THE EFFECTIVENESS OF PELVIC FLOOR
PHYSIOTHERAPY IN WOMEN WITH PROVOKED
VESTIBULODYNIA

by

Corrie Anne Goldfinger

A thesis submitted to the Department of Psychology
In conformity with the requirements for
the degree of Masters of Science

Queen’s University
Kingston, Ontario, Canada
(September, 2008)

Copyright © Corrie Anne Goldfinger, 2008
Abstract

Provoked vestibulodynia (PVD) is the most common form of vulvodynia affecting 12% of pre-menopausal women in the general population. It is commonly described as a sharp or burning pain at the entrance of the vagina in response to contact or pressure to the vulvar vestibule. PVD has negative impacts on sexual functioning, relationship adjustment, psychological well-being, and overall quality of life. Studies suggest that increased muscle tension in the pelvic floor of women with PVD may play an important role in maintaining and exacerbating their pain. Despite this finding, no prospective studies of pelvic floor physiotherapy (PFP) for PVD have been carried out. The purpose of the current study was to prospectively examine the effectiveness of a comprehensive PFP intervention in treating the physical and psychosexual components of PVD. Thirteen women with PVD completed 8 sessions of PFP. Women were assessed at pre- and post-treatment via gynecological examinations, vestibular pain threshold testing, structured interviews and standardized questionnaires measuring pain variables (pain during intercourse, McGill Pain Questionnaire, Pain Disability Index), cognitive variables (Pain Catastrophizing Scale, Pain Anxiety Symptom Scale-20, coping strategies), and sexual function (frequency of intercourse, Female Sexual Function Index). To-date, ten women have also completed a 3-month follow-up interview. Results indicated that vestibular pain thresholds significantly increased from pre- to post-treatment, indicating reduced pain sensitivity. As compared with pre-treatment, women reported significant reductions in pain intensity during the gynecological examination and during intercourse.
Women also significantly improved on measures of negative pain cognitions and various components of sexual function. There were no changes with respect to mental health or quality of life. The treatment was considered to be successful for 10 (77%) of the 13 women and treatment satisfaction was rated very high. Predictors of successful treatment outcome at the follow-up period were a longer period of time in treatment and decreases in pain catastrophizing and pain-related anxiety. Results provide preliminary support for the effectiveness of PFP in treating the physical and psychosexual components of PVD. These findings indicate the need for large-scale, randomized studies of the effectiveness of PFP in comparison and in conjunction with other treatment options.
Acknowledgements

Firstly, I would like to thank my supervisor Dr. Caroline Pukall for her continual support and feedback on this thesis and all of my work in the lab. Thank you for all of your good insight and attention to detail. I believe I will be a better researcher and clinician because of your mentorship.

I would like to thank my current and previous committee members Dr. Ronald Holden, Dr. Wendy Craig, Dr. Tara MacDonald, and Dr. Uzma Rehman for their feedback and guidance on my thesis. I would also like to thank SSHRC, CIHR, and OWHC for their financial support of my Master’s thesis.

I would also like to thank the other members of the research team. Evelyne Gentilcore-Saulnier, thank you for your excellent clinical skills and amazing team work; this project would not even be possible if not for you. Dr. Linda McLean, thank you for your help during the planning phases of the project. Dr. Susan Chamberlain, thank you for your continued involvement in the project.

Thanks to my family, friends, and Dave for their emotional support, friendship, and love during the last two years. I know you will all continue to support me throughout my PhD and will help me find and maintain balance in life.
# Table of Contents

Abstract .................................................................................................................................................. ii
Acknowledgements ............................................................................................................................. iv
Table of Contents .................................................................................................................................... v
List of Figures .......................................................................................................................................... viii
List of Tables .......................................................................................................................................... ix
Chapter 1 Introduction ............................................................................................................................. 1
Chapter 2 Literature Review ................................................................................................................... 3
  Vulvodynia ........................................................................................................................................ 3
  Provoked Vestibulodynia .................................................................................................................... 3
  Psychological and Sexual Correlates of PVD ..................................................................................... 5
Etiological Factors .................................................................................................................................. 7
Treatment Options .................................................................................................................................. 13
Current Study .......................................................................................................................................... 21
Chapter 3 Hypotheses ............................................................................................................................. 23
Chapter 4 Methods ................................................................................................................................. 26
  Participants ......................................................................................................................................... 26
  Procedures ......................................................................................................................................... 28
    Recruitment and screening ............................................................................................................... 28
    Gynecological examination ............................................................................................................. 28
    Interview and questionnaires .......................................................................................................... 30
    Quantitative sensory testing ........................................................................................................... 31
    Pre-treatment physiotherapy assessment ....................................................................................... 33
    Pelvic floor physiotherapy treatment .............................................................................................. 34
  Post-treatment evaluations ............................................................................................................... 38
    3-month follow-up evaluation ........................................................................................................ 39
Measures .................................................................................................................................................. 39
  Pain measures ..................................................................................................................................... 39
  Health and mental health measures .................................................................................................. 42
  Sexuality measures ............................................................................................................................... 44
Data Considerations and Analysis ........................................................................................................... 45
Chapter 5 Results .................................................................49
Participant Characteristics ..................................................49
Changes from Pre-Treatment to Post-Treatment .......................53
Quantitative sensory testing ..................................................53
Gynecological examination ..................................................54
Dyspareunia and other activities causing vulvar pain ..................54
Sexual function .....................................................................60
Psychological factors and quality of life ..................................63
3-Month Follow-Up ..............................................................66
Dyspareunia and other activities causing vulvar pain ..................67
Sexual function .....................................................................73
Psychological factors ............................................................76
Treatment Success and Satisfaction .........................................78
Predicting Treatment Success .................................................80
Chapter 6 Discussion ............................................................84
Physical and Psychophysical Testing .......................................84
Dyspareunia and Sexual Function ..........................................87
Psychological Factors and Quality of Life .................................93
Treatment Success and Predicting Success ...............................96
Limitations and Future Directions ...........................................99
Chapter 7 Conclusions ........................................................106
References ...........................................................................107
Appendix A Recruitment Letter and Flyer .................................125
Appendix B Telephone Information and Screening Form ............127
Appendix C Letter of Information and Consent Form ................138
Appendix D Confidentiality Form ............................................145
Appendix E Medical History Form .........................................146
Appendix F Vulvar Pain History Form .....................................147
Appendix G Gynecological Examination Record Form ...............148
Appendix H Pre-Treatment Interview .......................................152
Appendix I Vulvalgesiometers ................................................186
Appendix J Intensity and Unpleasantness Rating Scales ......................................................... 187
Appendix K Vulvodynia Information Package ................................................................... 188
Appendix L PFM Contraction Form .................................................................................. 200
Appendix M Dilator Exercises Form .................................................................................. 202
Appendix N sEMG System and Probe .............................................................................. 206
Appendix O Electrical Stimulation Device ....................................................................... 207
Appendix P Dilators ........................................................................................................ 208
Appendix Q Post-Treatment Interview ............................................................................. 209
Appendix R Follow-Up Interview .................................................................................... 225
Appendix S Non-Parametric Test Results ........................................................................ 237
List of Figures

Figure 1. The tension-anxiety-pain cycle. ............................................................................................................. 12

Figure 2. Means for the Female Sexual Function Index (FSFI) Total Score and the Sexual-Esteem (SS-SE) and Sexual Depression (SS-SD) subscales of the Sexuality Scale at pre-treatment and post-treatment. ................................................................................................................................. 62

Figure 3. Means for general intercourse pain intensity and unpleasantness ratings at pre-treatment, post-treatment, and follow-up. ........................................................................................................................................ 71

Figure 4. Means for the percentage of painful activities at pre-treatment, post-treatment, and follow-up. ........................................................................................................................................ 72

Figure 5. Means for the percentage of painful activities at pre-treatment, post-treatment, and follow-up. ........................................................................................................................................ 73

Figure 6. Means for the number of monthly intercourse attempts at pre-treatment, post-treatment, and follow-up. ........................................................................................................................................ 74

Figure 7. Means for the Female Sexual Function Index (FSFI) Total Scores at pre-treatment, post-treatment, and follow-up. ........................................................................................................................................ 75

Figure 8. Means for the Pain Catastrophizing Scale (PCS) and Pain Anxiety Symptoms Scale-20 (PASS-20) Total Scores at pre-treatment, post-treatment, and follow-up. ........................................................................ 77
List of Tables

Table 1 ................................................................. 50
Means (M), Standard Deviations (SD), and Percentages (%) on Sexual and Relationship History Variables

Table 2 ................................................................. 53
Percentages (%) of Participants Attempting Various Treatments for PVD

Table 3 ................................................................. 56
Means (M) and Standard Deviations (SD) for Intercourse Pain Intensity and Unpleasantness Ratings and Other Vulvar Pain Variables at Pre-Treatment and Post-Treatment

Table 4 ................................................................. 58
Percentages (%) of Participants Experiencing Vulvar Pain during Activities at Pre-Treatment, Post-Treatment, and Follow-Up

Table 5 ................................................................. 59
Means (M) and Standard Deviations (SD) for McGill Pain Questionnaire (MPQ) Scales at Pre-Treatment and Post-Treatment

Table 6 ................................................................. 61
Means (M) and Standard Deviations (SD) for Sexuality Variables at Pre-Treatment and Post-Treatment

Table 7 ................................................................. 64
Means (M) and Standard Deviations (SD) for Psychological Factors and Quality of Life at Pre-Treatment and Post-Treatment

Table 8 ................................................................. 67
Percentages (%) of Participants reporting the use of Various Coping Strategies at Pre-Treatment and Post-Treatment

Table 9 ................................................................. 69
Means (M) and Standard Deviations (SD) for Variables Assessed Across Pre-Treatment, Post-Treatment, and Follow-Up

Table 10 ................................................................. 82
Summary of Hierarchical Regression Analyses for Variables Predicting Post-Treatment Self-Report Degree of Vulvar Pain Improvement

Table 11 ................................................................. 83
Summary of Hierarchical Regression Analyses for Variables Predicting Follow-Up Self-Report Degree of Vulvar Pain Improvement
Chapter 1

Introduction

Provoked vestibulodynia (PVD; formerly known as vulvar vestibulitis syndrome) is the most common form of chronic vulvar pain. The pain of PVD is commonly described as a sharp or burning sensation at the vulvar vestibule (i.e., entrance of the vagina) in response to contact or pressure (Bergeron, Binik, Khalifé, Pagidas, & Glazer, 2001a). Dyspareunia, or painful sexual intercourse, is the most common complaint of women with PVD. Although a recent epidemiological study found that PVD affects approximately 12% of pre-menopausal women in the general population (Harlow, Wise, & Stewart, 2001), and PVD has been shown to have significant negative impacts on both psychological and sexual health (e.g., Gates & Galask, 2001; Nylander Lundqvist & Bergdahl, 2003; Sackett, Gates, Heckman-Stone, Kobus, & Galask, 2001), researchers in myriad fields are still striving to determine the causes of and treatments for PVD. In fact, there is still no consensus among researchers as to how PVD should be conceptualized. This study will position PVD within a biopsychosocial framework which highlights the importance of biological, psychological, and social factors in understanding the effects, etiology, and treatment of the disorder.

The purpose of this study was to prospectively investigate the effectiveness of one treatment option for PVD known as pelvic floor physiotherapy (PFP). This treatment option is based on empirical findings of heightened pelvic floor muscle (PFM) tension in
women with PVD, yet there are only preliminary reports of success using this treatment. Thus, further investigation is required to more firmly determine the effectiveness of PFP in treating the physical, psychological, and sexual components of PVD.

An overview of the diagnosis of PVD will be followed by a discussion of the psychosocial and psychosexual correlates of PVD, the multitude of etiological theories, and the extant literature on different treatment options.
Chapter 2
Literature Review

Vulvodynia

Vulvodynia, as recently defined by the International Society for the Study of Vulvovaginal Disease (ISSVD), is “vulvar discomfort, most often described as burning pain, occurring in the absence of relevant visible findings or a specific, clinically identifiable, neurological disorder” (Haefner, 2007). Vulvodynia is further classified into subtypes depending on (1) the location of the pain (i.e., pain localized in a particular vulvar area versus pain affecting the whole vulvar region), and (2) the temporal characteristics of the pain (i.e., pain that only occurs when provoked by some form of pressure, pain that exists on a constant basis and needs no provocation, or a combination of provoked and unprovoked pain). Provoked pain can be elicited in sexual and/or non-sexual situations.

Provoked Vestibulodynia

The most common subtype of vulvodynia, and the subtype most frequently researched, is provoked vestibulodynia (PVD). Friedrich (1987) outlined the three diagnostic criteria for PVD: (1) severe pain upon vestibular touch or attempted vaginal entry, (2) tenderness to pressure localized within the vulvar vestibule, and (3) physical findings limited to vestibular erythema (i.e., redness) of various degrees. There is evidence of the reliability and validity of the first two of these criteria; however, this finding was not the case with the third criterion (Bergeron et al., 2001a). These results
indicate that the presence or absence of erythema does not significantly contribute to the process of making a diagnosis of PVD. Currently, a diagnosis of PVD is based upon a combination of the woman’s self-report of vulvar pain (e.g., where and when they experience pain, the quality of the pain) and the presence of pain during a cotton-swab test carried out by a gynecologist (the standard gynecological method for diagnosing PVD; Friedrich, 1987). The cotton-swab test consists of palpations of the vestibular tissue to assess Friedrich’s second criterion.

The onset of pain may be at first intercourse attempt (i.e., primary PVD) or may develop after some period of pain-free intercourse (i.e., secondary PVD). Women with primary PVD report higher pain scores when heat is applied to the forearm (Granot, Friedman, Yarnitsky, Tamir, & Zimmer, 2004), report a history of more severe vulvar pain, and are more likely to report some family history of dyspareunia or inability to use tampons than those with secondary PVD (Goetsch, 1991). Differences between these two subsets have led researchers to believe that they may have different etiological pathways; however, more research in this area is needed before conclusions can be drawn.

PVD is currently classified as a sexual dysfunction, and more specifically, a sexual pain disorder, in the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR; American Psychiatric Association, 2000). Although dyspareunia is the most common complaint associated with PVD, this classification fails to take into account the various non-sexual circumstances under which women with PVD experience pain, such as tampon insertion, friction with clothing, and sporting activities (Bergeron et al.,
This classification is being challenged by a body of evidence that supports the conceptualization of PVD as a pain disorder that interferes with sexual function rather than as a sexual dysfunction itself (Binik, Pukall, Reissing, & Khalifé, 2001; Pukall, Kao, & Binik, 2004; Pukall, Reissing, Binik, Khalifé, & Abbott, 2000). Classifying PVD as a pain disorder may lead to different ways of investigating the causes of the pain and to more appropriate treatment modalities.

The general pain literature is no stranger to recognizing the importance of non-physical aspects of pain. Unlike a biomedical perspective, the biopsychosocial health model supports the importance of a variety of psychological factors, such as fear and self-efficacy, in understanding chronic pain in addition to the biological and physiological components often given precedence (Turk & Okifuji, 2002). Currently, this multidimensional viewpoint in which biological, psychological, and social factors are all seen as fundamental to understanding and treating PVD is accepted by PVD researchers (Weijmar-Schultz, Basson, Binik, Eschenbach, Wesselmann, & van Lankveld, 2005).

**Psychological and Sexual Correlates of PVD**

A variety of psychological, sexual, and relational factors have been investigated in women with PVD in comparison with non-affected women. The existing literature is based on correlational designs and therefore the factors associated with PVD can neither be attributed as causes or results of the pain. These factors, however, can help us better understand the experiences of women living with PVD and guide us in determining areas that should be addressed in treatment.
Research has shown that the pain of PVD has negative impacts on overall quality of life, including feeling out of control of one’s life and body (Arnold, Bachmann, Rosen, Kelly, & Rhoads, 2006). Numerous studies have found significantly higher levels of depression in women with PVD as compared to non-affected women (Gates & Galask, 2001; Nylander Lundqvist & Bergdahl, 2003). There are similar findings with respect to state and trait anxiety, with higher scores among women with PVD than non-affected women (Granot & Lavee, 2005; Nylander Lundqvist & Bergdahl, 2003; Payne, Binik, Amsel, & Khalifé, 2005). Additionally, women with PVD have shown hypervigilance for sexual intercourse pain (Payne et al., 2005) and report higher rates of pain catastrophizing with respect to their pain during sexual intercourse as compared to other pain experienced (Granot & Lavee, 2005; Pukall, Binik, Khalifé, Amsel, & Abbott, 2002).

Women with PVD report negative impacts on self-esteem, self-confidence, and body image following the onset of their vulvar pain (Sackett et al., 2001). Many women with PVD also feel a loss of femininity or see themselves as inadequate sexual partners (Ayling & Ussher, 2008; Marriott & Thompson, 2008; Sackett et al., 2001). Also common are reports of lower levels of sexual functioning, including negative effects on sexual desire, lower intercourse and orgasmic frequency, lower scores on sexual self-concept, and lower sexual satisfaction scores as compared with non-affected women (Gates & Galask, 2001; Masheb, Lozano-Blanco, Kohorn, Minkin, & Kerns, 2004). Although one study demonstrated that 74% of women with PVD reported that the pain directly impacts their intimate relationships (Bergeron, Bouchard, Fortier, Binik, &
Khalifé, 1997), numerous studies have found comparable rates of relationship satisfaction among both women with PVD and their partners and non-affected women and their partners (Desrosiers, Bergeron, Meana, Leclerc, Binik, & Khalifé, 2008; van Lankveld, Weijenborg, & ter Kuile, 1996).

All of these findings are consistent with the biopsychosocial model of PVD in that affected women experience concerns related to their pain in various aspects of their intrapsychic and sexual lives. In addition to numerous correlates of pain that are often proposed as effects or results of PVD, research has also attempted to answer the question ‘what causes PVD?’

**Etiological Factors**

Although a plethora of etiological theories have been proposed for PVD, there is no single factor that has proven itself as the cause of PVD. Alternately, research has revealed myriad factors that potentially contribute to the onset and maintenance of the pain in women with PVD. Many researchers have examined the vestibular tissue itself for abnormalities that might explain the heightened sensitivity in this region. In comparison with non-affected women, women with PVD have increased inflammatory mediators (Bornstein, Goldschmid, & Sabo, 2004), nerve fibre innervation (Bohm-Starke, Hilliges, Falconer, & Rylander, 1998; Bornstein et al., 2004; Halperin, Zehavi, Vakin, Ben-Ami, Pansky, & Schneider, 2005; Tympanidis, Terenghi, & Dowd, 2003; Weström & Willén, 1998), number of pain receptors (Tympanidis, Casula, Yiangou, Terenghi, Dowd, & Anand, 2004), blood flow (Bohm-Starke, Hilliges, Blomgren, Falconer, & Rylander, 2004),
2001), and pain-related peptides (Bohm-Starke, Hilliges, Falconer, & Rylander, 1999) in the vestibule. It has been proposed that these changes could lead to a heightened sensitivity in response to pressure applied to the vestibular tissue (Bohm-Starke, Hilliges, Brodda-Jansen, Rylander, & Torebjörk, 2001; Pukall et al., 2002), consistent with the provoked pain presentation in women with PVD.

The increased sensitivity exhibited by women with PVD is not restricted to the vestibule. Indeed, such findings have been reported in controlled quantitative sensory testing (QST) studies which examine central, in addition to peripheral, nervous system functioning. Women with PVD are not only more sensitive to vestibular touch and pain than non-affected women (Bohm-Starke, Hilliges, Brodda-Jansen et al., 2001; Giesecke, Reed, Haefner, Giesecke, Clauw, & Gracely, 2004; Lowenstein et al., 2004; Pukall et al., 2002), they are also more sensitive to touch, pain, pressure, and heat pain on non-vestibular areas, such as their forearm (Granot, Friedman, Yarnitsky, & Zimmer, 2002; Pukall et al., 2002). Women with PVD also report more pain-related complaints than non-affected women (Danielsson, Eisemann, Sjöberg, & Wikman, 2001; Pukall, Baron, Amsel, Khalifé, & Binik, 2006; Pukall et al., 2002). This evidence supports a central, in addition to a peripheral, pain modulatory dysfunction in women with PVD and is further bolstered by the findings of a recent functional magnetic resonance imaging study (Pukall, Strigo, Binik, Amsel, Khalifé, & Bushnell, 2005). Women with PVD showed significantly higher neuronal activation during both painful and non-painful vestibular stimulation in comparison with non-affected women during equivalent pressure levels.
Generalized changes in pain processing have also been reported in patients with other chronic pain syndromes including chronic low-back pain (e.g., Giesecke, Gracely et al., 2004; O’Neill, Manniche, Graven-Nielsen, & Arendt-Nielsen, 2007), chronic headaches (e.g., Ashina, Bendtsen, Ashina, Magerl, & Jensen, 2006) and migraines (e.g. Burstein, Yarnitsky, Goor-Aryeh, Ransil, & Bajwa, 2000). Recent research, however, has shown that central nervous system functioning may be different in women with PVD than in patients with other chronic pain conditions. For example, unlike individuals with other chronic pain conditions, women with PVD have been shown to have intact diffuse noxious inhibitory control (Johannesson, de Boussard, Brodda-Jansen, & Bohm-Starke, 2006; Sutton, 2007). When women with PVD experience some persistent noxious stimulation an endogenous analgesic system is turned on, thus making other noxious stimulations less painful; this system does not seem to function properly in patients with other chronic pain conditions. Thus, it appears as though PVD shares many, but not all, characteristics with other chronic pain conditions, perhaps due to its provoked nature.

Factors outside the vestibular tissue and nervous system have also been posited to play a role in the development of PVD. A link between hormonal changes due to the use of oral contraceptives (Bazin, Bouchard, Brisson, Morin, Meisels, & Fortier, 1994; Bouchard, Brisson, Fortier, Morin, & Blanchette, 2002) and early menarche and/or painful menstruation (Bazin et al., 1994; Harlow et al., 2001) has been suggested, given that alterations in the hormonal milieu can lead to increased sensitivity of the vestibule (Bohm-Starke, Johannesson, Hilliges, Rylander, & Torebjörk, 2004). Findings from a
recent population-based study, however, did not support the strong association between oral contraceptive use and risk for PVD that had previously been found in clinic-based studies (Harlow, Vitonis, & Stewart, 2008). Other imbalances in the vaginal/pelvic environment have been reported as risk factors for PVD. For example, one of the most consistent findings in the histories of women with PVD is that of repeated yeast infections (Mann, Kaufman, Brown, & Adam, 1992). It is not known, however, whether it is the yeast itself, the iatrogenic effects of the yeast infection treatments, or some other factor that may sensitize the vestibule. Further, women with PVD have been shown to have a high incidence of several alleles (Babula, Danielsson, Sjoberg, Ledger, & Witkin, 2004; Gerber, Bongiovanni, Ledger, & Witkin, 2003; Jeremias, Ledger, & Witkin, 2000) associated with abnormal regulation of inflammation in chronic inflammatory conditions (Heresbach et al., 1997; Mansfield et al., 1994) and with immune defense against microorganisms (Babula et al., 2004), leading some to believe that there may be a genetic basis for PVD in some women. One hypothesis is that women with PVD who present with some of these alleles may be at increased risk for a pro-inflammatory immune response if triggered by some stimuli (e.g., yeast infection, injury) and may not have the ability to terminate this response. The prolonged inflammation may trigger other changes and lead to an increased sensitivity both within and outside the vestibule (Gerber, Bongiovanni, Ledger, & Witkin, 2002; Gerber et al., 2003). Alternatively, the presence of another one of the alleles might increase susceptibility to a lower genital tract infection by a microorganism that may cause symptoms of PVD (Babula et al., 2004).
The chronic pain literature emphasizes the important maintaining factor of heightened muscle tension in several conditions, including pelvic pain syndromes in men and women (e.g., prostatitis/chronic pelvic pain syndrome [Zermann, Ishigooka, Doggweiler, & Schmidt, 1999] and interstitial cystitis [Brookoff & Bennett, 2006]). Pelvic floor muscle function has also been examined in women with PVD. Studies have shown that women with PVD, as compared with non-affected women, have pelvic floor hypertonicity (i.e., increased PFM tension; Glazer, Rodke, Swencionis, Hertz, & Young, 1995; Reissing, Binik, Khalifé, Cohen, & Amsel, 2004; Reissing, Brown, Lord, Binik, & Khalifé, 2005). In addition to heightened tension of the PFMs, women with PVD have also been shown to have instability of the PFMs, poor contractile strength, and poor recovery after a contraction (White, Jantos, & Glazer, 1997).

Reissing et al.’s study (2005) on hypertonicity of the PFMs in women with PVD demonstrated that these women exhibited significantly more hypertonicity in the pelvic floor at the superficial level, less vaginal muscle strength, less ability to relax the intravaginal muscles, and a smaller degree of vaginal opening than non-affected women. The most important finding from this study was that there were less consistent findings at deeper layers—there was a lack of generalized pelvic floor hypertonicity. This finding suggests that hypertonicity may result from, rather than cause, PVD. The authors posit that the tension begins as a protective guarding response to the pain at the vestibule and with time, this response results in an increased resting tone. This increased tonicity leads to an increase in pressure on the vestibule during intercourse or other activities, which
further increases the pain and therefore perpetuates and increases the protective guarding response (see Figure 1). Hypertonicity may therefore act as a maintaining and exacerbating factor in PVD. Clinically, this finding has strong implications for the need of pelvic floor assessment and treatment. Other treatment options may be less likely to result in complete pain relief if the protective response of muscle guarding and lack of muscle control are not addressed.

Figure 1. The tension-anxiety-pain cycle. Once pain has been initiated at the vestibule by some trigger (e.g., repeated yeast infections, first intercourse experience), the body responds by tightening the muscles of the pelvic floor. Over time, these muscles become hypertonic and exacerbate the pain experienced at the vestibule. This cycle is further impacted by the role of numerous psychological factors such as pain anxiety and catastrophizing. These factors perpetuate the body’s protective response and magnify the woman’s experience of the pain.
Treatment Options

Given that there is no single, verifiable cause for PVD, treatment options vary greatly. The major therapeutic alternatives for PVD can be categorized as medical treatments, cognitive-behavioural interventions, alternative treatment options, or pelvic floor muscle therapies, each based on one or several of the etiological theories. Medical interventions include topical interventions (e.g., anti-fungal, corticosteroid and/or estrogen creams), injectable medical treatments (e.g., interferon, lidocaine, botulinum toxin), systemic medications (e.g., antibiotics), and surgical intervention (i.e., vestibulectomy, see below). Two reviews found overall poor long-term results for a variety of topical, injectable, and systemic medications (Bergeron, Pukall, & Mailloux, 2006; Pukall, Payne, Kao, Khalifé, & Binik, 2005). Additionally, randomized controlled trials demonstrated no greater benefit of some of these medical interventions (i.e., fluconazole, cromolyn cream) over placebos (Bornstein, Livnat, Stolar, & Abramovici, 2000; Nyirjesy, Sobel, Weitz, Leaman, Small, & Gelone, 2001). Although some medical interventions have led to improvements in subsets of women with PVD, some authors caution against the use of systemic and injectable medications stating that they may cause more harm than benefit (Wesselmann & Reich, 1996). A recent review of various treatment options for PVD found success rates for medical treatments—including topical, injectable, and systemic medications—ranging from 13 to 67% (Landry, Bergeron, Dupuis, & Desrochers, 2008).
This same review also investigated the extant literature investigating the effectiveness of vestibulectomy (i.e., surgical excision of the hymen and vestibule surrounding the introitus to a depth of about 2mm), yielded success rates ranging from 61 to 94% (Landry et al., 2008). In one randomized trial, however, the surgery group had the highest drop-out rate; in addition, 2 of the 22 participants who underwent this invasive procedure reported being worse following the treatment (Bergeron et al., 2001b). Although this procedure has shown significant success rates, dropout rates in studies and the mere invasiveness of the procedure calls for additional therapeutic options for women who choose not to undergo surgery.

Cognitive-behavioural interventions for PVD include cognitive-behavioural pain management and sex therapy to target pain reduction and sexual functioning. Common techniques used in cognitive-behavioural pain management and sex therapy include: education about pain as a multifactorial condition and about how vulvar pain affects sexual desire and arousal, progressive muscle relaxation and/or suggestive relaxation, abdominal breathing, distraction techniques usually focusing on sexual imagery, rehearsal of coping self-statements, communication skills training, cognitive restructuring, counseling aimed at improving self-image and body-image, Kegel exercises, and vaginal dilation. Success rates ranging from 43 to 86% have been reported in three studies in which sex therapy and pain management were combined (Abramov, Wolman, & David, 1994; ter Kuile & Weijenborg, 2006; Weijmar-Schultz et al., 1996). In a randomized treatment outcome study (Bergeron et al., 2001b), after eight sessions of
group CBT (GCBT), women with PVD had significantly lower pain levels, improved sexual functioning, and increased frequency of intercourse than at pre-treatment. Although 6 months following treatment the percentage of pain reduction was not as great as for women who received vestibulectomy, no women in the GCBT group dropped out of this treatment option and the treatment was considered successful (i.e., subjective report of “great improvement” or “complete relief of pain”) for 39% of the women (as compared with 68% for vestibulectomy). In a 2.5-year follow-up, self-reported pain intensity during intercourse did not differ between participants who completed the GCBT and those who had vestibulectomy (Bergeron, Khalifé, Glazer, & Binik, 2008). These results indicate that although the effects of GCBT may take longer to present, it is as effective as vestibulectomy in reducing intercourse pain intensity.

Research on alternative treatment strategies including acupuncture (Danielsson, Sjöberg, & Ostman, 2001; Powell & Wojnarowska, 1999) and hypnosis (Kandyba & Binik, 2003; Pukall, Kandyba, Amsel, Khalifé, & Binik, 2007) are preliminary and have shown some success in treating women with PVD.

Treatment options targeting the pelvic floor musculature, pelvic floor physiotherapy (PFP), and various components of PFP, including surface electromyographic (sEMG) biofeedback, have been investigated as potential avenues for women with PVD. Biofeedback trains individuals to change their behaviour in ways to improve their health using signals from their own bodies. Pelvic floor biofeedback, for instance, provides clients with feedback about the degree of tension in their PFMs and
makes them aware of how they can change this tension by making changes in their bodies. sEMG is a biofeedback technique used with women with PVD and it involves inserting a probe with sensors into the vagina and connecting it to a computerized EMG system. The electrical activity of individual muscles or muscle groups are detected, amplified, and analyzed by a computer and the visual feedback to the client is provided in the form of numbers or lights. The client is asked to tighten and release their PFMs and the feedback assists them in gaining voluntary control over these muscles by enabling them to visualize their muscle activity. The ultimate goal is to reduce vulvar pain by reducing tension in and improving control over the pelvic floor musculature.

sEMG biofeedback has been used in response to findings of pelvic floor hypertonicity in women with PVD (Glazer et al., 1995; Reissing et al., 2004; Reissing et al., 2005). Glazer et al. (1995) provided the first report of the effectiveness of surface sEMG biofeedback – one component of PFP – in women with PVD. After four months of daily contraction and relaxation exercises monitored by sEMG, women showed an increase in muscle strength and stability, as well as a decrease in resting tone. Subjective pain reports decreased, on average, by 83%, with over half the women reporting pain-free intercourse at the end of treatment. As well, 79% of women who abstained from intercourse pre-treatment resumed sexual activity post-treatment. This study included women who had different forms of vulvodynia, and therefore cannot necessarily be generalized to women with PVD. Biofeedback, however, shows promise for therapeutic options targeting the pelvic floor musculature in women with PVD. In another study
including only women with PVD, 24 of 29 women (83%) reported experiencing either negligible or mild pain with intercourse following four to six months of daily sEMG biofeedback exercises, and 69% had resumed sexual activity (McKay, Kaufman, Doctor, Berkova, Glazer, & Redko, 2001).

In a randomized treatment outcome study comparing sEMG biofeedback and topical lidocaine gel in women with PVD, results indicated that women in both treatment groups benefited from treatment. Participants demonstrated significant increases in vestibular pain thresholds, quality of life, and sexual functioning at 12-month follow-up, with no between-groups differences (Danielsson, Torstensson, Brodda-Jansen, & Bohm-Starke, 2006). Small sample sizes and low compliance with the daily sEMG exercises may have contributed to the lack of group differences. In the previously mentioned randomized treatment outcome study, Bergeron et al. (2001b) compared vestibulectomy, GCBT, and pelvic floor sEMG biofeedback for the treatment of PVD. sEMG biofeedback demonstrated significant pain reduction during the gynecological examination and sexual intercourse at the 6-month follow-up; pain during intercourse continued to decrease at the 2.5-year follow-up. Despite these findings, vestibulectomy resulted in significantly more pain reduction than sEMG biofeedback during the gynecological examination and sexual intercourse at both the 6-month and 2.5-year follow-ups (Bergeron et al., 2001b; Bergeron et al., 2008).

Support for pelvic floor treatment options has also been demonstrated in a number of small studies investigating other components of PFP. For instance, one small
uncontrolled study using electrical stimulation with a heterogeneous group of women with vulvar pain resulted in improvements in both PFM contractile and resting ability, and self-report measures demonstrated pain reduction and improvements in sexual functioning (Nappi, Ferdeghini, Abbiati, Vercesi, Farina, & Polatti, 2003). Two uncontrolled studies of the use of vaginal dilator therapy in women with superficial dyspareunia showed decreased pain ratings during intercourse in 78% and 90% of the affected women following treatment (Idama & Pring, 2000; Smith & Gillmer, 1998). In a recently published study, women with PVD had significant decreases in PFM resting baseline and PFM instability as well as increases in contraction strength following a treatment program composed of sEMG biofeedback; vaginal dilators; and brief psychotherapeutic intervention targeting fear of penetration, loss of sexual desire and arousal, stress management, and relationship issues (Jantos, 2008).

Given that the treatment goals of women with PVD typically include pain reduction and improvements in sexual function, it appears as if sexual functioning requires attention over and above that of pain reduction. One interesting finding from the previously mentioned randomized study is that although vestibulectomy was superior to the other two treatments in reducing pain intensity, it was not significantly better at restoring sexual function in these women at either the 6-month or 2.5-year follow-ups. Additionally, despite the finding that women in all three groups reported improvements in sexual function from pre- to post-treatment, they were still well below the norms of sexual intercourse frequency for same-aged healthy control women (Bergeron et al.,
2001b). Perhaps a comprehensive hands-on treatment that includes procedures allowing a woman with PVD to practice relaxation and other techniques in response to the provoked pain would be more useful at targeting not only the pain component, but also the sexual function aspect, of PVD.

In an attempt to increase success rates and target psychosexual issues in women with PVD, some researchers have moved beyond solely using sEMG for the treatment of PVD. As mentioned above, sEMG is only one of many techniques used by pelvic floor physiotherapists offering a comprehensive treatment plan to their patients. The goals of a comprehensive physiotherapeutic intervention according to Bergeron and Lord (2003) are to (1) increase awareness and proprioception of the pelvic floor musculature; (2) improve muscle discrimination and muscle relaxation; (3) normalize muscle tone; (4) increase elasticity of the tissue at the vaginal opening, as well as desensitize the painful area; and (5) decrease fear of vaginal penetration. To meet these goals, the authors propose an intervention plan including education about the role of pelvic floor hypertonicity in maintaining PVD, EMG biofeedback, electrical stimulation, stretching and other manual techniques, and insertion techniques such as the use of vaginal accommodators (i.e., dilators).

One treatment study (Bergeron, Brown, Lord, Oala, Binik, & Khalifé, 2002) retrospectively evaluated the effectiveness of such a comprehensive PFP program in 35 women with PVD. After an average of 7 treatment sessions, results indicated at least a moderate improvement in vulvar pain in over 70% of the participants. Participants
reported significant post-treatment decreases in pain during intercourse and gynecological exams, as well as decreases in pain frequency, pain interference with intercourse, and fear of vaginal penetration. In addition, increases in intercourse frequency and in levels of sexual desire and arousal were reported, indicating that both pain and sexual function improved. The treatment was considered successful (i.e., subjective report of “great improvement” or “complete relief of pain”) for 52% of the women in the study.

A recent survey including a scenario of a woman presenting with PVD was sent to American clinicians known to treat women with PVD (e.g., gynecologists, dermatologists, family physicians) and asked them to identify what first-, second-, and third-line treatments they would use for the case (Updike & Wiesenfeld, 2005). The results indicated that the most frequently recommended treatments were tricyclic antidepressants (67%), local anesthesia (52%), vestibulectomy (48%), and physical therapy (44%). Although physical therapy was recommended as a first-line treatment by 16% of the clinicians, local anesthesia, tricyclic antidepressants, topical steroids, and estrogens were more frequently recommended as first-line treatments, while vestibulectomy was most commonly recommended as a third-line treatment after other failed interventions. Other treatment options recommended included psychiatric care, gabapentin, steroid injections, and interferon, and the majority of clinicians indicated recommending lifestyle modifications to their actual patients (e.g., unscented detergents, cotton underwear; Updike & Wiesenfeld, 2005). Results from this study indicate the
broad array of variability in the treatment of PVD across clinicians. Further research into the effectiveness of treatment options is necessary for clinicians to determine the optimal interventions for women with PVD.

Current Study

There is still a need to investigate a variety of treatment options including the use of PFP, either as a solitary treatment or as part of a multidisciplinary treatment program. Although several studies have shown significant reductions in pain and improvements in psychosexual functioning after sEMG, and one retrospective study showed success using a comprehensive PFP program, no prospective studies have been conducted on the effectiveness of a comprehensive PFP intervention in women with PVD. In addition, there is a lack of information related to which women will benefit most from this form of treatment, or whether the treatment will prove effective in treating some of the psychological and sexual correlates of the pain.

The purpose of the current study was to prospectively examine the effectiveness of a comprehensive PFP intervention in treating the pain and psychological and sexual correlates of PVD. The aims of this prospective study were to increase the current knowledge of non-medical treatment options for PVD, as well as to determine the need for a large-scale, randomized study including the use of PFP for the treatment of PVD. Specifically, the following research questions were addressed: (1) Does PFP decrease vulvar pain sensitivity? (2) Does PFP reduce pain intensity ratings during physical examinations, and does this reduction generalize to self-reported vulvar pain levels
during intercourse? (3) Does PFP improve psychological and sexual correlates of pain?
and (4) What factors predict successful treatment outcomes?
Chapter 3

Hypotheses

Although no prospective studies of the effectiveness of PFP have been conducted, findings from studies of sEMG biofeedback and other behavioural treatment options informed predictions of the outcomes of the current study. Although specific hypotheses are identified below based on the extant literature, some aspects of this preliminary study are exploratory.

1. It was hypothesized that following PFP, there would be an increase in vestibular pressure pain thresholds, indicating a decrease in pain sensitivity.

2. It was hypothesized that following PFP, vulvar pain intensity ratings would decrease during the gynecological examination, and this decrease would generalize to self-reported intercourse pain ratings.

3. It was hypothesized that following PFP, there would be improvements with respect to cognitive factors of pain (i.e., pain-related anxiety, and pain catastrophizing), as well as psychological and sexual correlates of pain (i.e., depression, anxiety, quality of life, and sexual function).

4. It was hypothesized that the changes outlined in the previous three hypotheses would occur from pre- to post-treatment and that the improvements would be maintained at the follow-up period.
5. This exploratory hypothesis investigated factors that potentially predicted successful treatment outcome. Following from previous research, there are a number of potential predictors of successful treatment outcome. One study indicated that women with secondary PVD were more likely to report complete response to vestibulectomy than women with primary PVD (Bornstein, Goldik, Stolar, Zarfati, & Abramovici, 1997). Given the method by which pelvic floor tension exacerbates vulvar pain in PVD outlined by Reissing et al. (2005; see above), it is likely that tension will increase over time and therefore be more difficult to treat after extended periods of time. Additionally, given that intercourse pain intensity ratings have been shown to progressively decline with the steady improvement of PFM functioning (e.g., strength of contraction) over the course of PFM treatments in women with PVD (McKay et al., 2001), it is likely that having a longer treatment period will result in greater pain reductions due to greater improvements in PFM functioning. The chronic pain literature has consistently shown that improvements in cognitive factors, including catastrophizing and pain-related anxiety, throughout the course of a treatment program, predict successful treatment outcomes (Burns, Glenn, Bruehl, Harden, & Lofland, 2003; Turner, Holtzman, & Mancl, 2007). Thus, the following factors may predict successful treatment outcomes: having secondary, rather than primary, PVD; having vulvar pain for a shorter, rather than longer, period of time; completing the PFP treatment sessions over a longer, rather than shorter, period of
time; and having greater decreases in pain catastrophizing and pain-related anxiety from pre- to post-treatment.
Chapter 4
Methods

Participants

Women were eligible to participate in the study if they were fluent in English, were 18 years of age or older, met the diagnostic criteria for PVD during the gynecological examination (see below), and had complaints of vulvar pain for at least 6 months. Exclusion criteria for the study included: (1) current major medical, psychiatric, or pain conditions that interfered with daily and/or sexual functioning (e.g., cardiac illness, incontinence), (2) current use of medications that interfered with pain processing (e.g., antidepressants), (3) current breastfeeding or being less than 6 months postpartum, (4) previous vestibular surgery, (5) postmenopausal status, and (6) an unwillingness to abstain from any other treatments for vulvar pain until the follow-up sessions were complete. Women who had pelvic pain during intercourse or who had mild vaginismus (i.e., fear and avoidance of vaginal penetration despite a desire to engage in such activities)—but were still able to have vaginal penetration—in addition to their vestibular pain were eligible to participate in the study.

Of the 30 women who were screened over the telephone, 9 were not eligible to participate and 2 were not interested in participating in the study. Reasons for ineligibility included being postmenopausal \( n = 4, \ 45\% \), experiencing only pelvic pain during intercourse \( n = 2, \ 22\% \), having infrequent vulvar pain \( n = 1, \ 11\% \), having vulvar pain for less than 6 months \( n = 1, \ 11\% \), and having incontinence \( n = 1, \ 11\% \). Based on the
telephone screening, 19 women went on to complete the gynecological examination to confirm eligibility for the study. Only 1 woman was ineligible following the gynecological examination because her pain ratings around the vaginal opening were very low and because she was strongly vaginismic. Of the 18 women eligible to continue in the study, 3 decided not to participate; 1 woman began to have serious migraines and was taking analgesics on a daily basis and 2 women gave no reason for choosing not to participate. Following the pre-treatment testing sessions (see below), 1 additional woman decided not to participate due to other medical concerns. Thus, 14 women began the treatment portion of the study. Only 1 woman did not complete the treatment and the follow-up sessions; after completing three sessions of treatment she was required to leave the Kingston area and therefore could not finish the treatment. All 13 women who finished the treatment completed the post-treatment follow-up session, and to-date, 10 women have completed the 3-month follow-up telephone interview. Women completed all portions of the study from September 2007 to July 2008.

The 13 participants who completed the study were on average 23 years of age ($SD = 3$; range 19-31) and 11 of them were students (85%). The majority of the women ($n = 11$, 85%) were Caucasian and all of the participants either identified as heterosexual or were in committed heterosexual relationships.
Procedures

Recruitment and screening. Women with PVD were recruited through two means: (1) Women with PVD who had previously participated in studies carried out by the Sexual Health Research Laboratory (SHRL), and who gave permission to be contacted about future studies, were either sent an email or called to inform them of the study, and (2) posters were distributed to family physicians and gynecologists around the Kingston area and posted on Kingston campuses and around the downtown area (see Appendix A for the letter sent to doctors and the recruitment flyer). Women interested in participating in the study contacted the SHRL to be screened for preliminary eligibility. A member of the SHRL informed the women of the purpose of the study as well as the details of what participation would entail using a standardized script. If the women were still interested following this explanation, they were asked a number of questions to determine whether they met the eligibility criteria of the study. This screening included a series of queries about the women’s vulvar pain to determine whether it was consistent with the symptoms of PVD (see Appendix B for the script and screening form). Women who met the eligibility criteria were then given an appointment with Dr. Susan Chamberlain, the study gynecologist. Before their appointment, the women were emailed a copy of the letter of information and consent form (Appendix C) for their perusal along with detailed directions to their appointment.

Gynecological examination. Potential participants met with a female member of the SHRL at the Department of Obstetrics and Gynecology, Kingston General Hospital at
which time they had the opportunity to ask any questions related to the letter of information. They signed the consent form along with another form explaining the limits to confidentiality that would apply throughout their participation in the study (Appendix D). The women were told that the purpose of the examination was to confirm a diagnosis of PVD and the components of the examination were described in detail. They were introduced to the pain intensity and pain unpleasantness scales which they were to use during the examination, and the difference between the two scales was explained as well. A brief medical history (Appendix E) was taken and a summary of their vulvar pain complaints were confirmed with each woman (Appendix F) before entering the examination room. Once in the room, the woman was introduced to the gynecologist and asked to remove her clothes from the waist down, behind a curtained area, and sit on the gynecological examination table with a drape over her. Once seated, the SHRL member entered the exam area with Dr. Chamberlain to observe the examination and record information (see Appendix G for the examination form). Dr. Chamberlain visually and manually examined the internal and external genitalia and reproductive organs and conducted the cotton-swab test. The cotton-swab test consisted of six palpations of the labia majora, four palpations of the labia minora, four palpations along the midline area of the vulva, and five palpations of previously-randomized sites around the vulvar vestibule (1, 4-5, 6, 7-8, and 11 o’clock). After each palpation, women rated the intensity of their pain on a numerical rating scale from 0 (no pain at all) to 10 (worst pain ever felt). The validity of numerical rating scales of pain intensity has been documented. They
show significant positive correlations with other measures of pain intensity with numerous chronic and acute pain populations and are sensitive to treatments that are expected to have an impact on pain intensity (Jensen & Karoly, 2001). Following the examination, the gynecologist determined the presence or absence of PVD based on the women’s self-reported vulvar pain history and the pain intensity ratings around the vestibule. The women were then informed of their eligibility for the study. The woman who did not meet the eligibility criteria was explained why she was not eligible and was sent an information package about vulvar pain and vulvar health. Women who did meet the eligibility criteria were contacted within a few days to book an appointment for the interview/questionnaire and sensory testing session.

*Interview and questionnaires*. Participants completed a 1-hour interview at the SHRL that included questions in the following areas: sociodemographic information (e.g., age, ethnicity, employment status), sexual and relationship history (e.g., sexual orientation, relationship status, relationship length, first intercourse experience, impact of vulvar pain on relationship), medical and gynecological history (e.g., menstruation history, history of yeast infections, sexually transmitted infections, non-vulvar pain history), a comprehensive history of vulvar pain (e.g., start of pain, diagnostic and treatment history, location and quality of pain, pain intensity and unpleasantness ratings), and treatment goals and expectations (see Appendix H for the full pre-treatment interview). Throughout the interview, participants completed a number of standardized
questionnaires. The interview was followed by an extended battery of computerized standardized questionnaires that took approximately 30 minutes to complete.

Quantitative sensory testing. Immediately following the completion of the computerized questionnaires, participants were explained the details of the quantitative sensory testing (QST), shown the measurement tool to be used during the testing, instructed on the use of the rating scales, and given the opportunity to ask any questions. At this point, a female member of the SHRL came into the room and was introduced to the participant. Participants were taken into a private testing room and asked to remove their clothes from the waist down and sit on a gynecological examination table with a drape over them. Once seated, the table was adjusted to ensure comfort in the lithotomy (gynecological) position with the feet supported in stirrups. The SHRL member remained in the room during the testing to record information. The session consisted of the measurement of the participant’s pressure pain threshold—the point at which one first detects the sensation of pain—at the 6 o’clock (i.e., posterior) position of the vulvar vestibule using vulvalgesiometers. Vulvalgesiometers are mechanical devices that exert standardized pressures from 3 to 950 grams using springs with different compression rates (see Appendix I for a photograph of the vulvalgesiometers used). A disposable cotton-swab is attached to one end of the device and is the portion that comes into contact with the participants’ skin. The sensation has been shown to replicate the burning pain many women with PVD report experiencing during sexual intercourse (Pukall, Binik, & Khalifé, 2004; Pukall, Young, Roberts, Sutton, & Smith, 2007). The lowest pressure was
applied first, and consecutively higher ones were applied with an interstimulus interval (ISI) of 10 seconds. Following each application of pressure, the participants were asked to report whether the sensation was painful or not, and to rate the intensity and unpleasantness of the sensations. The non-painful sensations were rated on an intensity scale from 0 (no sensation at all) to 10 (most intense non-painful sensation) and the painful sensations were rated on the same intensity scale used during the gynecological examination from 0 (no pain at all) to 10 (worst pain ever felt). The unpleasantness of the sensations were rated on a similar scale from 0 (not unpleasant at all) to 10 (most unpleasant ever; see Appendix J for the rating scales). Pain intensity was described to participants as the sensory component of the pain (i.e., how much the sensation physically hurts), whereas unpleasantness was described as the emotional component of the sensation (i.e., how bothersome or uncomfortable the sensation is). A rating of 1-3 was considered mild intensity, 4-6 was considered moderate intensity, and 7-9 was considered extreme intensity. Pressures were applied until moderate pain intensity was reached. Participants were also asked to describe in words the painful sensations during the testing (e.g., sharp, burning, cutting). This QST protocol has been used in previous studies of PVD (Pukall et al., 2004; Pukall, Strigo et al., 2005; Pukall, Young et al., 2007).

At the completion of this session, all participants were given an information package about different forms of vulvodynia, vulvar health hints, and hints for people with vulvar pain both in and not in relationships (Appendix K).
**Pre-treatment physiotherapy assessment.** Before the participants’ first treatment session, they completed a pelvic floor muscle (PFM) assessment with the treating physiotherapist at the Motor Performance Laboratory. The physiotherapist was a Master’s level graduate student in the School of Rehabilitation Therapy at Queen’s University, who was registered through the College of Physiotherapists of Ontario. She specializes in female urogenital conditions and has had two years experience treating women with vulvar pain. After obtaining a brief medical history from the participants and screening for concerns related to PFM functioning, participants completed a manual PFM assessment to determine baseline measures of muscle functioning. The assessment measured four distinct aspects of PFM functioning (i.e., PFM tension, PFM strength, ability of the PFMs to relax, and degree of vaginal opening) which were later addressed during the treatment protocol.

Following the assessment, the findings from the assessment and the theoretical basis behind PFP were explained to the participants. The components of the treatment protocol were explained in detail and the participants were encouraged to ask questions or voice any concerns. Verbal consent to continue into the treatment portion of the study was then obtained from the participants. Before leaving, each participant was instructed on how to properly perform a PFM contraction and was given a sheet (Appendix L) to take home with them which described the contractions they were asked to perform at home on a regular basis. Depending on their degree of vaginal opening, participants were either sent home with a small probe or the smallest of a set of three vaginal dilators with
which to perform stretches. The method of inserting the probe/dilator and the recommended frequency and length of the stretches were explained and the participant received an information package explaining the use of dilators in more detail (Appendix M). Lastly, since the treatment attempts to be as pain-free as possible, it was recommended that participants not engage in sexual intercourse throughout the treatment program. If they were to engage in intercourse, it was recommended that they attempt to not go beyond a pain intensity of 4. Minimizing the amount and degree of pain experienced at the vulva during treatment aims at re-educating the brain such that a chronic association between the genital region and the sensation of pain is avoided. Another reason for abstaining from intercourse during the treatment was to ensure that participants did not feel discouraged about the progress of treatment. The effects of PFP are often not seen until close to the end of treatment; therefore, attempting intercourse in the middle of treatment and experiencing high levels of pain may promote distrust in the treatment and a sense of hopelessness. Participants were then booked an appointment for their first PFP treatment session.

Pelvic floor physiotherapy treatment. Participants completed eight treatment sessions that lasted approximately 75 minutes each. Although the sessions were intended to be on a weekly basis, due to scheduling conflicts weekly sessions did not always occur. The time to complete all treatment sessions ranged from 10 to 19 weeks ($M = 13.15$, $SD = 3.16$). Each treatment session began with a brief discussion including: pain ratings during probe/dilator stretches, concerns regarding at-home exercises, engagement
in sexual intercourse, adherence to the at-home exercises, and the plan for that day’s session. This discussion was followed by a series of manual techniques carried out by the physiotherapist with either one or two fingers inserted vaginally. The techniques used were akin to a pelvic floor massage and aimed at improving the flexibility of the tissue surrounding the vaginal opening, decreasing the tension in the PFMs, increasing the blood flow to the PFMs, and increasing the ability to tolerate friction at the vaginal opening. The manual techniques progressed over the course of the treatment program (e.g., progressed from one to two fingers, more pressure applied) based on the speed of progress of each participant, and on their particular needs.

Following the manual techniques, a Femiscan™ probe (Biomation, Almonte, ON, Canada) was inserted vaginally and hooked up to a DE-2.1 Bagnoli™ sEMG system (Delsys, Boston, MA, USA; see Appendix N for a photograph of the equipment). The participants were instructed to contract and relax their PFMs while watching the display of their muscle activity on a computer screen. Participants also practiced a number of other PFM exercises with the probe inserted including contracting and relaxing as many times as possible in 10 seconds and slowly and steadily contracting and relaxing. The goal of obtaining feedback from the PFMs was to increase proprioception; that is, to enable the participants to become more aware of the state of their muscles such that they would be able to voluntarily contract and relax when required. Additionally, the exercises themselves served to strengthen the PFMs. Next, the probe was wired to a Danmeter Elpha II 3000 electrical stimulation device (Biomation, Almonte, ON, Canada; see
Appendix O for a photograph of the equipment) that generated the electrical stimulation which passed through the PFMs for 5 to 12 minutes (15 Hz, pulse width 250 ms, current output 0-100 mA, rise time 1s, fall time 0.5 s, with on-off 4 s cycles). This process aimed at desensitizing the nerve endings of the PFMs, increasing blood flow to the PFMs, decreasing the reactivity of the PFMs to stimulation, and re-educating the PFMs by creating an association between the genital area and a sensation other than pain (i.e., tingling).

Following the electrical stimulation, the physiotherapist inserted the vaginal dilator to determine whether or not the participants were ready to start using the next dilator. Each participant progressed through three vaginal dilators either with (La Sexérie, Montreal, QU, Canada) or without latex (Come as You Are, Toronto, ON, Canada) throughout the course of the treatment (see Appendix P for photographs of the dilators). In addition to the insertion of the dilator at each treatment session, the participants were required to insert the dilator twice every 2 days for 2 minute stretches. The goals of the dilator insertions were to desensitize the participants to friction, increase the flexibility of the vaginal opening, practice PFM relaxation during insertions, and decrease the fear of penetration.

Lastly, at-home exercises were prescribed to the participants and progressed over the course of the treatment program according to the current needs of the participants. The exercises included: daily PFM contractions and relaxations with the goal of increasing proprioception, increasing the strength of the PFMs, and increasing circulation
to the muscles; hip and buttock muscle stretches with the goal of increasing flexibility; and abdominal massage and deep abdominal breathing with the goal of relaxing the abdominal muscles, dealing with stress, and learning a positive coping mechanism for dealing with pain. Recommendations regarding sexual activity were also provided to the participants such as using lubrication at every intercourse attempt, using the Reality condom to decrease friction, trying particular intercourse positions based on where the participants experienced their pain around the vaginal opening, and including the partner in the treatment process (e.g., partner doing manual stretches before attempting intercourse). At the completion of the last treatment session, the participants were provided with a maintenance program that they were encouraged to adhere to in order to continue their progress. Additionally, partners were welcome to attend a session on how to perform basic manual stretches that could be conducted before engaging in intercourse. Four partners came in for this session.

The number and length of the sessions, in addition to the assessment and treatment techniques used, were consistent with current clinical practice in the field of PFP for vulvar pain (Hartmann, Strauhal, & Nelson, 2007). Although all of the participants progressed through the same components of treatment, the speed with which they progressed and the amount of focus placed on various at-home exercises differed depending on the participants’ progress and individual needs. This tailoring of the treatment to the needs of the participants attempted to approximate a clinical treatment experience.
Post-treatment evaluations. Within one month following the completion of the eight treatment sessions, participants completed a follow-up session, comprising three appointments. Participants completed a brief gynecological examination with the gynecologist that included a visual examination of the genitals and the same cotton-swab test as was completed at the pre-treatment examination. Participants also came into the SHRL and completed a 45-minute post-treatment interview that included questions in the following areas: relationship factors (e.g., relationship status, effects of treatment on relationship), changes in gynecological and medical status (e.g., recent yeast infections, changes in general physical and mental health), vulvar pain characteristics since the pre-treatment interview (e.g., percentage of painful intercourse attempts, pain intensity and unpleasantness ratings), degree of vulvar pain improvement [“up to what point do you feel your vulvar pain has improved following the treatment”; responses from 1 (complete cure) to 6 (the pain is worse)], and satisfaction with the treatment rated from 0 (completely dissatisfied) to 10 (completely satisfied; see Appendix Q for the post-treatment interview). The participants then completed the same set of standardized questionnaires that were completed at the pre-treatment session. For questionnaires that did not already have a time frame in their directions, the participants were asked to respond to all questions with respect to the time since they had last completed the questionnaires (i.e., before they began treatment). The QST session that involved the measurement of pressure pain threshold was then carried out in the same manner as it had been at the pre-treatment session. The participants also returned for a follow-up session
with the treating physiotherapist to reassess the four muscle functioning factors that had been assessed before treatment began.

Participants who completed all of the post-treatment sessions were mailed a cheque for $50 to compensate them for participation in the study.

3-month follow-up evaluation. Between 3 and 4 months following each participant’s last PFP treatment session, they were contacted for a 30-minute telephone interview to assess any further changes in vulvar pain that had occurred since the previous interview and to reassess degree of vulvar pain improvement and treatment satisfaction (see Appendix R for the telephone interview). Participants were emailed a form ahead of time with the answer options for a number of the standardized questionnaires such that they could more easily respond to the items over the telephone.

Measures

Pain measures. The McGill Pain Questionnaire (MPQ; Melzack, 1975) was used as a measure of pain intensity. It is a self-report checklist comprised of 78 words to describe the sensory (scores range from 0 to 42), affective, (scores range from 0 to 14) and evaluative (scores range from 0 to 5) qualities of pain. The total number of words chosen (NWC) score ranges from 0 to 78 with higher scores reflecting higher pain intensity. It also includes a single 6-point overall present pain intensity (PPI) scale ranging from 0 (no pain) to 5 (excruciating). Among a variety of pain populations including patients experiencing dental pain, back pain, and pain due to cancer, the mean
Pain Rating Index (PRI) for sensory pain ranged from 10.3 to 17.3, from 1.7 to 3.5 for affective pain, and from 1.9 to 4.1 for evaluative pain. The mean number of words chosen ranged from 6.7 to 10.9 and the mean PPI ranged from 1.9 to 3.0 for the same populations (Melzack, 1975). The MPQ was administered at both the pre-treatment and post-treatment sessions in the current study. Scores of 0 were given to participants who were no longer experiencing vulvar pain at the post-treatment or follow-up time periods. Internal consistency of this measure could not be obtained due to the descriptive nature of the items. Although quantitative scores are calculated based on the weights of the participant responses, the checklist items are grouped by different types of sensations/experiences and participants are not required to select responses in all groups of items.

The Pain Disability Index (PDI; Pollard, 1984) is a 7-item self-report questionnaire designed to assess the degree to which pain interferes with functioning across the following life activities: family/home responsibilities, recreation, social activity, occupation, sexual behaviour, self-care, and life-support activities. Participants score each item from 0 (no disability) to 10 (total disability). Scores range from 0 to 70 with higher scores representing greater disability. Although the entire questionnaire was administered at both the pre-treatment and post-treatment sessions, only the sexual behaviour item was used in data analysis due to almost non-existent positive (i.e., greater than 0) scores on the other items. Internal consistency for this measure was therefore not computed.
A number of cognitive components relating to pain were also assessed. The Pain Catastrophizing Scale (PCS; Sullivan, Bishop, & Pivik, 1995) consists of 13 items to which participants assign a frequency ranging from 0 (not at all) to 4 (all the time), which describe their thoughts and feelings experienced when they are in pain. The scale consists of three components: rumination (scores range from 0 to 16), magnification (scores range from 0 to 12), and helplessness (scores range from 0 to 24). Total scores range from 0 to 52 with higher scores representing greater catastrophizing. Research into a number of different populations have found mean PCS total scores of 18.80 for low-back pain (Swinkels-Meewisse, Roelofs, Oostendorp, Verbeek, & Vlaeyen, 2006), 20.30 for fibromyalgia pain (Roelofs, Peters, McCracken, & Vlaeyen, 2003), and 20.80 for labor pain (Goldstein Ferber & Feldman, 2005). The PCS was administered at the pre-treatment, post-treatment, and three-month follow-up sessions and demonstrated good internal consistency (Pre-treatment: α = .92; Post-treatment: α = 1.00; Three-month Follow-up: α = .88) in the current study. Scores of 0 were given to participants who were no longer experiencing vulvar pain at the post-treatment or follow-up time periods.

The Pain Anxiety Symptoms Scale-20 (PASS-20; McCracken & Dhingra, 2002) is a self-administered 20-item questionnaire that measures fear and anxiety responses to pain. The scale assesses four components of pain-related anxiety: fearful appraisal of pain, cognitive anxiety, physiological anxiety, and escape and avoidance behaviours; each subscale score ranges from 0 to 25. Participants indicated to what extent the items were true on a 6-point scale ranging from 0 (never) to 5 (always). The total score ranges
from 0 to 100 with higher scores indicating more fear/anxiety. A non-clinical sample showed significantly lower PASS-20 total scores ($M = 24.04$) than in a clinical chronic pain sample ($M = 38.62$), and a score of 30 or more is considered to reflect high levels of pain anxiety (Abrams, Carleton, & Asmundson, 2007). The PASS-20 was administered at the pre-treatment, post-treatment, and three-month follow-up sessions and demonstrated good internal consistency (Pre-treatment: $\alpha = .87$; Post-treatment: $\alpha = .84$; Three-month Follow-up: $\alpha = .93$) in the current study.

Participants were also asked to describe the coping strategies, both positive and negative, that they use when they are experiencing their vulvar pain. The six cognitive coping strategies and two behavioural coping strategies from the Coping Strategies Questionnaire (CSQ; Rosenstiel & Keefe, 1983) were used, in addition to one more behavioural strategy (i.e., avoidance). Each strategy was followed with an explanation and example, and participants were instructed to indicate whether or not they have ever used these strategies to cope with their vulvar pain. Participants were also asked to rank the three coping strategies that they used most frequently to deal with their vulvar pain. These questions were administered at the pre-treatment and post-treatment sessions.

**Health and mental health measures.** The Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977) is a 20-item self-report scale where participants rate the frequency of depressive symptoms on a scale from 0 (*rarely or none of the time*) to 3 (*most or all of the time*) in relation to how they felt during the past week. The validity of the scale has been shown to be uncompromised among persons with
chronic pain (Geisser, Roth, & Robinson, 1997). Scores range from 0 to 60 with higher scores representing higher levels of depression. The clinical cut-off score on the CES-D is a score of 16. The CES-D was administered at both the pre-treatment and post-treatment sessions and demonstrated good internal consistency (Pre-treatment: $\alpha = .92$; Post-treatment: $\alpha = .91$) in the current study.

The State-Trait Anxiety Inventory Trait Version (STAI-T; Spielberger, 1970) consists of 20 statements that asked participants how they generally feel on a scale from 1 (almost never) to 4 (almost always) and was used to assess stable individual differences in anxiety proneness. Scores range from 20 to 80 with higher scores representing higher levels of trait anxiety. There does not appear to be a consistently used clinical cut-off score for this scale. Among female undergraduate students—which constituted over half of the sample in the current study—Spielberger (1970) found a mean STAI-T score of 38.25. The STAI-T was administered at both the pre-treatment and post-treatment sessions and demonstrated good internal consistency (Pre-treatment: $\alpha = .94$; Post-treatment: $\alpha = .88$) in the current study.

The Medical Outcome Survey 12-Item Short-Form Health Survey (SF-12; Ware, Kosinski, & Keller, 1996) is a 12-item shortened version of the SF-36, a measure of health related quality of life which consists of two components, physical (SF-12-PCS) and mental health status (SF-12-MCS). Subscale scores range from 0 to 100 with higher score representing better functioning. One population-based study conducted in the United States found a mean SF-12-PCS score of 53.2 and a mean SF-12-MCS score of
51.4 for individuals under the age of 35. When the respondents were split by gender, females had a mean SF-12-PCS score of 49.1 and a mean SF-12-MCS score of 50.7 (Franks, Lubetkin, Gold, Tancredi, & Jia, 2004). Similarly, Ware et al. (1996) found a mean SF-12-PCS score of 47.42 and a mean SF-12-MCS score of 53.82 among a population with minor medical problems. The SF-12 was administered at both the pre-treatment and post-treatment sessions and demonstrated moderate to good internal consistency (Pre-treatment: \( \alpha = .81 \); Post-treatment: \( \alpha = .63 \)) in the current study.

**Sexuality measures.** The Female Sexual Function Index (FSFI; Rosen et al., 2000) is a 19-item questionnaire which was used to assess desire, subjective arousal, lubrication, orgasm, satisfaction, and pain. Participants were asked to rate their sexual feelings and responses during the past 4 weeks on a 5-point scale from 0 or 1 to 5 with anchors that fit each item. On numerous items, a score of 0 denoted no sexual activity. Total scores range from 2 to 36 with higher scores representing better sexual functioning; all subscale scores range from 0 to 6 except the desire subscale which ranges from 1.2 to 6. A clinical cut-off of 26.55 has been established in the literature for sexual dysfunction (Wiegel, Meston, & Rosen, 2005). The FSFI was administered at the pre-treatment, post-treatment, and three-month follow-up sessions and demonstrated good internal consistency (Pre-treatment: \( \alpha = .94 \); Post-treatment: \( \alpha = .94 \); Three-month Follow-up: \( \alpha = .93 \)) in the current study.

The Sexual Esteem and Sexual Depression subscales of the Sexuality Scale (SS-SE, SS-SD; Snell & Papini, 1989) are 10-item subscales of the SS on which participants
were asked to rate items on their degree of agreement from 0 (agree) to 4 (disagree). The subscales were used to assess positive regard for and confidence in experiencing one's sexuality in a satisfying and enjoyable way and the experience of feelings of depression regarding one's sex life. Subscale scores range from 0 to 40 with higher scores representing poorer sexual esteem and less sexual depression. The SS subscales were administered at both the pre-treatment and post-treatment sessions and demonstrated moderate to good internal consistency (SE: Pre-treatment: $\alpha = .96$; Post-treatment: $\alpha = .98$; SD: Pre-treatment: $\alpha = .49$; Post-treatment: $\alpha = .84$) in the current study.

Data Considerations and Analysis

All data analyses were conducted using Statistical Package for the Social Sciences (SPSS) version 16. The General Linear Model option was used to carry out the two-way repeated-measures analysis of variances (ANOVA's) and the repeated-measures ANOVAs. Retrospective power analyses for the paired-samples t-tests were conducted using GPOWER (Faul & Erdfelder, 1992). The significance level for all tests was set at alpha = .05. Trends toward statistical significance are presented due to the preliminary nature of the study and were defined as significance levels between .05 and .07. Data were explored for normality and univariate and multivariate outliers through examination of z scores, Mahalanobis distance, histograms, box plots, and P-P plots. Significant skewness was identified by testing the observed skewness value against the null hypothesis of zero using the following equation $z = \frac{S-0}{\sqrt{6/N}}$. So as not to reduce power by excluding participants, analyses investigating the changes from pre- to post-treatment for
all 13 participants were conducted separately from the investigation of the changes across
all three time periods (pre-treatment, post-treatment, follow-up) for the 10 participants
who have completed the 3-month follow-up interview to date.

Paired-samples t-tests were conducted to assess changes in continuous measures
from pre- to post-treatment with time as the independent variable. Since significant
skewness was often present in variables at one time period and not the other, Wilcoxon
signed-rank tests (the non-parametric equivalent of the paired-samples t-test) were
conducted to control for non-normality. The use of these tests prevented the need to
transform the variables at both time points—which would be required to compare their
values—and it allowed for ease of variable interpretation. Conclusions from all Wilcoxon
signed-rank tests conducted were equivalent to the conclusions from their corresponding
paired-samples t-tests, and therefore only the parametric test results are presented. The
results from all non-parametric tests conducted are presented in Appendix S. Where
continuous variables were conceptually related (e.g., pain intensity and unpleasantness),
two-way repeated-measures ANOVAs were conducted with two within-subject variables:
time and measure. Where Mauchly’s test of sphericity was significant, the Huynh-Feldt
adjustment was applied. In addition to an interest in the time effect, trend analysis was
planned for the interaction effect to determine whether there were differences in the
pattern of the measures. To maintain an experiment-wise error rate of 5% an alpha level
of .025 was set for each of the two polynomial trends (i.e., linear and quadratic). Cohen’s
$d$ for the paired-samples t-tests were calculated using the equation $d = \frac{\mu_2 - \mu_1}{\sigma_{x_1 - x_2}}$ so that they
would be compatible with the observed power calculations using GPOWER. The benefit of using this calculation over using the pre-treatment standard deviation or the average of the two standard deviations as the denominator is that it takes into consideration the correlation between the variables at the two time periods. Effect sizes of .20, .50, and .80 are considered small, moderate, and large, respectively (Cohen, 1988).

Repeated-measures ANOVAs were conducted to assess changes in continuous variables over the three time periods. Due to differences in skewness of variables across the three time points, Friedman rank tests (the non-parametric equivalent of the repeated-measures ANOVA) were conducted to control for non-normality. Conclusions from Friedman rank tests conducted were equivalent to all of the conclusions from their corresponding repeated-measures ANOVAs; and therefore only the parametric test results are presented. As recommended by Howell (2006), trend analysis, rather than pairwise comparisons, was planned for the time effect for all repeated-measures ANOVAs. To maintain an experiment-wise error rate of 5%, an alpha level of .025 was set for each of the two trends. As with the analyses across the pre- and post-treatment time periods, where continuous variables were conceptually related two-way repeated-measures ANOVAs were conducted with two within-subject variables: time and measure. Where Mauchly’s test of sphericity was significant, the Huynh-Feldt adjustment was applied. Trend analysis was planned for both the time and the interaction effect. Partial eta square ($\eta^2$) values are presented as effect size measures for all ANOVAs. Values of .01, .06, and .14 are considered small, moderate, and large, respectively (Cohen, 1988).
To assess predictors of treatment success, hypothesized predictor variables were correlated with the self-report degree of vulvar pain improvement. To assess the correlation between changes over time and the degree of vulvar pain improvement, Zumbo’s (1999) recommendation about when to use simple difference scores was applied. When the correlation between the measures at two time points is greater than the ratio of the time 1 standard deviation to the time 2 standard deviation, then a simple difference score should be used, otherwise, one could use a regression analysis (Zumbo, 1999).
Chapter 5

Results

Participant Characteristics

Thirteen women suffering from PVD completed the pre- and post-treatment sessions; ten of these also completed the 3-month follow-up session. The seven women who were eligible to participate following the telephone screening, but who did not complete the study (i.e., non-participants), were compared with the thirteen participants on several pain measures obtained during the screening interview. The mean length of time the non-participants experienced dyspareunia ($M = 3.5$ years, $SD = 2.18$) did not differ significantly from the mean length of time the participants experienced dyspareunia ($M = 3.17$ years, $SD = 1.98$), $t(18) = -0.34$, $p = 0.738$, $d = 0.17$, observed power = 0.06. The percentage of intercourse attempts that were painful for the non–participants ($M = 81.43$, $SD = 16.51$) also did not differ from the percentage among the participants ($M = 90.38$, $SD = 12.98$), $t(18) = 1.34$, $p = 0.197$, $d = 0.54$, observed power = 0.19. Unfortunately, at the time of the telephone screening the women were not asked to rate the intensity of their pain during intercourse and therefore the severity of vulvar pain between the two groups could not be compared.

During the pre-treatment interview, participants were asked numerous questions about their relationship and sexual history; these results are presented in Table 1. Of the 12 participants in a relationship at the time of the interview, 10 (83%) indicated that PVD had a negative impact on their relationship. Participants noted an inability or little desire
Table 1

Means (M), Standard Deviations (SD), and Percentages (%) on Sexual and Relationship History Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>M (SD) or n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at first intercourse (years)</td>
<td>17.46 (1.45)</td>
</tr>
<tr>
<td>Pain intensity during first intercourse (0-10)</td>
<td>5.36 (2.66)</td>
</tr>
<tr>
<td>Unpleasantness during first intercourse (0-10)</td>
<td>4.55 (1.81)</td>
</tr>
<tr>
<td>Impact of PVD on initiating dating relationships (0-10)</td>
<td>4.75 (4.11)</td>
</tr>
<tr>
<td>Pre-Treatment relationship status breakdown:</td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>1 (8%)</td>
</tr>
<tr>
<td>Dating one person regularly</td>
<td>3 (23%)</td>
</tr>
<tr>
<td>Dating one person regularly—long distance</td>
<td>7 (54%)</td>
</tr>
<tr>
<td>Married/common-law</td>
<td>2 (15%)</td>
</tr>
<tr>
<td>Length of current relationship (years)</td>
<td>3.44 (2.58)</td>
</tr>
</tbody>
</table>

Note. At the time of the post-treatment and 3-month follow-up interviews, two participants had ended their regular dating relationships, and the previously single participant was dating one partner regularly.

to have sexual intercourse with their partner, feeling distant from their partner, feeling like a failure, as well as feelings of guilt, shame, and insecurity. Some noted that their partners also experienced feeling like a failure, and that sometimes the pain would cause
conflict in the relationship. Nonetheless, 5 participants (42%) also reported that the PVD had positive impacts on their relationship. Knowing that the relationship was not based on sex, openly and honestly communicating with each other about pain during sexual activity, and recognizing how supportive their partner could be, were some of the ways in which participants felt their PVD had a positive impact on their relationship.

Participants were also asked a variety of questions about their physical health, particularly with respect to gynecological concerns. Nine participants (69%) were using some form of hormonal contraceptive with a mean duration of hormonal contraceptive use of 5.83 years ($SD = 3.72$) and all participants were nulliparous (i.e., never given birth). Only two of the participants had a history of repeated yeast infections and nine participants (69%) reported experiencing other gynecological concerns at some point in their life including HPV ($n = 1, 8\%$), urinary tract infections ($n = 9, 69\%$), bacterial vaginitis ($n = 3, 23\%$), and molescum (i.e., a viral infection of the skin or membrane of the genitals causing lesions; $n = 1, 8\%$). One participant was being seen by several doctors to determine whether or not she had endometriosis; after the 3-month follow-up session it was determined that she had mesenteric adenitis (i.e., a self-limited inflammatory process that affects the mesenteric lymph nodes). At the gynecological examination, the possibility of the presence of pelvic floor myofascial syndrome was noted in another participant; this diagnosis was later confirmed. Furthermore, in addition to having PVD, one participant also reported symptoms somewhat consistent with generalized vulvodynia (GVD; e.g., unprovoked vulvar pain, pain/sensitivity of the labia
minora and labia majora). Despite the presence of these symptoms, she was not given a diagnosis of GVD at the gynecological examination and the unprovoked pain she experienced was not present at all times.

Participants were also asked numerous questions to obtain a detailed history of their vulvar pain. Eight participants (62%) had primary PVD (i.e., experienced vulvar pain since their first intercourse attempt) whereas five participants (38%) had secondary PVD (i.e., experienced a period of pain-free intercourse before the onset of their vulvar pain). Of those with secondary PVD, only two (40%) could identify a possible trigger for their pain: treatment for a yeast infection. Participants had experienced dyspareunia for an average of 3.66 years ($SD = 1.96$). In addition to experiencing vulvar pain during sexual intercourse, participants also reported experiencing pain during a variety of other activities (e.g., tampon insertion, masturbation; see dyspareunia section). In addition to vestibular pain, three participants (23%) also reported experiencing pain on the inner labia during intercourse, while four participants (31%) reported experiencing some deeper pelvic pain during intercourse.

Ten participants had consulted at least one health professional; the mean number of healthcare professionals consulted was three ($SD = 3.12$). The types of professionals consulted included: family physicians, gynecologists, sex therapists/psychologists, physiotherapists, urologists, dermatologists, and naturopathic doctors. Gynecologists were the most frequently consulted healthcare professionals; eight of the ten participants (80%) who had consulted a healthcare professional had consulted at least one
gynecologist. Despite this, only three participants (23%) had received a formal diagnosis before entering the study. Participants also reported taking steps to treat or alleviate their pain; these results are presented in Table 2.

Table 2

Percentages (%) of Participants Attempting Various Treatments for PVD

<table>
<thead>
<tr>
<th>Activity</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changing Aspects of Sex Life (e.g., lubrication, sexual positions)</td>
<td>13 (100)</td>
</tr>
<tr>
<td>Alternative Medicine (e.g., diet, physiotherapy)</td>
<td>5 (38)</td>
</tr>
<tr>
<td>Creams</td>
<td>4 (31)</td>
</tr>
<tr>
<td>Small Changes (e.g., change soap, change underwear)</td>
<td>4 (31)</td>
</tr>
<tr>
<td>Psychological Treatment</td>
<td>3 (23)</td>
</tr>
<tr>
<td>Other Medical Treatment (e.g., antibiotics)</td>
<td>1 (8)</td>
</tr>
</tbody>
</table>

Changes from Pre-Treatment to Post-Treatment

Quantitative sensory testing. To assess changes in vulvar pain sensitivity during the vulvalgesiometer testing, the number of grams required to reach pressure pain threshold was compared between the pre- and post-treatment examination times. Additionally, the number of grams required to reach a moderate pain level (i.e., the first time a pain intensity rating of at least 4 was reported) was also compared between the two examination times. This variable was assessed in addition to the pressure pain threshold
since most women were experiencing moderate levels of pain during intercourse at the pre-treatment period. The number of grams required to reach pressure pain threshold was significantly higher at the post-treatment QST session ($M = 134.61, SD = 153.19$, range: 10.00-500.00) than at the pre-treatment QST session ($M = 49.46, SD = 78.32$, range: 3.00-300.00), $t(12) = 2.75, p = .018$, $d = 0.76$, observed power = .71. The number of grams required to reach a moderate level of pain was also significantly higher at the post-treatment QST session ($M = 390.00, SD = 215.48$, range: 80.00-800.00) than at the pre-treatment QST session ($M = 198.08, SD = 262.19$, range: 15.00-800.00), $t(12) = 2.92, p = .013$, $d = 0.83$, observed power = .78. Pressure pain thresholds improved by 37% while moderate pain thresholds improved by 51%.

**Gynecological examination.** To assess changes in pain intensity ratings during the gynecological examination, the average of the pain intensity ratings provided at each of the five vestibular sites was computed and compared between the pre- and post-treatment examination times. Participant’s mean pain intensity ratings were significantly lower at the post-treatment examination ($M = 2.06, SD = 1.67$, range: 0.60–6.20) than at the pre-treatment examination ($M = 5.23, SD = 2.05$, range: 2.20–8.20), $t(12) = -6.27, p < .001$, $d = 1.74$, observed power = .99.

**Dyspareunia and other activities causing vulvar pain.** Means and standard deviations for dyspareunia ratings and other vulvar pain variables are presented in Table 3. Dyspareunia was assessed by asking participants to rate the average intensity and unpleasantness of pain during intercourse at the vestibule specifically, and also during
intercourse overall, at both the pre- and post-treatment interview sessions. An average overall pain intensity and unpleasantness rating was obtained to account for participants who experienced other forms of pain during intercourse (e.g., pelvic pain). Correlations between average pain intensity and unpleasantness ratings were calculated for vestibular pain and overall pain at the pre- and post-treatment periods. Although average pain intensity and unpleasantness were significantly correlated for both vestibular \( r(11) = .81, p = .001 \) and overall pain \( r(11) = .89, p < .001 \) at the pre-treatment period, they were not significantly correlated for either vestibular \( r(9) = .57, p = .067 \) or overall pain \( r(9) = .51, p = .108 \) at the post-treatment period. Average pain intensity and unpleasantness were therefore not combined. Correlations were also calculated between vestibular and overall average pain intensity ratings and vestibular and overall average unpleasantness ratings at the pre- and post-treatment periods. Vestibular and overall average pain intensity were significantly correlated for both the pre-treatment \( r(11) = .95, p < .001 \) and post-treatment \( r(9) = .68, p = .022 \) periods, as were the vestibular and overall average unpleasantness ratings at the pre- \( r(11) = .78, p < .001 \) and post-treatment \( r(9) = .92, p < .001 \) periods. Vestibular and overall average pain intensity and unpleasantness were therefore combined to create general pre- and post-treatment average pain intensity and unpleasantness scores by computing the mean of the two values. Since two participants were not engaging in intercourse at the time of the post-treatment interview, the results are based on eleven participants. The reasons for not engaging in sexual intercourse were (1) not having an opportunity to resume sexual intercourse due to not
seeing their partner because of long-distance, and (2) not being able to find an appropriate place in which to have intercourse. Participants were also asked to rate their overall worst pain intensity during intercourse at both the pre- and post-treatment interviews; missing values on this measure were present at both time periods.

Table 3

Means (M) and Standard Deviations (SD) for Intercourse Pain Intensity and Unpleasantness Ratings and Other Vulvar Pain Variables at Pre-Treatment and Post-Treatment

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pre-Treatment</th>
<th>Post-Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (SD, range)</td>
<td>M (SD, range)</td>
</tr>
<tr>
<td>General Pain Intensity (0-10)***</td>
<td>6.73 (1.85, 4.00-9.00)</td>
<td>2.23 (1.31, 0-4.00)</td>
</tr>
<tr>
<td>General Unpleasantness (0-10)***</td>
<td>6.77 (1.93, 3.50-10.00)</td>
<td>2.14 (1.80, 0–4.50)</td>
</tr>
<tr>
<td>Worst Pain Intensity (0-10)*</td>
<td>8.25 (2.05, 5.00-10.00)</td>
<td>3.75 (2.71, 0-7.00)</td>
</tr>
<tr>
<td>% of Painful Intercourse Attempts**</td>
<td>97.27 (6.47, 80.00–100.00)</td>
<td>54.09 (35.62, 0–100.00)</td>
</tr>
<tr>
<td>% of Activities Causing Pain***</td>
<td>39.29 (19.55, 8.33–75.00)</td>
<td>24.34 (20.46, 0–62.50)</td>
</tr>
</tbody>
</table>

Note. The general pain intensity and unpleasantness variables were calculated by creating an average of the ratings at the vestibule during intercourse and the overall intercourse ratings.

* = significant at $p < .05$; ** = significant at $p < .01$; *** = significant at $p < .001$; $^a$ = significance based on overall two-way repeated-measures ANOVA.

A two-way repeated-measures ANOVA was performed on the two components of intercourse pain: general intensity and unpleasantness over the two time periods (pre- and
post-treatment). No data were missing, nor were there any significant univariate or multivariate outliers. The time main effect was statistically significant $F(1, 10) = 35.45, p < .001$, partial $\eta^2 = .78$, observed power = 1.00. The time by measure interaction was not significant $F(1, 10) = .08, p = .781$, partial $\eta^2 = .008$, observed power = .058, indicating that both general pain intensity and unpleasantness decreased with the same pattern from pre- to post-treatment. Worst intercourse pain intensity also significantly decreased from pre- to post-treatment, $t(7) = -3.30, p = .013, d = 1.56$, observed power = .96.

Participants were also asked to report the percentage of intercourse attempts that were painful at both the pre- and post-treatment interviews. The percentage of painful intercourse attempts decreased significantly from pre- to post-treatment, $t(10) = -3.65, p = .004, d = 1.31$, observed power = .98.

As previously mentioned, participants reported experiencing vulvar pain during activities other than sexual intercourse. Including sexual intercourse, participants were asked whether they experienced pain during 12 different activities or situations (e.g., finger insertion, friction with clothing). To assess changes in the number of activities that participants reported as painful, the sum of each participant’s positive responses (i.e., painful activity) was divided by the number of activities in which they engaged to compute the percentage of activities that resulted in pain. This percentage significantly decreased from pre- to post-treatment, $t(12) = -4.84, p < .001, d = 0.87$, observed power = .82. The percentages of participants reporting pain with each activity at each time period are presented in Table 4.
Table 4

Percentages (%) of Participants Experiencing Vulvar Pain during Activities at Pre-Treatment, Post-Treatment, and Follow-Up

<table>
<thead>
<tr>
<th>Activity</th>
<th>Pre-Treatment</th>
<th>Post-Treatment</th>
<th>Follow-Up</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n engaging in</td>
<td>n engaging in</td>
<td>n engaging in</td>
</tr>
<tr>
<td></td>
<td>the activity</td>
<td>the activity</td>
<td>the activity</td>
</tr>
<tr>
<td></td>
<td>n experiencing pain</td>
<td>n experiencing pain</td>
<td>n experiencing pain</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercourse</td>
<td>13</td>
<td>13</td>
<td>100</td>
</tr>
<tr>
<td>Finger Insertion</td>
<td>12</td>
<td>8</td>
<td>66</td>
</tr>
<tr>
<td>Manual Stimulation</td>
<td>13</td>
<td>7</td>
<td>54</td>
</tr>
<tr>
<td>Oral Stimulation</td>
<td>13</td>
<td>4</td>
<td>31</td>
</tr>
<tr>
<td>Masturbation</td>
<td>10</td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>Tampon Insertion</td>
<td>9</td>
<td>4</td>
<td>44</td>
</tr>
<tr>
<td>Tampon Removal</td>
<td>9</td>
<td>4</td>
<td>44</td>
</tr>
<tr>
<td>Clothing Friction</td>
<td>13</td>
<td>2</td>
<td>15</td>
</tr>
<tr>
<td>Urination</td>
<td>13</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Urination After Sex</td>
<td>13</td>
<td>6</td>
<td>46</td>
</tr>
<tr>
<td>Sporting Activities</td>
<td>13</td>
<td>2</td>
<td>15</td>
</tr>
<tr>
<td>No Provocation</td>
<td>13</td>
<td>2</td>
<td>15</td>
</tr>
</tbody>
</table>
In addition to numerical rating scales of pain intensity and unpleasantness, participants also completed the MPQ with respect to their vestibular pain during intercourse. The major measures of the MPQ are (1) the pain rating index for sensory, affective, and evaluative pain, (2) the number of words chosen, and (3) the present pain intensity. The pain rating index for evaluative pain showed a trend toward a significant decrease from pre- to post-treatment ($p = .065$). Although the direction of means for the other MPQ measures indicated decreases in all scores, none of them significantly decreased from pre- to post-treatment; these results are presented in Table 5.

Table 5

*Means (M) and Standard Deviations (SD) for McGill Pain Questionnaire (MPQ) Scales at Pre-Treatment and Post-Treatment*

<table>
<thead>
<tr>
<th>MPQ Measure</th>
<th>Pre-Treatment M (SD, range)</th>
<th>Post-Treatment M (SD, range)</th>
<th>$t$</th>
<th>df</th>
<th>$p$</th>
<th>$d$</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRI—Sensory</td>
<td>15.27 (4.82, 6.00-21.00)</td>
<td>12.27 (5.73, 0-20.00)</td>
<td>-1.63</td>
<td>10</td>
<td>.134</td>
<td>0.49</td>
<td>.37</td>
</tr>
<tr>
<td>PRI—Affective</td>
<td>1.54 (2.30, 0-6.00)</td>
<td>0.73 (1.42, 0-4.00)</td>
<td>-1.30</td>
<td>10</td>
<td>.223</td>
<td>0.39</td>
<td>.25</td>
</tr>
<tr>
<td>PRI—Evaluative†</td>
<td>2.91 (1.70, 1.00-5.00)</td>
<td>1.73 (1.01, 0-4.00)</td>
<td>-2.08</td>
<td>10</td>
<td>.065</td>
<td>0.62</td>
<td>.54</td>
</tr>
<tr>
<td>NWC</td>
<td>9.73 (2.53, 4.00-13.00)</td>
<td>7.82 (3.66, 0-15.00)</td>
<td>-1.70</td>
<td>10</td>
<td>.120</td>
<td>0.51</td>
<td>.39</td>
</tr>
<tr>
<td>PPI</td>
<td>3.18 (.98, 2.00-5.00)</td>
<td>2.36 (1.03, 0-3.00)</td>
<td>-1.48</td>
<td>10</td>
<td>.170</td>
<td>1.00</td>
<td>.91</td>
</tr>
</tbody>
</table>

Note. PRI = Pain Rating Index; NWC = Number of Words Chosen; PPI = Present Pain Intensity.
† = trend toward significance.
**Sexual function.** Means and standard deviations for the sexual function variables are presented in Table 6. Sexual function was assessed by asking a variety of questions related to sexual activity and by administering the FSFI, the SS-SE, and the SS-SD at both pre- and post-treatment interviews. The frequency of sexual intercourse was assessed by asking participants the average number of intercourse attempts per month over the past 6 months (for the pre-treatment interview) or since the pre-treatment interview (for the post-treatment interview).

Surprisingly, the number of sexual intercourse attempts per month decreased from pre- to post-treatment, \( t(11) = -2.68, p = .021, d = 0.77, \) observed power = .68. Pain interference on sexual behaviour, as measured by the PDI, significantly decreased from pre- to post-treatment, \( t(11) = -3.42, p = .006, d = 0.98, \) observed power = .87.

A two-way repeated-measures ANOVA was performed on three measures of sexuality: FSFI Total Score, SS-SE, and SS-SD over the two time periods. The values on all SS-SE items were reverse coded and the subscale was rescored such that higher scores represented better sexual esteem. No data were missing, nor were there any significant univariate or multivariate outliers. Mauchly’s test of sphericity for the interaction was not significant. The time main effect was statistically significant \( F(1, 12) = 8.44, p = .013, \) partial \( \eta^2 = .41, \) observed power = .76, indicating an improvement in overall sexual-related measures. The time by measure interaction was not significant \( F(2, 24) = .78, p = .470, \) partial \( \eta^2 = .06, \) observed power = .17. Figure 2 plots the profiles for the three
Table 6

**Means (M) and Standard Deviations (SD) for Sexuality Variables at Pre-Treatment and Post-Treatment**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pre-Treatment</th>
<th>Post-Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$ ($SD$, range)</td>
<td>$M$ ($SD$, range)</td>
</tr>
<tr>
<td># of Monthly Intercourse Attempts*</td>
<td>4.83 (3.71, 1.00-12.00)</td>
<td>3.08 (3.37, 0-12.00)</td>
</tr>
<tr>
<td>PDI-Sexual Behaviour**</td>
<td>6.58 (2.61, 3.00-7.00)</td>
<td>4.50 (2.11, 2.00-7.00)</td>
</tr>
<tr>
<td>FSFI Total Score** a</td>
<td>20.15 (7.25, 4.20-30.80)</td>
<td>24.60 (7.33, 5.80-33.20)</td>
</tr>
<tr>
<td>FSFI Desire</td>
<td>3.55 (1.26, 1.20-6.00)</td>
<td>3.60 (1.34, 1.80-6.00)</td>
</tr>
<tr>
<td>FSFI Arousal**</td>
<td>3.85 (1.73, 0-6.00)</td>
<td>4.52 (1.75, 0-6.00)</td>
</tr>
<tr>
<td>FSFI Lubrication</td>
<td>3.97 (1.96, 0-6.00)</td>
<td>4.57 (1.50, 0-6.00)</td>
</tr>
<tr>
<td>FSFI Orgasm</td>
<td>3.38 (2.09, 0-6.00)</td>
<td>3.60 (1.95, 0-6.00)</td>
</tr>
<tr>
<td>FSFI Satisfaction*</td>
<td>4.00 (1.62, 1.2-6.00)</td>
<td>4.83 (0.97, 2.80-6.00)</td>
</tr>
<tr>
<td>FSFI Pain**</td>
<td>1.38 (1.09, 0-2.80)</td>
<td>3.48 (2.20, 0-6.00)</td>
</tr>
<tr>
<td>SS-SE a</td>
<td>22.46 (11.90, 7.00-38.00)</td>
<td>25.69 (12.06, 4.00-39.00)</td>
</tr>
<tr>
<td>SS-SD a</td>
<td>20.31 (6.85, 10.00-32.00)</td>
<td>22.62 (8.75, 6.00-33.00)</td>
</tr>
</tbody>
</table>

Note. PDI=Pain Disability Index, FSFI=Female Sexual Function Index, SS-SE=Sexual-Esteem subscale of the Sexuality Scale, SS-SD=Sexual Depression subscale of the Sexuality Scale.

Higher scores on the FSFI Pain subscale represent lower pain levels. The SS-SE score was calculated by reverse coding each item and re-computing the sum score; therefore, higher scores represent higher sexual-esteeem. Higher scores on the SS-SD represent less sexual depression.

* = significant at $p < .05$; ** = significant at $p < .01$; a = significance based on overall two-way repeated-measures ANOVA.
measures over the two time periods and an examination of these indicates that all three measures improved from pre- to post-treatment.

*Figure 2.* Means for the Female Sexual Function Index (FSFI) Total Score and the Sexual-Esteem (SS-SE) and Sexual Depression (SS-SD) subscales of the Sexuality Scale at pre-treatment and post-treatment. Vertical lines depict standard errors of the mean.

In order to compare the effects of PFP to previous treatment studies that investigated specific aspects of sexual function, the subscales of the FSFI were explored to determine which areas of sexual function had improved following treatment. Participants significantly improved with respect to levels of Arousal \[t(12) = 2.63, p = .022, d = 0.73, \text{observed power} = .68\], Sexual Satisfaction \[t(12) = 2.78, p = .017, d = \]
0.77, observed power = .72], and Pain during sexual activity \([t(12) = 3.40, p = .005, d = 0.95, \text{observed power = .88}]\). Participants did not have significant improvements with respect to levels of Desire \([t(12) = .127, p = .901, d = 0.04, \text{observed power = .05}]\), Lubrication \([t(12) = 1.50, p = .160, d = 0.41, \text{observed power = .28}]\), or Orgasm \([t(12) = .85, p = .414, d = 0.24, \text{observed power = .13}]\).

**Psychological factors and quality of life.** Means and standard deviations for the psychological factors and quality of life are presented in Table 7. A two-way repeated-measures ANOVA was performed on two measures of mental health: depression (CES-D) and anxiety (STAI-T) over the two time periods. No data were missing, nor were there any significant univariate or multivariate outliers. Neither the time main effect \([F(1, 12) = .18, p = .678, \text{partial} \eta^2 = .02, \text{observed power = .07}]\) nor the time by measure interaction \([F(1, 12) = .05, p = .824, \text{partial} \eta^2 = .004, \text{observed power = .06}]\) were statistically significant.

In addition to these mental health measures, health-related quality of life was also measured by the physical and mental health composite scores of the SF-12. Neither the SF-12-PCS \([t(12) = -.03, p = .908, d = 0.008, \text{observed power = .05}]\) nor the SF-12-MCS \([t(12) = -.39, p = .704, d = 0.11, \text{observed power = .07}]\) significantly changed from pre- to post-treatment.
Table 7

*Means (M) and Standard Deviations (SD) for Psychological Factors and Quality of Life at Pre-Treatment and Post-Treatment*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pre-Treatment</th>
<th>Post-Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (SD, range)</td>
<td>M (SD, range)</td>
</tr>
<tr>
<td>CES-D</td>
<td>12.69 (9.99, 3.00-33.00)</td>
<td>12.08 (9.15, 2.00-35.00)</td>
</tr>
<tr>
<td>STAI-T</td>
<td>42.08 (10.83, 26.00-58.00)</td>
<td>41.00 (8.43, 27.00-57.00)</td>
</tr>
<tr>
<td>SF-12-PCS</td>
<td>56.79 (5.00, 43.97-62.62)</td>
<td>56.72 (7.87, 38.67-65.15)</td>
</tr>
<tr>
<td>SF-12-MCS</td>
<td>39.74 (11.10, 24.75-57.83)</td>
<td>38.83 (9.29, 20.53-52.99)</td>
</tr>
<tr>
<td>PCS Total Score***</td>
<td>25.83 (10.37, 7.00-40.00)</td>
<td>10.08 (8.04, 0-24.00)</td>
</tr>
<tr>
<td>PCS Rumination**</td>
<td>10.92 (4.38, 2.00-16.00)</td>
<td>5.08 (3.82, 0-13.00)</td>
</tr>
<tr>
<td>PCS Magnification</td>
<td>2.83 (2.08, 0-7.00)</td>
<td>1.67 (1.83, 0-5.00)</td>
</tr>
<tr>
<td>PCS Helplessness***</td>
<td>12.08 (5.04, 4.00-20.00)</td>
<td>3.33 (3.08, 0-8.00)</td>
</tr>
<tr>
<td>PASS-20 Total Score**</td>
<td>31.92 (13.86, 7.00-52.00)</td>
<td>21.83 (11.57, 6.00-42.00)</td>
</tr>
<tr>
<td>PASS-20 Avoidance</td>
<td>7.23 (3.79, 2.00-14.00)</td>
<td>6.85 (3.69, 1.00-13.00)</td>
</tr>
<tr>
<td>PASS-20 Fearful Thinking</td>
<td>3.92 (3.73, 0-13.00)</td>
<td>2.23 (2.42, 0-6.00)</td>
</tr>
<tr>
<td>PASS-20 Cognitive Anxiety</td>
<td>13.23 (5.33, 5.00-20.00)</td>
<td>9.85 (5.86, 2.00-21.00)</td>
</tr>
<tr>
<td>PASS-20 Physiological Response</td>
<td>6.46 (4.70, 0-16.00)</td>
<td>3.62 (3.40, 0-11.00)</td>
</tr>
</tbody>
</table>

Note. CES-D = Center for Epidemiological Studies Depression Scale, STAI-T = State-Trait Anxiety Inventory-Trait Version, SF-12-PCS & SF-12-MCS = Medical Outcome Survey 12-Item Short-Form Health Survey Physical Composite Score & Mental Composite Score, PCS = Pain Catastrophizing Scale, PASS-20 = Pain Anxiety Symptoms Scale-20. ** = significant at $p < .01$;
A two-way repeated-measures ANOVA was performed on two measures of pain cognition: pain catastrophizing (PCS) and pain-related anxiety (PASS-20) over the two time periods. One participant did not complete the post-treatment PCS because she was not engaging in activities that caused vulvar pain; the results are based on the remaining twelve participants. There were no significant univariate or multivariate outliers. The time main effect was statistically significant $F(1, 11) = 11.76, p = .006$, partial $\eta^2 = .52$, observed power = .88, indicating an improvement in overall pain cognitions. The time by measure interaction was not significant $F(1, 11) = 1.98, p = .187$, partial $\eta^2 = .15$, observed power = .25.

As part of exploratory analyses, the subscales of the PCS and PASS-20 were explored to determine which aspects of pain cognition had improved following treatment. Although the Magnification subscale of the PCS did not significantly improve [$t(11) = -1.50, p = .161, d = 0.42$, observed power = .26], the Rumination subscale [$t(11) = -3.65, p = .004, d = 1.05$, observed power = .91] and the Helplessness subscale [$t(11) = -5.45, p < .001, d = 1.58$, observed power = .99] did significantly improve from pre- to post-treatment. None of the PASS-20 subscales significantly improved from pre- to post-treatment [Avoidance: $t(12) = -.346, p = .736, d = 0.09$, observed power = .09; Fearful Thinking: $t(12) = -1.68, p = .119, d = 0.46$, observed power = .33; Cognitive Anxiety:
\[ t(12) = -1.85, p = .09, d = 0.51, \text{observed power} = .39; \text{Physiological Response: } t(12) = -1.92, p = .079, d = 0.53, \text{observed power} = .42 \].

The coping strategies that participants reported using at the pre- and post-treatment interviews are presented in Table 8. When asked which coping strategy they used most frequently, the most common response at both time periods was avoidance [6 participants (46%) at both the pre- and post-treatment periods]. Differences in the number and pattern of coping strategies reported at pre- and post-treatment were not statistically compared due to an inability to interpret the meaning of the change (e.g., changes could reflect no longer needing to cope due to reduced pain or the increased helpfulness of one strategy over another).

**3-Month Follow-Up**

All follow-up analyses are based on the ten participants who completed the interviews. Measures obtained at the 3-month follow-up session were: average pain intensity and unpleasantness ratings during intercourse, percentage of painful intercourse attempts, activities causing vulvar pain, number of sexual intercourse attempts per month, FSFI, PCS, PASS-20, degree of vulvar pain improvement, and treatment satisfaction. All means and standard deviations for the variables analyzed across all three time points among the subset of participants who completed the follow-up interview are presented in Table 9.
Table 8

Percentages (%) of Participants reporting the use of Various Coping Strategies at Pre-Treatment and Post-Treatment

<table>
<thead>
<tr>
<th>Coping Strategy</th>
<th>Pre-Treatment</th>
<th>Post-Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
</tr>
<tr>
<td>Diverting Attention</td>
<td>12 (92)</td>
<td>8 (62)</td>
</tr>
<tr>
<td>Avoidance</td>
<td>11 (85)</td>
<td>8 (62)</td>
</tr>
<tr>
<td>Coping Self-Statements</td>
<td>10 (77)</td>
<td>9 (69)</td>
</tr>
<tr>
<td>Ignoring Pain Sensations</td>
<td>10 (77)</td>
<td>3 (23)</td>
</tr>
<tr>
<td>Reinterpreting Pain Sensations</td>
<td>9 (69)</td>
<td>9 (69)</td>
</tr>
<tr>
<td>Praying/Hoping</td>
<td>6 (46)</td>
<td>2 (15)</td>
</tr>
<tr>
<td>Increasing Pain Reducing Behaviours</td>
<td>5 (39)</td>
<td>7 (54)</td>
</tr>
<tr>
<td>Catastrophizing</td>
<td>4 (31)</td>
<td>3 (23)</td>
</tr>
<tr>
<td>Increasing Distracting Activities</td>
<td>4 (31)</td>
<td>5 (39)</td>
</tr>
</tbody>
</table>

*Dyspareunia and other activities causing vulvar pain.* Average pain intensity and unpleasantness were not combined due to non-significant correlations between intensity and unpleasantness scores (see above in dyspareunia section). Vestibular and overall average pain intensity ($r(6) = .85, p = .004$) and vestibular and overall average unpleasantness ratings ($r(6) = .93, p < .001$) were significantly correlated at the follow-up period. Vestibular and overall pain intensity and unpleasantness were therefore combined.
to create general pain intensity and unpleasantness scores as was done with the pre- and post-treatment values.

A two-way repeated-measures ANOVA was performed on the two components of intercourse pain: general intensity and unpleasantness over the three time periods (pre-treatment, post-treatment, follow-up). One participant was not engaging in intercourse at the time of the follow-up interview because she had not seen her partner due to a long-distance relationship; the results are based on the remaining nine participants. There were no significant univariate or multivariate outliers. Mauchly’s test of sphericity for the time effect was not significant. The time effect was statistically significant $F(2, 16) = 21.63, p < .001$, partial $\eta^2 = .73$, observed power = 1.00. The trend analysis indicated that the time effect significantly fit both a linear [$F(1, 8) = 26.16, p = .001$, partial $\eta^2 = .77$, observed power = .99] and a quadratic trend [$F(1, 8) = 13.72, p = .006$, partial $\eta^2 = .63$, observed power = .90]. The time by measure interaction was not significant $F(2, 16) = 1.83, p = .192$, partial $\eta^2 = .19$, observed power = .33. Figure 3 plots the profiles for the intensity and unpleasantness ratings over the three time periods. An examination of the plots indicates that intercourse pain intensity and unpleasantness ratings decreased from pre- to post-treatment and then began to level off from post-treatment to follow-up.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Pre-Treatment $M(SD, \text{range})$</th>
<th>Post-Treatment $M(SD, \text{range})$</th>
<th>Follow-Up $M(SD, \text{range})$</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Pain Intensity (0-10)***&lt;sup&gt;a&lt;/sup&gt;</td>
<td>6.33 (1.80, 4.00-9.00)</td>
<td>2.11 (1.39, 0-4.00)</td>
<td>1.67 (1.35, 0-4.00)</td>
</tr>
<tr>
<td>General Unpleasantness (0-10)***&lt;sup&gt;a&lt;/sup&gt;</td>
<td>6.50 (2.05, 3.50-10.00)</td>
<td>2.17 (1.75, 0-4.50)</td>
<td>2.39 (1.65, 0-5.00)</td>
</tr>
<tr>
<td>% of Painful Intercourse Attempts***</td>
<td>96.67 (7.07, 80.00-100.00)</td>
<td>52.22 (34.83, 0-100.00)</td>
<td>35.89 (32.88, 0-100.00)</td>
</tr>
<tr>
<td>% of Activities Causing Pain**</td>
<td>41.11 (22.17, 8.33-75.00)</td>
<td>25.14 (23.52, 0-62.50)</td>
<td>17.56 (22.27, 0-77.78)</td>
</tr>
<tr>
<td># of Monthly Intercourse Attempts</td>
<td>4.70 (3.74, 1.00-12.00)</td>
<td>3.50 (3.54, 0-12.00)</td>
<td>5.20 (4.18, 0-12.00)</td>
</tr>
<tr>
<td>FSFI Total Score*</td>
<td>19.72 (8.15, 4.20-30.80)</td>
<td>23.48 (7.82, 5.80-31.40)</td>
<td>25.67 (6.39, 16.70-33.60)</td>
</tr>
<tr>
<td>FSFI Desire</td>
<td>3.60 (1.44, 1.20-6.00)</td>
<td>3.30 (1.27, 1.80-6.00)</td>
<td>3.96 (0.99, 2.40-4.80)</td>
</tr>
<tr>
<td>FSFI Arousal</td>
<td>3.57 (1.86, 0-6.00)</td>
<td>4.20 (1.89, 0-6.00)</td>
<td>4.23 (1.75, 1.80-6.00)</td>
</tr>
<tr>
<td>FSFI Lubrication</td>
<td>3.75 (2.11, 0-6.00)</td>
<td>4.38 (1.64, 0-6.00)</td>
<td>4.68 (1.29, 2.10-6.00)</td>
</tr>
<tr>
<td>FSFI Orgasm</td>
<td>3.28 (2.15, 0-6.00)</td>
<td>3.24 (1.99, 0-6.00)</td>
<td>3.60 (1.95, 1.20-5.60)</td>
</tr>
<tr>
<td>FSFI Satisfaction</td>
<td>3.84 (1.77, 1.20-6.00)</td>
<td>4.72 (1.10, 2.80-6.00)</td>
<td>4.56 (1.20, 2.80-6.00)</td>
</tr>
<tr>
<td>FSFI Pain***</td>
<td>1.68 (1.03, 0-2.80)</td>
<td>3.64 (2.20, 0-6.00)</td>
<td>4.64 (1.17, 2.40-6.00)</td>
</tr>
<tr>
<td>PCS Total Score**</td>
<td>24.00 (10.79, 7.00-40.00)</td>
<td>8.89 (8.59, 0-24.00)</td>
<td>6.89 (5.88, 0-18.00)</td>
</tr>
<tr>
<td>PCS Ruminination**</td>
<td>10.00 (4.58, 2.00-16.00)</td>
<td>4.56 (4.33, 0-13.00)</td>
<td>3.78 (3.38, 0-8.00)</td>
</tr>
<tr>
<td>PCS Magnification*</td>
<td>2.56 (2.35, 0-7.00)</td>
<td>1.44 (1.67, 0-5.00)</td>
<td>0.33 (0.50, 0-1.00)</td>
</tr>
</tbody>
</table>

<sup>a</sup> Indicates a significant difference from Pre-Treatment.
<table>
<thead>
<tr>
<th>PCS Helplessness***</th>
<th>11.44 (5.10, 4.00-19.00)</th>
<th>2.89 (3.10, 0-8.00)</th>
<th>2.78 (2.73, 0-9.00)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PASS-20 Total Score**a</td>
<td>28.78 (13.51, 7.00-48.00)</td>
<td>21.44 (13.05, 6.00-42.00)</td>
<td>14.56 (12.51, 0-39.00)</td>
</tr>
<tr>
<td>PASS-20 Avoidance</td>
<td>6.78 (3.60, 2.00-11.00)</td>
<td>6.44 (4.19, 1.00-13.00)</td>
<td>4.33 (4.50, 0-14.00)</td>
</tr>
<tr>
<td>PASS-20 Fearful Thinking</td>
<td>4.11 (4.31, 0-13.00)</td>
<td>2.33 (2.83, 0-6.00)</td>
<td>1.22 (1.72, 0-5.00)</td>
</tr>
<tr>
<td>PASS-20 Cognitive Anxiety*</td>
<td>12.56 (5.27, 5.00-20.00)</td>
<td>8.89 (6.11, 2.00-21.00)</td>
<td>6.67 (4.74, 0-13.00)</td>
</tr>
<tr>
<td>PASS-20 Physiological Response</td>
<td>5.33 (3.50, 0-11.00)</td>
<td>3.78 (3.73, 0-11.00)</td>
<td>2.33 (3.32, 0-9.00)</td>
</tr>
</tbody>
</table>

Note. Derived from the participants who completed the follow-up session. FSFI = Female Sexual Function Index, PCS = Pain Catastrophizing Scale, PASS-20 = Pain Anxiety Symptoms Scale-20.

* = significant at $p < .05$; ** = significant at $p < .01$; *** = significant at $p < .001$; † = trend toward significance; a = significance based on overall two-way repeated-measures ANOVA.
Figure 3. Means for general intercourse pain intensity and unpleasantness ratings at pre-treatment, post-treatment, and follow-up. Vertical lines depict standard errors of the means.

A repeated-measures ANOVA was performed on the percentage of painful intercourse attempts over the three time periods. No data were missing, nor were there any significant univariate or multivariate outliers. Mauchly’s test of sphericity was not significant. The time effect was statistically significant \( F(2, 16) = 14.09, p < .001 \), partial \( \eta^2 = .64 \), observed power = .99. The trend analysis indicated that the time effect significantly fit a linear trend \( F(1, 8) = 21.46, p = .002 \), partial \( \eta^2 = .73 \), observed power = .98] but not a quadratic trend \( F(1, 8) = 2.43, p = .158 \), partial \( \eta^2 = .23 \), observed power = .28]. Figure 4 plots the profile for the percentage of painful intercourse attempts over the three time periods. An examination of the plots indicates that the percentage of
painful intercourse attempts continued to decrease from pre- to post-treatment to follow-up.

Figure 4. Means for the percentage of painful activities at pre-treatment, post-treatment, and follow-up. Vertical lines depict standard errors of the means.

A repeated-measures ANOVA was also performed on the percentage of activities that resulted in pain over the three time periods. No data were missing, nor were there any significant univariate or multivariate outliers. Mauchly’s test of sphericity was not significant. The time effect was statistically significant $F(2, 18) = 11.68, p = .001$, partial $\eta^2 = .57$, observed power = .98. The trend analysis indicated that the time effect significantly fit a linear [$F(1, 9) = 17.32, p = .002$, partial $\eta^2 = .66$, observed power = .96] but not a quadratic trend [$F(1, 9) = 1.34, p = .276$, partial $\eta^2 = .13$, observed power = .18]. Figure 5 plots the profile for the percentage of painful activities over the three time periods. An examination of the plots indicates that the percentage of painful activities
continued to decrease from pre- to post-treatment to follow-up. The percentages of participants reporting pain with each activity at the follow-up period are presented in Table 4.

![Graph showing percentage of painful activities over time](image)

*Figure 5.* Means for the percentage of painful activities at pre-treatment, post-treatment, and follow-up. Vertical lines depict standard errors of the means.

**Sexual function.** A repeated-measures ANOVA was performed on the frequency of sexual intercourse attempts at the three time periods. No data were missing, nor were there any significant univariate or multivariate outliers. Mauchly’s test of sphericity was significant ($p = .036$) and therefore the Huynh-Feldt adjustment was applied. The time effect was not statistically significant $F(1.40, 12.58) = 1.56$, $p = .243$, partial $\eta^2 = .15$, observed power = .24. Figure 6 plots the profile of the number of intercourse attempts per month and shows a dip at the post-treatment time period.
A repeated-measures ANOVA was performed on FSFI Total Scores over the three time periods. No data were missing, nor were there any significant univariate or multivariate outliers. Mauchly’s test of sphericity was not significant. The time effect was significant $F(2, 18) = 4.00, p = .036$, partial $\eta^2 = .31$, observed power = .64. The trend analysis indicated that the time effect showed a trend toward significantly fitting a linear trend $[F(1, 9) = 5.73, p = .040$, partial $\eta^2 = .39$, observed power = .57] but not a quadratic trend $[F(1, 9) = .29, p = .605$, partial $\eta^2 = .03$, observed power = .08]. Figure 7 plots the profile for the FSFI Total Scores over the three time periods. An examination of the plots indicates that the scores continued to increase from pre- to post-treatment to follow-up.
Figure 7. Means for the Female Sexual Function Index (FSFI) Total Scores at pre-treatment, post-treatment, and follow-up. Vertical lines depict standard errors of the means.

The subscales of the FSFI were further examined across all three time periods with repeated-measures ANOVAs. Mauchly’s test of sphericity was significant for the Arousal and Sexual Satisfaction subscale tests and therefore the Huyn-Feldt adjustment was applied. There were no significant univariate or multivariate outliers. The time effect for the Pain subscale was significant $F(2, 18) = 13.92, p < .001$, partial $\eta^2 = .61$, observed power = .99, with a significant linear trend [$F(1, 9) = 32.77, p < .001$, partial $\eta^2 = .79$, observed power = .99], but a non-significant quadratic trend [$F(1, 9) = .80, p = .395$, partial $\eta^2 = .08$, observed power = .13]. This indicates that pain during penetration continued to decrease from pre- to post-treatment to follow-up. The Desire [$F(2, 18) = 1.87, p = .184$, partial $\eta^2 = .17$, observed power = .34], Arousal [$F(1.40, 12.64) = 0.69, p$
= .470, partial $\eta^2 = .07$, observed power = .13], Lubrication $[F(2, 18) = 1.95, p = .171$, partial $\eta^2 = .18$, observed power = .35], Orgasm $[F(2, 18) = .40, p = .677$, partial $\eta^2 = .04$, observed power = .11], and Sexual Satisfaction $[F(1.24, 11.16) = 1.75, p = .216$, partial $\eta^2 = .16$, observed power = .25] time effects were non-significant.

**Psychological factors.** A two-way repeated-measures ANOVA was performed on two measures of pain cognition: pain catastrophizing (PCS) and pain-related anxiety (PASS-20) over the three time periods. One participant did not complete the follow-up PCS or PASS-20 because she was not engaging in activities that caused vulvar pain; the results are based on the remaining nine participants. There were no significant univariate or multivariate outliers. Mauchly’s test of sphericity was not significant. The time main was significant $F(2, 16) = 6.59, p = .008$, partial $\eta^2 = .45$, observed power = .85, indicating an improvement in overall pain cognitions. The trend analysis indicated that the time effect significantly fit a linear trend $[F(1, 8) = 10.64, p = .011$, partial $\eta^2 = .57$, observed power = .81] but not a quadratic trend $[F(1, 8) = .93, p = .363$, partial $\eta^2 = .10$, observed power = .14]. The time by measure interaction was not significant $F(2, 16) = 1.71, p = .212$, partial $\eta^2 = .18$, observed power = .31. Figure 8 plots the profile for the PCS and PASS-20 Total Scores over the three time periods. An examination of the plots indicates that the scores continued to decrease from pre- to post-treatment to follow-up.
Repeated-measures ANOVAs were also conducted to examine changes in the PCS and PASS-20 subscale scores across the three time points. Mauchly’s test of sphericity was not significant for any of the test, nor were there any significant univariate or multivariate outliers. The time effect for the PCS Rumination subscale was significant multivariate $F(2, 16) = 7.44, p = .005$, partial $\eta^2 = .48$, observed power = .89, with a significant linear trend $[F(1, 8) = 11.64, p = .009$, partial $\eta^2 = .59$, observed power = .85], but a non-significant quadratic trend $[F(1, 8) = 2.55, p = .149$, partial $\eta^2 = .24$, observed power = .29]. The time effect for the PCS Magnification subscale was also significant
\( F(2, 16) = 4.00, p = .039, \text{ partial } \eta^2 = .33, \text{ observed power } = .63, \) with a trend toward a significant linear trend \( [F(1, 8) = 7.48, p = .026, \text{ partial } \eta^2 = .48, \text{ observed power } = .67], \) but a non-significant quadratic trend \( [F(1, 8) = .00, p = 1.00, \text{ partial } \eta^2 = .00, \text{ observed power } = .05]. \) These two subscales continue to improve from pre- to post-treatment to follow-up. The time effect for the PCS Helplessness subscale was significant \( F(2, 16) = 15.45, p < .001, \text{ partial } \eta^2 = .66, \text{ observed power } = .99 \) with a significant linear trend \( [F(1, 8) = 17.11, p = .003, \text{ partial } \eta^2 = .68, \text{ observed power } = .95], \) and a significant quadratic trend \( [F(1, 8) = 11.82, p = .009, \text{ partial } \eta^2 = .60, \text{ observed power } = .85]. \) This subscale improved from pre- to post-treatment and then leveled off from post-treatment to follow-up.

The time effect for the PASS-20 Cognitive Anxiety was significant \( F(2, 16) = 3.89, p = .042, \text{ partial } \eta^2 = .33, \text{ observed power } = .62, \) with a trend toward a significant linear trend \( [F(1, 8) = 7.64, p = .025, \text{ partial } \eta^2 = .49, \text{ observed power } = .68], \) but a non-significant quadratic trend \( [F(1, 8) = .153, p = .706, \text{ partial } \eta^2 = .02, \text{ observed power } = .06]. \) The Avoidance \( [F(2, 16) = 1.72, p = .210, \text{ partial } \eta^2 = .18, \text{ observed power } = .31], \) Fearful Thinking \( [F(2, 16) = 2.27, p = .135, \text{ partial } \eta^2 = .22, \text{ observed power } = .39], \) and Physiological Response \( [F(2, 16) = 1.68, p = .217, \text{ partial } \eta^2 = .17, \text{ observed power } = .30] \) time effects were non-significant.

**Treatment Success and Satisfaction**

The self-report degree of vulvar pain improvement obtained at the post-treatment interview resulted in one participant (8%) reporting a ‘complete cure’, nine participants
(69%) reporting ‘great improvement’, one participant (8%) reporting ‘some improvement’, and two participants (15%) reporting ‘little improvement’. The self-report degree of vulvar pain improvement obtained at the follow-up interview resulted in two participants (20%) reporting ‘complete cure’, five participants (50%) reporting ‘great improvement’ and three participants (30%) reporting ‘some improvement’. Consistent with previous research investigating the effectiveness of biofeedback and PFP (Bergeron et al., 2001b; Bergeron et al., 2002; Bergeron et al., 2008), treatment success was defined as a self-reported ‘great improvement’ or ‘complete cure’. Therefore ten participants (77%) can be said to have had a successful outcome following the PFP treatment at the post-treatment period and seven participants (70%) at the follow-up period.

Twelve participants (92%) at the post-treatment interview and ten participants (100%) at the follow-up interview reported that the treatment was beneficial in ways other than a reduction in vulvar pain. Some of these benefits included: better body awareness, knowledge about the pain, and a new language for communicating about pain \( (n = 7, 54\%) \); improved self-esteem, sexual-confidence, more positive attitudes about sex, and reduced feelings of shame \( (n = 4, 31\%) \); improved relationship quality including feeling closer to a partner and having a partner better appreciate what sex is like with pain \( (n = 11, 85\%) \); and a reduced sense of hopelessness about pain and self-satisfaction about taking control of the pain \( (n = 3, 23\%) \). The mean treatment satisfaction score was 9.31 \( (SD = .85) \) at the post-treatment period and 8.90 \( (SD = .99) \) at the follow-up period. Treatment satisfaction was significantly correlated with degree of vulvar pain
improvement at both the post-treatment ($r(11) = -.71, p = .006$) and follow-up periods ($r = -.74, p = .014$).

**Predicting Treatment Success**

Subset of PVD (primary or secondary) did not significantly predict self-report degree of vulvar pain improvement at either the post-treatment period [$r(11) = .47, p = .10$] or at the follow-up period [$r(11) = .18, p = .629$]. The length of having had vulvar pain also did not significantly predict self-report degree of vulvar pain reduction at either the post-treatment period [$r(11) = .06, p = .858$] or the follow-up period [$r(11) = .16, p = .657$]. The length of time that it took for participants to complete all PFP treatment sessions was also assessed as a potential predictor of success, and although it did not significantly predict degree of vulvar pain improvement at the post-treatment period [$r(11) = -.20, p = .503$], it did significantly predict degree of vulvar pain improvement at the follow-up period [$r(11) = -.66, p = .039$]. This finding indicates that participants whose treatment sessions took longer to complete had a greater reduction in self-report degree of vulvar pain improvement at the follow-up period.

Correlations between pre-treatment PCS and PASS-20 Total Scores and the post-treatment and follow-up PCS and PASS-20 Total Scores were less than the ratio of time 1 standard deviations to time 2 standard deviations; therefore hierarchical regression models were used to predict self-report degree of vulvar pain improvement from changes in pain catastrophizing and pain-related anxiety. Changes in pain catastrophizing and pain-related anxiety from pre- to post-treatment did not predict the self-report degree of
vulvar pain improvement at the post-treatment period (see Table 10 for the regression models). Changes in pain catastrophizing from pre-treatment to follow-up, however, showed a trend ($p = .059$) toward significant prediction of self-report degree of vulvar pain improvement at the follow-up period, and changes in pain-related anxiety from pre-treatment to follow-up significantly ($p = .014$) predicted self-report degree of vulvar pain improvement at the follow-up period (see Table 11 for the regression models).
Table 10

Summary of Hierarchical Regression Analyses for Variables Predicting Post-Treatment Self-Report Degree of Vulvar Pain Improvement

<table>
<thead>
<tr>
<th>Variable Entered</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>ΔR²</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent Variable: Post-Treatment Degree of Vulvar Pain Improvement</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-Treatment PCS Total Score</td>
<td>-.03</td>
<td>.03</td>
<td>-.32</td>
<td>.102</td>
<td>-1.07</td>
<td>.312</td>
</tr>
<tr>
<td>Step 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-Treatment PCS Total Score</td>
<td>-.03</td>
<td>.02</td>
<td>-.33</td>
<td></td>
<td>-1.17</td>
<td>.273</td>
</tr>
<tr>
<td>Post-Treatment PCS Total Score</td>
<td>.05</td>
<td>.03</td>
<td>.41</td>
<td>.17</td>
<td>1.45</td>
<td>.180</td>
</tr>
<tr>
<td><strong>Dependent Variable: Post-Treatment Degree of Vulvar Pain Improvement</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-Treatment PASS-20 Total Score</td>
<td>-.01</td>
<td>.02</td>
<td>-.17</td>
<td>.03</td>
<td>-.56</td>
<td>.574</td>
</tr>
<tr>
<td>Step 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-Treatment PASS-20 Total Score</td>
<td>-.01</td>
<td>.02</td>
<td>-.16</td>
<td></td>
<td>-.53</td>
<td>.610</td>
</tr>
<tr>
<td>Post-Treatment PASS-20 Total Score</td>
<td>-.01</td>
<td>.02</td>
<td>-.08</td>
<td>.006</td>
<td>-.26</td>
<td>.804</td>
</tr>
</tbody>
</table>

Note. PCS = Pain Catastrophizing Scale, PASS-20 = Pain Anxiety Symptoms Scale-20.
Table 11

*Summary of Hierarchical Regression Analyses for Variables Predicting Follow-Up Self-Report Degree of Vulvar Pain Improvement*

<table>
<thead>
<tr>
<th>Variable Entered</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>ΔR²</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-Treatment PCS Total Score</td>
<td>-.02</td>
<td>.02</td>
<td>-.34</td>
<td>.12</td>
<td>-.97</td>
<td>.365</td>
</tr>
<tr>
<td>Step 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-Treatment PCS Total Score</td>
<td>-.02</td>
<td>.02</td>
<td>-.25</td>
<td>--</td>
<td>-.88</td>
<td>.415</td>
</tr>
<tr>
<td>Follow-Up PCS Total Score†</td>
<td>.08</td>
<td>.03</td>
<td>.65</td>
<td>.42</td>
<td>2.33</td>
<td>.059</td>
</tr>
</tbody>
</table>

Dependent Variable: Follow-Up Degree of Vulvar Pain Improvement

Step 1

Pre-Treatment PASS-20 Total Score | -.01| .02  | -.13| .02 | -.35| .737 |

Step 2

Pre-Treatment PASS-20 Total Score | -.01| .01  | -.25| --  | -1.06| .328 |

Follow-Up PASS-20 Total Score* | .05 | .01  | .82 | .65 | 3.42| .014 |

Note. PCS = Pain Catastrophizing Scale, PASS-20 = Pain Anxiety Symptoms Scale.

* = significant at p < .05; † = trend toward significance.
Chapter 6
Discussion

This study aimed to prospectively examine the effectiveness of PFP in treating various physical, sexual, and psychological components of PVD. The results of the present study demonstrate that PFP is a potentially effective treatment option for treating PVD. In concordance with the biopsychosocial model, improvements were demonstrated with respect to not only the pain of PVD, but also some of the sexual and psychological correlates of pain. Over two-thirds of the participants had a successful treatment outcome and participants were extremely satisfied with the treatment. Support for all four hypotheses was demonstrated in this prospective pilot study of PFP.

Physical and Psychophysical Testing

The hypothesis that following PFP, there would be an increase in vestibular pressure pain thresholds was supported. At the post-treatment QST session there was a significantly higher mean pressure pain threshold at the posterior region of the vestibule as compared to the pre-treatment session, as well as an increase in the amount of pressure participants were able to sustain before reaching a moderate pain level. The effect sizes were in the moderate to large range. These results are indicative of decreases in vestibular sensitivity and are consistent with increased vestibular pressure pain thresholds found in treatment studies investigating various treatment options for PVD. Women with PVD who underwent EMG biofeedback increased in their pressure pain threshold from 20g to 40g from pre-treatment to a 12-month follow-up, whereas women who received a
lidocaine treatment increased in their pressure pain threshold from 20g to 30g (Danielsson et al., 2006). In one study of local anesthetic nerve blockade, pre-menopausal women with PVD demonstrated a 50% improvement in their pressure pain thresholds (Rapkin et al., 2008). Unlike these other studies, the current study only measured pressure pain thresholds at one site on the vestibule. It is not known whether changes in pain sensitivity occurred at other areas of the vestibular tissue. Although the posterior position was most frequently reported as the area of greatest sensitivity during sexual intercourse by the participants, it did not receive the highest pain ratings during the gynecological cotton-swab test.

The changes in pain sensitivity from pre- to post-treatment may signify actual physiological changes with respect to peripheral nervous system functioning; however, they may also reflect a shift in participant’s subjective experience of pain. Granot and Lavee (2005) noted the importance of various psychological factors such as anxiety, somatization, and catastrophizing in the perception of experimental pain during QST. Thus, it is possible that changes in psychological constructs from pre- to post-treatment may account for some of the variance in the decreased vestibular sensitivity. The large improvements with respect to the number of grams required to reach a moderate pain level may also indicate an increased ability to cope with or tolerate pain. Vestibular tissue samples would need to be taken before and after treatment to determine whether physiological changes occurred.
The hypothesis that following PFP, vulvar pain intensity ratings would significantly decrease during the cotton-swab test was supported in the current study. This finding is consistent with decreased pain ratings during gynecological examinations found in treatment studies investigating various treatment options for PVD. In a hypnosis study, cotton-swab ratings decreased from extreme to moderate levels of pain intensity (Pukall, Kandyba et al., 2007). In Bergeron et al.’s (2001b) randomized study, women who underwent vestibulectomy decreased from moderate pain intensity at the pre-treatment cotton-swab test to mild pain intensity at post-treatment, 6- and 12-month follow-up cotton-swab tests. Women who underwent EMG biofeedback or GCBT, however, decreased from high-moderate pain intensity ratings at the pre-treatment cotton-swab test to low-moderate pain intensity ratings at the post-treatment, 6- and 12-month follow-up cotton-swab tests. Women with PVD who received capsaicin treatment also showed significant reductions in pain intensity following treatment (Steinberg, Oyama, Rejba, Kellogg-Spadt, & Whitmore, 2005); however, the rating scale used was different from that employed in the current study and therefore cannot be directly compared. In the current study, pain ratings during the examination decreased from moderate to mild levels of pain with a large effect size. Although a diagnosis of PVD is dependent on both the ratings during the cotton-swab test and the clinical presentation of pain, the ratings given by many of the participants at the post-treatment examination were not at a clinical level and could be observed in a control population without a diagnosis of PVD.
Dyspareunia and Sexual Function

The hypothesis that following PFP, self-report pain ratings would decrease during intercourse was also supported. From pre-treatment to the two follow-up times, participants demonstrated significant decreases in self-report measures of intercourse-related pain intensity and unpleasantness. Mean ratings for both variables decreased from moderate/high ratings to mild ratings and effect sizes were large. In the current study, ratings leveled off from post-treatment to follow-up. This “plateau” effect is inconsistent with previous studies investigating various treatment options for PVD that found continually decreasing intercourse intensity ratings after treatment; that is, pain intercourse ratings decreased not only from pre-treatment to the first post-treatment period, but also from that post-treatment period to the next follow-up period, and so on. In Bergeron et al.’s (2001b; 2008) randomized study all three treatment groups began with extreme intercourse pain intensity ratings at pre-treatment. The vestibulectomy group decreased to mild pain ratings at post-treatment and further significant decreases were seen at the 12-month follow-up. The EMG biofeedback and GCBT groups decreased to moderate pain ratings at post-treatment and further significant decreases were seen at the 12-month follow-up. In one prospective study of vestibulectomy for PVD, women decreased from extreme pre-treatment intercourse pain ratings to moderate ratings at a 6-month follow-up and mild ratings at another follow-up over 1 year later (Bohm-Starke & Rylander, 2008). A similar pattern was found in a hypnosis study of PVD; women decreased from extreme pre-treatment intercourse pain ratings to moderate
ratings at post-treatment and to mild ratings at 6-months follow-up (Pukall, Kandyba et al., 2007). Despite the leveling off of pain intensity and unpleasantness ratings from post-treatment to follow-up in the current study, the mean pain intensity rating at the post-treatment and follow-up periods of this study were lower than nearly all of the mean or median pain intensity ratings at the lowest point in the previously mentioned studies.

In previous treatment studies of PVD, self-report pain intensity ratings have been the sole method of assessing changes in vulvar pain outside of experimental pain testing (i.e., QST or gynecological examinations). This study, however, also assessed changes in the percentage of intercourse attempts that resulted in pain and whether participants were experiencing pain with various other activities, both sexual and non-sexual. Both of these variables improved not only from pre- to post-treatment, but they also continued to improve from post-treatment to follow-up. These findings indicate that participants were more frequently able to engage in various pain-free sexual and non-sexual activities. These occurrences likely had a positive impact on sexual activity in that even if participants were still experiencing pain during intercourse, they may have been able to have pain-free manual or oral stimulation that they had not previously experienced. Additionally, having pain-free instances of intercourse and other activities may have discouraged feelings of helplessness that they had previously felt regarding their vulvar pain. This shift may, in turn, have increased motivation to adhere to the at-home treatment components.
Despite improvements in these self-report pain variables, pain intensity as measured by most of the MPQ scales did not significantly decrease from pre- to post-treatment. This lack of improvement on the MPQ is inconsistent with previous treatment studies of PVD which also found improvements on the cotton-swab test and self-report pain intensity during intercourse (e.g., Bergeron et al., 2001b; Bergeron et al., 2008; Pukall, Kandyba et al., 2007). Although the direction of the means in the current study indicates a decrease in pain intensity, an investigation of the number of positive and negative ranks provided by Wilcoxon signed-rank tests indicate that one or two participants for each of the MPQ PRI (Pain Rating Index) scores actually had higher pain intensity scores at the post-treatment period as compared to the pre-treatment period despite reporting less intercourse pain. This unique finding could possibly be explained by an increase in these participants’ ability to describe their pain rather than actual increase in pain intensity. This possible explanation is consistent with reports of some participants that they developed a new language with which to communicate their pain, and is also consistent with the PFP treatment protocol that encourages participants to become more aware of the sensations in their body. One other thing to note is that despite a non-significant result with respect to the MPQ PPI (Present Pain Intensity), the effect size for the change is still considered large. The evaluative PRI score did indicate a trend toward significant improvement following treatment. This score is based on a single item that asks the participants to rate their pain on a scale from ‘annoying’ to ‘unbearable’ and therefore represents a more cognitive, rather than physical, aspect of the pain. The
improvement in this measure is therefore somewhat consistent with improvements found in other pain cognition components.

Considering all of these changes with respect to intercourse pain experiences, one could expect positive effects on sexual function. Participants did, in fact, have significantly higher FSFI Total Scores at post-treatment than at pre-treatment, and their scores continued to improve from post-treatment to follow-up. This finding supported the hypothesis that following PFP, there would be improvements with respect to sexual function. Despite improvements following PFP, FSFI Total Scores were still within the clinical range at the post-treatment and follow-up period. This finding may be due to the short follow-up period (i.e., 3 to 4 months post-treatment); sexual function may need more time to restore. Studies investigating the effectiveness of hypnosis (Pukall, Kandyba et al., 2007), vaginal trainers (Murina, Bernorio, & Palmiotto, 2008), and electrical stimulation (Nappi et al., 2003) for PVD also resulted in significant improvements in FSFI scores despite still being in the clinical range at the post-treatment or follow-up period, the latest of which was six months following treatment. In addition to the pain subscale showing significant improvements at the post-treatment and follow-up periods, sexual arousal and sexual satisfaction also significantly improved at the post-treatment period. Given the significant changes in arousal and satisfaction, it was surprising that there was not also a significant improvement in sexual desire, another variable that is highly psychologically influenced. Other than the observed low power, one potential explanation for this finding is that, although PASS-20 scores were in the
normal range at the post-treatment and follow-up periods, participants still had some fear regarding their pain and therefore, may still have had reservations about engaging in sexual activity. This potential explanation is supported by the fact that avoidance was still the most frequently reported coping mechanism following treatment; however, this explanation was not statistically tested. Alternatively, there may have been other factors influencing desire such as being in a long-distance relationship. One study using EMG for treating PVD, however, had similar results and found significant improvements with respect to sexual satisfaction, but no significant improvements in sexual desire or orgasm (Danielsson et al., 2006).

Consistent with increased sexual function results was the finding of improved sexual esteem among participants following treatment. Whereas participants did not mention improvements in sexual function when asked about benefits of the treatment other than vulvar pain, several participants did mention improvements with respect to their confidence as a sexual partner. This factor seems to be particularly important for this population. Participants’ improvements in sexual depression from pre- to post-treatment were significant, and fit well with the findings of reduced pain disability on sexual behaviour as measured by the PDI.

One surprising finding was that the frequency of sexual intercourse attempts did not significantly improve following treatment. In fact, there was a slight decrease in frequency of sexual intercourse from pre- to post-treatment before it resumed to its pre-treatment frequency at follow-up. Few PVD treatment studies to-date have measured
actual frequency of sexual intercourse before and after treatment; however, those that did found no significant changes (e.g., Bergeron et al., 2001b; Danielsson et al., 2006). A number of studies, however, have found significant increases in the percentage of women who were able to engage in sexual intercourse following treatment. In a study using capsaicin for PVD, the percentage of women able to engage in intercourse increased from 62% at pre-treatment to 95% at post-treatment (Steinberg et al., 2005). Additionally, in one study using EMG biofeedback for 29 women with PVD who were not able to engage in sexual intercourse, 20 women (69%) were able to have sexual intercourse following treatment (McKay et al., 2001). It is possible that the null findings in this study are a reflection of (1) the high number of participants who were in a long-distance relationship and the short time following treatment in which they had the opportunity to engage in sexual intercourse, and (2) the fact that the physiotherapist recommended that participants not engage in sexual intercourse until the completion of treatment to reduce the risk of participants feeling discouraged about the progress of treatment. It is possible that because the post-treatment measures were taken shortly after treatment completion participants had not returned to their regular frequency of intercourse. Furthermore, the fact that follow-up intercourse frequency was not higher than pre-treatment intercourse frequency may be because many of the participants were in long-distance relationships. Additionally, two of the participants who were in relationships at the pre-treatment period were only engaging in casual sexual relationships at the time of follow-up and therefore did not have regular sexual partners. Alternately, the results may be a reflection of the
common use of avoidance as a coping technique found in participants at both pre- and post-treatment.

**Psychological Factors and Quality of Life**

Contrary to the hypothesis that following PFP there would be improvements with respect to mental health factors related to PVD, participants did not improve with respect to depression, trait anxiety, or health-related quality of life. Previous PVD treatment studies have demonstrated mixed results with respect to changes in mental health functioning and quality of life. Studies investigating hypnosis (Pukall, Kandyba et al., 2007) and GCBT (ter Kuile & Weijenborg, 2006) found no changes in various measures of psychological distress following treatment, however Bergeron et al. (2001b) did find improvements in psychological distress across the EMG biofeedback, vestibulectomy, and GCBT conditions. Additionally, although improvements in quality of life were found in one treatment study of acupuncture for PVD (Danielsson, Sjöberg, et al., 2001), significant improvements were not found in either the EMG biofeedback or topical lidocaine group in another study (Bohm-Starke et al., 2007). It is unknown whether differences in mental health and quality of life outcomes across studies is due to the treatment differences or whether it is a result of the different tools used to measure these constructs. In the current study, the findings may be explained by the limited disability outside of the sexual context caused by the participant’s vulvar pain. Only five participants (38%) at the pre-treatment period reported any disability caused by their vulvar pain in areas other than sexual behaviour on the PDI; one of these participants was
also experiencing GVD symptoms and therefore included that generalized pain when responding to the questionnaire. Four participants (31%) reported some disability in the area of recreation, two (15%) in the area of social activity, two (15%) in the area of occupation, three (23%) in the area of self-care, and no participants reported any disability in the areas of family/home responsibilities and life support activities. The ratings of degree of interference were all very low. The fact that interference of PVD was limited to sexual behaviour for most of the participants could be an indication that it did not significantly impair their general mental health functioning. This finding would indicate why mental health constructs did not improve following a reduction in vulvar pain. Sexual depression did significantly improve, and this finding is consistent with the finding of high interference in the area of sexual behaviour in the current study. Another reason for these findings is that the PFP treatment does not directly address concerns related to mental health outside of the context of sexuality, whereas a CBT treatment program may be more likely to teach skills that could be applied to areas outside of the context of sexuality. Lastly, the non-significant findings for the STAI-T could be a result of the fact that the STAI-T is used to measure trait anxiety which is purported to be a somewhat fixed construct rather than one that changes over time.

Pain cognitions including pain catastrophizing and pain-related anxiety were also assessed for improvements following treatment. Although the two-way repeated-measures ANOVAs indicated improvements in pain cognitions when the PCS and PASS-20 were combined, the exploratory repeated-measures ANOVAs indicated that although
all three subscales of the PCS did improve following treatment, only the Cognitive Anxiety subscale of the PASS-20 significantly improved following treatment. Despite the non-significant findings, the PASS-20 Total Score did drop below the clinical level following treatment. Additionally, all of the effect sizes for the PASS-20 subscale changes were large; the non-significant findings may be due to the low observed power for these tests. Alternately, as with sexual function, it is possible that the non-significant findings were due to the short duration of time having passed since treatment completion.

Pain catastrophizing, on the other hand, did significantly decrease from pre- to post-treatment and follow-up. This decrease in catastrophizing is consistent with the previously mentioned study that investigated the effectiveness of hypnosis for PVD (Pukall, Kandyba et al., 2007). As cognitive factors were not directly targeted as part of the treatment protocol, the improvements seen with respect to catastrophizing may be a result of observed reductions in vulvar pain; that is, with actual reduced level of pain, participants did not have the need to catastrophize. Alternatively, the reductions in catastrophizing may be a consequence of merely going through the process of treatment. This process may instill a sense of control over the pain and the recognition that something can be done to reduce their pain. It is surprising that few PVD treatment studies have included measures of cognitive pain factors given that the chronic pain literature has consistently shown that improvements in cognitive factors, including catastrophizing and pain-related anxiety, throughout the course of a treatment program, predict successful treatment outcomes (Burns et al., 2003; Turner et al., 2007) and given
the findings of Granot and Lavee (2005) and Payne et al. (2005) of the importance of various psychological factors in PVD pain perception. One study (Woby, Roach, Urmston, & Watson, 2007) also found that cognitive factors, including functional self-efficacy and catastrophizing, accounted for almost one-third of the variance in pain severity and physiotherapy treatment outcome among patients with chronic low-back pain.

_Treatment Success and Predicting Success_

Although the results of this study cannot directly be compared with results from previous treatment studies because of differences in samples, measures, and treatment protocols, the percentage of participants with successful treatment outcomes was slightly higher than the percentage reported in the retrospective study of PFP carried out by Bergeron et al. (2002). The rate was also equal to or higher than rates of successful treatment outcome for a number of studies investigating the use of biofeedback (e.g., Bergeron et al., 2001b; Danielson et al., 2006). Moreover, unlike the retrospective study (Bergeron et al., 2002), no participants in this study reported ‘no improvement’ or ‘the pain is worse’ on the self-report degree of vulvar pain improvement. Also unlike the retrospective study, none of the participants in this study used other treatment options either throughout the treatment period or following the completion of the PFP treatment. This study was therefore able to control for the effects of alternate treatments.

In addition to high success rates, participants were also very satisfied with the results of the treatment. High satisfaction rates, despite reports of ‘little improvement’ or
‘some improvement’ on the self-report degree of vulvar pain improvement, may be a reflection of the fact that most participants reported benefits of the treatment in addition to a reduction in vulvar pain.

The fact that participants had improvements in myriad areas including physical, sexual, and psychological components raises the question of how treatment success should actually be defined. This study defined success by a self-report measure of vulvar pain improvement, however, success rates may have been different had success been defined in some other way. For instance, success could be defined by the percentage improvement in intercourse pain intensity ratings, or by the frequency of intercourse attempts that result in pain. However, these options would then exclude participants who were not engaging in sexual intercourse, and would not take into account whether participants were enjoying sexual activity or whether they were still so fearful of sexual activity that they would only attempt penetration every 6 months. Alternately, success could possibly be defined by the participants themselves based on their treatment goals. Clearly, success can be defined in numerous ways; however, for the purpose of this study, a previously designed scale was used such that comparisons between studies could be made.

Findings regarding predictors of treatment success indicated that subtype of PVD and the length of time experiencing vulvar pain did not significantly predict treatment success. Although these findings may be due to low power, they may also be due to the method of defining success as previously mentioned. Participants, however, whose PFP
treatment sessions took longer to complete were more likely to rate a higher degree of vulvar pain improvement at the follow-up period. This finding is likely due to the fact that between treatment sessions they were able to complete the at-home activities (i.e., dilator insertions, PFM contractions) more frequently. The longer overall duration of the treatment period likely allowed for more progress with respect to PFM changes to occur and therefore lead to a greater reduction in pain intensity. For example, a greater amount of time between sessions may have allowed a participant to become accommodated to the use of the second dilator and therefore prepared to move on to the use of the third dilator. This finding indicates that weekly sessions of PFP may be less desirable than sessions that occur less frequently.

Consistent with findings from treatment studies of other chronic pain conditions (Burns at al., 2003; Turner et al., 2007), participants’ degree of vulvar pain improvement at the follow-up period was predicted by improvements in pain catastrophizing and pain-related anxiety. These findings were present despite the fact that pain cognitions were not directly targeted as part of the treatment protocol and despite non-significant changes in the PASS-20 subscales. In fact, the regression analyses indicated that changes in pain catastrophizing and pain-related anxiety from pre-treatment to follow-up explained 42% and 65% of the variance in the follow-up self-report measure of vulvar pain reduction, respectively. These findings indicate that a reduction in negative pain cognitions is of great importance in the treatment of PVD. Although changes in these cognitions were present in the current study, the addition of CBT would likely lead to a greater decrease
than was found with PFP alone, therefore possibly leading to greater success. As previously mentioned, the reductions in negative pain cognitions could have been a direct result of reduced pain intensity levels during sexual activity, and therefore this variable, and possibly others, may mediate the relationships found.

It is also of importance to note that PFP is significantly less invasive than the medical treatment options for PVD such as vestibulectomy or injectable steroids, and no negative health risks are associated with the treatment. No side effects were reported other than the expected pain experienced during the PFP sessions and the at-home exercises. Other than the single participant who was required to leave the area, no participants ended treatment due to dissatisfaction nor was it apparent that any eligible women decided not to participate in the study due to the nature of the treatment.

**Limitations and Future Directions**

Given the uncontrolled nature of this study, it could be argued that the changes found in this study were not a direct result of the PFP treatment itself. In fact, a number of factors could be posited to play a role in the changes found in the current study. One commonly reported confound in uncontrolled treatment studies is the presence of a historical event that occurs between the pre- and post-treatment times that leads to the improvements. In the current study, the participants began treatment at various times with the earliest and latest treatment start dates being over 4 months apart; some participants had completed their post-treatment measures before others had even begun their
treatment. This fact makes history an unlikely explanation for the changes found in the current study.

The mere passage of time must always be considered in a study with no control group. One argument against this explanation is that in the current study, the duration of dyspareunia before beginning the treatment was over 3.5 years and 6 (46%) participants reported trying other medical or alternative treatments for their pain before the study with no success. Only a study with a wait-list control group, however, would be capable of discounting the passage of time as an explanation for changes.

Another change over the course of the treatment that is often considered when there is a lack of control group is the maturation of participants. Although in the current study maturation would likely not explain the kinds of differences found, there may have been common changes among the participants themselves that affected their perception of pain. In addition to the reduction in negative pain cognitions which was found to predict more successful treatment outcomes, the participants may have felt more comfortable with discussing pain and sexuality or may have changed their perceptions based on the reading materials with which they were provided. An increased level of comfort with the testing procedures (i.e., gynecological examination, QST) from pre- to post-treatment may also have led to a testing effect; the mere presence of the pre-treatment testing may have accustomed the participants to having pressure applied to the vestibule and therefore reduced their stress around having the post-treatment testing carried out, thereby reducing perceptions of pain intensity.
Another factor which cannot be discounted is that participants had continued contact with the physiotherapist during the treatment sessions. It is possible that the improvements seen were partly due to the experience of having someone listen to their concerns, validate their experiences, and provide empathic responses. Participants who developed a positive relationship with the physiotherapist over the course of treatment may have consciously or unconsciously played the ‘good participant role,’ leading to a favourable treatment response. Another alternative explanation for the study findings is regression toward the mean; that is, since the participants had extreme scores on the pre-treatment variables (i.e., pain sensitivity, pain intensity) their scores were more likely to be closer to the mean (i.e., norm) at the post-treatment and follow-up periods.

Another limitation of the current study was the small sample size, which reduced the power of some of the statistical tests that were conducted (i.e., unable to find significant differences even with large effect sizes) and limited the types of analyses that could be carried out to further explore the effects of PFP on PVD. For instance, it was not possible to examine within-group differences (e.g., primary PVD versus secondary PVD) or to investigate mediating or moderating factors in the prediction of successful treatment outcome. The participants in this study had large amounts of variability with respect to psychophysical measurements, pain severity, and sexual function and thus may reflect a compilation of various subtypes of PVD.

Improvements from pre- to post-treatment were either maintained at or continued to improve at the follow-up period. The follow-up measures, however, were obtained
within 3 to 4 month following treatment completion; it is possible that there would be further changes had the measures been taken again at a later time frame. Although it is not possible to know whether participants would improve more given a longer passage of time or whether the positive effects of treatment would decline once participants were out of treatment for a longer time, participants who completed biofeedback (as well as GCBT and vestibulectomy) in the above mentioned randomized study continued to improve at a 6-month and a 2.5 year follow-up (Bergeron et al., 2001b, Bergeron et al., 2008). Thus, it is possible that participants in this study would continue to improve on variables on which they already showed significant changes and that they would show significant improvements on variables that were not found to be significant at the post-treatment or follow-up periods.

Although measures of physical, sexual, and psychological function were taken before and after treatment, is self-report vulvar pain improvement as a measure of treatment success any different from carrying out a retrospective study and asking how much they improved following treatment? As mentioned previously, there are multiple ways of defining treatment success and not one will account for all of the ways in which women may benefit from PVD treatment. In the current study, the self-report measure of vulvar pain improvement appeared to have face validity in that it was consistent with participant reports of decreased pain intensity during intercourse, reductions in pain intensity during the gynecological examinations, and decreases in vulvar pain sensitivity. It therefore seems appropriate for use as a measure of treatment success. Had this
measure not been consistent with other findings, however, treatment success would have been much more difficult to define. Future research should investigate correlations between different measures of treatment success and determine the most effective and comprehensive way of defining success.

Since participants were recruited through the use of flyers, it is possible that sampling bias may have occurred in the study. Participants who chose to respond to the recruitment flyers and participate in a research study may have different characteristics than the larger population of women with PVD. This sample may reflect highly motivated women who are willing to devote much time and energy to treating their pain. PFP does require significant commitment on the part of the participant to adhere to at-home exercises and to show up for many treatment sessions. All women approaching their doctor or gynecologist about vulvar pain may not be as willing or able to devote this amount of time and effort, and therefore this treatment option may not be suitable for all women. Women who do not adhere to all portions of the treatment may not gain such significant results. The current study did not assess adherence to treatment, other than completion of the eight treatment sessions, and therefore it is not known to what extent treatment adherence would impact treatment success. Bergeron et al.’s (2001b) study, however, did find that there was no significant correlation between treatment adherence for either the EMG biofeedback or GCBT conditions with 6-month follow-up pain measures. Future studies should include a measure of treatment adherence so as to confirm or disconfirm these findings.
In addition to possible sampling bias in the study, it is possible that there were attrition effects; that is, the women who chose to complete the study may have differed in important ways from the women who chose not to complete the study after finding out they were eligible. Although there were no differences with respect to the length of time experiencing dyspareunia or the percentage of painful intercourse attempts, the severity of pain or the subtype of pain (i.e., primary versus secondary) was not assessed during the telephone screening. It is possible that women with different pain profiles would differ with respect to motivation to change as well as treatment outcomes.

Future research should investigate the effectiveness of PFP in comparison and in conjunction with other treatment options. This study also highlights the need for a study design including a wait-list control group and long-term follow-ups. It would also be of importance to investigate other predictors of successful treatment outcome and to determine which components of the PFP treatment protocol are most effective in producing positive change. It is possible that some aspects of the treatment are of benefit while others produce no change. It is likely, however, that different women require different treatment components based on their specific needs and goals.

Future research should investigate cognitive factors, including measures of a sense of control over one’s pain, to determine whether these factors have an impact on treatment outcomes, and sexual esteem also appears to be an important consideration in assessing treatment outcome. As previously mentioned, examining vestibular tissue
samples at both pre- and post-treatment would be beneficial in determining whether different treatment options result in actual peripheral nervous system changes.
Chapter 7
Conclusions

Despite the limitations of this study, given that this study was a preliminary study of the effectiveness of PFP and the first prospective study of its kind, the results indicate that PFP may be an effective treatment option for treating the physical, psychological, and sexual components of PVD. This study built upon the findings of the retrospective study of PFP and indicates that further investigation of PFP is warranted.

The main conclusions that can be drawn from the results of this study are: (1) PFP is associated with decreasing vestibular pain sensitivity. (2) PFP is associated with reducing pain intensity during gynecological examinations and during sexual intercourse. It is also associated with reducing the occurrences of sexual intercourse that result in pain as well as in reducing the pain of activities other than sexual intercourse. (3) PFP is associated with improving sexual function; however, it does not restore sexual function to non-clinical levels after a short period of time. Although PFP is associated with decreasing negative pain cognitions, it does not have significant effects on overall depression, anxiety, or quality of life. (4) Gains from the PFP treatment are maintained or continue to improve at 3-month follow-up. (5) Completing PFP treatment sessions over a longer duration of time and larger decreases in negative pain cognitions predict more successful treatment outcomes. (6) There is still a great need for large-scale, randomized studies of PFP in comparison and in conjunction with other treatment options for PVD.
References


Babula, O., Danielsson, I., Sjoberg, I., Ledger, W. J., & Witkin, S. S. (2004). Altered distribution of mannose-binding lectin alleles at exon I codon 54 in women with


Appendix A
Recruitment Letter and Flyer

Dear Dr,

We are writing to inform you of a multidisciplinary study being conducted by the Department of Psychology, the Department of Obstetrics & Gynecology, and the School of Rehabilitation Therapy at Queen’s University. Our goal is to examine physical, psychophysical, and psychosocial factors before and after a pelvic floor physiotherapy treatment intervention for women with Provoked Vestibulodynia (PVD), a condition previously termed Vulvar Vestibulitis Syndrome (VVS).

As you may be aware, women with PVD experience severe pain at the introitus upon activities such as attempted vaginal penetration, tampon insertion, and pelvic examinations. Common treatment options include psychotherapy, surgery, topical therapies, and pelvic floor physiotherapy. Pelvic floor physiotherapy has recently been the focus of increased research, and findings of retrospective studies suggest that physiotherapy is effective at reducing the pain of PVD. In fact, most health professionals now consider pelvic floor physiotherapy a worthwhile approach for PVD; however, there is a paucity of prospective research studies investigating its effectiveness.

We are conducting a pilot research study examining the effectiveness of pelvic floor physiotherapy for PVD in comparison with vaginal dilator therapy. We request your help in recruiting women by informing your patients with PVD about our study. Participants will receive compensation for their participation, and the physiotherapy treatment and vaginal dilator therapy as well as any treatment materials (e.g., dilators) will be provided free of charge. Please refer to the pamphlet for more details about the study components.

We thank you in advance for your help! Please do not hesitate to contact the Sexual Health Research Laboratory at (613) 533-3276 (SHRL@queensu.ca), or Caroline Pukall, PhD, at (613)533-3200; caroline.pukall@queensu.ca, if you have any questions.

Sincerely,

Caroline F. Pukall, PhD
Assistant Professor
Dept. of Psychology
Queen’s University

Linda McLean, PhD
Assistant Professor
Rehabilitation Therapy
Queen’s University

Sue Chamberlain, MD
Assistant Professor
Dept. of Obs/Gyn
KGH

Corrie Goldfinger, MA Student
Dept. of Psychology
Queen’s University

Evelyne G.Saulnier, PhT MSc Student
Rehabilitation
Queen’s University

Caroline’s University

125
Do You Have Pain During Sexual Intercourse?

Are You Looking For a Treatment Option For This Pain?

We are looking for women to participate in a study on the effectiveness of pelvic floor physiotherapy on painful intercourse.

**Study Procedures:**
gynecological examination, interview, 8 weekly sessions of pelvic floor physiotherapy, and follow-up sessions

All information is strictly confidential.

**All treatment is provided free of charge**

Interested?
For more information, please contact the Sexual Health Research Lab (613) 533-3276 SHRL@queensu.ca

Investigators:
Caroline Pukall PhD, Linda McLean BScPT, PhD, Susan Chamberlain MD Corrie Goldfinger, BA, MA Student, Evelyne Gentilcore-Saulnier BScPT, MSc Student
Appendix B
Telephone Information and Screening Form

Telephone Information Sheet: Efficacy of Pelvic Floor Physiotherapy for Women with PVD

Start here if it is a new potential participant:

Thank you for your interest in the study. First of all, can I ask you where you found out about the study? [fill this in on the screening form pg. 1]

Start here if we recruited them through Kate or Kelly’s study:

First I am going to tell you about the purpose of this study, as well as the details of what your participation would entail if you are eligible and choose to participate. If you are still interested after the description of the study then I will ask you a number of questions to determine your eligibility for the study. If you are not eligible for this study but would like your name to be added to our lab recruitment database for future studies for which you may be eligible then this can be done at that time. This description and screening questionnaire could take 20 to 30 minutes, and some of the questions are personal in nature. Is now an appropriate time to complete the interview, or would you like us to give you a call back? [If to call back, get their name and contact information and the best time to reach them]

Please interrupt me at any time if you have questions. The purpose of this study is to determine the effectiveness of a treatment option known as pelvic floor physiotherapy for women with provoked vestibulodynia or PVD. This was previously called vulvar vestibulitis syndrome or VVS. PVD is a form of chronic vulvar pain which affects approximately 12% of women in the general population. More specifically it refers to pain experienced near the opening of the vagina that usually occurs at times of vaginal penetration; however, it may also be experienced at other times when pressure is applied to the area. We are only including women in this study who have PVD. However if you think you may have PVD but have not been given a diagnosis that is fine; we go through a formal process of determining whether or not you have PVD.
The pelvic floor muscles are the muscles responsible for vaginal, urinary, and anal functioning. For example, these muscles are the ones you would tense up to prevent urination. It is believed that a tightening of the muscles in the pelvic floor contributes to the maintenance and worsening of vulvar pain, and that physiotherapy can thus help reduce this muscle tension, therefore decreasing pain. Although studies have looked at the effectiveness of one of the techniques used in physiotherapy, studies have not assessed pelvic floor muscles tightenings, nor have they looked at the effectiveness of a comprehensive program of pelvic floor physiotherapy for women with PVD despite its use in practice today.

Your participation in the study would include several steps. [If you have already participated in one or both of the other PVD studies taking place in the lab, you will still have to go through all of these steps, even if some procedures are the same.] First, you would have a gynecological exam carried out at the Kingston General Hospital with a gynecologist, and a research assistant would be present in the room to take down notes. As Kingston General Hospital is a teaching hospital, it is also possible that a medical student will attend the gynecological exam. This would be a 15-minute appointment in which the doctor will determine the presence or absence of PVD. If a diagnosis is not made, or cannot be made due to an inability to complete the examination, then participation in the study cannot continue. If a diagnosis of PVD is made then you would come into the Sexual Health Research Lab at the Psychology Department at Queen’s University for one 2.5 hour session on a different day. This session would be run by a female graduate student and would include an interview and questionnaire session covering information about sociodemographics, medical, sexual and general pain history, vulvar pain history, general health and emotional well-being, sexual functioning, and relationship functioning if you are currently in a relationship. It also entails sensory testing during which the graduate student will be applying different amounts of pressure to the vestibule, or the area around the opening to the vagina. She will be asking you when you feel touch and pain, and will ask you to rate the intensity and unpleasantness of the sensations. The pressures increase in small increments and stop increasing when you indicate that you can no longer tolerate the pain or when you reach a moderate level of pain. Pressure does not increase to any standard amount for all participants, so the amount of increase will depend entirely on your tolerance levels. Although pain will be experienced during this examination, no health risks are posed and the painful sensations should not last for a long
period of time. A female research assistant will be in the room at the time of the sensory testing to record information.

After this session is done, you will be booked in to see the physiotherapy graduate student. She is a registered physiotherapist by the College of Physiotherapists of Ontario who has extensive training and experience using pelvic floor physiotherapy with women with PVD. You will take part in one 1.5-2 hour physiotherapy evaluation at the Queen’s University Motor Performance Laboratory at the School of Rehabilitation Therapy. It will consist of an interview of your medical history and symptoms, a pelvic floor physical examination, a pelvic floor biofeedback testing, which I will describe, and an educational session. The graduate student who performed the interview and sensory testing will be at this session to record information. Before starting the pelvic floor evaluation, the physiotherapist will record your heart rate in order to assess your level of stress associated with the procedures. During the pelvic floor evaluation, the physiotherapist will visually and manually evaluate your pelvic floor muscles both externally and internally. This will be done in order to evaluate its capacity to contract and to relax. The pelvic floor examination will be followed by a biofeedback test of your pelvic floor. This involves inserting a small probe into your vagina, with the assistance of the physiotherapist. The probe is hooked up to a computer monitor which will allow recording of the reaction of your pelvic floor muscles during the application of pressure on your vulvar vestibule with a cotton-swab. Finally, the physiotherapist will explain to you the results of the evaluation. She will invite you to ask questions or voice concerns you might have. Much like the sensory testing session, no health risks are posed by the physical therapy assessment techniques and any discomfort you feel should be lower in intensity than the pain you experience with intercourse; it will also be brief (i.e., less than 1 minute).

At this point, you will set up a weekly meeting time with the physiotherapist for treatment sessions. You will complete eight 1-hour weekly pelvic floor physiotherapy treatment sessions. You will also receive a list of daily exercises to perform at home. These exercises take approximately 10 minutes. One of the main goals of the physiotherapy treatment is to enable you to relax your pelvic floor muscles, which is thought to be the key to diminishing your pain. As such, there might be some discomfort associated with manual intra-vaginal pelvic floor muscle
techniques performed by the physiotherapist. The components of the treatment include (a) pelvic floor muscle exercises using biofeedback (b) the use of vaginal dilators which are phallic-shaped silicone instruments (c) recommendations regarding sexual health (d) hands-on techniques such as pelvic floor massage and stretches (e) education (f) electrical stimulation and (g) home exercises. All participants in this treatment group will receive the same treatment approach, but treatment is flexible enough so that each participant will progress according to her own pace. In fact, you and your physiotherapist will discuss each step of the treatment to ensure that you will be in control of its progression. All participants in this group will receive eight physiotherapy sessions. If you still require physiotherapy beyond the length of the study, you will be referred to a different physiotherapist that specializes in pelvic floor physiotherapy for vulvar pain.

The treatments and the vaginal dilators will be provided to you free of charge. We ask that you avoid any other form of treatment for the PVD pain during the course of the study and until you have returned for a follow-up session. Within one month after you have completed the eight weeks of treatment you will return for a follow-up session. This follow-up session will include a gynecological exam at the Kingston General Hospital, an interview and questionnaire portion and sensory testing session done by the same researcher as prior to the treatment, and a pelvic floor muscle evaluation done by the physiotherapist. After completion of the follow-up session, you will be compensated $50 for your participation in the study. You will be called approximately three months following the completion of the treatment sessions for a half-hour telephone interview with the psychology graduate student. The interview will include questions about your current pain levels and characteristics, sexual functioning, and satisfaction with the treatment.

Do you have any questions?

Are you interested in seeing if you are eligible for participating in the study? (Note this on page 1 of the screening form)

If no, thank them for their time, and ask them to feel free to call back if they change their mind. If yes, get their full name. Go through the questions on the screening form (pg. 2-4). If you come to a *(ineligible) explain why they are ineligible and thank them for their time.
Ask them if they would like their name and contact information to be put into our recruitment database so we can contact them about future studies for which they may be eligible. Fill this out on the bottom slip of the Call Log page.

**If they are eligible for the study:** At this point you are eligible for the study. Are you still interested in participating? *If yes,* we can now book you for the gynecological exam to ensure that you are eligible to participate in the entirety of the study. The entire study may take anywhere from 15 to 25 weeks, depending on scheduling. Will you be in Kingston for this length of time or be willing to come in for all sessions if you will be away? *If yes,* we can now book you for the gynecological exam to ensure that you are eligible to participate in the entirety of the study.

We can also book you in for the interview and sensory session now, however remember that your participation is dependent on a positive diagnosis of PVD at the time of the gynecological examination. After the exam we will inform you about the gynecologist’s diagnosis and will let you know whether or not you are able to participate in the study.

**Enter all data into the Excel spreadsheet.**

Reasons for ineligibility:
- under the age of 18 (for legal purposes)
- not fluent in English (need to fully understand the interview and questionnaire section)
- menopausal (likely has different etiological factors and therefore different treatment options)
- major medical or psychiatric conditions which impact with daily or sexual functioning (e.g. cancers, heart or other major organ problems, chronic fatigue syndrome, interstitial cystitis, incontinence) (these may confound the findings; we do not want to harm them any more)
- use of any medications (may alter pain processing system)
- another pain condition other than genital pain that significantly interferes with daily and sexual functioning (e.g. fibromyalgia, chronic back pain, chronic migraines) (vulvar pain may be a component of a larger pain disorder)
- genital pain other than PVD (e.g. GVD—pain all the time and everywhere on the vulva, pelvic or abdominal pain, vaginismus—spasms or avoidant behaviour which does not enable any penetration) (different etiological factors and therefore different treatment options)
- PVD for less than six months (may not be chronic)
- not willing to cease PVD treatment during study (can’t control for effect of these treatments)
- never had a gynecological exam (our gynecologist cannot be the first to give the exam—no time to go through extensive education about the procedure)
- within six months post partum (pain may be due to birth process; do not want to harm body)
- breastfeeding or pregnant (don’t want to do possible harm to woman and child)
Telephone Screening Form: Efficacy of Pelvic Floor Physiotherapy for Women with PVD

Date of Call: _________________________ Method of Contact: __________________

Contacted Participant [1] OR Participant Contacted Us [2]

Name: ________________________________________________________________________

Home #: (      ) - (best time to call: ) leave a message? Y N
Cell #: (      ) - (best time to call: ) leave a message? Y N
Work #: (      ) - (best time to call: ) leave a message? Y N

(Message will indicate that we are calling from Queen’s University)

Email address: __________________________________________________________________

Recruitment Source: __________________________________________________________________

Interested in Finding out if they are Eligible? Y [1] N [0]

If no, any reason given? ______________

Eligible for Study after Screening? Y [1] N [0] Not Sure (______________)

If no, why? ______________________________________________________________________

Interested in Participating? Y [1] N [0] If no, any reason given? ______________

Availability ______________________________________________________________________

Eligible for Study after Gynecological Exam? Y [1] N [0]

If no, why? ______________________________________________________________________

Gynecological Exam Date and Time: ______________________________
(they can be menstruating if they don’t mind)

Interview/Sensory Date and Time: ______________________________
1. Are you fluent in English? Y [1]   N* [0]

2. To determine if you are eligible to participate in the study we will need to ask you some questions about your medical history. Is that okay? Y [1] (→3)   N [0]

   If no, say “In order to determine whether you are eligible to participate we need to ask these questions. If you would like to think about it please take your time and call us back if you change your mind.”

3. How old are you? _________________ (* not eligible if under 18 or if menopausal; if over 45 ask if they are menopausal)

4. Are you currently in a romantic or sexual relationship? Y [1]   N [0]

   If yes, is this relationship heterosexual [1] or same-sex [0]? _______________________

5. Are you currently suffering from any medical or psychiatric conditions? Y* (if b or c are endorsed or condition is very serious) [1]   N [0] (→6) (ask about incontinence)

   If yes:

   a) With what condition(s) have you been diagnosed? (If unsure of eligibility ask questions about how long they’ve had this diagnosis, severity of condition) _________________

   ________________________________________________________________

   ________________________________________________________________

   b) Are you taking medication/receiving any treatment for this/these conditions? Y* [1]   N [0]

   If yes, which one(s)? ________________________________________________

   c) Does this condition interfere significantly with you daily and sexual functioning?

   Y* [1]   N [0]
6. Have you ever suffered, or are you currently suffering, from a pain condition other than genital pain?  Y* (if d or e are endorsed or condition is very serious) [1]  N [0] (→7)

If yes:

a) With what condition(s) have you been diagnosed? (same probes as above)

___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________

b) When did/do this episode/these episodes occur? ______________________________

___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________

c) How long did/do this episode/these episodes last? ____________________________

___________________________________________________________________________
___________________________________________________________________________

b) Are you currently taking painkillers/other treatment for this/these conditions? Y* [1]  N [0]

If yes, which one(s)? ___________________________________________________________________

e) Does this condition interfere significantly with your daily and sexual functioning?
Y* [1]  N [0]

7. Do you currently experience pain in your genital region?  Y [1]  N* [0]

a) For how long have you had this pain? ____________________________ (*not eligible if less than six months—tell them to call back if the pain persists for six months)

b) I am going to list some scenarios and let me know whether each reflects your experiences.

1. The genital pain is always or almost always present even in situations where pressure is not being applied  Y* [1]  N [0]
2. The genital pain occurs during sexual intercourse (penis, fingers, sex toys) Y [1] N [0]
   If yes, what percentage of intercourse attempts results in pain?
   __________________________

3. The genital pain occurs during tampon insertion Y [1] N [0] N/A (don’t use tampons)
   If yes, what percentage of these instances results in pain?
   __________________________

   Does vaginal pain prevent tampon use? Y [1] N [0]

4. The genital pain occurs during gynecological exams Y [1] N [0]
   If yes, do you experience pain at every gynecological exam? Y [1] N [0]
   Does vaginal pain prevent gynecological exams? Y [1] N [0]

5. The genital pain is always or almost always present and worsens during intercourse or other activities involving vaginal penetration Y* [1] N [0]

6. Other __________________________

   _______________________________________________________________________

   c) When does the pain start or worsen during these situations?

   1. Before the penis/object touches the vagina; it is always there Y* [1] N [0]
   2. When the penis/object starts to enter the vagina Y [1] N [0]
   3. When the penis/object is fully entered and thrusting Y* (only if 2. not endorsed) [1] N [0]
   4. After penetration Y* (only if 2. not endorsed) [1] N [0]
   If yes, how long does it last? ____________________________________________

   d) From the following list, please indicate in which of these genital areas you feel the pain.

   1. At the vaginal opening Y [1] N [0]
   2. Everywhere on the vulva Y* [1] N [0]
   3. Inside the vagina Y [1] N [0]
   4. In the pelvic or abdominal region Y* [1] N [0]
   5. Another area Y [1] N [0] __________________________

   e) What adjectives would you use to describe the pain? __________________________

   _______________________________________________________________________

   f) Have you received a diagnosis for this pain? Y [1] N [0]
If yes, what diagnosis/diagnoses did you receive? ____________________________________________
________________________________________________________________________

By whom? _____________________________________________________________________________

When? __________________________________________________________________________________

g) Are you currently undergoing any treatment for the pain? Y [1] N [0]

If yes, which one(s)? _____________________________________________________________________________
(* not eligible if currently undergoing physiotherapy)

Would you be willing to substitute this treatment for the duration of the study? Y [1] N* [0]

If no, have you ever undergone any treatment for the pain? Y [1] N [0]

If yes, which one(s)? _____________________________________________________________________________
(* not eligible if they have had previous vestibular surgery)

8. Do you have any difficulty with vaginal penetration other than the pain? Y* [1] N [0]
(if spasms or avoidant behaviour that doesn’t allow penetration)

If yes, what? _____________________________________________________________________________

9. When was your last gynecological examination including a speculum examination?
(* not eligible if they have never had a gynecological exam)

10. Are you currently taking hormonal contraceptives? Y [1] N [0]
11. Do you have a regular menstrual cycle (approximately once a month)?  Y [1]  N [0]
12. What was the start date of your last period? ________________________________

   If yes, was this in the last six months?  Y* [1]  N [0]

   How many vaginal deliveries have you had? ______________

   How many children have you had though caesarean-section? ________________

14. Is there any possibility that you might currently be pregnant?  Y* [1]  N [0]

   2nd Gynecological Exam Date and Time: ________________________________
   (can be menstruating if they don’t mind)

   1 Month Follow-up Interview/Sensory Date and Time:

   Notes:
Appendix C

Letter of Information and Consent Form

The effectiveness of pelvic floor physiotherapy in women with provoked vestibulodynia

Investigators:
Caroline Pukall, Ph.D., Assistant Professor, Department of Psychology, Queen's University
Corrie Goldfinger, B.A. M.A Candidate, Department of Psychology, Queen's University
Linda McLean, P.T., Ph.D., Assistant Professor, School of Rehabilitation Therapy, Queen's University
Evelyne Gentilcore-Saulnier, B.Sc., M.Sc. Candidate, School of Rehabilitation Therapy, Queen's University
Susan Chamberlain, M.D., Assistant Professor, Department of Obstetrics and Gynecology, Queen's University

Background Information: You are being invited to participate in a research study directed by a multidisciplinary treatment team consisting of psychologists, physiotherapists, and a gynecologist to evaluate the effectiveness of pelvic floor physiotherapy for women with provoked vestibulodynia (PVD; previously called vulvar vestibulitis syndrome or VVS), a common cause of painful intercourse. The psychology graduate student will read through this consent form with you, describe the procedures in detail, and answer any questions you may have. This study has been reviewed for ethical compliance by the Queen's University Health Sciences and Affiliated Teaching Hospitals Research Ethics Board.

There is currently no single treatment that has been shown to be effective for all women with PVD. Research has indicated that increased pelvic floor muscle tension plays a role in maintaining and worsening the pain in women with PVD. Although some research has shown positive results after using one of the techniques commonly used in pelvic floor physiotherapy (i.e., biofeedback), and one self-report study demonstrated some success with pelvic floor physiotherapy, there have been no studies assessing pain and other important variables (e.g., sexual function) before and after a standardized pelvic floor physiotherapy protocol.
**Purpose of the Study:** The purpose of the study is to conduct a preliminary investigation to determine the effectiveness of pelvic floor physiotherapy in reducing pain and improving psychosexual functioning and pelvic floor muscle physiological variables in women with PVD.

**Inclusion and Exclusion Criteria:** You will be considered for this study if you meet the following criteria: 1) over the age of 18 and premenopausal; 2) receive a diagnosis of PVD from the study gynecologist; 3) have experienced the vulvar pain for a minimum of six months, and 4) able to undergo a physical examination by a gynecologist. You will not be considered for this study if you meet any of the following criteria: 1) are currently using any other treatments for PVD and/or are not willing to refrain from using other treatments for PVD for the entirety of the present study; 2) have any major medical, psychiatric, or other pain conditions that significantly interfere with your daily or sexual functioning; 3) are taking any medications that may interfere with pain processing (e.g., antidepressant medication); 4) are pregnant, breastfeeding, or have given birth within the last six months, or 5) have had genital surgery. If your status with respect to any of these has changed since your initial telephone screening and you believe that you may no longer be eligible to participate, please let the graduate student know.

**Procedures of the Study:** Your participation in the study involves undergoing the following procedures: 1) a gynecological examination; 2) a semi-structured interview and questionnaires and brief sensory testing session; 3) one physiotherapy pelvic floor evaluation, 4) eight weekly treatment sessions of pelvic floor physiotherapy, 5) a 1-month follow-up session, and 6) a 3-month follow-up telephone interview.

**Gynecological examination:** During the gynecological examination (10-15 minutes), the gynecologist will examine the internal and external genitalia and reproductive organs, and palpate external genital areas with a cotton-swab while asking you to rate the intensity of the pain on a scale from 0 to 10. You will be in control of the procedure and may ask to stop or slow down at any time. The graduate student will be present during the examination to record information. If your diagnosis is not consistent with PVD, or if you cannot complete all aspects of the gynecological examination, you will not be eligible to participate in the remainder of the study. In
this case, the graduate student will explain to you why you are not eligible and can provide you with some information about vulvar health if you wish. Please note that although the gynecologist will be seeing you for the examination, a file will not be created for you at KGH and no ongoing gynecologic care will be provided. The gynecologist’s role is strictly that of diagnosis for the purpose of inclusion into the research study.

*Interview, questionnaires, and sensory testing:* The semi-structured interview and questionnaires will take place at the Sexual Health Research Lab (SHRL) at the Department of Psychology, Queen's University with a graduate student (1.5-2 hours). Questions will cover demographic information, medical and gynecological history, pain during sexual intercourse and other activities, sexual and relationship history, and current physical and psychological symptoms. Following the completion of these, you will complete a brief (20 minute) sensory testing session in which the graduate student will measure your pressure pain thresholds. You will be presented with varying intensities over your forearm first, and then the 6 o’clock (i.e., posterior) position of the vulvar vestibule (i.e., the area of skin around the entrance to your vagina) using a cotton swab attached to a device that exerts set amounts of pressure. You will be presented with a range of weak and strong pressures and will be asked to rate them on intensity and unpleasantness scales from 0 to 10. The pressure stimuli increase in small increments. We do not increase pressure to any standard amount for all participants, so the amount of increase will depend entirely on your ratings. Although some of the stimuli may be uncomfortable or painful, they will not damage your skin. You will be in control of the procedure and may ask to stop or slow down at any time. You can withdraw from and/or terminate any stimulus that is too uncomfortable at any time.

*Treatment:* The pelvic floor physiotherapy evaluation, which all participants will complete, will be performed by a physiotherapist at the Queen’s University Motor Performance Laboratory. The physiotherapy evaluation will consist of an interview of your medical history, a pelvic floor physical examination and an educational session (1.5-2 hours). Her questions may be similar to the ones asked during the interview session. They will cover your medical history with respect to PVD, your description of your pain during sexual intercourse, your urinary voiding habits and other current physical symptoms. She will also explain to you the details of the pelvic floor evaluation, which will be performed in a gynecological position. The physiotherapist will then
record your heart rate and blood pressure to measure your level of stress before the procedures. During the evaluation, the physiotherapist will visually and manually evaluate your pelvic floor muscles both externally and internally. This will be done in order to evaluate its capacity to contract and relax. The physical examination will also consist of a biofeedback (electromyography) test during which you will be asked to insert a small probe in your vagina. The therapist will visually inspect the probe to ensure that it is properly located, and then the probe will be used to allow the therapist to record the reaction of your pelvic floor muscles to different stimuli including light touch and pressure applied to your genitals. A female research assistant will be present during the evaluation to record information. After the physical evaluation, the physiotherapist will discuss with you the results of the evaluation, and finally, provide answers to any questions or concerns you might have.

At this point, you will set up a weekly meeting time with the physiotherapist for treatment sessions. You will complete eight 1-hour weekly pelvic floor physiotherapy treatment sessions. After completion of the physiotherapy evaluation, you and the physiotherapist will discuss your treatment goals, the treatment techniques and the expected results. You will be provided with home exercises, which will change as the treatment progresses. Each session will be tailored to your progress and to the findings on your initial physiotherapy assessment. They will consist of manual intra-vaginal techniques such as pelvic floor muscle massage and stretches, pelvic floor muscle retraining using biofeedback, training with vaginal dilators, recommendations regarding sexual health, and a series of related exercises for you to carry out at home. All participants in this treatment group will receive the same information and education. The treatment will be progressed based on your symptoms, which means that the treatment is flexible and allows each participant to progress according to their own pace. In fact, you and your physiotherapist will discuss each step of the treatment, and you will be in control of your treatment progression. Should you still require physiotherapy beyond the length of the study, you will be referred to another physiotherapist that specializes in pelvic floor physiotherapy.

*Follow-up sessions:* Approximately one month after the completion of the pelvic floor physiotherapy, the gynecological examination, interview and questionnaires, sensory testing, and pelvic floor physiotherapy evaluation will be repeated to assess the short-term effects of the
treatment on pain and other symptoms. To assess long-term effects of the treatment, you will be called approximately three months following the completion of the treatment sessions for a half-hour telephone interview with the psychology graduate student. The interview will include questions about your current pain levels and characteristics, sexual functioning, and satisfaction with the treatment.

**Compensation:** All treatment will be provided free of charge and you will be provided with a set of dilators that are yours to keep after the completion of the study. You will be given $50 at the completion of the 1-month follow-up session to compensate you for the time and inconvenience related to the multiple appointments required by this study.

**Risks and Benefits:** It is possible that you may experience some discomfort or pain due to some of the procedures (i.e., gynecological examination, sensory testing, pelvic floor physiotherapy treatment sessions). Some of the issues discussed in the interview may be considered sensitive (e.g., sexuality, depression) and therefore may cause some distress. Pelvic floor physiotherapy can also cause a temporary increase in pelvic floor muscle soreness as a result of the treatment techniques. The direct potential benefits include: access to a multidisciplinary treatment team comprised of psychologists and physiotherapists; education about pelvic floor function, pain, and sexual function; and a greater understanding of the cycle of pain. You may also experience a reduction in vulvar pain and/or improvements in psychosocial variables related pain reduction (e.g., improved sexual functioning, improved quality of life) after the treatment. The indirect benefit of your participation is that clinicians will have a better understanding of the usefulness of pelvic floor physiotherapy as a treatment for women with PVD; this information may benefit other women in the future.

**Confidentiality:** All information obtained during the course of this study is strictly confidential and your anonymity will be protected at all times. A hard copy of your interview, questionnaires, gynecological examination, and physiotherapy notes will be kept in a filing cabinet in a locked office. Electronic copies of some of your questionnaires will be kept in a password-protected file in the same locked office. All of these forms and files identify you only by a participant ID number rather than your name, and the electronic file which matches up participant names and ID
numbers is password-protected. The results of the interview and questionnaires, and the physiotherapy sessions will be available only to the investigators directly involved in this study, as well as research assistants at the SHRL who are required to sign a confidentiality form. Neither your name nor any other identifying information will be mentioned in any publications or reports.

**Participant Rights and Liability:** Your participation in this study is voluntary. You may withdraw from this study at any time and your withdrawal will not affect your future access to services. You are also free to refuse to answer any questions posed without explanation. The study investigators may decide to withdraw you from this study for scientific reasons at any time during the study. In this case, you will be informed of the reason for withdrawal. In the event that you are injured as a result of the study procedures, medical care will be provided to you until resolution of the medical problem. By signing this consent form, you do not waive your legal rights nor release the investigators from their legal and professional responsibilities.

**Participant’s Signature:** I have read and understood the consent form for this study, I have had the purposes and procedures of this study explained to me. I have been given sufficient time to consider the above information and to seek advice if I chose to do so. I have had the opportunity to ask questions which have been answered to my satisfaction. I am voluntarily signing this form. I will receive a copy of this consent form for my information.

If at any time I have further questions, problems, or adverse events, I can contact:

**Study Investigators:**

**Faculty Supervisors:**
Caroline Pukall, Ph.D. at (613) 553-3200 or caroline.pukall@queensu.ca
Linda McLean, PT, Ph.D. at (613) 533-6101 or mcleanl@post.queensu.ca

**Graduate Students:**
Corrie Goldfinger at (613) 533-3276 or 5cg24@queensu.ca
Evelyne Gentilcore-Saulnier at (613) 533-6000 extension 77850 or 5eg11@queensu.ca
Department of Psychology, Head: Vern Quinsey, Ph.D. at (613) 533-2492 or psychead@post.queensu.ca

If I have questions regarding my rights as a research subject I can contact: Dr. Albert Clark, Chair, Queen’s University Health Sciences and Affiliated Teaching Hospitals Research Ethics Board at (613) 533-6081

By signing this consent form, I am indicating that I agree to participate in this study.

_________________________________  ______________________  ______________________
Signature of Participant              Print Name                     Date

**Statement of Investigator:** I have carefully explained to the participant the nature of the above research study. I certify that, to the best of my knowledge, the participant understands clearly the nature of the study and demands, benefits, and risks involved to participants in this study.

_________________________________  ______________________  ______________________
Signature of Investigator              Print Name                     Date
Appendix D
Confidentiality Form

Information about Confidentiality

All information disclosed during your participation in this research study is confidential and will not be disclosed to anyone without your written and informed consent except where reporting is required by law, that is –

1. where there is suspicion that a child or children (that is, an individual who is PRESENTLY under the age of 16) has been or is being abused,
2. where the research participant is likely to harm herself or himself unless protective measures are taken,
3. where the research participant presents a serious danger of violence to others, and
4. if the research participant reveals that she has been sexually abused by a health care provider (for example, a psychologist or physician) covered by the Regulated Health Professionals Act, it is necessary by law to report the name of the perpetrator to his/her governing body.

IF YOU HAVE ANY CONCERNS ABOUT THESE MATTERS, OR ABOUT THIS FORM, PLEASE DISCUSS THESE WITH ME.

**************************************************************************

PLEASE SIGN THE ACKNOWLEDGEMENT BELOW TO INDICATE THAT YOU HAVE READ THIS INFORMATION ABOUT CONFIDENTIALITY

**************************************************************************

I acknowledge the circumstances that limit confidentiality and I accept them.

_________________________  ________________________  __________
Participant’s name  Participant’s signature  Date

_________________________  ________________________  __________
Witness’ name  Witness’ signature  Date
# Appendix E

## Medical History Form

### Participant Past Medical History

<table>
<thead>
<tr>
<th>Participant ID</th>
<th>Date</th>
<th>Pre</th>
<th>FU1</th>
</tr>
</thead>
</table>

Cardiovascular/vascular (e.g., angina, heart attack, transient ischemic attack, stroke, etc) ______

Respiratory (e.g., asthma, chronic obstructive pulmonary disease, emphysema, etc) ______

Gastrointestinal/renal (e.g., irritable bowel syndrome, interstitial cystitis, etc) ______

Musculoskeletal/rheumatological (e.g., fibromyalgia, arthritis, etc) ______

Endocrinological (e.g., hypothyroidism, diabetes, etc) ______

Gynecological (e.g., endometriosis, pelvic inflammatory disease, recurrent yeast infections, etc) ______

Psychiatric/psychological (e.g., depression) ______

Reproductive history

# of pregnancies: ______  # of live births: ______  Mode of delivery: ______

Pregnancy complications: ______

Sexually transmitted infections (e.g., Chlamydia, gonorrhea, herpes, HPV) ______

Past surgeries: ______

Current medications: ______

Allergies: ______

Other: ______
Appendix F
Vulvar Pain History Form

Participant Vulvar Pain History Form

Participant ID ____________________ Date ____________________ Pre   FU1

Age: __________

Pain location(s):  ________________

_________________

_________________

Previous diagnoses and treatment:
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Description of pain:
________________________________________________________________________
________________________________________________________________________

When the pain starts:
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Situation/s that elicit the pain:
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
Appendix G
Gynecological Examination Record Form

<table>
<thead>
<tr>
<th>Gynecological Examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant ID ____________________ Date ____________________ Pre   FU1</td>
</tr>
<tr>
<td>Examing physician: _______________ Research Assistant: _____________________</td>
</tr>
</tbody>
</table>

### SECTION I: INSPECTION OF THE VULVA

#### Clitoris

<table>
<thead>
<tr>
<th>No abnormalities</th>
<th>Partially hooded</th>
<th>Complete phimosis</th>
</tr>
</thead>
</table>

#### Labia minora

<table>
<thead>
<tr>
<th>No abnormalities</th>
<th>Partially fused</th>
<th>Completely fused</th>
</tr>
</thead>
</table>

#### Posterior fourchette

<table>
<thead>
<tr>
<th>No abnormalities</th>
<th>Scar from previous fissure</th>
<th>Active fissure</th>
</tr>
</thead>
</table>

#### Vestibule: BEFORE the cotton-swab test

<table>
<thead>
<tr>
<th>No abnormalities</th>
<th>Erythema</th>
<th>Fissure</th>
<th>Synechia</th>
</tr>
</thead>
</table>

#### Pubic Hair

<table>
<thead>
<tr>
<th>Sparse</th>
<th>Normal</th>
<th>Shaved</th>
</tr>
</thead>
</table>

#### Labia

<table>
<thead>
<tr>
<th>Dry, atrophic</th>
<th>In between atrophic and full</th>
<th>Full</th>
</tr>
</thead>
</table>
SECTION II: COTTON-SWAB TEST

LABIA MAJORA: pain intensity ratings

Patient’s right, anterior: ______  Patient’s left, anterior: ______

Patient’s right, mid-point: ______  Patient’s left, mid-point: ______

Patient’s right, posterior: ______  Patient’s left, posterior: ______

INNER LABIA MINORA: pain intensity ratings

Patient’s right, anterior: ______  Patient’s left, anterior: ______

Patient’s right, posterior: ______  Patient’s left, posterior: ______

MIDLINE AREAS and VESTIBULE (random order): pain intensity ratings

Between vagina and urethra: ______  1 o’clock: ______

Inside vagina: ______  4-5 o’clock: ______

Posterior fourchette: ______  6 o’clock: ______

Perineum: ______  7-8 o’clock: ______

11 o’clock: ______

Appearance of vestibule after cotton-swab test:

<table>
<thead>
<tr>
<th>No erythema</th>
<th>Erythema</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

149
Ask women: Does this pain feel like the pain you experience during sexual activity?

Yes ☐ No ☐ Maybe ☐ If no, how was it different? _________________________________

ANAL WINK TEST

<table>
<thead>
<tr>
<th>Present ☐</th>
<th>Weak ☐</th>
<th>Absent ☐</th>
</tr>
</thead>
</table>

SECTION III: MUSCLE TENSION ASSESSMENT (random order)

Apply pressure inside the vagina for 3 seconds at 8, 6, and 4 o’clock. Record pain intensity ratings.

8 o’clock: ______ 6 o’clock: ______ 4 o’clock: ______

Evaluation of muscle tension by the examining physician

<table>
<thead>
<tr>
<th>Relaxed ☐</th>
<th>Tense ☐</th>
<th>Severe tension ☐</th>
</tr>
</thead>
</table>

Kegel evaluation: degree of contraction

<table>
<thead>
<tr>
<th>None ☐</th>
<th>Weak ☐</th>
<th>Strong ☐</th>
<th>Very strong ☐</th>
</tr>
</thead>
</table>

Kegel evaluation: degree of relaxation

<table>
<thead>
<tr>
<th>None ☐</th>
<th>Relaxed ☐</th>
<th>Tense ☐</th>
</tr>
</thead>
</table>

SECTION IV: SPECULUM EXAMINATION

Speculum insertion: pain intensity rating ______

Skin elasticity and turgor:

<table>
<thead>
<tr>
<th>Poor ☐</th>
<th>Fair ☐</th>
<th>No abnormalities ☐</th>
</tr>
</thead>
</table>
Vaginal mucosa:

- Atrophic [ ]
- No abnormalities, rugal appearance [ ]

Vaginal depth:

- Shortened [ ]
- No abnormalities [ ]

SECTION V: BIMANUAL PALPATION

Palpate the uterus, the adnexae, and the cervix. Describe any and all abnormalities, including pain (fibroids, cysts, endometriosis, etc):

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Introitus:

- <1 fingerbreadth [ ]
- 1 fingerbreadth [ ]
- 2 fingerbreadths [ ]
- +2 fingerbreadths [ ]

SECTION VI: OVERALL UNPLEASANTNESS OF GYNECOLOGICAL EXAMINATION

Ask: On a scale from 0 to 10, how unpleasant overall was the gynecological examination? _____

SECTION VII: DIAGNOSTIC IMPRESSION

- No gynecological diagnosis _____
- Lichen planus _____
- Provoked vestibulodynia _____
- Lichen sclerosus _____
- Generalized vulvodynia _____
- Heightened muscle tension _____
- Vaginal atrophy _____
- Other please specify: _____________
- Vulvar fissures _____
Appendix H
Pre-Treatment Interview

Structured Interview

Pelvic Floor Physiotherapy Treatment Study

Pre-Treatment Interview

Subject Number ________________

Date of Interview ________________
PART A: Socio-Demographic Information

First I am going to ask you some general questions about yourself.

1) What is your date of birth_____/_____/_______ Age______________

2) What is your place of birth? ________________________________
   - Canada □1
   - United States □2
   - Latin/South America □3
   - Caribbean □4
   - Australia/Oceana □5
   - Eastern Europe □6
   - Western Europe □7
   - Middle East □8
   - Africa □9
   - Asia □10

3) How do you define your ethnocultural heritage? ________________________________
   __________________________________________

4) What is your mother tongue?
   - English □1
   - French □2
   - Other □3 ________________________________

5) Do you identify with any religious community?
   - Yes □1 Which one? ________________________________
   - No □2

6) Does your religious or spiritual identity play an important role in your life?
   - Yes □1
   - No □2
7) What is the highest level of formal education you have received?

Some high school □ 1
High school graduate □ 2
Some trade school □ 3
Trade school graduate □ 4
Some college or undergraduate degree □ 5
College or undergraduate graduate □ 6
Some graduate school or professional training □ 7
Graduate or professional school degree □ 8
Other □ 9 _______________________

8) How many years of schooling has that included? _________________________

9) What is your current employment status?

Employed full-time □ 1
Employed part-time □ 2
Student □ 3
Retired □ 4
Unemployed □ 5
On disability □ 6
Full-time parenting □ 7
Other □ 8 _________________________

10) What is your approximate total annual income? If you are living with a partner please include their income in this value.

$0 - $9,999 □ 1
$10,000 - $19,999 □ 2
$20,000 - $29,000 □ 3
$30,000 - $39,999 □ 4
$40,000 - $49,000  □5
$50,000 - $59,000  □6
$60,000 and over  □7

Notes:
PART B: Relationship History

Now I am going to ask you some questions about your sexuality and about your relationship history. Please note that if you are currently involved in a relationship or are dating, you will be asked questions about your partner. If you are in an open or non-monogamous relationship, the questions referring to 'your partner' refer to your main partner.

1) How do you define your sexual orientation?

- Heterosexual/Straight □1
- Lesbian □2
- Gay □3
- Bisexual □4
- Queer □5
- Homosexual □6
- Not Sure □7
- Other □8 ____________________________________________________

2) Are you currently in a relationship?

- Yes □1
- No □2

   a. If yes, what is the sex of your current partner?

      - Male □1
      - Female □2
      - Other □3 ____________________________________________________

3) At what age did you first have penetrative intercourse? (In terms of a heterosexual experience, this refers to penis-in-vagina intercourse. In terms of a same-sex experience, this refers to the first time a partner penetrated you with fingers or a sex toy) ________________
4) Some women report experiencing pain during their first experience of penetrative intercourse. Please rate the intensity of the pain (that is, how strong the pain felt) you might have felt on a scale from 0-10 (0 represents no pain at all; 10 represents the worst pain imaginable).

_______

a. (if your pain intensity rating was in the 1-10 range in the previous question) Please rate the unpleasantness of that pain (that is, how much the pain bothered you) on a scale from 0 to 10 (0 represents the experience was not unpleasant at all; 10 represents that it was the most unpleasant experience imaginable).

_______

5) Have you experienced vulvar pain since your first penetrative intercourse experience?

Yes □1

No □2

6) With how many partners have you had penetrative intercourse? __________

7) How many long-term (i.e., lasting 3 months or longer) committed relationships have you been in? __________

a. How many of the long-term relationships reported above have you been in since your vulvar pain started? __________

8) How many casual dating (i.e., relationships that you did not consider yourself committed to) relationships have you been in? __________

a. How many of the dating relationships reported above have you been in since your vulvar pain started? __________

9) Which of the following best describes your current relationship situation?

Single, not dating □1

Not dating any one person regularly □2

Dating one partner regularly □3

Dating one partner regularly—long distance □4

Living with a partner □5

Married □6
10) How long have you been in this situation? ___________years ___________months

11) If you are in a long-term relationship, for how long have you been in a long-term (i.e., lasting 3 months or longer) relationship with your current partner? OR If you are single or dating and do not consider yourself involved in a committed relationship, how long was your last long-term or committed relationship (i.e., lasting 3 months or longer)? OR If you have never been in a relationship, do not answer.

_________ days _________ months ________ years

a. If you are currently single or dating and do not consider yourself involved in a committed relationship, when did your most recent committed relationship end? ________

12) Were you in a relationship at the time that your vulvar pain started?

Yes □1
No □2

a. If yes, how long had you been in the relationship before the pain first started? __________
b. If yes, and if you are no longer in this relationship, for how long were you in the relationship after the pain started? _________________

13) How has your relationship status changed since the onset of your vulvar/genital pain?

Your relationship status has not changed. You are currently in the same relationship you were in at the time the vulvar pain started. [1]
You are currently in a different relationship than the one you were in when the vulvar pain started. [2]

You were in a relationship at the time the vulvar pain started and you are now dating casually. [3]

You were in a relationship at the time the vulvar pain started and you are now single. [4]

You were dating casually at the time the vulvar pain started and you are now in a relationship. [5]

You were dating casually at the time the vulvar pain started and you are still dating casually. [6]

You were dating casually at the time the vulvar pain started and you are now single. [7]

You were single at the time the vulvar pain started and you are now in a relationship. [8]

You were single at the time the vulvar pain started and you are now dating casually. [9]

You were single at the time the vulvar pain started and you are currently single. [10]
14) I am going to read a list of sexual activities and I would like you to indicate which activities you engaged in prior to and after the onset of your vulvar pain. When answering this question please keep in mind all of your partners, not just your current or most recent relationship. If you have always experienced vulvar pain, please indicate after vulvar pain onset only.

<table>
<thead>
<tr>
<th>Prior to Vulvar Pain</th>
<th>After onset of Vulvar Pain</th>
</tr>
</thead>
<tbody>
<tr>
<td>_____</td>
<td>a. Manual stimulation of partner’s genitals</td>
</tr>
<tr>
<td>_____</td>
<td>b. Partner’s manual stimulation of your genitals</td>
</tr>
<tr>
<td>_____</td>
<td>c. Oral stimulation of partner’s genitals</td>
</tr>
<tr>
<td>_____</td>
<td>d. Partner’s oral stimulation of your genitals</td>
</tr>
<tr>
<td>_____</td>
<td>e. Penetrative vaginal intercourse on you</td>
</tr>
<tr>
<td>_____</td>
<td>f. Penetrative vaginal intercourse on partner</td>
</tr>
<tr>
<td>_____</td>
<td>g. Manual stimulation of partner’s anus</td>
</tr>
<tr>
<td>_____</td>
<td>h. Partner’s manual stimulation of your anus</td>
</tr>
<tr>
<td>_____</td>
<td>i. Oral stimulation of partner’s anus</td>
</tr>
<tr>
<td>_____</td>
<td>j. Partner’s oral stimulation of your anus</td>
</tr>
<tr>
<td>_____</td>
<td>k. Penetrative anal intercourse on you</td>
</tr>
<tr>
<td>_____</td>
<td>l. Penetrative anal intercourse on partner</td>
</tr>
</tbody>
</table>
15) To what extent has your vulvar pain impacted your ability to initiate dating relationships? Please rate on a scale from 0 (no impact) to 10 (greatest impact imaginable). __________

For those currently involved in a relationship/dating:

16) Do you feel that your vulvar/genital pain has negatively affected your relationship?

Yes ☐1
No ☐2

a. If yes, please rate how much the pain has negatively impacted your relationship on a scale from 0 (no impact) to 10 (greatest impact imaginable). __________

b. If yes, in what ways has the pain negatively impacted your relationship? Please describe:
___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________

17) Do you feel that your vulvar/genital pain has positively impacted your relationship?

Yes ☐1
No ☐2

a. If yes, please rate how much the pain has positively impacted your relationship on a scale from 0 (no impact) to 10 (greatest impact imaginable). __________

b. If yes, in what ways has it positively impacted your relationship? Please describe:
PART C: Gynecological and Medical History

1) Do you menstruate regularly (approximately once a month)?
   
   Yes □ 1
   No □ 2 Why not? __________________________________________

2) What was the start date of your last menstrual period? _______ / _______ / _______
   mo  day  year
   □ 1 Follicular (few days after menstruation)
   □ 2 Ovulatory (about 2 weeks after start of last menstruation)
   □ 3 Luteal (after ovulation, few days before menstrual onset)
   □ 4 Menstrual

3) If has current partner: Do you and/or your partner use any method(s) of contraception?
   
   Yes □ 1
   No □ 2

   If no current partner: Did you and/or your past partners use any method(s) of contraception?
   
   Yes □ 1
   No □ 2

   a. If yes to either question, which one(s)? ______________________________
   b. If using hormonal contraceptive, which brand? ____________________________
   c. How long have you been using the hormonal contraceptives? ______________

4) Have you ever had a yeast infection?
   
   Yes □ 1 How many? ______________________ (i)
   No □ 2

163
a. **If yes,** have you suffered from repeated yeast infections?

<table>
<thead>
<tr>
<th></th>
<th>□1 Since what age? ____________________ (i)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>□1</td>
</tr>
<tr>
<td>No</td>
<td>□2</td>
</tr>
<tr>
<td>DK</td>
<td>□3</td>
</tr>
<tr>
<td>N/A</td>
<td>□99</td>
</tr>
</tbody>
</table>

b. **If yes,** how were the yeast infections diagnosed?

<table>
<thead>
<tr>
<th>diagnosis</th>
<th>□1 Number of times ________</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical plus positive culture</td>
<td>□1</td>
</tr>
<tr>
<td>Clinical only</td>
<td>□2</td>
</tr>
<tr>
<td>Self-diagnosed</td>
<td>□3</td>
</tr>
</tbody>
</table>

5) I am going to list a number of gynecological problems, please let me know which ones you have had.

<table>
<thead>
<tr>
<th>problem</th>
<th>□1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlamydia</td>
<td>□1</td>
</tr>
<tr>
<td>Gerdnerella vaginalis</td>
<td>□2</td>
</tr>
<tr>
<td>Genital Warts or HPV</td>
<td>□3</td>
</tr>
<tr>
<td>Gonorrhea</td>
<td>□4</td>
</tr>
<tr>
<td>Genital herpes</td>
<td>□5</td>
</tr>
<tr>
<td>HIV</td>
<td>□6</td>
</tr>
<tr>
<td>Syphilis</td>
<td>□7</td>
</tr>
<tr>
<td>Trichomoniasis</td>
<td>□8</td>
</tr>
<tr>
<td>Bladder/urinary infections</td>
<td>□9</td>
</tr>
<tr>
<td>Interstitial cystitis</td>
<td>□10</td>
</tr>
<tr>
<td>PID</td>
<td>□11</td>
</tr>
<tr>
<td>Endometriosis</td>
<td>□12</td>
</tr>
<tr>
<td>Other _________________________</td>
<td>□13</td>
</tr>
<tr>
<td>None</td>
<td>□14</td>
</tr>
</tbody>
</table>

6) Now I am going to list a number of gynecological interventions, please let me know which ones you have had.

<table>
<thead>
<tr>
<th>intervention</th>
<th>□1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hysterectomy</td>
<td>□1</td>
</tr>
<tr>
<td>Laparoscopy</td>
<td>□2</td>
</tr>
<tr>
<td>Ovariectomy</td>
<td>□3</td>
</tr>
<tr>
<td>Tubal Ligation</td>
<td>□4</td>
</tr>
<tr>
<td>Curettage</td>
<td>□5</td>
</tr>
<tr>
<td>Abortion</td>
<td>□6</td>
</tr>
<tr>
<td>Other _______________</td>
<td>□7</td>
</tr>
<tr>
<td>None</td>
<td>□8</td>
</tr>
</tbody>
</table>
7) Have you ever been diagnosed with any chronic pain condition?
   Yes □1 What condition(s)? ______________________________________________
   No □2

8) Are you currently taking any analgesics (i.e., pain medication)?
   Yes □1
   No □2
   a. If yes, why? ___________________________________________________________
   b. For how long? _________________________________________________________

9) Are you currently taking any medication?
   Yes □1
   No □2
   a. If yes, why? ___________________________________________________________
   b. For how long? _________________________________________________________

10) How much bodily pain (other than genital pain) have you had during the past 4 weeks?
    None □1(→ question 12) Moderate □4
    Very Mild □2 Severe □5
    Mild □3 Very Severe □6

11) During the past 4 weeks, how much did bodily pain interfere with your work, including both work outside the home and housework?
    Not at all □1 Quite a bit □4
    A little bit □2 Extremely □5

165
12) I am going to list a number of problems which can cause pain or discomfort, please let me know which ones you have ever experienced or been diagnosed with?

**For each “yes” response, ask:**

How serious of a problem is this for you?
(0 = not at all serious, 5 = moderately serious, 10 = extremely serious)

How much does this pain/discomfort interfere with your usual activities?
(0 = not at all, 5 = moderately, 10 = totally)

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Yes [1]/No [2]</th>
<th>Seriousness (0 – 10)</th>
<th>Interference (0 – 10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headaches/migraines</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Menstrual cramps</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ovulatory pain</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Endometriosis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cystitis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yeast infections</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vaginal infections</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urinary/bladder infections</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other viral/bacterial infections</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sexually transmitted infections</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-menstrual syndrome</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fibromyalgia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chronic fatigue syndrome</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arthritis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Angina</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
13) I am going to list a variety of body parts or areas and I’d like you to indicate whether you have ever regularly (i.e. once a month or more) suffered from pain or discomfort in any of them. If relevant, please also indicate what type of pain or discomfort it is, for example bone, muscle, skin, organ, etc.

**For each “yes” response, ask:**

- How serious of a problem is this for you now?
  
  \(0 = \text{not at all serious}, \ 5 = \text{moderately serious}, \ 10 = \text{extremely serious}\)

- How much does this pain/discomfort interfere with your usual activities?
  
  \(0 = \text{not at all}, \ 5 = \text{moderately}, \ 10 = \text{totally}\)

<table>
<thead>
<tr>
<th>Body Area</th>
<th>Yes/No</th>
<th>Type of Pain (bone, muscle, skin, other)</th>
<th>Seriousness ((0 – 10))</th>
<th>Interference ((0 – 10))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Face (jaw, eyes, ears, etc)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mouth (teeth, gums, etc)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
168

<table>
<thead>
<tr>
<th>Neck</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Throat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Back</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hands</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chest</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breast</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stomach/abdomen</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pelvic area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bladder</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kidney</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ovary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uterus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gall bladder</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rectum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Legs/knees</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(specify____________)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total/Average</td>
<td>a.</td>
<td>b.</td>
</tr>
</tbody>
</table>

14) **If more than one pain was chosen**, which is the worst? _____ N/A

15) On a scale of 0 to 10, please rate the intensity of this/the worst pain (0 represents no pain at all; 10 represents the worst pain imaginable). _____ N/A

16) On a scale of 0 to 10, please rate the degree of unpleasantness you experience during this/the worst pain (0 represents the experience was not unpleasant at all; 10 represents that it was the most unpleasant experience imaginable). _____ N/A

**Administer the PCS-non-vulvar with respect to this pain**
PART D: Pain with Intercourse History

1) When did you first start experiencing pain with intercourse? _______ month _______ year

2) When did it start?

With first experience □1 After repeated bladder infections □5
After repeated yeast infections □2 After gynecological surgery □6
After childbirth □3 After abortion □7
For no apparent reason □4 Change of partner □8
Life stress (marital conflict, $ problems, etc) (specify: ________________________) □9
Other (specify: _______________________________________________________) □10

3) How many health professionals have you consulted for the pain? ________

4) What kind of health professional have you consulted for the pain? _____________________
   __________________________________________________________________________
   __________________________________________________________________________

5) What diagnoses and treatments, if any, were you given by the health professionals to whom you reported the pain? Please list the name of every diagnosis and any medication/treatment the health professional suggested.

   a. No diagnoses ever given ______   b. No medication/treatment ever given ________

   1) Diagnosis: ________________________________ Treatment Suggested: __________________________
   2) Diagnosis: ________________________________ Treatment Suggested: __________________________
   3) Diagnosis: ________________________________ Treatment Suggested: __________________________

6) Either by suggestion of a health professional or on your own accord, have you ever attempted to treat or alleviate the pain?
Yes □1
No □2

a. If yes, how?

Changing aspects of sex life (e.g., position, speed, enhancing arousal) □1
Creams (e.g., K-Y, Crisco, moisturizers, corticosteroids, hormonal, anesthetics) □2
Alternative medicine (e.g., vitamins, diets, homeopathic remedies, physiotherapy) □3
Psychological treatments (e.g., psychotherapy, hypnosis, Kegels, biofeedback) □4
Surgery (e.g., vestibulectomy, laser) □5
Other medical treatments (e.g., hormones, interferon, antibiotics) □6
Small changes (e.g., cotton underwear, mild soaps, changing mattresses) □7
Other (please specify:_______________________________) □8

Notes:
PART E: Vulvar Pain Characteristics

1) Have you had sexual intercourse in the past 6 months?
   Yes □1
   No □2 If no, go to PART F

2) Do you regularly (i.e. once a month or more) experience pain in your genital region during any of the following situations?

   a. Sexual intercourse
      Yes □1
      No □2

   b. Finger insertion (own or partner’s)
      Yes □1
      No □2

   c. Standard gynecological examination
      Yes □1
      No □2

   d. Inserting a tampon/feminine hygiene product
      Yes □1
      No □2

   e. Partner stimulating you manually
      Yes □1
      No □2

   f. Partner stimulating you orally
      Yes □1
      No □2

   g. Masturbating alone
      Yes □1
      No □2

   h. Removing a tampon/feminine hygiene product
      Yes □1
i. Friction with clothing
Yes □1
No □2
j. Urinating in general
Yes □1
No □2
k. Urinating after intercourse
Yes □1
No □2
l. Sporting activity
Yes □1 (please specify) ________________________________
No □2
m. Pain not related to any specific activity
Yes □1
No □2
n. Other
Yes □1 (please specify) ________________________________
No □2

o. If they do not report any pain with penetrative activities, so in the past 6 months you have not had any regular vulvar pain due to any kind of penetrative activity?
Corrrect □1 (omit questions 7-11)
Incorrect □2 Please explain ________________________________

If they only reported pain during intercourse ask questions 3-11 only in relation to sexual intercourse and omit questions 14 and 15. If they only report pain during non-intercourse penetrative activities ask questions 3-11 only in relation to non-intercourse penetrative activities and omit questions 12 and 13.

3) Over the past 6 months, approximately how many times per month have you attempted to
a) have intercourse? ______ If 0, go to PART F  

b) have non-intercourse penetration? ______

4) During these attempts, approximately how many times have you succeeded in having entry
a) and some penetration during intercourse? ______

b) during non-intercourse penetration? ______

5) During these attempts, approximately how many times have you been able to
a) have intercourse to whatever you consider to be completion, without having to terminate
due to pain? ______

b) complete the activity without having to terminate due to pain? ______

6) What percentage of
a) sexual intercourse attempts was painful? ______

b) non-intercourse penetration was painful? ______

7) I am going to ask you some questions about the pain during these penetrative activities
including when the pain starts, how long it lasts, where you feel the pain, and what the pain
feels like.

a. Would you say that all of these different activities result in pain that has all of these same
qualities?

Yes □1 (ask questions 8-11 for all of the penetrative activities combined)

No □2

b. If no, do all of them have different qualities, or are there some activities that result in the
same kind of pain while other activities result in another kind of pain?

All different □1 (label them below and ask questions 8-11 for each different activity)
Clustered □2

C. If clustered, can you tell me which ones result in the same kind of pain? (ask questions
8-11 for each cluster of activities)
Activity/Cluster 1: ______________________________________
Activity/Cluster 2: ______________________________________
Activity/Cluster 3: ______________________________________
Activity/Cluster 4: ______________________________________

8) When does the pain typically start?

Before the penis/object touches the vaginal opening; it is always there □1 □1 □1 □1
When the penis/object starts to enter the vagina □2 □2 □2 □2
When the penis/object has fully entered and is thrusting □3 □3 □3 □3
After penetration (how long does it last? ________________) □4 □4 □4 □4
Other (please specify: ________________________________) □5 □5 □5 □5

9) How long does the pain typically last?

Only during penile/object entry □1 □1 □1 □1
Only during penile/object thrusting □2 □2 □2 □2
Only for a period after penile/object exit □3 □3 □3 □3
During penile/object entry and after penile/object exit □4 □4 □4 □4
During penile/object entry and during penile/object thrusting □5 □5 □5 □5
During penile/object thrusting and for some time after penile/object exit □6 □6 □6 □6
During entry, during thrusting, and after exit □7 □7 □7 □7
It is never the same: there is no typical pattern □8 □8 □8 □8

a. If it lasts after penile/object exit, please state for how long after the pain is felt.

Time: __________ minutes __________ hours __________ days

10) Show MPQ diagrams. Where do you typically feel the pain during penetration? Is there a specific spot you can show me? If yes, where?

At the vaginal opening (diagram 1) □1 □1 □1 □1
Everywhere on the vulva (diagram 1) □2 □2 □2 □2
Inside the vagina (diagram 2) □3 □3 □3 □3
In the pelvic or abdominal region (diagram 3) □4 □4 □4 □4

Administer the MPQ

11) **If chose only one location, proceed to the appropriate number.**
    **If more than one pain**, can you differentiate among these different pains?

    Yes □1 □1 □1 □1 go to appropriate numbers
    No □2 □2 □2 □2 go to question 12
    DK □3 □3 □3 □3 go to question 12

a) Vaginal opening:
On a scale of 0 to 10, please rate the average intensity of the pain at the vaginal opening (past 6 months). _____ _____ _____ _____ N/A N/A N/A N/A
On a scale of 0 to 10, please rate the average degree of unpleasantness you experience because of this pain. _____ _____ _____ _____ N/A N/A N/A N/A

b) Everywhere on the vulva:
On a scale of 0 to 10, please rate the average intensity of the pain everywhere on the vulva (past 6 months). _____ _____ _____ _____ N/A N/A N/A N/A
On a scale of 0 to 10, please rate the average degree of unpleasantness you experience because of this pain. _____ _____ _____ _____ N/A N/A N/A N/A

c) Inside the vagina:
On a scale of 0 to 10, please rate the average intensity of the pain inside the vagina (past 6 months). _____ _____ _____ _____ N/A N/A N/A N/A
On a scale of 0 to 10, please rate the average degree of unpleasantness you experience because of this pain. _____ _____ _____ _____ N/A N/A N/A N/A

175
d) Pelvic or abdominal region:
On a scale of 0 to 10, please rate the average intensity of the pain in the pelvic or abdominal region (past 6 months). _____ _____ _____ N/A N/A N/A N/A
On a scale of 0 to 10, please rate the average degree of unpleasantness you experience because of this pain. _____ _____ _____ N/A N/A N/A N/A

12) On a scale of 0 to 10, please rate the average intensity of pain you experience during intercourse. _____

13) On a scale of 0 to 10, please rate average degree of unpleasantness you experience during intercourse. _____

14) On a scale of 0 to 10, please rate the average intensity of pain you experience during non-intercourse penetrative activities. _____

15) On a scale of 0 to 10, please rate average degree of unpleasantness you experience during non-intercourse penetrative activities. _____

Administer the PCS-vulvar pain

Administer PDI

Go to PART G

Notes:
PART F: Vulvar Pain Characteristics (women who haven’t had intercourse in 6 months)

1) How long has it been since you last had intercourse? __________ months _________ years

2) What is the reason that you have not had intercourse in the past 6 months?

   - I have no partner at the moment □ 1
   - It hurts too much □ 2
   - I have no desire □ 3
   - I fear pain □ 4
   - I am too anxious □ 5
   - I don’t want penetration □ 6
   - My partner has erection problems □ 7
   - My partner has no desire □ 8
   - My partner is concerned about hurting me □ 9
   - Other (please specify:____________________________________________) □ 10

Now I am going to ask you some question about the pain that you experienced during intercourse in the past. This time frame would cover from the first time you experienced pain during sexual intercourse until the last time you had sexual intercourse.

3) Approximately how many times per month were you attempting intercourse? ____

4) During these attempts, approximately how many times did you succeed in having entry and some penetration? ______

5) During these attempts, approximately how many times were you able to have intercourse to whatever you consider to be completion, without having to terminate due to pain? ______

6) During these intercourse attempts, what percentage was painful? ______

7) When did the pain typically start?

   Before the penis/object touched the vaginal opening; it was always there □ 1
When the penis/object started to enter the vagina □2
When the penis/object had fully entered and was thrusting □3
After intercourse (how long did it last? _____________________________) □4
Other (please specify:___________________________________________) □5

8) How long did the pain typically last?

Only during penile/object entry □1
Only during penile/object thrusting □2
Only for a period after penile/object exit □3
During penile/object entry and after penile/object exit □4
During penile/object entry and during penile/object thrusting □5
During penile/object thrusting and for some time after penile/object exit □6
During penile/object entry, during penile/object thrusting, and after penile/object exit □7
It is never the same: there is no typical pattern □8

a. If it lasted after penile exit, please state for how long after the pain was felt.

Time: ______minutes   ______hours   _______days

9) **Show MPQ diagram.** Where did you typically feel the pain during intercourse? Is there a specific spot you can show me? **If yes,** where?

At the vaginal opening (diagram 1) □1
Everywhere on the vulva (diagram 1) □2
Inside the vagina (diagram 2) □3
In the pelvic or abdominal region (diagram 3) □4

10) **If chose only one location,** proceed to the appropriate number.
**If more than one pain,** can you differentiate among these different pains?

Yes □1 go to appropriate numbers
No □2 go to question 11
a) Vaginal opening:
On a scale of 0 to 10, please rate the average intensity of the pain at the vaginal opening during intercourse. _____ N/A
On a scale of 0 to 10, please rate the average degree of unpleasantness you experienced because of this pain. _____ N/A

b) Everywhere on the vulva:
On a scale of 0 to 10, please rate the average intensity of the pain everywhere on the vulva during intercourse. _____ N/A
On a scale of 0 to 10, please rate the average degree of unpleasantness you experienced because of this pain. _____ N/A

c) Inside the vagina:
On a scale of 0 to 10, please rate the average intensity of the pain inside the vagina during intercourse. _____ N/A
On a scale of 0 to 10, please rate the average degree of unpleasantness you experienced because of this pain. _____ N/A

d) Pelvic or abdominal region:
On a scale of 0 to 10, please rate the average intensity of the pain in the pelvic or abdominal region during intercourse. _____ N/A
On a scale of 0 to 10, please rate the average degree of unpleasantness you experienced because of this pain. _____ N/A

11) On a scale of 0 to 10, please rate the average intensity of pain you experienced during intercourse. _____

12) On a scale of 0 to 10, please rate average degree of unpleasantness you experienced during intercourse. _____
13) Do you regularly (i.e., once a month or more) experience pain in your genital region during any of the following situations?

a. Finger insertion (own or partner’s)
   Yes □1
   No □2

b. Standard gynecological examination
   Yes □1
   No □2

c. Inserting a tampon/feminine hygiene product
   Yes □1
   No □2

d. Partner stimulating you manually
   Yes □1
   No □2

e. Partner stimulating you orally
   Yes □1
   No □2

f. Masturbating alone
   Yes □1
   No □2

g. Removing a tampon/feminine hygiene product
   Yes □1
   No □2

h. Friction with clothing
   Yes □1
   No □2

i. Urinating in general
   Yes □1
   No □2

j. Urinating after intercourse
   Yes □1
No □ 2

k. Sporting activity
Yes □ 1 (please specify) __________________________________________
No □ 2

l. Pain not related to any specific activity
Yes □ 1
No □ 2

m. Other
Yes □ 1 (please specify) __________________________________________
No □ 2

n. If they do not report any pain with non-intercourse penetrative activities, so in the past 6 months you have not had any regular vulvar pain due to any kind of penetrative activity?
Correct □ 1 (omit questions 18-22)
Incorrect □ 2 Please explain __________________________________________________

14) Over the past 6 months, approximately how many times per month have you attempted non-intercourse penetration? ______

15) During these attempts, approximately how many times have you succeeded in having entry? ______

16) During these attempts, approximately how many times have you been able to complete the activity without having to terminate due to pain? ______

17) During these non-intercourse penetration attempts, what percentage was painful? ______

18) I am going to ask you some questions about the pain during these penetrative activities including when the pain starts, how long it lasts, where you feel the pain, and what the pain feels like.

a. Would you say that all of these different activities result in pain that has all of these same qualities?
Yes □ 1 (ask questions 19-22 for all of the penetrative activities combined)
b. If no, do all of them have different qualities, or are there some activities that result in the same kind of pain while other activities result in another kind of pain?

All different □1 (label them below and ask questions 19-22 for each different activity)
Clustered □2

c. If clustered, can you tell me which ones result in the same kind of pain? (ask questions 19-22 for each cluster of activities)

Activity/Cluster 1: ______________________________________
Activity/Cluster 2: ______________________________________
Activity/Cluster 3: ______________________________________

19) When does the pain typically start?

Before the object touches the vaginal opening; it is always there □1 □1 □1
When the object starts to enter the vagina □2 □2 □2
When the object has fully entered and is thrusting □3 □3 □3
After penetration (how long does it last? ________________) □4 □4 □4
Other (please specify:____________________________________) □5 □5 □5

20) How long does the pain typically last?

Only during object entry □1 □1 □1
Only during object thrusting □2 □2 □2
Only for a period after object exit □3 □3 □3
During object entry and after object exit □4 □4 □4
During object entry and during object thrusting □5 □5 □5
During object thrusting and for some time after object exit □6 □6 □6
During object entry, during object thrusting, and after object exit □7 □7 □7
It is never the same: there is no typical pattern

a. If it lasts after penile exit, please state for how long after the pain is felt.

Time: ___/___/___ minutes  ___/___/___ hours  ___/___/____ days

21) **Show MPQ diagrams.** Where do you typically feel the pain during these non-intercourse penetrative activities? Is there a specific spot you can show me? **If yes,** where?

- At the vaginal opening  (diagram 1) □1 □1 □1
- Everywhere on the vulva (diagram 1) □2 □2 □2
- Inside the vagina (diagram 2) □3 □3 □3
- In the pelvic or abdominal region (diagram 3) □4 □4 □4

**Administer the MPQ**

22) **If chose only one location,** proceed to the appropriate number.

**If more than one pain,** can you differentiate among these different pains?

Yes □1 □1 □1 go to appropriate numbers
No □2 □2 □2 go to question 23
DK □3 □3 □3 go to question 23

a) Vaginal opening:
On a scale of 0 to 10, please rate the average intensity of the pain at the vaginal opening (past 6 months).  ______  ______  ______  N/A  N/A  N/A

On a scale of 0 to 10, please rate the average degree of unpleasantness you experienced because of this pain. ______  ______  ______  N/A  N/A  N/A

b) Everywhere on the vulva:
On a scale of 0 to 10, please rate the average intensity of the pain everywhere on the vulva (past 6 months).  ______  ______  ______  N/A  N/A  N/A
On a scale of 0 to 10, please rate the average degree of unpleasantness you experienced because of this pain. N/A N/A N/A

c) Inside the vagina:
On a scale of 0 to 10, please rate the average intensity of the pain inside the vagina (past 6 months). N/A N/A N/A
On a scale of 0 to 10, please rate the average degree of unpleasantness you experienced because of this pain. N/A N/A N/A

d) Pelvic or abdominal region:
On a scale of 0 to 10, please rate the average intensity of the pain in the pelvic or abdominal region (past 6 months). N/A N/A N/A
On a scale of 0 to 10, please rate the average degree of unpleasantness you experienced because of this pain. N/A N/A N/A

23) On a scale of 0 to 10, please rate the average intensity of pain you experience during non-intercourse penetrative activities. _____

24) On a scale of 0 to 10, please rate average degree of unpleasantness you experience during non-intercourse penetrative activities. _____

Administer the PCS-vulvar pain

Administer PDI

Go to PART G

Notes:
**PART G: Expectations and Goals**

1) On a scale from 0 to 10, how much do you think that the pelvic floor physiotherapy treatment will help alleviate your vulvar pain? ______

2) Besides a reduction in vulvar pain, in what other areas are you hoping to see changes due to the treatment? (e.g., intercourse frequency, self-esteem, etc.)

____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________

Discontinue Interview

Notes:
Appendix I
Vulvalgesiometers
Appendix J

Intensity and Unpleasantness Rating Scales

Non-Painful Intensity:

<table>
<thead>
<tr>
<th></th>
<th>mild</th>
<th>moderate</th>
<th>extreme</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
</tbody>
</table>

no sensation                      most intense non-painful sensation
at all                           at all

Pain Intensity:

<table>
<thead>
<tr>
<th></th>
<th>mild</th>
<th>moderate</th>
<th>extreme</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
</tbody>
</table>

no pain                      worst pain ever felt
at all                       at all

Unpleasantness:

<table>
<thead>
<tr>
<th></th>
<th>mild</th>
<th>moderate</th>
<th>extreme</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
</tbody>
</table>

not unpleasant                      most unpleasant ever
at all                               at all
Appendix K
Vulvodynia Information Package

What is Vulvodynia?

Vulvodynia is defined as “vulvar discomfort, most often described as burning pain, occurring in the absence of relevant visible findings or a specific, clinically identifiable, neurologic disorder.” Vulvodynia affects an estimated 16% of women in the general population. There are two major types of vulvodynia that are based on pain location. The first is localized vulvodynia, in which pain is restricted to a portion of the vulva, such as the vestibule, as in vulvar vestibulitis syndrome (VVS). The second is generalized vulvodynia (GVD), in which the pain is more diffuse, involving the whole vulva.

1. What is vulvar vestibulitis syndrome (VVS; also called provoked vestibulodynia)?

VVS is the most common cause of dyspareunia (i.e., painful intercourse) in women of child-bearing age. A recent epidemiological study estimated that VVS affects 12% of pre-menopausal women in the general population. Women with VVS report experiencing a highly localized, burning and/or cutting pain at the entrance of the vagina (called the vulvar vestibule) during sexual intercourse, as well as during other activities that involve applying pressure to the vestibule (e.g., tampon insertion, gynecological exams). Although the pain of VVS typically disappears after pressure to the vestibule is removed, many women report lasting pain or discomfort after sexual intercourse or similar activities.

Approximately 50% of women who suffer from VVS have what is called primary VVS, indicating that the pain has been present since their first intercourse attempt. The other half has secondary or acquired VVS, which develops after a period of pain-free intercourse, and in many cases, after an aggravating factor (e.g., repeated vaginal infections, sexually transmitted diseases). However, little is known about the causes of VVS; most health professionals agree that it is caused by a combination of factors.

How is VVS Treated?

There is scientific evidence that the following treatments are effective for VVS:
Psychotherapy including a specific focus on pain management and sexuality. This can be done in group, couple, or individual format.

Pelvic floor muscle training/physiotherapy assisted by biofeedback.

Surgical removal of the painful area of the vulvar vestibule (vestibulectomy).

It is generally recommended to begin treatment with either psychotherapy or physiotherapy, or both. Psychotherapy and pelvic floor muscle training via biofeedback are equally successful, with psychotherapy receiving greater rates of satisfaction; both treatments complement each other well. Thirty-five to forty percent of women who followed either of these treatments reported a great decrease in their pain or complete pain relief, as reported in a treatment outcome study published in the journal *Pain* in 2001. As well, another published study indicated that 70% of women who underwent an average of 7 sessions of pelvic floor physiotherapy reported moderate or great improvement in their pain and sexual functioning.

If there is no significant improvement with psychotherapy or physiotherapy, a vestibulectomy may be indicated. This is a relatively minor day procedure carried out under general or spinal anesthesia. Following the operation, women will typically experience some discomfort in the genital region. Neither intercourse nor any other penetrative activity should be attempted for 6-8 weeks post-surgery. Seventy percent of women who underwent this surgery reported a great decrease in their pain or complete pain relief in the treatment outcome study mentioned above.

You may have come across information about other forms of treatment for VVS, such as vaginal creams, diets, and laser surgery. There is no evidence for their effectiveness, and in fact, some of these treatments may have unintended, negative side effects. Reports have suggested that alternative treatments, such as hypnosis for pain control and acupuncture, have been successful in some women with VVS. However, more research is needed to fully understand the effects of these treatments.

2. What is generalized vulvodynia (GVD)?

GVD is a common form of vulvar pain, affecting 6-7% of women in the general population, with a higher prevalence in women over the age of 30. In GVD, the pain is present on a constant or almost constant basis and affects the entire vulvar region. Like VVS, the pain of GVD is described predominantly as burning; in fact, the original term for GVD was “the burning vulva syndrome.” GVD not only affects sexual functioning in most
women, it also affects daily activities (e.g., sitting for long periods of time at work, bicycle riding) due to the constant nature of the pain.

**How is GVD treated?**

There is little research on the treatment of GVD. A few small studies showed that women who were treated with a low dose antidepressant medication (i.e., amitriptyline; commonly used for the treatment of neuropathic pain conditions which share the “burning” and “constant” qualities of pain with GVD) or gabapentin (also used for the treatment of neuropathic pain) reported pain reduction. While psychotherapy that combines a pain management and sexuality component might be helpful for women with GVD, there is no direct evidence to support this. Surgery, however, should be avoided.

**Vulvar Health Hints:**

Listed below are some general hints for vulvar health. If you suffer from vulvodynia, this information will likely not provide a cure for, or significant relief from, your pain – but it may help prevent further irritation. Please note that you do not have to follow all of the vulvar health hints at the same time; rather, choose the ones that best suit your lifestyle and try them for a period of time. We recommend that you start with as many as possible, since many lifestyle routines may lead to vulvar irritation in those who are sensitive. Once you are using as many of these measures as is practical, you can gradually re-introduce, if necessary, the previous habits one at a time and watch for signs of irritation. Find what works best for you.

**Laundry Care**

- Use dermatologically-approved detergent (e.g., Purex®️, Clear®️) on underwear or any other type of clothing/material that comes into contact with the vulva (e.g., pajama bottoms, exercise clothing, towels); Use 1/3 to 1/2 the suggested amount per load. Other clothing may be washed with the laundry soap of your choice.
- Avoid using fabric softener and/or bleach on underwear or any other kind of clothing or material that comes onto contact with the vulva.
- Avoid using dryer sheets on clothing/material that comes into contact with the vulva; hang-dry these items.
- Double-rinse underwear and any other kind of clothing that comes into contact with the vulva.
If you use stain-removing products on items that come into contact with the vulva, soak and rinse them in clear water and then wash them in your regular washing cycle (given the restrictions above) in order to remove as much of the product as possible.

**Clothing Choice**

- Wear white, 100% cotton underwear to allow air in and moisture out.
- Go without underwear when possible (e.g., when sleeping).
- Avoid thong (g-string) underwear.
- Avoid wearing full-length pantyhose; try thigh-high or knee-high stockings instead.
- Avoid tight fitting pants or jeans that may put pressure on the vulva.
- Avoid spandex®, lycra® and other tight-fitting clothing during workouts, and remove wet bathing suits and exercise clothing promptly.

**Hygiene Hints**

- Use soft, white, non-recycled, unscented toilet paper and 100% cotton pads or tampons.
- Avoid using scented products such as bubble bath, feminine hygiene products (pads or tampons), creams, or soaps that come into contact with the vulvar region.
- Avoid using feminine deodorant sprays, Vaseline®, and colored soaps in the vulvar area, and avoid douching unless recommended by your physician.
- When you shower/bathe, do not use soap until the very end, and avoid applying it directly to the vulva. Use mild soaps such as Dove®, and avoid getting shampoo on the vulvar area.
- Wash the vulva with cool to lukewarm water with your hand. Pat your vulvar area dry, do not rub. Do not use soap, wash cloths, or loofahs on the vulva; these can dry out and /or irritate the sensitive vulvar skin.
- Many women wash the vulva too often which can further irritate the area once a day is enough.
- Avoid shaving the vulvar area.
- Keeping the vulvar area dry is important; if you are chronically damp, keep an extra pair of underwear with you in a small bag and change if you become damp during the day at school/work.
- If you suffer from repeated vaginal infections, avoid using over-the-counter creams which might irritate the sensitive vulvar skin. Instead, discuss with your doctor the option of a systemic, oral medication (e.g., Diflucan®). It is important to visit your doctor for an examination when you suspect you have an infection; self-diagnosis and treatment without confirmation may lead to
misdiagnosis and unnecessary treatment that can cause more harm than benefit to your vulva.

**Physical Activities**

- Avoid exercises that put direct pressure on the vulva such as bicycle riding and horseback riding. Use padded shorts/bicycle seats if you do engage in such activities.
- Limit intense exercises that create a lot of friction in the vulvar area.
- Use a frozen gel pack wrapped in a towel to relieve symptoms after exercise.
- Enroll in a yoga class to learn relaxation and breathing techniques.
- Avoid swimming in highly chlorinated pools, and avoid using hot tubs.

**Pre- and Post-Sexual Intercourse Suggestions**

- Use a lubricant that is water-soluble before penetration (e.g., Liquid K-Y®, Astroglide®). If you find that these lubricants irritate you or dry out during intercourse, a pure vegetable oil (such as Crisco®, solid or oil) has no chemicals and is also water-soluble. Please note that Crisco® is not latex-friendly and therefore should not be used in combination with condoms. Using lubrication is particularly important for women who are peri- or post-menopausal, since vaginal dryness is common in these women.
- A topical anesthetic (for example, Xylocaine®) may help before intercourse; discuss this with your doctor and ensure that you know how, where, and when to apply it.
- To relieve burning and irritation after intercourse, take cool or lukewarm sitz or baking soda baths (4-5 tablespoons, 1-3 times a day for 10 minutes each).
- Apply ice or a frozen blue gel pack wrapped in one layer of a hand towel to relieve burning after intercourse. Other ideas include a bag of frozen peas, or fill a dish-soap bottle with water and freeze it; these fit well against the vulva.
- Urinate (to prevent infection) and rinse the vulva with cool water after sexual intercourse.

**Relationship Advice for Single Women with Vulvodynia and Couples:**

Whether you are single or in a relationship, your vulvar pain is likely affecting your romantic life in some way. Experiencing vulvar pain can lead to avoidance of sexual activities, especially when the pain is directly linked to sexual activity (as in the case of vulvar vestibulitis syndrome, or VVS).
Your sexual self-esteem, sexual desire and arousal, and relationship may suffer. It is important for you and your partner to recognize that vulvodynia does not just affect the vulva, but your entire perception of your sexuality.

The following are some suggestions for dealing with relationship aspects of vulvodynia:

**For Single Women with Vulvodynia**

- Participate in non-painful sexual activities (e.g., masturbation, erotica) to keep your sexuality alive.
- Seek information on your own. The more you know about vulvodynia, the more control you have over your situation.
- Chronic pain sufferers need others for support. Family and friends can help.
- Many single women with vulvodynia wonder if they should get involved in a new relationship since sex is a problem because of the pain. Of course you can! There is more to sex than just intercourse, and dealing with pain can be seen as one of the various challenges that people in a relationship face.
- There are no rules for when you should tell a potential partner, but do not feel pressured. Telling someone on the first date or before you know him/her well enough to gauge that he/she is worth the effort may be too soon. Take your time and get to know him/her. The right time may be at the point at which you see that the relationship has potential but is not yet very serious.
- When you do tell him/her, bear in mind that while you have become an expert on vulvodynia, he/she has probably never heard of it. It can be useful to give him/her some information (e.g., articles, websites). You might want to say up front that vulvodynia is not a sexually transmitted disease, not contagious, not life threatening, and not an excuse to avoid having sex with him/her, but that it is a pain condition which impacts sexual functioning.
- Give your partner some time to absorb the information before you ask for or expect a reaction. It is a lot of information to take in and you want him/her to understand the situation fully before making a decision.
- Remember, not all individuals are equipped to deal with relationship challenges such as vulvodynia.
- Seeing a sex or couple therapist is often helpful for single women dealing with vulvodynia by helping them confront difficult issues related to having chronic pain, sexual problems, and fears of entering new relationships.

**For Vulvodynia Sufferers in a Relationship**

- Some women find that joining a support group or a chatroom for women with vulvar pain is helpful. It is important to know that you are not alone – and you are not.
Not all vulvodynia sufferers are the same; although joining an online support group helps break the isolation, it is important to consult a health professional before applying some of the advice received through the group. Keep in mind that not everything said in vulvodynia chatrooms applies to all situations.

Participate in non-painful sexual activities (e.g., masturbation, oral sex). Sexual activity is more than vaginal intercourse. Be creative with your partner; find out what activities are pain-free and enjoy them.

Do not blame yourself. Being a chronic pain sufferer is not your fault.

It is helpful to talk about your fears with your partner – both of you might be afraid of emotional or physical abandonment. Clear communication can build your relationship. You might want to consult a sex or couple therapist to help you with this aspect of your relationship.

Your partner may feel rejected because of the limitations on sexual activity. It may be helpful to include him/her in your treatment visits (e.g., at the doctor’s office, psychotherapy, pelvic floor physiotherapy). Often, some of the techniques you learn through these therapies can be incorporated into foreplay and sexual activity by your partner. This may help him/her feel like part of your treatment and understand better that you are not rejecting him/her, but rather that it is your pain condition that is at the source of your diminished interest in sexuality. It may also be a way for your partner to get much needed support of his/her own.

Sex or couple therapists can help women and their partners confront difficult issues that arise when sexual dysfunction is present in a relationship due to pain, and help the couple explore alternative avenues of expressing love and affection.

For Partners of Women with Vulvodynia

Research vulvodynia (e.g., articles, websites).

Listen actively to your partner – acknowledge her fears and frustrations.

Communicate your fears and frustrations to your partner, and ask her to acknowledge them.

Vulvodynia may lead the two of you to question your attractiveness as a person and toward one another. Remind your partner that she is still attractive, sexual, and feminine. Ask her to do the same for you.

Take your partner seriously. Even if doctors do not find a physical reason for her pain, reassure her that you know it is real.

Remember that the pain is not your fault. She does not have the pain because you are a bad lover or because you are sexually unattractive.

If you feel isolated, some partners might find it helpful to join a support group or chatroom. ONElist is an example of one for partners (mostly male) of women with vulvodynia who want to discuss their feelings and frustrations: www.onelist.com/community/vulvodynia_partners
Not all vulvodynia couples are the same; although joining an online support group helps break the isolation, it is important to consult a health professional before applying some of the advice received through the group. Keep in mind that not everything said in vulvodynia chatrooms applies to all situations.

**Resources:**

**Who can I contact in the Kingston area?**

**Gynecology**

Contact your family doctor for a referral to a local gynecologist.

**Pelvic floor physiotherapy**

Liz Tata, MCISc(PT)
Progress Physiotherapy Clinic, 817 Blackburn Mews, Kingston, K7P 2N6
Phone: (613) 533-6595
Please note that you need a referral from your family doctor to see Ms. Tata.

**Psychology (focusing on pain management and sexual functioning)**

Resources are currently in progress. Please check the website for updates, or contact the Sexual Health Research Laboratory.

**Sexual Health Research Laboratory**

Phone: (613) 533-3276
Email: shrl@queensu.ca

**General Mental Health Resources:**

**24 Hour Emergency & Crisis Resources:**

The following are 24 hour emergency and crisis services available to the public. If you experience distress and require immediate assistance, you may call these numbers at any time to receive guidance and help:
Brockville General Hospital Emergency Dept (24 hours)  (613) 345-5645

Kingston General Hospital Emergency Dept (24 Hours)  (613) 548-2333

Frontenac Community Mental Health Services (24 hour crisis line):  (613) 544-4229

Lennox & Addington Community Crisis Centre:
No Charge Dial Information.........................  (800) 267-7877

Community Resources for Information on Mental Health and Counseling Services:
The following are professional services and information resources available to the public. If you experience distress and do not require immediate assistance, you may call these numbers to receive guidance and information on counseling and mental health services within your community:

Lanark County Mental Health .........................  (613) 283-2170

Belleville General Hospital ............................  (613) 969-5511

Frontenac Community Mental Health Services (Information):  (613) 544-1356

Leeds and Grenville Rehabilitation and Counseling Services:
Toll Free....................................................  (800) 267-4406
Delta .........................................................  (613) 928-3460
Gananoque..................................................  (613) 382-4016
.................................................................  x1000
Kemptville ..................................................  (613) 258-7204
Prescott......................................................  (613) 925-5940

Mental Health Services Hastings and Prince Edward Counties:
Belleville Main Office................................................. (613) 968-2619
Prince Edward County ................................. (613) 476-2990
Centre Hastings ........................................ (613) 478-9983
North Hastings ........................................ (613) 332-3826
Trenton ......................................................... (613) 394-1655

or (613) 967-4734

**Vulvodynia Web Links:**

Sex Information and Education Council of Canada (SIECCAN) website:
http://www.sieccan.org

Go Ask Alice! is a health question and answer internet service produced by Alice!, Columbia University’s Health Education Program. Its mission is to increase access to, and use of, health information by providing factual, in-depth, straight-forward, and nonjudgmental information to assist readers’ decision-making about their physical, sexual, emotional, and spiritual health:
http://www.goaskalice.columbia.edu/

Canadian website devoted to sexuality education and information and administered by the Society of Obstetricians and Gynecologists of Canada:
http://www.sexualityandu.com/index_e.aspx

A site that contains general information on vulvar pain:
http://www.thewebpaige.com/vpf/links.htm

A website dedicated to vulvodynia:
http://www.vulvodynia.com/
The International Society for the Study of Vulvovaginal Disease (ISSVD) website:
http://www.issvd.org/

National Vulvodynia Association website:
http://www.nva.org/

A discussion group for general vulvar problems:
http://groups.yahoo.com/group/VulvarDisorders/

Un groupe de discussion sur internet dédié spécifiquement au syndrome de vestibulite vulvaire (site en français):
http://groups.msn.com/Vestibulite

Groupe Elva: l’Association officielle pour les femmes atteintes de maladies vulvo-vaginales (site en français):
http://www.groupeelva.org/

International Academy of Sex Research (IASR) website:
http://www.iasr.org/

International Society for the Study of Women’s Sexual Health (ISSWSH) website:
http://www.isswsh.org/

Society for the Scientific Study of Sexuality (SSSS):
http://www.sexscience.org/

Society for Sex Therapy and Research (SSTAR) website:
http://www.sstarnet.org/
The College of Psychologists of Ontario (CPO) website:
http://www.cpo.on.ca/

The Canadian Psychological Association (CPA) website:
http://www.cpa.ca/

American Psychological Association (APA) website:
http://www.apa.org/

McGraw-Hill website for students considering graduate school and a career in psychology; it includes a list of and links to all major psychology programs:
http://www.mhhe.com/socscience/intro/cafe/common/career/top-toe.htm
Appendix L
PFM Contraction Form

Recommendations for intercourse

1. **First, Contract / Relax Your Pelvic Floor Muscles**
   - 2 series of 10 contractions;
   - Contract 2 sec / Relax 4 sec.

2. **Ensure lubrication and excitation**
   - Use water-based Liquid Lubricant each time for 6 months following treatment. How do we ensure excitation?

3. **Perform “Peace Sign” stretches with 2 fingers or probe**
   - Hold each stretch 30 seconds.
   - Perform once or twice. If done with partner, start with 1, then 2 fingers.

4. **Penetration**
   - Communication with your partner is the key (Establish a non-verbal system for stopping and re-starting).
   - To prevent and/or decrease pain, stop the movement and contract – relax 10 times. Go slowly. Remember to record duration, frequency and pain.

5. **AFTER INTERCOURSE**
   - If some discomfort persists, use ice wrapped in cloth to decrease the pain.

Daily exercises

**Contract / Relax**
Perform a strong contraction and hold the contraction for 5s, and then relax for 5s. Repeat 5 times, 3 times per day.

**Speed**
Try to contract as many times as possible within 10s. Repeat 3 times per day.

**Wave**
Contract progressively for 5s until you reach your maximum strength of contraction, and then relax progressively for 5 s… Like a wave! Repeat 5 times, 3 times per day.

Contact info:
Evelyne G. Saulnier, phd
31 George St
Kingston, ON K7L 2N6
Phone at the lab: 613.533.3276
evelyne.g.saulnier@gmail.com

Offered by the Pelvic Floor and Sexual Health Research Labs
Queen’s University

An Exercise Guide for Women with Provoked Vulvodynia (PVD)

National Vulvodynia Association website
www.nva.org
Pelvic floor muscles (PFMs)

The PFMs are situated in your pelvic area. The PFMs play an important role in bladder and bowel control and sexual function; they are responsible for the closing of the urethral, vaginal, and anal openings. Basically, your pelvic floor muscles can be compared to a bowl supporting your internal organs (see picture above).

Controlling your PFMs

To complete the dilator exercises efficiently, you must first learn to contract and relax your PFMs. Try the contractions/relaxations anywhere while sitting or lying on your back. Remember: practice makes perfect! Be patient.

Why bother with PFMs?

When you have PVD, the muscles are attempting to protect you from painful penetration by contracting, which limits further penetration activities and increases your pain. Thus, by relaxing your PFMs, you will increase the diameter of the vaginal opening, and decrease the pain associated with penetrative activities.

Recommendations for dilator exercises (3x/week)

1. **CHOOSE A STRESS-FREE TIME** CONTRACT / RELAX EXERCISES BEFORE THE INSERTION.

   Contract 2 sec / Relax 4 seconds;

   Perform 2 series of 10 contractions/relaxations.

2. **ENSURE LUBRICATION OF PROBE AND DILATOR**

   Use water-based, gel-like lubricant on the full length of the probe/ dilator.

3. **PERFORM “PEACE SIGN” STRETCHES WITH THE PROBE/DILATOR OR WITH PARTNER**

   Peace sign at 4, 6, and 8 o’clock with fingers or probe. Hold each stretch 30 seconds. Repeat twice. If done with partner, start with 1, then 2 fingers.

4. **INSERT DILATOR 2 OR 3 TIMES**

   Insert and rotate gently to distribute the gel. If painful, do not remove the dilator suddenly, stop the progression and contract-relax 10 times while keeping the dilator immobile. Keep dilator inserted for 30s.

5. **REMOVE DILATOR**

   If painful, use counter pressure with your fingers against the labia majora. Apply ice (wrapped in cloth) if necessary after probe removal for 10-30s during 5-10min.
Appendix M
Dilator Exercises Form

What are dilation exercises?
Dilation exercises consist of the insertion of vaginal dilators of progressively larger sizes into your vagina, while your pelvic floor muscles are relaxed. The goal of the dilation exercises is to reduce the pain that you experience in the genital area. Dilation exercises reduce pain by helping you overcome the anxiety associated with painful penetration, and by relaxing the pelvic floor muscles and gradually stretching the vaginal opening. Dilation exercises are performed in combination with pelvic floor muscles contractions and relaxations, which means that you will perform contractions/relaxations of your pelvic floor before and during the dilator insertions, in order to further reduce the pain associated with penetration.

Are dilation exercises recommended for women who have genital pain?
Yes, dilation exercises have been recommended to women with many pelvic floor muscle problems, including genital pain and incontinence. Dilation exercises are commonly recommended by doctors, physiotherapists, and psychologists treating women with genital pain.

What are pelvic floor muscles (PFMs)?
The pelvic floor muscles (PFMs) are situated in your pelvic area. The PFMs play an important role in bladder and bowel control and sexual function; they are responsible for the closing of the urethral, vaginal, and anal openings. Basically, your pelvic floor muscles can be compared to a bowl supporting your internal organs (see picture below).
**How do I perform a PFM contraction?**

To complete the dilator therapy efficiently, you must first learn to contract and relax your PFMs. You can try those contractions/relaxations anywhere, since no one will be able to tell! You can perform the contractions/relaxations while sitting, lying on your back, or lying on your stomach. At the beginning, you may find the contractions difficult to perform, but remember: practice makes perfect! Be patient. It may take weeks before you feel comfortable with performing contractions and relaxations.

1. Sit or lie down comfortably with the muscles of your thighs, buttocks and abdomen relaxed.
2. Tighten the ring of muscle around the urethra and anus as if you are trying to control urine flow, diarrhoea, or wind. Hold the contraction for two seconds. Relax it.
3. Practice this movement several times until you are sure you are exercising the correct muscle. Try not to squeeze your buttocks or thighs.
4. If you are having trouble isolating the PFMs, when you are urinating, try to stop the flow mid-stream, and then restart it. Only do this to learn which muscles are the correct ones to use do not attempt to perform this exercise often, as it may interfere with normal bladder emptying. When you have identified your PFMs, you can start the dilator therapy.

**Why should I do PFM contractions during the dilation exercises?**

It is believed that when you have chronic vulvar pain, the muscles are attempting to protect you from painful penetration by contracting, which limits further penetration activities and increases your pain. Thus, by relaxing your PFMs, it is believed you will increase the diameter of the vaginal opening, in turn reducing the pain associated with penetrative activities.

**How do I do the dilation exercises?**

We suggest that you do the exercises in a relaxed environment when you have at least 30 uninterrupted minutes available.

Start by getting in a comfortable position, such as half-sitting with your back supported by pillows, and with your knees bent. Perform two series of 10 pelvic floor muscles contractions, and focusing on relaxing your pelvic floor muscles at the end of each contraction. After having performed 20 contractions, apply lubricant on the dilator, ensuring that the dilator is covered with lubricant from top to bottom. Then, insert the dilator slowly and gently into the vagina. Use a mirror to guide you if necessary. Remember to take deep breaths and take your time.
If you feel pain and/or discomfort during the insertion, maintain the dilator immobile and perform pelvic floor contraction while the dilator is inserted. In doing so, focus on the relaxation part following the contraction, and try inserting the dilator further. You can insert the dilator as far into the vagina as it feels comfortable. Hold the dilator in the vagina for 2-3 minutes. Then, remove the dilator slowly.

You will be provided with 3 dilators, one small, one medium, and one large, as well as some water-based gel-like lubricant. Start with slowly inserting the smallest dilator. When you feel ready to do so, and when the pain has decreased with the use of the small dilator; progress to the medium dilator and repeat the same exercises. Then, move on to the large-sized dilator when you feel ready and repeat the same exercises.

The dilator insertions can be performed with your partner once you have become comfortable performing insertions by yourself. Simply instruct him/her on how to perform the insertions, and let him/her know when, how fast and how far to insert the dilator. The best way to do this is for you to get into a gynecological examination position with your knees bent and your back supported by pillows. Position yourself so that you are at the edge of a table or bed, so that your partner can comfortably maneuver the dilator. Remember to communicate with your partner throughout the exercises to let him/her know when to stop and re-start inserting the dilator. Most partners will be very concerned with provoking a painful reaction, and in turn, their involvement with the dilator therapy could be a good preliminary to eventual attempts at intercourse, by giving them a better understanding of your condition.

**How many times and for how long should I do these exercises?**

Dilation exercises should be performed 5 times a week. Each time you do the exercises; perform 2 or 3 insertions, depending on your level of comfort. If you have too much pain or discomfort, it is better to avoid exacerbating your symptoms, and to try again later. After each insertion, leave the dilator in the vagina for approximately 2-3 minutes to allow the stretch of the vagina to occur.
How do I clean the dilators?
The dilators can be cleaned with hand-soap and tap water. Soap might be irritable for the area at the entrance of the vagina (the vulvar vestibule), so rinse thoroughly, and dry with a towel. Roll the dilators in a dry towel to store them, and rinse them again before using them at the next exercise session.

When can I expect to see some improvement?
Dilator therapy can seem very invasive, uncomfortable and time-consuming. Keep in mind that for the treatment to take effect, it could some time and lots of practice as gaining tissue flexibility takes time to achieve. However, once it is achieved, you can expect to have to perform one insertion of the dilator 2-3 times a week to maintain what you have gained during treatment.

Some more tips
You may find using a dilator is more comfortable after a hot bath, which relaxes you, and makes your skin softer and more pliable. The easiest way to insert a dilator into the vagina is to lie down on a bed in a relaxed position, with your knees bent. However, much like tampons, some women prefer to insert them whilst standing with one leg on a chair. Please note that you should not develop buttock, thighs, back or abdominal pain while or after having performed the pelvic floor muscles contractions. If this occurs, you are probably performing the contractions too strenuously.

What is I have questions and /or concerns regarding the treatment?
During treatment, feel free to contact the graduate student at the Sexual Health Research Lab, at Queen’s University with any questions or concerns you may have. Corrie and Evelyne can be contacted at 613-533-3276 during weekdays.
Appendix N
sEMG System and Probe
Appendix O
Electrical Stimulation Device
Appendix P

Dilators

Come As You Are Dilators

Indicates the dilators used in the current study

La Sexérie Dilators
Appendix Q
Post-Treatment Interview

Structured Interview

Pelvic Floor Physiotherapy Treatment Study

Post-Treatment Follow-Up

Subject Number ________________

Date of Interview ________________
PART A: Relationship History

1) Is your relationship status the same as when we last met?
   
   Yes □1 (go to Question 4) ____________
   No □2

2) Which of the following best describes your current relationship situation?
   
   Single, not dating □1
   Not dating any one person regularly □2
   Dating one partner regularly □3
   Dating one partner regularly—long distance □4
   Living with a partner □5
   Married □6
   Common-law □7
   Separated □8
   Divorced □9
   Widowed □10
   Other □11 _____________________________

3) How long have you been in this situation? ______ years ______ months

4) I am going to read a list of sexual activities and I would like you to indicate which activities you have engaged in since we last met.

   a. Manual stimulation of partner’s genitals ______
   
   b. Partner’s manual stimulation of your genitals ______
   
   c. Oral stimulation of partner’s genitals ______
   
   e. Penetrative vaginal intercourse on you ______
f. Penetrative vaginal intercourse on partner ______

g. Manual stimulation of partner’s anus ______

h. Partner’s manual stimulation of your anus ______

i. Oral stimulation of partner’s anus ______

j. Partner’s oral stimulation of your anus ______

k. Penetrative anal intercourse on you ______

l. Penetrative anal intercourse on partner ______

m. Penetrative sex-toy play on partner ______

n. Penetrative sex-toy play on you ______

o. Masturbation ______

**If currently in a relationship,**

5) **How, if at all, do you think the treatment and/or the effects of the treatment in general have impacted your relationship to this point?**

   - Positively □ 1 Explain: __________________________________________
     ______________________________________________________________
     ______________________________________________________________

   - Negatively □ 2 Explain: __________________________________________
     ______________________________________________________________
     ______________________________________________________________

   - Had no impact □ 3

Notes:
PART B: Gynecological and Medical History

1) What was the start date of your last menstrual period? _______/_______/_______
   □ 1 Follicular (few days after menstruation)
   □ 2 Ovulatory (about 2 weeks after start of last menstruation)
   □ 3 Luteal (after ovulation, few days before menstrual onset)
   □ 4 Menstrual

2) Has there been any change in your menstrual cycle pattern since we last met?
   Yes □ 1
   No □ 2
   a. If yes, in what way has it changed?
   From ____________________________ to ___________________________
   b. Why? ___________________________________________________________________

3) Have you changed your method(s) of contraception or brand of oral contraceptive since we last met?
   Yes □ 1
   No □ 2
   a. If yes, From _________________________ to ___________________________

4) How many yeast infections have you had since we last met? ________ (If 0 → 5)
   a. What treatments did you use? ________________________________
   b. How were they diagnosed?
Clinical plus positive culture  □1 Number of times ________
Clinical only  □2 Number of times ________
Self-diagnosed  □3 Number of times ________

c. Is this an increase, a decrease, or no change since we last met?
   No change  □1
   Increase  □2 Increased from _____ per ______ to _____ per ______
   Decrease  □3 Decreased from _____ per ______ to _____ per ______

5) Have you been diagnosed with any gynecological conditions since we last met?
   Yes  □1
   No  □2

   a. **If yes,** which one(s)?
   Chlamydia  □1  Trichomoniasis  □8
   Gardnerella vaginalis  □2  Bladder/urinary infections  □9
   Genital Warts or HPV  □3  Interstitial cystitis  □10
   Gonorrhea  □4  PID  □11
   Genital herpes  □5  Endometriosis  □12
   HIV  □6  Other __________________  □13
   Syphilis  □7  None  □14

6) Have you undergone any gynecological surgeries/interventions since we last met?
   Yes  □1
   No  □2

   a. **If yes,** which one(s)?
   Hysterectomy  □1  Curettage  □5
   Laparoscopy  □2  Abortion  □6
   Ovariectomy  □3  Other __________________  □7
   Tubal Ligation  □4  None  □8
7) Are you currently pregnant?

Yes □ 1
No □ 2
DK □ 3

8) Have you experienced any changes in terms of your general medical health (e.g., diagnosis of pain disorder) since we last met?

Yes □ 1
No □ 2

a. If yes, what? ____________________________

b. Have you been taking medications because of this/these problems?

Yes □ 1 i. Which ones? ____________________________
No □ 2

9) Have you been diagnosed with any psychiatric disorders since we last met?

Yes □ 1
No □ 2

a. If yes, which one(s)? ____________________________

b. Have you been taking medications because of this/these problems?

Yes □ 1 i. Which ones? ____________________________
10) How much bodily pain (other than genital pain) have you had during the past 4 weeks?

<table>
<thead>
<tr>
<th>Level</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>□1(→ question 12)</td>
<td>Moderate</td>
</tr>
<tr>
<td>Very Mild</td>
<td>□2</td>
<td>Severe</td>
</tr>
<tr>
<td>Mild</td>
<td>□3</td>
<td>Very Severe</td>
</tr>
</tbody>
</table>

11) During the past 4 weeks, how much did this bodily pain interfere with your work, including both work outside the home and housework?

<table>
<thead>
<tr>
<th>Interference</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all</td>
<td>□1</td>
</tr>
<tr>
<td>A little bit</td>
<td>□2</td>
</tr>
<tr>
<td>Moderately</td>
<td>□3</td>
</tr>
<tr>
<td>Quite a bit</td>
<td>□4</td>
</tr>
<tr>
<td>Extremely</td>
<td>□5</td>
</tr>
</tbody>
</table>

12) I am going to list a variety of body parts or areas and I’d like you to indicate whether you have suffered from pain or discomfort in any of them since we last met. If relevant, please also indicate what type of pain or discomfort it is, for example bone, muscle, skin, organ, etc.

For each “yes” response, ask:

How serious of a problem is this for you?
(0 = not at all serious, 5 = moderately serious, 10 = extremely serious)

How much does this pain/discomfort interfere with your usual activities?
(0 = not at all, 5 = moderately, 10 = totally)
<table>
<thead>
<tr>
<th>Location</th>
<th>a.</th>
<th>b.</th>
<th>c.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neck</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Throat</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Back</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hands</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chest</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breast</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stomach/abdomen</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pelvic area</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bladder</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kidney</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ovary</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uterus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gall bladder</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rectum</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Legs/knees</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feet</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

13) If more than one pain was chosen, which is the worst? _____ N/A

14) On a scale of 0 to 10, please rate the intensity of this/the worst pain (0 represents no pain at all; 10 represents the worst pain imaginable). _____ N/A

15) On a scale of 0 to 10, please rate the degree of unpleasantness you experience during this/the worst pain (0 represents the experience was not unpleasant at all; 10 represents that it was the most unpleasant experience imaginable). _____ N/A

**Administer the PCS-non-vulvar with respect to this pain**

Notes:
PART C: Vulvar Pain Characteristics

16) Have you had or attempted sexual intercourse since we last met?

Yes □1
No □2

a. If no, how long has it been since you last had intercourse? ______________

b. If no, what is the reason that you have not had intercourse since we last met?

I have no partner at the moment □1
It hurts too much □2
I have no desire □3
I fear pain □4
I am too anxious □5
I don’t want penetration □6
My partner has erection problems □7
My partner has no desire □8
My partner is concerned about hurting me □9
The physiotherapist suggested that I do not attempt intercourse □10
Other (please specify: ___________________________________________________) □11

17) Since we last met, have you regularly (i.e. once a month or more) experienced pain in your genital region during any of the following situations?

a. Sexual intercourse

Yes □1
No □2

b. Finger insertion

Yes □1
No □2
c. Standard gynecological examination
   Yes □ 1
   No □ 2

d. Inserting a tampon/feminine hygiene product
   Yes □ 1
   No □ 2

e. Partner stimulating you manually
   Yes □ 1
   No □ 2

f. Partner stimulating you orally
   Yes □ 1
   No □ 2

g. Masturbating alone
   Yes □ 1
   No □ 2

h. Removing a tampon/feminine hygiene product
   Yes □ 1
   No □ 2

i. Friction with clothing
   Yes □ 1
   No □ 2

j. Urinating in general
   Yes □ 1
   No □ 2

k. Urinating after intercourse
   Yes □ 1
   No □ 2

l. Sporting activity
   Yes □ 1 (please specify) ___________________________
   No □ 2

m. Pain not related to any specific activity
Yes □1
No □2
n. Other
Yes □1 (please specify) ________________________________
No □2

If they do not report any pain with penetrative activities, so since we last met you have not had any regular vulvar pain due to any kind of penetrative activity?
Correct □1 (omit questions 7-11)
Incorrect □2 Please explain __________________________________________________

If they only reported pain during intercourse ask questions 3-11 only in relation to sexual intercourse and omit questions 14 and 15. If they only report pain during non-intercourse penetrative activities ask questions 3-11 only in relation to non-intercourse penetrative activities and omit questions 12 and 13.

18) Since we last met, approximately how many times per month have you attempted to have
a) have intercourse? ______  b) have non-intercourse penetration? ______

19) During these attempts, approximately how many times have you succeeded in having entry
a) and some penetration during intercourse? ______
  b) during non-intercourse penetration? ______

20) During these attempts, approximately how many times have you been able to
a) have intercourse to whatever you consider to be completion, without having to terminate
due to pain? ______
  b) complete the non-intercourse penetrative activity without having to terminate due to pain? ______

21) What percentage of
a) sexual intercourse attempts was painful? ______
  b) non-intercourse penetration was painful? ______
22) I am going to ask you some questions about the pain during these penetrative activities including when the pain starts, how long it lasts, where you feel the pain, and what the pain feels like.

a) Would you say that all of these different activities result in pain that has all of these same qualities?

Yes □1 (ask questions 8-11 for all of the penetrative activities combined)
No □2

b. If no, do all of them have different qualities, or are there some activities that result in the same kind of pain while other activities result in another kind of pain?

All different □1 (label them below and ask questions 8-11 for each different activity)
Clustered □2

c. If clustered, can you tell me which ones result in the same kind of pain? (ask questions 8-11 for each cluster of activities)

Activity/Cluster 1: ________________________________
Activity/Cluster 2: ________________________________
Activity/Cluster 3: ________________________________
Activity/Cluster 4: ________________________________

23) When does the pain typically start?

Before the penis/object touches the vaginal opening; it is always there □1 □1 □1 □1
When the penis/object starts to enter the vagina □2 □2 □2 □2
When the penis/object has fully entered and is thrusting □3 □3 □3 □3
After penetration (how long does it last? ________________) □4 □4 □4 □4
Other (please specify:______________________________) □5 □5 □5 □5
24) How long does the pain typically last?

<table>
<thead>
<tr>
<th>Duration</th>
<th>□ 1</th>
<th>□ 1</th>
<th>□ 1</th>
<th>□ 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Only during penile/object entry</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Only during penile/object thrusting</td>
<td>□ 2</td>
<td>□ 2</td>
<td>□ 2</td>
<td>□ 2</td>
</tr>
<tr>
<td>Only for a period after penile/object exit</td>
<td>□ 3</td>
<td>□ 3</td>
<td>□ 3</td>
<td>□ 3</td>
</tr>
<tr>
<td>During penile/object entry and after penile/object exit</td>
<td>□ 4</td>
<td>□ 4</td>
<td>□ 4</td>
<td>□ 4</td>
</tr>
<tr>
<td>During penile/object entry and during penile/object thrusting</td>
<td>□ 5</td>
<td>□ 5</td>
<td>□ 5</td>
<td>□ 5</td>
</tr>
<tr>
<td>During penile/object thrusting and for some time after penile/object exit</td>
<td>□ 6</td>
<td>□ 6</td>
<td>□ 6</td>
<td>□ 6</td>
</tr>
<tr>
<td>During entry, during thrusting, and after exit</td>
<td>□ 7</td>
<td>□ 7</td>
<td>□ 7</td>
<td>□ 7</td>
</tr>
<tr>
<td>It is never the same: there is no typical pattern</td>
<td>□ 8</td>
<td>□ 8</td>
<td>□ 8</td>
<td>□ 8</td>
</tr>
</tbody>
</table>

a. If it lasts after penile exit, please state for how long after the pain is felt.

Time: ___________minutes ___________hours ___________days

25) **Show MPQ diagrams.** Where do you typically feel the pain during penetration? Is there a specific spot you can show me? **If yes,** where?

<table>
<thead>
<tr>
<th>Location</th>
<th>(diagram)</th>
<th>□ 1</th>
<th>□ 1</th>
<th>□ 1</th>
<th>□ 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>At the vaginal opening</td>
<td>(diagram 1)</td>
<td>□ 2</td>
<td>□ 2</td>
<td>□ 2</td>
<td>□ 2</td>
</tr>
<tr>
<td>Everywhere on the vulva</td>
<td>(diagram 1)</td>
<td>□ 3</td>
<td>□ 3</td>
<td>□ 3</td>
<td>□ 3</td>
</tr>
<tr>
<td>Inside the vagina</td>
<td>(diagram 2)</td>
<td>□ 4</td>
<td>□ 4</td>
<td>□ 4</td>
<td>□ 4</td>
</tr>
<tr>
<td>In the pelvic or abdominal region</td>
<td>(diagram 3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Administer the MPQ**

26) **If chose only one location, proceed to the appropriate number.**
If more than one pain, can you differentiate among these different pains?

- Yes □ 1 □ 1 □ 1 □ 1 go to appropriate numbers
- No  □ 2 □ 2 □ 2 □ 2 go to question 12
- DK    □ 3 □ 3 □ 3 □ 3 go to question 12
a) Vaginal opening:
On a scale of 0 to 10, please rate the average intensity of the pain at the vaginal opening (past 6 months). _____ _____ _____ _____ N/A N/A N/A N/A
On a scale of 0 to 10, please rate the average degree of unpleasantness you experience because of this pain. _____ _____ _____ _____ N/A N/A N/A N/A

b) Everywhere on the vulva:
On a scale of 0 to 10, please rate the average intensity of the pain everywhere on the vulva (past 6 months). _____ _____ _____ _____ N/A N/A N/A N/A
On a scale of 0 to 10, please rate the average degree of unpleasantness you experience because of this pain. _____ _____ _____ _____ N/A N/A N/A N/A

c) Inside the vagina:
On a scale of 0 to 10, please rate the average intensity of the pain inside the vagina (past 6 months). _____ _____ _____ _____ N/A N/A N/A N/A
On a scale of 0 to 10, please rate the average degree of unpleasantness you experience because of this pain. _____ _____ _____ _____ N/A N/A N/A N/A

d) Pelvic or abdominal region:
On a scale of 0 to 10, please rate the average intensity of the pain in the pelvic or abdominal region (past 6 months). _____ _____ _____ _____ N/A N/A N/A N/A
On a scale of 0 to 10, please rate the average degree of unpleasantness you experience because of this pain. _____ _____ _____ _____ N/A N/A N/A N/A

27) On a scale of 0 to 10, please rate the average intensity of pain you experience during intercourse. _____

28) On a scale of 0 to 10, please rate the average degree of unpleasantness you experience during intercourse. _____

29) On a scale of 0 to 10, please rate the average intensity of pain you experience during non-intercourse penetrative activities. _____
30) On a scale of 0 to 10, please rate average degree of unpleasantness you experience during non-intercourse penetrative activities. _____

Administer the PCS-vulvar pain

Administer PDI

31) Since we last met, have you attempted to treat or alleviate the vulvar pain in any other way than the treatment you received in this study?

Yes □1 a. What treatments? __________________________________________________________
No □2

32) Up to what point do you feel your vulvar pain has improved following the treatment you received in this study?

Complete cure (no more pain) □1
Great improvement □2
Some improvement □3
Little improvement □4
No improvement □5 (→ question 20)
The pain is worse □6 (→ question 20)

33) Specifically, what aspects of the treatment do you believe helped you the most in terms of vulvar pain reduction? __________________________________________________________
___________________________________________________________________________
___________________________________________________________________________

34) Can you think of anything else—aside from the treatment you received in this study—that might have contributed to improve or eliminate your vulvar pain? ______________________
___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________
35) Do you feel the treatment was beneficial to you in aspects other than vulvar pain reduction (e.g., other pain reduction, stress reduction, relationship factors)?

Yes □1
No □2 (→ question 22)

a. If yes, in what way/s? _______________________________________________________
___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________

36) Specifically, what aspects of the treatment do you believe helped you the most in terms of these other aspects? __________________________________________________________
___________________________________________________________________________
___________________________________________________________________________

37) On a scale of 0 to 10, please rate your overall satisfaction with the treatment you received.

0 1 2 3 4 5 6 7 8 9 10
completely dissolved completely satisfied

Discontinue questionnaire

Notes:
Appendix R
Follow-Up Interview

Structured Interview

Pelvic Floor Physiotherapy Treatment Study

Telephone Post-Treatment Follow-Up

Subject Number ________________

Date of Interview ________________
PART A: Relationship History

1) Is your relationship status the same as when we last met?
   Yes □ 1  
   No □ 2

2) Which of the following best describes your current relationship situation?
   Single, not dating □ 1  
   Not dating any one person regularly □ 2  
   Dating one partner regularly □ 3  
   Dating one partner regularly—long distance □ 4  
   Living with a partner □ 5  
   Married □ 6  
   Common-law □ 7  
   Separated □ 8  
   Divorced □ 9  
   Widowed □ 10  
   Other □ 11 _____________________________

If currently in a relationship,  

3) How, if at all, do you think the treatment and/or the effects of the treatment in general have impacted your relationship to this point?
   Positively □ 1 Explain: _____________________________
   _____________________________
   _____________________________
   _____________________________
   _____________________________
   _____________________________
   _____________________________
   _____________________________
   _____________________________
   _____________________________
   _____________________________
   _____________________________
   _____________________________
   _____________________________
   _____________________________
   _____________________________
   _____________________________

   Negatively □ 2 Explain: _____________________________
   _____________________________
   _____________________________
   _____________________________
   _____________________________
   _____________________________
   _____________________________
   _____________________________
   _____________________________
   _____________________________
   _____________________________
   _____________________________
   _____________________________
   _____________________________
   _____________________________
   _____________________________
   _____________________________
   _____________________________
   _____________________________
   _____________________________
   _____________________________

   Had no impact □ 3

Notes:
PART B: Gynecological and Medical History

1) Have you changed your method(s) of contraception or brand of oral contraceptive since we last met?

Yes □1
No □2

   a. If yes, From _________________________ to __________________________

2) How many yeast infections have you had since we last met? _________
   a. What treatments did you use? ________________________________

3) Have you been diagnosed with any gynecological conditions since we last met?

   Yes □1
   No □2

   a. If yes, which one(s)?

      Chlamydia □1   Trichomoniasis □8
      Gardnerella vaginals □2   Bladder/urinary infections □9
      Genital Warts or HPV □3   Interstitial cystitis □10
      Gonorrhea □4   PID □11
      Genital herpes □5   Endometriosis □12
      HIV □6   Other _____________________ □13
      Syphilis □7   None □14

4) Have you undergone any gynecological surgeries/interventions since we last met?

   Yes □1
   No □2

227
228

a. **If yes, which one(s)?**

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hysterectomy</td>
<td>□1</td>
<td>□5</td>
</tr>
<tr>
<td>Curettage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laparoscopy</td>
<td>□2</td>
<td>□6</td>
</tr>
<tr>
<td>Abortion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ovariectomy</td>
<td>□3</td>
<td>□7</td>
</tr>
<tr>
<td>Other __________________</td>
<td>□7</td>
<td></td>
</tr>
<tr>
<td>Tubal Ligation</td>
<td>□4</td>
<td>□8</td>
</tr>
<tr>
<td>None</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5) **Are you currently pregnant?**

<table>
<thead>
<tr>
<th>Status</th>
<th>Yes</th>
<th>No</th>
<th>DK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>□1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>□2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DK</td>
<td>□3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6) **Have you experienced any changes in terms of your general medical health (e.g., diagnosis of pain disorder) since we last met?**

<table>
<thead>
<tr>
<th>Status</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>□1</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>□2</td>
<td></td>
</tr>
</tbody>
</table>

   a. **If yes, what?** ________________________________________________________________

   ________________________________________________________________

b. **Have you been taking medications because of this/these problems?**

<table>
<thead>
<tr>
<th>Status</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>□1</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>□2</td>
<td></td>
</tr>
</tbody>
</table>

7) **Have you been diagnosed with any psychiatric disorders since we last met?**

<table>
<thead>
<tr>
<th>Status</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>□1</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>□2</td>
<td></td>
</tr>
</tbody>
</table>
a. **If yes, which one(s)?** ______________________________________________________
___________________________________________________________________________

b. Have you been taking medications because of this/these problems?

Yes  □ 1 i. Which ones? ________________________________________________

No   □ 2

Notes:
PART C: Vulvar Pain Characteristics

1) Have you had or attempted sexual intercourse since we last met?

Yes □1
No □2

a. **If no**, how long has it been since you last had intercourse? _______________

b. **If no**, what is the reason that you have not had intercourse since we last met?

I have no partner at the moment □1
It hurts too much □2
I have no desire □3
I fear pain □4
I am too anxious □5
I don’t want penetration □6
My partner has erection problems □7
My partner has no desire □8
My partner is concerned about hurting me □9
The physiotherapist suggested that I do not attempt intercourse □10
Other (please specify: _____________________________)□11

2) Since we last met, have you regularly (i.e. once a month or more) experienced pain in your genital region during any of the following situations?

a. Sexual intercourse

Yes □1
No □2

b. Finger insertion

Yes □1
No □2
c. Inserting a tampon/feminine hygiene product
   Yes □ 1
   No □ 2

d. Partner stimulating you manually
   Yes □ 1
   No □ 2

e. Partner stimulating you orally
   Yes □ 1
   No □ 2

f. Masturbating alone
   Yes □ 1
   No □ 2

g. Removing a tampon/feminine hygiene product
   Yes □ 1
   No □ 2

h. Friction with clothing
   Yes □ 1
   No □ 2

i. Urinating in general
   Yes □ 1
   No □ 2

j. Urinating after intercourse
   Yes □ 1
   No □ 2

k. Sporting activity
   Yes □ 1 (please specify) ________________________________
   No □ 2

l. Pain not related to any specific activity
   Yes □ 1
   No □ 2

m. Other
n. If they do not report any pain with penetrative activities, so since we last met you have not had any regular vulvar pain due to any kind of penetrative activity?

Correct □ 1
Incorrect □ 2 Please explain __________________________________________________

If they only reported pain during intercourse, ask questions 3-7 only in relation to sexual intercourse and omit questions 11 and 12. If they only report pain during non-intercourse penetrative activities ask questions 3-7 only in relation to non-intercourse penetrative activities and omit questions 9 and 10.

3) Since we last met, approximately how many times per month have you attempted to have a) have intercourse? ______ b) have non-intercourse penetration? ______

4) During these attempts, approximately how many times have you succeeded in having entry a) and some penetration during intercourse? ______ b) during non-intercourse penetration? ______

5) During these attempts, approximately how many times have you been able to a) have intercourse to whatever you consider to be completion, without having to terminate due to pain? ______ b) complete the non-intercourse penetrative activity without having to terminate due to pain? ______

6) What percentage of a) sexual intercourse attempts was painful? ______ b) non-intercourse penetration was painful? ______

7) Where do you typically feel the pain during penetration? At the vaginal opening □ 1 Everywhere on the vulva □ 2

232
Inside the vagina □3
In the pelvic or abdominal region □4

8) **If chose only one location, proceed to the appropriate number.**
**If more than one pain,** can you differentiate among these different pains?

Yes □1 go to appropriate numbers
No □2 go to question 9
DK □3 go to question 9

a) Vaginal opening:
On a scale of 0 to 10, please rate the average intensity of the pain at the vaginal opening (past 6 months). ______  N/A
On a scale of 0 to 10, please rate the average degree of unpleasantness you experience because of this pain. ______  N/A

b) Everywhere on the vulva:
On a scale of 0 to 10, please rate the average intensity of the pain everywhere on the vulva (past 6 months). ______  N/A
On a scale of 0 to 10, please rate the average degree of unpleasantness you experience because of this pain. ______  N/A

c) Inside the vagina:
On a scale of 0 to 10, please rate the average intensity of the pain inside the vagina (past 6 months). ______  N/A
On a scale of 0 to 10, please rate the average degree of unpleasantness you experience because of this pain. ______  N/A

d) Pelvic or abdominal region:
On a scale of 0 to 10, please rate the average intensity of the pain in the pelvic or abdominal region (past 6 months). ______  N/A
On a scale of 0 to 10, please rate the average degree of unpleasantness you experience because of this pain. _______ N/A

9) On a scale of 0 to 10, please rate the average intensity of pain you experience during intercourse. ______

10) On a scale of 0 to 10, please rate the average degree of unpleasantness you experience during intercourse. ______

11) On a scale of 0 to 10, please rate the average intensity of pain you experience during non-intercourse penetrative activities. ______

12) On a scale of 0 to 10, please rate average degree of unpleasantness you experience during non-intercourse penetrative activities. ______

Administer the PCS-V

13) Since we last met, have you attempted to treat or alleviate the vulvar pain in any other way than the treatment you received in this study?

Yes □1 a. What treatments? ________________________________

No □2

14) Up to what point do you feel your vulvar pain has improved following the treatment you received in this study?

Complete cure (no more pain) □1
Great improvement □2
Some improvement □3
Little improvement □4
No improvement □5 (→ question 17)
The pain is worse □6 (→ question 17)

15) Specifically, what aspects of the treatment do you believe helped you the most in terms of vulvar pain reduction? ________________________________
16) Can you think of anything else—aside from the treatment you received in this study—that might have contributed to improve or eliminate your vulvar pain? ____________________________

____________________________

______________________________________________

17) Do you feel the treatment was beneficial to you in aspects other than vulvar pain reduction (e.g., other pain reduction, stress reduction, relationship factors)?

Yes □1
No □2 (→ question 19)

a. If yes, in what way/s? _______________________________________________________

______________________________________________

______________________________________________

18) Specifically, what aspects of the treatment do you believe helped you the most in terms of these other aspects? _______________________________________________________

______________________________________________

______________________________________________

19) On a scale of 0 to 10, please rate your overall satisfaction with the treatment you received.

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
</tbody>
</table>
completely dissatisfied | completely satisfied

Notes:

Administer the PASS
Administer the FSFI

Administer the GRISS to those in a relationship

Evelyne’s Follow-up Questions

1. Since we last met, what is the approximate frequency of intercourse attempts? (per week, per month, etc.) __________________________________________________________

2. Since we last met, what is the approximate frequency of non-intercourse vaginal penetration? __________________________________________________________

3. Since we last met, what is the average duration of penetrative activity? __________

4. Since we last met, what is the average pain of vaginal penetration? (0-10)________

5. Since we last met, what is the worst pain during vaginal penetration? (0-10)________

6. At the end of treatment, Evelyne provided you with a maintenance program. To what extent have you adhered to this program? _______%

7. a. Please describe what aspects of the program you have and have not maintained.
   ______________________________________________________________________
   ______________________________________________________________________
   ______________________________________________________________________
   ______________________________________________________________________
   ______________________________________________________________________

8. If still using the dilators, what is the average pain you are experiencing during insertion of the largest dilator you are using? (0-10) ___________ dilator size __________

9. If still using the dilators, what is the worst pain you are experiencing during insertion of the largest dilator you are using? (0-10) ___________ dilator size __________
## Appendix S

**Non-Parametric Test Results**

*Non-Parametric Tests Conducted on Analyses with Skewed Variables*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Time Period</th>
<th>Test</th>
<th>Test Statistic</th>
<th>n</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pre-Treatment to Post-Treatment Changes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure Pain Threshold*</td>
<td>PT (+)</td>
<td>WSR</td>
<td>( z = -2.59 )</td>
<td>13</td>
<td>.01</td>
</tr>
<tr>
<td>Percentage of Painful Intercourse Attempts*</td>
<td>PT (-)</td>
<td>WSR</td>
<td>( z = -2.55 )</td>
<td>11</td>
<td>.011</td>
</tr>
<tr>
<td>MPQ Pain Rating Index—Affective</td>
<td>AT (+)</td>
<td>WSR</td>
<td>( z = -1.22 )</td>
<td>11</td>
<td>.223</td>
</tr>
<tr>
<td>MPQ Present Pain Intensity</td>
<td>AT (-)</td>
<td>WSR</td>
<td>( z = -1.38 )</td>
<td>11</td>
<td>.168</td>
</tr>
<tr>
<td>Number of Monthly Intercourse Attempts*</td>
<td>AT (+)</td>
<td>WSR</td>
<td>( z = -2.38 )</td>
<td>12</td>
<td>.018</td>
</tr>
<tr>
<td>FSFI Arousal*</td>
<td>AT (-)</td>
<td>WSR</td>
<td>( z = -2.20 )</td>
<td>13</td>
<td>.028</td>
</tr>
<tr>
<td>FSFI Satisfaction*</td>
<td>AT (-)</td>
<td>WSR</td>
<td>( z = -2.33 )</td>
<td>13</td>
<td>.020</td>
</tr>
<tr>
<td><strong>Changes Across All Three Time Periods</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage of Painful Intercourse Attempts**</td>
<td>PT (-)</td>
<td>FR</td>
<td>( \chi^2 = 9.88 )</td>
<td>9</td>
<td>.007</td>
</tr>
<tr>
<td>Percentage of Activities Causing Pain**</td>
<td>FU (+)</td>
<td>FR</td>
<td>( \chi^2 = 9.77 )</td>
<td>10</td>
<td>.008</td>
</tr>
<tr>
<td>Number of Monthly Intercourse Attempts</td>
<td>AT (+)</td>
<td>FR</td>
<td>( \chi^2 = 3.31 )</td>
<td>10</td>
<td>.191</td>
</tr>
<tr>
<td>FSFI Arousal</td>
<td>AT (-)</td>
<td>FR</td>
<td>( \chi^2 = 2.57 )</td>
<td>10</td>
<td>.276</td>
</tr>
<tr>
<td>FSFI Satisfaction</td>
<td>AT (-)</td>
<td>FR</td>
<td>( \chi^2 = 4.63 )</td>
<td>10</td>
<td>.099</td>
</tr>
</tbody>
</table>

Note. MPQ = McGill Pain Questionnaire; FSFI = Female Sexual Function Index. PT = Pre-Treatment; AT = Post-Treatment; FU = Follow-Up; (+) = positive skew; (-) = negative skew. WSR = Wilcoxon signed-rank test; FR = Friedman rank test. * = significant at \( p < .05 \); ** = significant at \( p < .01 \).