting tone and weakness. As this methodology is a pain free assessment technique, these findings suggested that PVD resulted in a higher resting tone that is not limited to a protection mechanism. Other interventional studies provided further empirical support about the role of PFM alterations in PVD. In fact, treatments targeting PFM function have been shown
to significantly reduce pain intensity after interventions provided by a physical therapist. However, no studies have investigated the association between PFM alteration and pain intensity thus far (19).

Since chronic pain can affect both the patient and her partner, one of the social variables frequently studied is partner response (20–22). Although it was established that partner response is associated with distress, pain and sexual function for chronic pain conditions in women, including vulvodynia, another determining social variable such as partner support, remains understudied. Partner support is a form of social support linked to health-related quality of life and relationship satisfaction in patients with cancer (23,24). Given the sexual aspect of PVD, it is likely that partner support will have an impact on women’s experience of pain. Also, social support was shown to influence multiple variables in other chronic pain conditions such as low back pain (LBP). In fact, social support was associated with chronicity, depressive symptoms and range of motion of the trunk in patients with LBP (25–27). Despite the fact that research on health and partner support usually focuses on its association with outcome variables, it has been recommended that social support should also be investigated as a moderator for its buffering effect on negative cognitions (28). Sullivan et al. (29) postulated through the communal coping model that catastrophizing was associated with a need for partner support expressed through behavioral characteristics of this coping strategy.

Since the etiology of PVD remains misunderstood, the ability to assess the variables contributing to pain intensity could be of great importance for evaluation and treatment. Fear-avoidance and partner variables have already been linked to pain intensity in women with PVD. PFM function was also shown to be different in this population. Therefore, could PFM function add to the prediction of pain intensity above and beyond the contribution of fear-avoidance variables?

The aim of this study was to investigate the association between fear-avoidance variables, partner support, PFM function and pain intensity in women with PVD as well as the moderator effect of partner support on catastrophizing. We hypothesized that the addition of muscular variables would better explain pain intensity among women with PVD. It is also expected that partner support will have a moderating role on catastrophizing.

**Materials and methods**

*Participants*
Participants were recruited by means of advertisements, participation in other PVD studies conducted by our team, visits to physicians’ and other health professionals’ referrals and word of mouth. The sample of women recruited included 12.7% during physicians’ visits, 1.2% at visits to other health professionals (e.g. psychologist, physiotherapist), 70.5% through advertisements, 7.5% via word of mouth and 8.1% unknown. Of the 223 women who underwent a gynecological examination, 173 women participated in the study (30). Other women were excluded because they had other gynecological conditions, infections or dermatological problems. Women included were nulliparous, aged 18 to 45 years and reporting pain intensity of at least 5/10 on the numerical rating scale (NRS) during 90% of attempted sexual intercourse for at least 6 months. Women had pain limited to the vestibule area and had a stable sexual partner to evaluate pain intensity. The exclusion criteria were: urogynecological conditions (incontinence, pelvic organ prolapse >1 stage on the pelvic organ prolapse quantification), vaginismus, current or previous pregnancy that lasted more than 18 weeks, active urinary or vaginal infection (or earlier in the last 3 months), used medication that could affect pain perception, had anterior vulvar or vaginal surgery or were in a post-menopausal status, refusal to abstain from other treatments for a 6-month period, other pelvic pathologies associated with lower genital pain (e.g. deep dyspareunia) and major psychological conditions or any coexisting significant medical condition (depressive symptoms and anxiety that could present a risk for women’s health, as well as cardiovascular, hematological, central nervous system, pulmonary and renal conditions). To confirm their diagnosis of PVD, women took part in a medical history interview and a physical examination performed by one of our collaborating gynecologists. The criteria followed during the examination were those defined by Friedrich (31) and recently modified by Bergeron et al. (32) : 1) pain on the vestibule following activities causing pressure (including attempted vaginal penetration); 2) acute pain provoked by the cotton-swab test (random pressure application to the vulvar vestibule). Those criteria were part of the new guidelines for evaluation and treatment of PVD and their inter-rater reliability was already established (32,33).

Procedure

The study was conducted in two university hospitals in large metropolitan areas. Women interested in the project were invited to contact the research coordinator to undertake an eligibility screening questionnaire and thereafter had their diagnosis confirmed by the gynecologist. Eligible women were convened to an assessment session by an experimented experienced pelvic floor physical therapist. After signing the informed consent, women (1) were an interviewed about socio-demographic information, pain, medical and gynecological history, (2) completed the self-
administered validated questionnaires assessing pain, psychosocial and sexual variables, and (3) had a physical examination, including PFM function assessment. The physical examination was completed with an empty bladder. Prior to the examination, the women were instructed how to contract PFM while the physical therapist used digital palpation to ensure it was done correctly.

**Dependent variable**

Pain intensity during intercourse or attempted vaginal penetration was evaluated using a NRS from 0 to 10, 0 representing no pain and 10 representing the worst pain imaginable. The NRS was recommended by the IMMPACT as a valid assessment in chronic pain population and (34) and showed adequate reliability (35). Women were asked to report the average pain they felt during attempted or successful intercourse over the last 6 months. Pain intensity was assessed before physical examination, ensuring that women answered according to symptoms during intercourse and not according to what they felt during the examination.

**Independent variables**

**Pain catastrophizing** was measured with the Pain Catastrophizing Scale (PCS), which includes three dimensions: rumination, magnification and helplessness (36). Women had to complete it based on their pain during attempted vaginal penetration using a Likert scale with the end points “not at all” and “all the time”. It was found that this version had psychometric properties comparable to the original questionnaire, which is a valid and reliable tool to assess catastrophizing (36,37).

**Pain-related fear** was assessed using the short version of the Pain Anxiety Symptoms Scale (PASS), where a higher score indicates higher fear of pain. Women had to rate 20 assertions based on the feelings they had when pain was experienced during intercourse using a Likert scale ranging from “never” to “always”. The short version’s predictive and construct validity was found good and its test-retest reliability strong for chronic pain (38).

**Partner support** was assessed with the Spousal Support Questionnaire, which showed good construct validity (28). The questionnaire includes four affirmations rated on a Likert scale with end points “never”, which scores 1, and “always”, which scores 5 for a maximum total of 20. This questionnaire evaluates women’s perception of the level of support shown by their partners. A higher score was representative of a higher support. To assess its contribution to pain intensity, the total score was used. Here are two examples of items included in the questionnaire: 1) My
partner supports me in my attempts to achieve my goals; 2) My partner understands my way of thinking and feeling things.

**PFM function** was examined using an intravaginal dynamometric speculum. Its psychometric properties, including its reliability, validity and responsiveness, have been assessed in multiple studies (39–42). Women were in the supine position with hips and knees flexed on a conventional gynecologist’s table during the evaluation. Maximal strength was obtained by asking the participant to contract PFM maximally against the dynamometer as much as she could, providing results in newtons. Speed of contraction was measured when the participant executed rapid consecutive contractions for 15 seconds. The measurement was obtained by calculating the slope of the first contraction giving results in newtons/second. Flexibility was evaluated using maximal aperture tolerated by the participant in millimeters (i.e. antero-posterior diameter). Muscle tone was the passive force recorded during dynamic stretches from minimal to maximal aperture. The mean force at 15-mm aperture was measured for the last three stretch-release cycles out of five. Further details on this methodology are provided elsewhere (43).

**Statistical Analyses**

Statistical analyses were conducted with SPSS® 24.0 (Statistical Package for the Social Sciences, IBM). Pearson and Spearman correlations were first computed to identify correlations between independent variables and pain intensity that could help build the hierarchical regression model. Then, a hierarchical regression analysis was conducted, based on variables identified as relevant in PVD in the current literature and results from bivariate correlations. It allowed us to assess each variable’s contribution to pain intensity, as measured by the NRS. Variables were entered in the models in the following order, based on the modified fear-avoidance model presented by Thomtén and Linton (44): (step 1) catastrophizing (PCS total score) and pain-related fear (PASS total score), (step 2) PFM function (dynamometric assessment), (step 3) partner support (Spousal Support Questionnaire total score). In the last step, the interaction terms between partner support and catastrophizing were entered to examine moderation. Following Aiken and West’s (1991)(45) recommendations, all predictors were centered to avoid multicollinearity. When an interaction term was significant, simple slopes were computed using the PROCESS macro developed by Hayes (2013) (46). This program computes 95% confidence intervals around the estimates on 5000 bootstrapping samples. Level of significance was set at p<0.05. All statistical assumptions were verified, e.g. normality of data and residuals, linearity and independence (considering a correlation threshold of >0.8 for multicollinearity (47).
Results

Sample characteristics

Participant characteristics are detailed in Table 1. On average, women were 24 years of age, were mostly single with a stable partner and had a frequency of five penetrations per month. They had been mostly affected by secondary PVD for a duration of four years. Psycho-social and PFM function variables are presented in Table 2.

Bivariate correlations between variables

Results from Spearman Pearson correlations are shown in Table 3. Maximal strength was significantly and negatively correlated with pain intensity, as were speed of contraction and maximal aperture. Muscle tone was not significantly associated with pain intensity. Catastrophizing, pain-related fear and partner support were positively related to pain.

Fear-avoidance and PFM variables explaining pain intensity

Hierarchical linear regression analysis was used to determine which variable contributed to pain intensity, as measured by the NRS. As shown in Table 4, the model significantly explained 28.3% of pain during intercourse \[F(8,164) = 9.497, p<0.001\]. Several variables were significantly related to pain intensity: catastrophizing (PCS total score), partner support (Spousal Support Questionnaire) and PFM flexibility. The PFM function could explain an additional 9% of pain intensity among PVD women beyond that accounted for by fear-avoidance variables. In addition, a significant interaction was found, revealing the moderating role of partner support. As presented in Figure 1, when partner support was viewed as high, catastrophizing was not related to pain \((b=0.023, \text{ Standard Error (S.E.)}=0.016, p=0.142, 95\%\text{CI} [-0.008, 0.055])\), whereas when partner support was viewed as low, catastrophizing was positively related to pain \((b=0.068, \text{ S.E.}=0.016, p<0.001, 95\%\text{CI} [0.037, 0.100])\).

Discussion

The aim of this study was to investigate the association between fear-avoidance, muscular variables and pain intensity in women with PVD as well as the moderating effect of partner support on catastrophizing and PFM function. This study found that PFM function was associated with pain intensity among women with PVD beyond the contribution of fear-avoidance variables. The significant moderating role of partner support on catastrophizing was also observed.
Univariate analyses revealed that pain catastrophizing, fear of pain and partner support were all significantly and positively correlated with pain intensity, suggesting that higher levels of pain catastrophizing, fear of pain and partner support were associated with higher pain intensity. This association could be bidirectional, meaning that women with higher pain intensity have higher levels of pain catastrophizing and pain-related fear. The significant association of catastrophizing (one of the fear-avoidance variables) with pain intensity is consistent with the findings of previous studies of women with PVD (14,15,48).

This study shows a positive correlation between partner support and pain intensity. Although partner support was not previously related to pain intensity in women with PVD, it was already linked to pain outcomes in rheumatoid arthritis by several studies (49,50). It was also correlated with quality of life and relationship satisfaction in other chronic pain conditions (23,24). That this variable is positively correlated with pain intensity raises some questions because partner support is generally conceptualized as a positive influence on pain and disability outcomes. Results from this study suggest an opposite association. Higher partner support could be associated with higher pain intensity similarly to partner solicitous responses (21,22). Rosen et al. put forward the idea that solicitous partners could contribute to greater pain in women by triggering an increase in avoidance responses towards intercourse (21,22). Moreover, Jolliffe et Nicholas (51) found that increased attention to pain could positively affect pain intensity scores. Given the results of Corsini-Munt et al. (52) that couple therapy could reduce pain intensity among women with PVD, the importance of partner support still needs to be established more clearly. Similarly, Miller et al. (53) found that among couples with chronic pain, a therapeutic assessment of pain coping strategies could decrease pain intensity and improve mood. It is also possible that women with higher pain intensity perceive that they need more support, explaining the positive association between those variables.

Results from this study show that PFM maximal strength, speed of contraction and flexibility were negatively correlated with pain intensity. These findings corroborate the available literature about the role of PFM function showing that women with PVD had lower strength, speed of contraction and flexibility than asymptomatic controls (16,54). Previous studies also highlighted the importance of muscle tone in women with PVD (16,54). However, we found a non-significant linear association with pain intensity. Given the intricate relationship between flexibility and muscle tone, these results deserve further explanation. It is plausible that a certain level of tone is required to elicit pain, masking the association with pain intensity. Previous studies found that both flexibility and muscle tone play a role in PVD as they were different in
women with PVD compared to asymptomatic controls (16,54). However, Morin et al. (2017) found a higher effect size for flexibility (Cohen d=1.787) than for PFM tone (Cohen d=0.884), which suggested a greater involvement of PFM flexibility when comparing women with and without PVD (16). The results of the current study are thus in line with this previous finding as PFM flexibility is the muscle variable the most strongly associated with pain. This could be explained by the fact that the flexibility measurement involves a pain component which could be more closely related to the patients’ symptoms. Furthermore, the findings of the present study are also consistent with studies showing that physical therapy addressing PFM function can successfully decrease pain intensity in women with PVD (41,42,55).

A hierarchical regression model using catastrophizing, pain-related fear, partner support and PFM function significantly explained 28.3% of pain intensity in women with PVD. Fear-avoidance variables have already been investigated in various studies to explain function and pain in women with PVD as well as other pathologies (6,13,14,21,22). Desrochers et al. (14) found that catastrophizing, fear of pain, hypervigilance and low self-efficacy could explain 15% of pain among women with PVD. These results are consistent with the results obtained in the current study, where catastrophizing and pain anxiety could significantly explain 15% of pain intensity. Previous studies have also shown that cognitive-behavioral therapy can significantly reduce pain intensity during intercourse (29,30,34), which is in line with the findings of the present study. The addition of PFM function could explain an additional 9% of pain intensity. PFM function has long been hypothesized as a factor contributing to pain in PVD in conceptual model and case-controlled studies (7,16,44), but the association had not been validated empirically (7,44). Results from this study are therefore a step forward in the confirmation of PFM function as a component of PVD etiology/pathophysiology.

Our results also revealed a moderator effect of partner support on catastrophizing (or buffer effect). When partner support was higher, catastrophizing was no longer associated with pain, suggesting a protective effect of partner support. The association between catastrophizing and pain intensity was only significant among women who perceived they had less support from their partner. These results are in line with the communal coping model by Sullivan et al., suggesting that catastrophizing would be a way of asking for support (29). When women perceive their partner as supportive, their catastrophizing behavior is no longer related to their pain intensity. This study provides a better understanding of the effect of partner support as a buffer of the association between catastrophizing and pain intensity. These results suggest that partner support should be investigated further because it could be a relevant treatment target.
This study presents some limitations. First, the pain was self-reported and women had to focus on the pain intensity experienced in the previous six months, which may have introduced a retrospective recall bias. Despite the limit it introduces, this method of evaluation remains the most widely used in pain studies (33). Daily diaries could have been used to monitor pain more closely to the action causing pain. Women could have recorded in their diary pain intensity during sexual intercourse shortly after it happened. Lastly, since this study was cross-sectional, it is not possible to establish whether PVD causes the alteration of PFM function and fear-avoidance variables or whether it’s the other way around. These muscle and psychosocial variables could therefore be involved as an initiator or a consequence of pain. A longitudinal study would be necessary to investigate the sequence of events.

The findings of this study confirm that catastrophizing, partner support and PFM function are associated with pain intensity. Moreover, the addition of PFM function explains the additional role of pain intensity compared to other studies. It was also found that partner support moderates the effect association between catastrophizing and pain intensity. Considering that the etiology of PVD is still misunderstood and that treatment includes a wide variety of modalities, this study shows that PFM function should be considered as well as fear-avoidance variables when treating PVD. Results from this study should be taken into consideration when developing new treatments.

Conflict of interest

Authors state that they have no conflict of interest.

Ethics

The Research Ethics Committees of the Centre hospitalier universitaire de Sherbrooke, Centre hospitalier universitaire de Montréal and Institut Universitaire de Gériatrie de Montréal approved this study.

Acknowledgments

This research and the laboratory infrastructure were funded by the Canadian Institutes of Health Research and the Canadian Foundation for Innovation, respectively. Dr Morin and Dr Dumoulin are supported by a salary award from the Fonds de la recherche du Québec – Santé (FRQ–S) and a Tier 2 Canadian Research Chair, respectively.
References


Copyright © 2018 Wolters Kluwer Health, Inc. Unauthorized reproduction of the article is prohibited.


27. Aghilinejad M, Tavakolifard N, Mortazavi SA, Kabir Mokamelkhah E, Sotudehmanesh A, Mortazavi SA. The effect of physical and psychosocial occupational factors on the


Figure legend

Figure 1 – Partner support as a moderator of catastrophizing

*** p<0.001
Table 1 – Participants’ characteristics

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Mean ± S.D. or n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>23.61 ± 4.01</td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
</tr>
<tr>
<td>Single with a stable partner</td>
<td>107 (61.8)</td>
</tr>
<tr>
<td>Cohabitating</td>
<td>52 (30.1)</td>
</tr>
<tr>
<td>Married</td>
<td>14 (8.1)</td>
</tr>
<tr>
<td>Education</td>
<td></td>
</tr>
<tr>
<td>Undergraduate (elementary, high school, college, minor, major)</td>
<td>110 (63.6)</td>
</tr>
<tr>
<td>Baccalaureate</td>
<td>43 (24.9)</td>
</tr>
<tr>
<td>Masters</td>
<td>16 (9.2)</td>
</tr>
<tr>
<td>Doctorate</td>
<td>4 (2.3)</td>
</tr>
<tr>
<td>Relationship duration (years)</td>
<td>3.13 ± 2.72</td>
</tr>
<tr>
<td>Frequency of intercourse (per month)</td>
<td>5.39 ± 5.72</td>
</tr>
<tr>
<td>Pain intensity (Numerical rating scale)</td>
<td>7.27 ± 1.52</td>
</tr>
<tr>
<td>Pain duration (years)</td>
<td>4.18 ± 3.32</td>
</tr>
<tr>
<td>Use of oral contraceptive</td>
<td>135 (78.0)</td>
</tr>
<tr>
<td>Type of PVD (primary / secondary)</td>
<td>68 (39) / 105 (61)</td>
</tr>
</tbody>
</table>

N = 173
Table 2 –Fear-avoidance and PFM function

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean ± S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychological</td>
<td>N=173</td>
</tr>
<tr>
<td>Catastrophizing (PCS total score)</td>
<td>27.65 ± 9.91</td>
</tr>
<tr>
<td>Pain-related fear (PASS total score)</td>
<td>40.75 ± 16.16</td>
</tr>
<tr>
<td>Social</td>
<td></td>
</tr>
<tr>
<td>Partner Support (Spousal Support Questionnaire)</td>
<td>16.68 ± 2.72</td>
</tr>
<tr>
<td>PFM function</td>
<td></td>
</tr>
<tr>
<td>PFM maximum strength (N)</td>
<td>3.26 ± 2.05</td>
</tr>
<tr>
<td>PFM contraction speed (N/sec)</td>
<td>5.82 ± 4.68</td>
</tr>
<tr>
<td>PFM flexibility – Maximal tolerated aperture (mm)</td>
<td>21.36 ± 8.30</td>
</tr>
<tr>
<td>PFM tone – Passive forces at 15 mm aperture (N)</td>
<td>2.20 ± 1.40</td>
</tr>
</tbody>
</table>

PCS Pain Catastrophizing Scale; PASS Pain Anxiety Symptoms Scale
Table 3 – Pearson correlations between fear-avoidance variables, PFM function and pain intensity

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>$r$</th>
<th>S.E.</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catastrophizing (PCS total score)</td>
<td>0.391</td>
<td>0.067</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Pain-related fear (PASS total score)</td>
<td>0.328</td>
<td>0.075</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Partner support (Spousal Support Questionnaire)</td>
<td>0.156</td>
<td>0.082</td>
<td>0.040</td>
</tr>
<tr>
<td>PFM maximum strength (N)</td>
<td>-0.152</td>
<td>0.066</td>
<td>0.045</td>
</tr>
<tr>
<td>PFM contraction speed (N/sec)</td>
<td>-0.251</td>
<td>0.066</td>
<td>0.001</td>
</tr>
<tr>
<td>PFM flexibility – Maximal tolerated aperture (mm)</td>
<td>-0.319</td>
<td>0.063</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>PFM tone – Passive forces at 15 mm aperture (N)</td>
<td>0.038</td>
<td>0.061</td>
<td>0.619</td>
</tr>
</tbody>
</table>
Table 4 – Hierarchical linear regression with pain intensity as dependant variable

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Adjusted R²</th>
<th>Standardized β</th>
<th>b</th>
<th>S.E.</th>
<th>p</th>
<th>95% C.I.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>0.150</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Catastrophizing (PCS total score)</td>
<td>0.310</td>
<td>0.046</td>
<td>0.013</td>
<td>&lt;0.001</td>
<td>[0.020, 0.073]</td>
<td></td>
</tr>
<tr>
<td>Pain-related fear (PASS total score)</td>
<td>0.102</td>
<td>0.009</td>
<td>0.008</td>
<td>0.260</td>
<td>[-0.007, 0.026]</td>
<td></td>
</tr>
<tr>
<td>Step 2</td>
<td>0.240</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PFM Function</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PFM flexibility – Maximal aperture tolerated (mm)</td>
<td>-0.255</td>
<td>-0.047</td>
<td>0.013</td>
<td>&lt;0.001</td>
<td>[-0.072, -0.021]</td>
<td></td>
</tr>
<tr>
<td>PFM maximal strength</td>
<td>0.033</td>
<td>0.024</td>
<td>0.074</td>
<td>0.743</td>
<td>[-0.122, 0.170]</td>
<td></td>
</tr>
<tr>
<td>PFM tone – Passive forces at 15 mm aperture</td>
<td>0.005</td>
<td>0.006</td>
<td>0.073</td>
<td>0.939</td>
<td>[-0.138, 0.149]</td>
<td></td>
</tr>
<tr>
<td>PFM contraction speed</td>
<td>-0.156</td>
<td>-0.049</td>
<td>0.032</td>
<td>0.130</td>
<td>[-0.113, 0.015]</td>
<td></td>
</tr>
<tr>
<td>Step 3</td>
<td>0.261</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partner Support (Spousal Support Questionnaire total score)</td>
<td>0.194</td>
<td>0.110</td>
<td>0.038</td>
<td>0.004</td>
<td>[0.035, 0.185]</td>
<td></td>
</tr>
<tr>
<td>Step 4</td>
<td>0.283</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partner support X PCS total score</td>
<td>-0.166</td>
<td>-0.009</td>
<td>0.004</td>
<td>0.014</td>
<td>[-0.017, -0.002]</td>
<td></td>
</tr>
<tr>
<td>Model p&lt;0.001</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PCS Pain Catastrophizing Scale; PASS Pain Anxiety Symptoms Scale; 95% C.I. 95% Confidence Interval.
Figure 1 – Partner support as a moderator of catastrophizing