

Psychophysiology of the Sexuality of Women with Lifelong Vaginismus:  
A Matched Controlled Thermography and Survey Investigation of Sexual Function,  
Behaviour, and Physiological Arousal

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## General Abstract

*Vaginismus* is defined as a persistent difficulty with vaginal entry, despite a woman's expressed wish, due to muscle tension, avoidance, and/or pain (Basson et al., 2003). The disorder is classified as a sexual dysfunction; however, there is a paucity of literature on the sexual response, sexual function, and sexual behaviour of women with vaginismus. This thesis research was designed to investigate the differential aspects of sexual health in women with lifelong vaginismus, compared to women with lifelong *dyspareunia* (pain with intercourse) and women with pain-free intercourse. In the first study, 45 women viewed erotic films, of which one set depicted penetration and the other did not. Physiological sexual arousal was assessed via thermography. Subjective responses to films were assessed with questionnaires. Despite significantly greater negative emotions and lower mental sexual arousal in response to erotic stimuli, women with vaginismus showed genital arousal comparable to the comparison groups. In the second study, 174 women completed an online survey. Women with vaginismus reported more sexual difficulties than the no-pain group and a restricted range of lifetime sexual behaviours and lower frequency of intercourse attempts/experiences than the comparison groups. Women with vaginismus and dyspareunia reported more anxiety during sexual activity and a restricted sexual behaviour repertoire in the previous year and month compared to the no-pain group. Women with vaginismus endorsed more negative cognitions related to penetration, specifically concerns about losing control of their body and the situation. The findings suggest that sexual function difficulties and restricted behavioural repertoire may be associated with negative emotions and maladaptive cognitions. Women with vaginismus may avoid encounters that could lead to intercourse. Alternatively, the negative response to sexual stimuli may be indicative of a more global negative response to sexuality beyond intercourse. The negative penetration-

related cognitions, negative responses to sexual stimuli, anxiety during sexual activity, and reduced range and frequency of sexual behaviours of women with vaginismus provide support for the Fear-Avoidance Model of Vaginismus. The impairment in sexual functioning supports the need to move beyond the singular treatment focus of making intercourse possible to an approach that addresses overall sexual rehabilitation.

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## General Introduction

*Sexual dysfunctions* involve a “disturbance in sexual desire and in the psychophysiological changes that characterize the sexual response cycle and cause marked distress and interpersonal difficulty” (American Psychiatric Association (APA), 2000, p. 535). These impairments in sexual functioning can have deleterious effects on quality of life, mental health, and couple functioning. Sexual pain disorders can be especially problematic as there is currently little information on etiology and effective treatment. Vaginismus is listed as one of the sexual pain disorders along with dyspareunia in the section for sexual dysfunctions in the DSM-IV-TR (APA, 2000). Women with vaginismus are unable to experience vaginal intercourse and are typically unable to undergo a standard gynecological examination or use a tampon (Reissing, Binik, Khalifé, Cohen, & Amsel, 2004).

Historically, the problem received relatively little research attention, but an increase in interest regarding the diagnosis, etiology, and treatment of vaginismus can be noted during the past decade. Despite being classified as a sexual dysfunction, however, there is still a significant paucity of empirical information on the sexual function, satisfaction, and response in women with vaginismus. This thesis research presents controlled research using both psychophysiological and questionnaire measures aimed at understanding the physiological and psychosexual correlates of sexuality in women with lifelong vaginismus.

### Historical Background

Vaginismus was first described by Trotula of Salerno, a female physician, in the eleventh century (1547/1940). She wrote of a “tightening of the vulva so that even a woman who has been seduced may appear a virgin” (p. 37) and indicated that this tightening could impede conception. The term *vaginismus* was introduced by Sims (1861), a gynecologist, who described symptoms similar to those noted by Trotula of Salerno: an involuntary spasm

of the vaginal entrance that prevents intercourse. He also noted hypersensitivity of the vulvo-vaginal area in women with vaginismus. He reported on the strong emotional reaction demonstrated by patients including crying, full-body shaking, and shrieking in response to attempted vaginal penetration. He proposed surgical treatment to enlarge the introitus followed by the use of dilators. The term vaginismus was adopted by other physicians, and physical and psychosocial causes were considered as possible etiological factors (Atkinson, 1880; Thorburn, 1885). For example, Faure and Sireday (1923) perceived vaginismus to be a reflexive muscle contraction resulting from hypersensitivity of the genitals, often due to vulvo-vaginal lesions or genital pain conditions, in conjunction with an “excitable nervous system.” Other potential causes that were discussed included a painful first intercourse experience and negative childhood experiences, such as forced enemas and suppositories (Malleon, 1942).

A psychoanalytic explanation of vaginismus was described by Fenichel (1945), who proposed that vaginismus was a conversion symptom. According to this conceptualization, vaginismus served to prevent sexual experiences, could be a form of penis envy, or a manifestation of hostility towards a partner. Vaginismus was considered part of a female castration complex and desire to retain the partner’s penis. In Abraham’s (1956) psychoanalytic view, vaginismus was described as a form of punishment in response to hostility towards a partner. Women with vaginismus were either libidinally fixated on their father, or had a strong attachment to their mother.

The potential etiological role of interpersonal relations began to receive more attention from researchers in the 1960s. A passive husband and unhappy family relationships were discussed as possible causes (Dawkins & Taylor, 1961; Ellison, 1968; Friedman, 1962). Other possible causes were ignorance, misinformation, and sexual guilt leading to

fear of pain or punishment and a subsequent physical defensive reaction consisting of a contraction of the vaginal muscles (Ellison, 1968; Ellison, 1972). Masters and Johnson (1970) also focused on psychological and social causes, such as male sexual dysfunction, religious orthodoxy, sexual trauma, and a homosexual orientation. They perceived vaginismus as a psychophysiological syndrome that was a reflex response to anticipated or attempted vaginal penetration and their treatment targeted the muscle contraction that prevented intercourse. The conceptualization of vaginismus as a conditioned response was further elaborated by Kaplan (1974). She believed that the response was due to the association of pain or fear with penetration. A multitude of factors could cause pain or fear to be associated with penetration, such as past negative experiences with vaginal penetration (e.g. gynecological examinations, sexual trauma), physical pathology, a lack of information about sex, or a conservative background. Kaplan placed emphasis on emotional distress, noting that women with vaginismus often have a phobia of intercourse and vaginal penetration.

The historical literature included few references to the sexual behaviour and the presence of other sexual dysfunctions experienced by women with vaginismus. The most common mention of sexual behaviour was negative first intercourse experience as an etiological factor (Faure & Sireday, 1923; Huhner, 1937). Other discussions of sexual behaviour were limited to masturbation as a possible cause of vaginismus due to the putative physical irritation and “nervous depression” caused by self-stimulation (Ashton, 1912), or masturbation as a possible outcome of vaginismus (Huhner, 1937). Any sexual excitement was to be avoided during treatment (Ashton, 1912; Faure & Sireday, 1923). Women with vaginismus were assumed to have other sexual difficulties (Malleon, 1942), although “clitoral” orgasm was usually possible (Malleon, 1954). In some cases it was thought that

low sexual desire contributed to the disorder, although it was acknowledged that some women with vaginismus had strong sexual feeling (White, Cook, & Gilliat, 1949).

Historically, there were no empirical studies and little consensus on the sexual behaviour and concurrent sexual dysfunctions in women with vaginismus.

### **Diagnosis**

Vaginismus was not included in the first version of the Diagnostic and Statistical Manual (DSM; APA, 1952). In the second edition of the Diagnostic and Statistical Manual (DSM-II; APA, 1968), sexual difficulties were subsumed under the category of psychophysiologic disorders, which involved physical symptoms precipitated by emotional factors. The category of psychophysiological genito-urinary disorders included dyspareunia (pain with intercourse), but vaginismus was not explicitly mentioned. Vaginismus was first included in the DSM-III (APA, 1980) where it was defined as a vaginal spasm that interfered with intercourse and listed as a psychosexual dysfunction along with dyspareunia. In the DSM-III-R (APA, 1987) both problems were combined in a sexual pain disorder category within sexual dysfunctions and were diagnostically exclusive.

Since DSM-III-R, the singular diagnostic criterion for vaginismus has been a recurrent or persistent involuntary spasm of the musculature of the outer third of the vagina that interferes with coitus; and, for dyspareunia, coitus that is associated with recurrent or persistent genital pain, in either the male or the female. Specifiers indicate that vaginismus and dyspareunia can be present lifelong or can be acquired after a period of problem-free sexual functioning. Both sexual pain disorders can be situational or generalized. These diagnostic criteria have been retained and are similar in other nosologies (American College of Obstetricians and Gynecologists (ACOG), International Statistical Classification of Diseases and Related Health Problems, Tenth Revision (ICD-10); see Reissing et al., 1999,

for review). DSM-IV (APA, 1994) and DSM-IV-TR (APA, 2000) maintained the key diagnostic criterion for vaginismus without change but added that significant distress or interpersonal difficulty were necessary for a diagnosis.

The prevalence rate for vaginismus in the general population is reported at 0.5-1%, but the research to determine these rates is not considered epidemiologically sound and these rates are generally considered an underestimation of the problem (Simons & Carey, 2001). The prevalence of dyspareunia in the general population has been reported ranging from 3-18% (Simons & Carey, 2001).

The diagnoses of both dyspareunia and vaginismus have received considerable attention and criticism recently, and the overlap on several dimensions including pain and muscle tone has been described (de Kruiff, ter Kuile, Weijnenborg, & van Lankveld, 2000; Engman, Lindehammar, & Wijma, 2004; Reissing et al., 2004; van Lankveld, Brewaeys, ter Kuile, & Weijnenborg, 1995). The DSM-IV-TR criteria for vaginismus have not been empirically supported (Reissing et al., 2004) and there is a paucity of data to support the development of a new, independent category for vaginismus (Binik, 2010). An alternative description of vaginismus was developed by an international multidisciplinary committee, indicating that vaginismus involves “persistent difficulties to allow vaginal entry of a penis, finger, and/or any object, despite the woman’s expressed wish to do so” (Basson et al., 2003, p. 226). In the DSM-5, the diagnoses of vaginismus and dyspareunia are likely to be replaced by a new diagnosis of Genito-Pelvic Pain/Penetration Disorder (GPPPD) that encompasses the symptoms of vaginismus and dyspareunia (Binik, 2010). Criteria would include:

- A) Persistent or recurrent difficulties for 6 months or more with at least one of the following:

1. Inability to have vaginal intercourse/penetration on at least 50% of attempts
2. Marked genito-pelvic pain during at least 50% of vaginal intercourse/penetration attempts
3. Marked fear of vaginal intercourse/penetration or of genito-pelvic pain during intercourse/penetration on at least 50% of vaginal intercourse/penetration attempts
4. Marked tensing or tightening of the pelvic floor muscles during attempted vaginal intercourse/penetration on at least 50% of occasions

B) The disturbance causes marked distress or interpersonal difficulty

Clinicians are to specify if a general medical condition is present.

This modification of the diagnostic criteria may be premature as there is a lack of consensus within the research field on whether vaginismus and dyspareunia should indeed be considered as distinct diagnoses or similar disorders on a continuum (Binik, 2010; Reissing, 2009; ter Kuile & Reissing, in press; ter Kuile, van Lankveld, Vlieland, Willekes, & Weijnenborg, 2005; Weijmar Schultz & van de Wiel, 2005). Thus, it will remain important to investigate vaginismus and dyspareunia separately in order to determine whether they differ along categorical dimensions that have not been explored (such as sexual function and behaviour) or to provide evidence for dimensional differences thus supporting the new category of GPPPD.

### **Sexual Function**

Although vaginismus is classified as a sexual dysfunction, there is very little understanding regarding whether the sexual health of women with vaginismus is different from other women in general and/or from women with sexual dysfunctions or dyspareunia specifically. In this thesis, the term *sexual function* encompasses sexual desire, arousal, lubrication, orgasm, and satisfaction. It is also unclear whether the sexual function and

behaviour of women with vaginismus is unimpaired as long as penetration is not attempted, as described in the DSM-IV-TR. There is evidence that both supports and refutes that women with vaginismus have impaired sexual function (see Table 1). Studies supporting that sexual function is unimpaired will first be discussed, followed by studies indicating that sexual function is impaired, and then the results of inconclusive studies will be presented.

**Unimpaired sexual function.** Several reports suggest that the sexual function of women with vaginismus is unimpaired. According to clinical reports and case studies, women with vaginismus can experience arousal, lubrication, and orgasm (Burchardt & Catalan, 1982; Cooper, 1969; Ellison, 1972; Kaplan, 1974; Leiblum, Pervin, & Campbell, 1989; Stuntz, 1986; Wijma & Wijma, 1997). In some empirical studies, women with vaginismus were found to have relatively good sexual functioning or better sexual functioning compared to a control group (Duddle, 1977) and compared to women with other sexual dysfunctions (Hawton & Catalan, 1990). An investigation comparing 32 women with vaginismus to 50 women seeking information on contraception found that women with vaginismus were more likely to report having experienced an orgasm before marriage, whether through masturbation, dreams, or “petting” (Duddle, 1977). The vaginismus group was 1.6 years older and it unclear whether this age difference was significant. These results suggest that the sexual function of women with vaginismus may not be impaired during non-penetrative sexual activity. As part of a treatment outcome study, Hawton and Catalan (1990) compared the characteristics of 30 couples with vaginismus entering sex therapy to those of 76 couples with other female sexual dysfunctions. The findings indicate that, prior to treatment, women with vaginismus were more interested in sex, had increased sexual arousal and pleasure, and less sexual aversion relative to women with other sexual

Table 1

*Review of Research Investigating Sexual Function in Vaginismus*

Study	Participants	Vaginismus Criteria and Diagnosis	Sexuality Measures	Findings	Study Objective	Conclusion about sexual function	Notes
Basson, 1996 (Canada)	60 lifelong vaginismus	Criteria not described; Diagnosis through sexual history taking	Unspecified	45% low desire, 90% sexually healthy before attempting intercourse, “Insufficient” lubrication: 40% of women with vaginismus and PVD, 13% of women with vaginismus alone	Etiology, Determine co-morbid conditions	Unclear – no normative group	2,3,4
Ben-Zion et al., 2007 (Israel)	32 vaginismus	DSM-IV criteria; Diagnosis through chart review	Chart data	6.25% reported lack of enjoyment, low sex drive, orgasmic difficulties	Treatment outcome	Unclear – no normative group	2,4,5
Borg et al., 2011 (Netherlands)	24 lifelong vaginismus 24 lifelong/acquired dyspareunia 32 controls	Criteria: based on Basson (2004); Diagnosis: gynecological exam, semi-structured interview, physical exam	GRISS	Vaginismus (vs. controls): Less satisfaction/ more impairment; Same as dyspareunia	Etiology (examined disgust)	Impaired	1

Dogan, 2009 (Turkey)	36 lifelong vaginismus	DSM-IV-TR criteria; Diagnosis by sexual history taking, diagnostic interview, gynecological exam	Interview on sexual function  GRISS (vaginismus subscale)	47.2% dyspareunia 22.2% orgasmic disorder 16.6% sexual desire disorder  GRISS dysfunctional: vaginismus	Prevalence of sexual dysfunctions, Comorbidity of sexual dysfunctions	Impaired on GRISS vaginismus subscale  Other aspects of function: Unclear – no controls	2 (for majority of results), 3,4
Duddle, 1977 (United Kingdom)	32 vaginismus 50 women seeking contraceptive advice	Criteria not described; Method of diagnosis unknown	Interview	Vaginismus (vs. controls): ↑ orgasm before marriage	Examine orgasmic capacity and personality traits	Unimpaired	2
Hawton & Catalan, 1990 (United Kingdom)	30 vaginismus 76 controls (60 low sexual interest, 8 orgasmic dysfunction, 4 dyspareunia, 4 other)	Criteria not described; Couples take part in assessment interview; Method of diagnosis unclear	Interview; Relationship Questionnaire; Pleasant- Unpleasant Feelings Questions (feelings evoked by five sexual situations)	Vaginismus (vs. controls): ↑ interest in sex ↑ sexual arousal ↑ sexual pleasure ↓ sexual aversion Better communication during sexual activity 90% had experienced orgasm	Describe treatment seekers, Treatment outcome and predictors	Unimpaired	Unclear whether measures are standardized; Inappropriate control group (consisted primarily of women with low sexual interest)

Kabakçı & Batur, 2003 (Turkey)	28 lifelong vaginismus	DSM-IV criteria; Method of diagnosis unclear	GRISS	GRISS dysfunctional: Avoidance Sensuality Vaginismus Infrequency Total	Treatment outcome and predictors	Impaired	1, 4, 5
Lamont, 1978 (Canada)	80 “vaginismus” (lifelong or acquired apareunia (unconsummated relationship), lifelong vaginismus, lifelong or acquired dyspareunia)	Criteria: difficult, painful, or impossible vaginal penetration; Diagnosis by referral information, physical exam, sexual history taking, attitude assessment	Unspecified	69% reported orgasm before treatment 14% developed orgasmic difficulty after difficulties with penetration	Treatment outcome	Unclear - no normative group	2, 3, 4, heterogeneous group
Munasinghe et al., 2004 (Sri Lanka)	56 vaginismus (52 lifelong, 4 acquired)	Criteria not described; Interviews for symptoms, sexual history; unclear if this was how diagnosis was obtained	Interview	66% anorgasmic 18% other sexual dysfunctions (e.g., desire, aversion)	Describe vaginismus, treatment outcome	Impaired	2,3,4

Reissing et al., in press (Canada)	12 lifelong vaginismus post-treatment	Criteria: never experienced full intercourse; Diagnosis by history taking	FSFI	Vaginismus (vs. normative group): ↓ total score ↓ desire ↑ problems with lubrication ↓ sexual satisfaction	Treatment outcome	Impaired	None
Reissing et al., 2003 (Canada)	29 lifelong vag 29 lifelong/acquired PVD (dyspareunia) 29 pain-free controls	Criteria: unable to have intercourse, 10 attempts; OR, unable to have intercourse with 2 attempts, and active avoidance of penetration, OR, unable to have intercourse and active avoidance for 1 year, penetration before this period; Diagnostic interview	Sexual History Form	Vaginismus = PVD on these measures Vaginismus and PVD (vs. pain-free controls): ↓ desire ↓ pleasure ↓ arousal	Etiology	Impaired	1
Scholl, 1988 (United States)	20 lifelong vaginismus	Criteria not described; Diagnosis by sexual history taking, physical exam	Interview/ history taking	70% orgasmic before treatment	Determine prognostic variables, treatment outcome	Unclear – no normative group	2, 3, 4

Seo et al., 2005 (Korea)	12 lifelong vaginismus	Criteria: DSM criteria and all attempts at penetration failed and physical exam causes spasm of vaginal sphincter and adduction of thigh; Diagnosis by physical exam, interview	Interview	25% arousal disorder 16.7% desire disorder	Treatment outcome	Unclear – no normative group	2, 3, 4
Silverstein, 1989 (United States)	22 lifelong vaginismus	Criteria not described; Method of diagnosis unclear	Chart review	72.7% orgasmic	Etiology	Unclear – no normative group	2,3,4
ter Kuile et al., 2005 (Netherlands)	91 lifelong vaginismus 84 superficial dyspareunia (50% lifelong)	Criteria: never experienced penile entry of the vagina Score of 10-20 on vaginismus subscale of GRISS; Diagnosis by score on GRISS, other methods of diagnosis unclear	GRISS	Vaginismus (vs. dyspareunia): ↑ vaginismus, but both groups in dysfunction range Total score: No group difference, both dysfunctional	Prevalence of PVD in women with vaginismus	Impaired	1

ter Kuile et al., 2007 (Netherlands)	117 lifelong vaginismus	DSM-IV-TR criteria; Diagnosis by sexual history taking	GRISS FSFI (excluded pain subscale)	GRISS dysfunctional: sexual avoidance sexual dissatisfaction FSFI: no differences between treatment responders and non-responders; normative data not presented	Prognostic factors, treatment outcome	Impaired	4, 5
ter Kuile et al., 2009 (Netherlands)	10 lifelong vaginismus	Criteria: never had full intercourse; Diagnosis by sexual history taking	GRISS (Vaginismus subscale and total score minus vaginismus subscale)	Posttreatment (vs. pre-treatment): ↓ vaginismus subscale No change on total score (5/10 women had scores in normal range pre-treatment)	Treatment outcome	Unclear	1, 4, 5
Tuğrul & Kabakçı, 1997 (Turkey)	40 vaginismus	Criteria not described; Method of diagnosis unclear	GRISS	GRISS dysfunctional: Vaginismus Non-sensuality Avoidance Frequency Total	Predictor variables	Impaired	1,3,4
van Lankveld et al., 1995 (Netherlands)	50 vaginismus 46 dyspareunia 51 mixed pain disorder (vaginismus and dyspareunia)	DSM-III-R criteria; Diagnostic interview, physical exam	Interview	No group differences: Sexual desire Orgasm Lubrication Arousal	Predictors of vaginismus	Impaired	2

van Lankveld et al., 2006 (Netherlands)	117 lifelong vaginismus	DSM-IV-TR criteria; Diagnosis by sexual history taking	FSFI	Vaginismus (vs. normative sample): ↓ desire ↓ arousal ↓ lubrication ↓ orgasmic function ↓ sexual satisfaction	Treatment outcome	Impaired	None
Ward & Ogden, 1994 (United Kingdom)	89 vaginismus (22 cured)	Criteria not described; Method of diagnosis unknown	Unstandardized questionnaires	65.2% enjoy sex with partner despite no penetration 46.1% avoid sexual activity with partner	Explore feelings, experiences, cognitions of women with vaginismus	Unclear – no normative group	2,3,4
Yasan & Akdeniz, 2009 (Turkey)	44 lifelong vaginismus	Criteria not described; Method of diagnosis unknown	Unstandardized questionnaires	52.3% comorbid disorder 29.5% orgasmic disorder 27.3% desire disorder 15.9% sexual avoidance 9.1% sexual arousal disorder	Treatment outcome	Unclear – no normative group	2,3,4

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*Note.* 1. Measure does not distinguish between difficulties with penetration and non-penetrative activities; 2. no standardized sexual function measure; 3. no control group; 4. no formal statistical analyses comparing vaginismus and controls (or normative group) on sexuality measures; 5. only within group comparison (vaginismus treatment responders vs. non-responders). PVD = provoked vestibulodynia (sharp, burning pain at entrance of vagina provoked by touch or pressure); GRISS = Golombok Rust Inventory of Sexual Satisfaction; FSFI = Female Sexual Function Index.

dysfunctions (low sexual interest, orgasmic disorder, dyspareunia, and ‘other’ (not specified); Hawton & Catalan, 1990). However, the comparison group was composed of women who, with the exception of those with dyspareunia, had sexual dysfunctions characterized by difficulties with sexual response and would therefore be expected to have difficulty with sexual desire, arousal, and orgasm. Another study reported that the sexual function of 50 women with vaginismus was similar to that of 46 women with dyspareunia and those with ‘mixed pain disorder’ (vaginismus and dyspareunia;  $n = 51$ ; van Lankveld et al., 1995) as there were no significant differences on desire, arousal, orgasm, and lubrication. A third of the women with vaginismus reported no other sexual complaints (van Lankveld et al., 1995).

**Impaired sexual function.** A number of more recent reports indicate that women with vaginismus are likely to experience lower sexual functioning, lower sexual satisfaction, and other types of sexual difficulties (Reissing, Binik, Khalifé, Cohen, & Amsel, 2003; ter Kuile et al., 2007; Weijmar Schultz & van de Wiel, 2005). A number of studies discuss the prevalence of sexual difficulties reported by women with vaginismus, but exclude comparison data from a control group. These sexual difficulties include problems with desire, arousal, orgasm, satisfaction, avoidance, and aversion (Basson, 1996; Ben-Zion, Rothschild, Chudakov, & Aloni, 2007; Lamont, 1978; Munasinghe, Goonaratma, & de Silva, 2004; Scholl, 1988; Seo, Choe, Lee, & Kim, 2005; Silverstein, 1989; Ward & Ogden, 1994; Yasan & Akdeniz, 2009). However, without the inclusion of control groups in these studies the interpretation of the results is unclear.

Nine studies have examined the sexual function of women with vaginismus using validated measures, including the Golombok Rust Inventory of Sexual Satisfaction (GRISS), Sexual History Form, and Female Sexual Function Index (FSFI). Norms have been

established for the GRISS and FSFI, enabling researchers to interpret the scores in the absence of a control group.

The GRISS is a measure of sexual function and satisfaction. The total mean scores of women with vaginismus indicated impaired sexual function (Kabakçi & Batur, 2003; ter Kuile et al., 2005; ter Kuile et al., 2009; Tuğrul & Kabakçi, 1997) and were similar to the total scores of women with dyspareunia (Borg, de Jong, & Weijmar Schultz, 2011; ter Kuile et al., 2005). In a study that included control groups, women with vaginismus and dyspareunia reported less satisfaction and more sexual difficulties compared to women without sexual complaints (Borg et al., 2011). Specifically, women with vaginismus score in the impaired range on the vaginismus (Dogan, 2009; Kabakçi & Batur, 2003; Tuğrul & Kabakçi, 1997; ter Kuile et al., 2005), sexual avoidance (Kabakçi & Batur, 2003; ter Kuile et al., 2007; Tuğrul & Kabakçi, 1997), dissatisfaction (ter Kuile et al., 2007), frequency (Kabakçi & Batur, 2003; Tuğrul & Kabakçi, 1997), and non-sensuality subscales (Kabakçi & Batur, 2003; Tuğrul & Kabakçi, 1997). However, findings of impairment may be compromised by the focus on intercourse in this measure. For example, one infrequency item asks, “Do you have intercourse more than twice a week?” which would not be applicable to women with vaginismus. The subscales of infrequency, satisfaction, and orgasm include at least one item that refers to “sex” or “intercourse”. As the respondents in these studies are unable to have intercourse, the subscale scores of women with vaginismus would be more likely to indicate dysfunction compared to women who are able to experience intercourse unless the participant interprets the questions differently or was instructed to do so. Despite the inclusion of an intercourse-related item, the anorgasmia subscale score was within the normal range (albeit near the impaired range), suggesting that

orgasm may not be impaired in women with vaginismus (Kabakçi & Batur, 2003; Tuğrul & Kabakçi, 1997).

The Sexual History Form assesses sexual functioning. Reissing and colleagues (2003) reported that women with vaginismus or dyspareunia had a lower level of sexual functioning relative to a control group of women who had neither pain nor difficulties with vaginal penetration. The women were matched on age, parity, and relationship status. The women in the no-pain group reported more sexual desire, pleasure, arousal, and self-stimulation. However, the measure did not distinguish between penetrative and non-penetrative problems; thus, it is unknown whether the overall lower level of sexual functioning in the women with vaginismus only applies to penetrative sexual activities.

In a study using the FSFI, a measure evaluating sexual function in the context of either intercourse or sexual activity, women with vaginismus were found to have lower desire, arousal, lubrication, orgasm, and satisfaction compared to a normative group (van Lankveld et al., 2006). Women with vaginismus who had completed treatment and were able to engage in intercourse continued to report difficulties with desire, lubrication, satisfaction, and pain (Reissing, Armstrong, & Allen, in press). Given that this measure does not use biased language, these results provide support that women with vaginismus have impaired sexual function.

The studies using validated measures suggest that the sexual function of women with vaginismus is impaired. However, the results from the GRISS and Sexual History Form may be biased due to their focus on penetrative sexual activity and may overestimate sexual difficulties. The FSFI is a more appropriate measure for women with vaginismus and studies using this measure (Reissing et al., in press; van Lankveld et al., 2006) found that women with vaginismus have difficulties with sexual function that extend beyond the inability to

have penetration. It is unclear whether sexual problems are the result of vaginismus interfering with sexual response (Basson, 1996; Ellison, 1968; Hiller, 2000; Lamont, 1978), or co-morbid sexual complaints that are typical for all sexual dysfunction (e.g., Fugl-Meyer & Fugl-Meyer, 2002).

It is unknown whether age of onset and the length of duration of difficulties with vaginal penetration in women with vaginismus would affect sexual function and satisfaction as no research has addressed this question. Research with women with a specific type of dyspareunia, provoked vestibulodynia (PVD; sharp, burning pain at the entrance of the vagina provoked by pressure), found no difference in sexual function as measured by the FSFI in women with lifelong or acquired PVD (Sutton, Pukall, & Chamberlain, 2009). However, the two groups reported a similar duration of pain with intercourse. Another study found that women with lifelong PVD are more likely to be single compared to women with acquired PVD, although the difference in relationship status could also be due to the age difference between the groups as the lifelong group was also five years younger (Bornstein, Maman, & Abramovici, 2001). Thus, the relationship between duration of vulvar pain and sexual function and satisfaction are unclear, providing little guidance for hypothesizing the relationship between duration of vaginismus and sexual function and satisfaction.

**Summary on sexual function.** The available literature on the sexual function of women with vaginismus offers mixed findings. A few reports support that women with vaginismus experience unimpaired sexual function, including the DSM description of vaginismus; however, the majority of recent findings provide evidence that sexual function is impaired beyond difficulties with vaginal penetration. Measurement issues complicate the interpretation of findings as a commonly used measure, the GRISS, may present with an inherent bias of intercourse-focused wording. Ten out of 19 studies were treatment studies

not intended to investigate etiology or sexual function and conclusions are speculative and based on a selected sample (Ben-Zion et al., 2007, Hawton & Catalan, 1990; Kabakçi & Batur, 2003; Lamont, 1978; Munasinghe et al., 2004; Scholl, 1988; Seo et al., 2005; ter Kuile et al., 2007; van Lankveld et al., 2006; Yasan & Akdeniz, 2009). Many studies did not include formal measures on sexual function (Basson, 1996; Ben-Zion et al., 2007; Duddle, 1977; Hawton & Catalan, 1990; Lamont, 1978; Munasinghe et al., 2004; Scholl, 1988; Seo et al., 2005; Silverstein, 1989; van Lankveld et al., 1995; Ward & Ogden, 1994; Yasan & Akdeniz, 2009), comparison groups (Basson, 1996; Dogan, 2009; Lamont, 1978; Leiblum et al. 1989; Munasinghe et al., 2004, Scholl, 1988; Seo et al., 2005; Silverstein, 1989; Tuğrul & Kabakçi, 1997; Ward & Ogden, 1994; Yasan & Akdeniz, 2009), or formal statistical analyses on sexuality measures (Basson, 1996; Ben-Zion et al., 2007; Dogan, 2009; Kabakçi & Batur, 2003; Lamont, 1978; Munasinghe et al., 2004; Scholl, 1988; Seo et al., 2005; Silverstein, 1989; ter Kuile et al., 2007; Tuğrul & Kabakçi, 1997; Ward & Ogden, 1994; Yasan & Akdeniz, 2009). Other studies only conducted comparisons between responders and non-responders to treatment (Ben-Zion et al., 2007; Kabakçi & Batur, 2003; ter Kuile et al., 2007). The studies with better methodological parameters indicate that women with vaginismus do indeed present with overall impaired sexual function but little agreement is available on which specific aspects of the sexual response may be impaired and under which circumstances, in particular with regard to penetration being anticipated or attempted.

### **Sexual Behaviour Repertoire**

As women with vaginismus appear to experience sexual difficulties, their sexual behaviour may also be affected. In addition, as vaginismus is marked by anxiety and avoidance of intercourse (Reissing et al., 2004), it suggests that women with vaginismus

may also avoid other sexual behaviours. There is a remarkable paucity of research on vaginismus and sexual behaviour other than intercourse in the literature.

**Unaffected sexual behaviour.** Despite difficulties with vaginal penetration, some women with vaginismus have been reported to enjoy non-penetrative sexual activity (Kaplan, 1974; Lamont, 1994) and can experience arousal, lubrication and orgasm with activities that exclude vaginal penetration (Harrison, 1996; Leiblum et al., 1989; Silverstein, 1989). They may seek clitoral stimulation and their sexual repertoire might include manual stimulation, rubbing their genitals against a partner's body, oral-genital contact, and coitus interfemora (Blazer, 1964; Burchardt & Catalan, 1982, Dawkins & Taylor, 1961; Ellison, 1968; Ellison, 1972; Gottesfeld, 1978; Leiblum & Rosen, 1989; Plaut & RachBeisel, 1997). However, little empirical information is available in the literature, and the reports that suggest that the sexual behaviour of women with vaginismus is unaffected are case studies or successful treatment outcome reports with significant methodological shortcomings. For example, one study reported a non-significant trend that 53% of women with vaginismus had masturbated compared to 37% of controls, but the control group was composed of women with other sexual dysfunctions, primarily women with low sexual interest who would presumably have little drive to self-stimulate due to low desire (Hawton & Catalan, 1990). One study in Sri Lanka found that 75% of their sample reported three to four attempts at sex a week. However, 27% of their sample was composed of women with "mild first degree vaginismus" which may be "relieved through reassurance" (Lamont, 1978) and 50% with "moderate" vaginismus, so it is unclear whether the results apply to all women with vaginismus, or only those with lesser impairment (Munasinghe et al., 2004).

**Affected sexual behaviour.** In contrast, more methodologically robust studies found that women with vaginismus reported a lower frequency of attempted penetrative sexual

activities compared to other women. In an empirical study on diagnostic differentiation between vaginismus and dyspareunia, Reissing and colleagues (2004) noted spasm and pain did not distinguish between women with vaginismus and dyspareunia. However, avoidance of all activities related to vaginal penetration (e.g., intercourse, gynecological examinations, tampon insertion) was noted only in women with vaginismus. The pain-free control group reported the highest number of intercourse attempts/experiences in the previous six months, followed by women with dyspareunia, and women with vaginismus reported the least number of attempts (Reissing et al. 2004). These findings have been supported by other studies (e.g., Engman et al., 2004), including a report that women with vaginismus endorse higher levels of fear of coitus compared to women without sexual difficulties (ter Kuile et al., 2007).

Other evidence suggests that the lower frequency of sexual behaviour extends to non-penetrative activity. One study found that women with vaginismus and dyspareunia reported similar levels of self-stimulation, which were significantly lower than those of a pain-free control group (Reissing et al., 2003). Women with vaginismus have endorsed higher levels of fear of non-coital sexual activity and less willingness to perform a range of sexual acts compared to women without sexual difficulties (Borg et al., 2011; ter Kuile et al., 2007).

**Mixed results.** Other studies present information on the sexual behaviour of women with vaginismus, but without formal measures or operationalization of variables and no control data for comparison the interpretation of the results is compromised. In one study, 81% of women with vaginismus reported having masturbated at some point in their life, and 11 reported a medium or high frequency of self-stimulation (Ben-Zion et al., 2007). However, in terms of the frequency of sexual activity, none of the women reported a high level of sexual activity and 69% reported a low level. It was not reported whether sexual

activity included only partnered activity. In a sample of Turkish women, the mean frequency of sexual activity (which included caressing, foreplay, and intercourse attempts) in a four-week period was 16 ( $SD = 11$ ; Dogan, 2009). A treatment study reported that 94% couples with vaginismus were sexually active, but the frequency and types of sexual behaviours were not reported (Harrison, 1996). These results suggest that women with vaginismus have sexual contact with their partners, but it is not known how this level of sexual activity compares to that of women without pain.

**Summary of sexual behaviour.** Based on the more methodologically sound reports, it appears that women with vaginismus may present with a limited range of sexual activities and may engage in non-coital sexual activity less frequently than women with dyspareunia and women with no sexual problems. However, no study has directly evaluated the sexual repertoire and frequency of women with vaginismus compared to a control group.

### **Sexual Response to Erotic Stimuli**

Although there are few data on the self-reported sexual function and behaviour of women with vaginismus, there is even less information on their response to erotic stimuli. No laboratory studies have examined the physiological sexual response of women with vaginismus and few have explored their subjective emotional responses to erotic stimuli. Therefore, it is unknown whether women with vaginismus respond with sexual arousal to erotic stimuli.

It is important to explore both physiological and subjective aspects of arousal as female sexual response results from a complex interaction between physiological and subjective components (e.g., Basson et al., 2003; Peterson & Janssen, 2007). Many women demonstrate a remarkable discordance between ratings of subjective and physiological sexual arousal (e.g., Brauer, Laan, & ter Kuile, 2006; Chivers, Seto, Lalumière, Laan, &

Grimbos, 2010; Palace & Gorzalka, 1990). Although women's physiological arousal typically increases during the viewing of a wide range of erotic stimuli, higher levels of physiological arousal are not necessarily related to higher levels of subjective sexual arousal. Women may demonstrate increased physiological sexual arousal while reporting low or no subjective sexual arousal, or even negative affect such as disgust, making the use of dual measures essential for the assessment of sexual response (Laan, Everaerd, van Bellen, & Hanewald, 1994; Morokoff & Heiman, 1980).

**Subjective sexual arousal.** Recent research indicates that women with vaginismus may experience cognitive and emotional factors that affect how sexual stimuli and situations are processed and/or experienced. Women with vaginismus report more concerns about loss of control during penetration, self-image as it relates to penetration, catastrophic and pain-related cognitions, and thoughts about genital incompatibility compared to women with dyspareunia and women without sexual complaints (Klaassen & ter Kuile, 2009; Reissing, 2012). These maladaptive cognitions might be linked to negative emotions, such as fear, which are endorsed by women with vaginismus. Women with vaginismus report more fear when thinking about intercourse and non-coital penetrative sexual activity (ter Kuile et al., 2007).

Investigation into the subjective responses of women with vaginismus to erotic stimuli also indicates differences on emotional factors, with greater reported levels of negative emotions. Women with vaginismus endorsed higher levels of disgust, threat, and annoyance, and lower levels of pleasant feelings in response to erotic slides and films depicting intercourse, compared to women with dyspareunia and women without sexual complaints (Borg, de Jong, & Weijmar Schultz, 2010; de Jong & Peters, 2009). Another study found that women with vaginismus tended to provide positive automatic affective

appraisals of pictures depicting vaginal penetration compared to neutral pictures; however, when women with vaginismus deliberately rated these stimuli, the appraisals were more negative than those of women with dyspareunia or women without sexual complaints (Huijding, Borg, Weijmar-Schultz, & de Jong, 2011). Women with vaginismus also demonstrated increased activity in the facial levator labii muscle while viewing an erotic film, indicating a physiological reaction of disgust (Borg et al., 2010). These group differences in emotional responding did not extend to non-sexual disgust-eliciting picture stimuli, implying that high levels of disgust are specific to sexual stimuli. A higher level of subjective disgust in women with vaginismus in response to visual erotic stimuli is consistent with the finding that vaginismus appears to be associated with a high level of disgust and contamination sensitivity for a significant subgroup of women (Blazer, 1964; Dawkins & Taylor, 1961; de Jong, van Overveld, Weijmar Schultz, Peters, & Buwalda, 2009). However, disgust may be experienced to some degree by women with dyspareunia, as well; women with vaginismus and dyspareunia have a similar level of automatic associations between sex and disgust on a test of implicit associations (Borg et al., 2010).

With the significant paucity of research into the subjective sexual response of women with vaginismus, only limited conclusions can be drawn. Research highlighting the prevalence of disgust in response to sexual stimuli suggests that subjective sexual arousal may be low in women with vaginismus because arousal is negatively correlated with disgust and threat and positively correlated with positive feelings (Koukounas & McCabe, 1997; van der Velde & Everaerd, 2001). Women with vaginismus, who appear to experience high levels of disgust and threat and a lower level of positive feelings, will likely report a lower level of subjective arousal to erotic stimuli.

**Physiological sexual response.** Until very recently, it was not possible to easily assess the physiological sexual responses of women with vaginismus. The device typically used to assess arousal, the vaginal photoplethysmograph, has to be inserted into the vagina (e.g., Levin, 1992; Meston, 2000). Women with vaginismus cannot experience vaginal penetration; hence this methodology was not appropriate. Other measures, such as the labial photoplethysmograph or labial thermistor, are physically uncomfortable (Prause, Cerny, & Janssen, 2005; Prause & Heiman, 2009) or provide participants with a limited degree of privacy because they need the device to be attached to the participants' genitalia by the researcher (Kukkonen et al., 2006; Payne & Binik, 2006).

Newer technology now permits researchers to examine physiological arousal in women with vaginismus. Thermography, a technique that involves measuring temperature by detecting the infrared signals emitted by the skin, has recently been validated as a measurement tool for the assessment of sexual arousal in men and women (Kukkonen, Binik, Amsel, & Carrier, 2007; Kukkonen, Binik, Amsel, & Carrier, 2010). Thermography was initially used to measure sexual arousal over two decades ago by assessing changes in the temperature of the genitals (Abramson, Perry, Seeley, Seeley, & Rothblatt, 1981; Seeley, Abramson, Perry, Rothblatt, & Seeley, 1980), an area over the pubic bone (Abramson, Perry, Rothblatt, Seeley, & Seeley, 1981) and the pectoral region (Abramson & Pearsall, 1983). More recently, infrared imaging techniques have become far more sensitive in detecting very small temperature changes and have been used successfully to measure temperature change of the left labium majora of women during exposure to erotic films (Kukkonen et al., 2007; Kukkonen et al., 2010). The technique is non-invasive, measuring the temperature change associated with increased blood flow to the external genitals that occurs during physiological sexual arousal via a thermal camera recording device placed at a distance in front of the

participant (e.g., Levin, 1992; Masters & Johnson, 1966). No equipment touches the vulva or requires insertion into the vagina; hence this technique is most suited for the assessment of physiological sexual arousal in women with vaginismus.

There have been no investigations of the physiological sexual response of women with vaginismus; however, studies have examined the physiological response of women with dyspareunia. One study reported that women with dyspareunia and a control group responded with similar increases in vasocongestion to a film depicting cunnilingus (Wouda et al., 1998). However, levels of vasocongestion differed significantly during a film that depicted intercourse; women with dyspareunia showed a decrease in vasocongestion while women with no pain showed an increase. Concerns regarding the methodological limitations of the Wouda and colleagues study have been noted, including that the order of presentation of the films was not counterbalanced (Brauer et al., 2006). The majority of other studies have found no difference in genital responsiveness to erotic film stimuli between women with dyspareunia and women without sexual problems (Brauer et al., 2006; Brauer, ter Kuile, Janssen, & Laan, 2007; Brauer, ter Kuile, & Laan, 2009; Payne et al., 2007). However, a recent study found that women with PVD showed less genital arousal to erotic films compared to women without PVD when superficial blood flow at the vulva was measured using laser Doppler imaging (measures blood flow to depth of 2-3 mm; Boyer, Pukall, & Chamberlain, 2012). Boyer and colleagues suggested that different measurement techniques (measuring internal vaginal blood flow versus blood flow of the external genitalia) might account for the disparate findings. One caveat about these studies is that some included women with both lifelong and acquired dyspareunia (Boyer et al., 2012; Brauer et al., 2006; Brauer et al., 2007; Brauer et al., 2009; Payne et al., 2007), and others did not sufficiently describe their samples (Wouda et al., 1998). It is not known whether

genital responsiveness would differ between women with lifelong and acquired difficulties. Although there are conflicting results, overall, these studies provide some evidence to suggest that women with dyspareunia are physiologically responsive to erotic stimuli.

It is currently unknown whether women with vaginismus experience physiological sexual arousal in response to erotic stimuli. Although the findings regarding the genital responsiveness of women with dyspareunia suggest that women with vaginismus may respond to sexual stimuli with vasocongestion, there are cognitive and emotional factors that are known to interfere with arousal that are typically experienced by women with vaginismus. Distraction is one cognitive factor that has been shown to impede physiological genital response in women with and without sexual difficulties (hypoactive sexual desire disorder, sexual aversion, orgasmic disorder, and dyspareunia; Adams, Haynes, & Brayer, 1985; Elliott & O'Donohue, 1997, Salemink & van Lankveld, 2006). Negative expectations regarding genital response to sexual stimuli may also play a role in sexual dysfunction (Palace, 1995a; 1995b). Women with lifelong vaginismus report a greater number of negative thoughts and fears associated with penetration compared to women with dyspareunia and acquired vaginismus (e.g., lack of control over situation, pain, injury; Klaassen & ter Kuile, 2009; Reissing, 2012), which may interfere with the information processing of the erotic stimuli depicting vaginal penetration.

Emotionally, feelings of anxiety and threat can affect physiological response. Although moderate levels of anxiety appear to facilitate genital response, high levels of state anxiety are associated with lower genital response in women (Bradford & Meston, 2006; Palace & Gorzalka, 1990; Payne et al., 2007). Women with vaginismus experience high levels of anxiety and distress with attempted vaginal penetration (Reissing et al., 2004). Accordingly, they may be highly anxious when confronted with images of coital activity.

Another emotional factor that interferes with physiological sexual response is the threat or fear of pain (Brauer et al., 2007) and women with vaginismus have been found to endorse expectations of pain with penetration (Klaassen & ter Kuile, 2009).

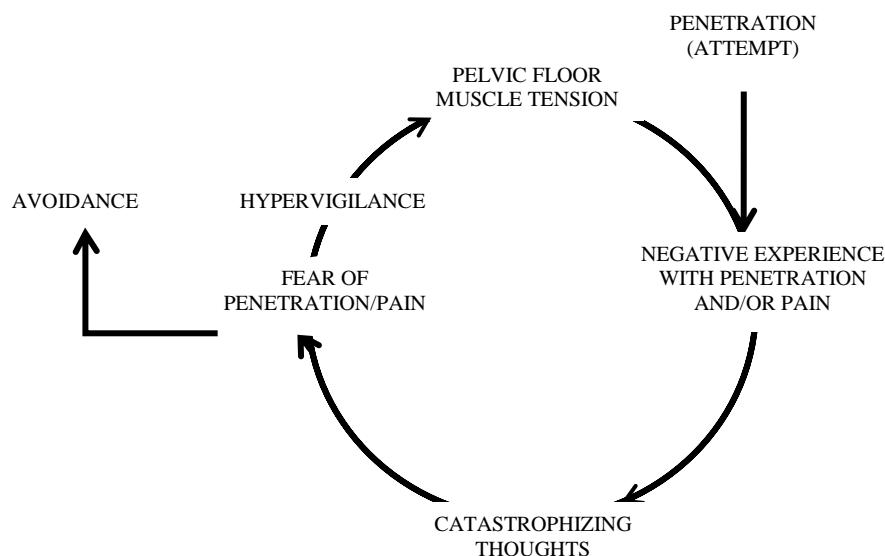
The physiological sexual response of women with vaginismus may differ according to the nature of the erotic stimuli. Women with vaginismus may be more likely to experience physiological sexual arousal during images of non-penetrative sexual activity and may have no difficulties with sexual response unless vaginal penetration is viewed (APA, 2000). At this point however, no study has investigated the physiological arousal of women with vaginismus and no clinical reports are available.

### **Fear-Avoidance Model of Vaginismus**

It appears that the notion of interference with intercourse in women with lifelong vaginismus may be multidetermined and more complex than previously assumed. One explanation offered to understand this complexity is the Fear-Avoidance Model of Vaginismus (FAM-V; see Figure 1; Reissing, 2009; ter Kuile & Reissing, in press). This model can also be helpful in developing hypotheses around sexual function, sexual behaviour, and subjective responses to erotic films in women with vaginismus.

According to the FAM-V, maladaptive, catastrophic thoughts about penetration result in fear of penetration, leading to avoidance of intercourse or hypervigilance to cues that support these cognitions. When penetration is actually attempted and these penetration-related cognitions are activated, the resulting hypervigilance involves increased attention to physical sensations and emotions that facilitate or potentiate pain during intercourse attempts. Fear, hypervigilance, and negative emotions can also result in defensive contractions of the pelvic musculature resulting in difficulties with vaginal penetration and pain, thereby powerfully confirming negative expectations and perpetuating the cycle of the

FAM-V. Avoidance of vaginal penetration, and possibly other aspects of sexual behaviour, results in a negative reinforcement of the FAM-V by eliminating fears and negative emotions temporarily. Renewed attempts are likely to be met by significant hypervigilance. Thus, cognitions and emotions may play a central role in the development and maintenance of vaginismus. Several components of this model have received empirical support (e.g., Klaassen & ter Kuile, 2009; Reissing et al., 2004; ter Kuile et al., 2007).



*Figure 1.* Fear-Avoidance Model of Vaginismus (FAM-V)

### **Purpose**

In summary, the limited information available suggests that women with vaginismus may experience difficulties with sexual function beyond interference with vaginal penetration. The nature and extent of these difficulties is not yet clear, although it may include difficulties with desire, arousal, lubrication, and satisfaction. Orgasmic function may be intact. Reports on sexual behaviour suggest that women with vaginismus engage in less self-stimulation and fewer attempts at penetrative sexual activity. There are no data available that compare other aspects of the sexual behaviour of women with vaginismus to that of other women. Little information is available on the sexual response of women with

vaginismus to erotic stimuli. Available literature on subjective response indicates that women with vaginismus respond to erotic stimuli with increased negative affect and decreased positive affect. These findings suggest that the subjective sexual arousal of women with vaginismus would also be lower compared to women without sexual pain. Although women with dyspareunia respond to erotic stimuli with physiological arousal, cognitive and emotional factors are expected to interfere with the physiological arousal of women with vaginismus. Physiological sexual arousal may be specific to stimuli and a lower level of physiological arousal may be associated only with depictions of vaginal penetration, the anxiety-provoking stimulus.

This research focuses on the examination of a number of variables that will contribute to the understanding of sexual function in women with lifelong vaginismus. In particular, this study will provide a more comprehensive examination of the sexual health of women with lifelong vaginismus. It empirically examines the subjective and physiological sexual responses of women with lifelong vaginismus in addition to sexual function, behaviour repertoire, and frequency. The research will involve two separate studies. These studies will be presented as journal articles. The first study will consist of a laboratory-based psychophysiological experiment to investigate the physiological and subjective sexual responses of women with vaginismus to film erotic stimuli. The second study will involve an online study with a different sample of women from the first study. It will include questionnaires on self-reported sexual function and sexual behaviour.

In addition to women with vaginismus, two comparison groups will be included. Pain and increased muscle tone are associated with both vaginismus and dyspareunia and it can be difficult to differentiate dyspareunia and acquired vaginismus, although pelvic pathology may be more severe in lifelong vaginismus (de Kruiff et al., 2000; Engman et al., 2004;

Reissing et al., 2004; van Lankveld et al., 1995). Therefore, to account for the potential overlap, a group of women with lifelong dyspareunia will be included as one of the control groups. The other comparison group shall be women with no genital pain.

### **Hypotheses**

The hypotheses for the two studies are presented below. The first set of hypotheses concerns the psychophysiological study and the second set describes the hypotheses for the questionnaire study.

**I. Physiological sexual arousal to erotic stimuli.** Women with vaginismus are expected to react to erotic films that depict sexual activity with no vaginal penetration with increased physiological arousal, similar to women with dyspareunia and no-pain. However, when viewing depictions of sexual activity with penetration, women with vaginismus are expected to experience lower physiological sexual arousal compared to their arousal during the no-penetration film and compared to both comparison groups.

**Subjective mental sexual arousal to erotic stimuli.** In line with previous reports of anxiety, fear, and disgust around vaginal penetration, women with vaginismus are expected to report lower levels of subjective mental sexual arousal compared to the other groups in response to depictions of intercourse. Groups will not differ in their subjective mental sexual arousal in response to depictions of non-penetrative sexual activity.

**Affective responses to erotic stimuli.** Women with vaginismus will endorse fewer positive and more negative affective responses during depictions of penetration compared to the control groups, consistent with past research and the FAM-V. Groups will not differ in their affective response with depictions of non-penetrative sexual activity.

**Sexual arousability and anxiety.** This study will evaluate *sexual arousability*, defined as sexual responsiveness to sexual situations (Chambless & Lifshitz, 1984;

Coleman, Hoon, & Hoon, 1983). Sexual arousability has not been investigated in women with vaginismus. The study will also assess sexual anxiety as it may interfere with arousability (Bradford & Meston, 2006). It is hypothesized that women with vaginismus, compared to both control groups, will report lower subjective sexual arousability. In addition, women with vaginismus are expected to report greater sexual anxiety, which would be consistent with the FAM-V.

**II. Overall sexual functioning.** Methodologically robust research studies suggest that the sexual function of women with vaginismus is impaired relative to women without sexual pain. Thus, it is expected that women with vaginismus will report impaired sexual function compared to the women with dyspareunia or without dyspareunia.

**Sexual arousability and anxiety.** It is hypothesized that women with vaginismus will report lower subjective sexual arousability and greater sexual anxiety.

**Sexual behaviour.** Dyspareunia and vaginismus are marked by avoidance of sexual activity to differing degrees. We expect that the vaginismus and dyspareunia groups will report a lower frequency of sexual activity and a lower repertoire of sexual behaviours compared to no-pain control group. However, given the high level of avoidance noted in women with vaginismus, women with vaginismus would have an even lower frequency and more restricted repertoire of sexual behaviour compared to women with dyspareunia, as suggested by the FAM-V.

RUNNING HEAD: Sexual arousal in vaginismus

A psychophysiological investigation of sexual arousal in women with lifelong vaginismus:

A clinical thermography study

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### **Abstract**

Relatively little is known about the subjective reactions of women with lifelong vaginismus in response to erotic stimuli, and physiological sexual arousal has never been investigated. Reports of maladaptive cognitions and fears regarding sexuality and intercourse suggest that anxiety may interfere with sexual response. The aims of this study are to examine the physiological and subjective responses to sexually explicit film stimuli of women with lifelong vaginismus, compared to women with lifelong dyspareunia and women with no pain. Forty-five women (15 vaginismus, 15 dyspareunia, 15 no-pain) viewed two neutral and two erotic film sets, one depicting sexual activity without vaginal penetration, and the other depicting intercourse. Subjective responses to sexual activities in general and to the erotic films specifically were evaluated using questionnaire measures. Vulvar temperature was recorded using an infrared camera. Women completed a measure of sexual anxiety and arousability. After viewing the films, participants completed a measure of subjective responses. All groups experienced increased vulvar temperature during the erotic films regardless of activity depicted. The vaginismus group reported less sexual arousability and more sexual anxiety, in general. In response to the films, the vaginismus group reported less mental sexual arousal than the no-pain group and more negative subjective responses compared to the other groups. The no-pain group showed concordance between their subjective and physiological responses, whereas the symptomatic groups did not. Despite negative subjective responses and lower self-reported sexual arousability, women with vaginismus responded with increased physiological sexual arousal to erotic films. The resilience of physiological response may have resulted from moderate levels of anxiety experienced in the laboratory setting facilitating sexual response regardless of subjective

appraisal; however, anxiety experienced in a dyadic context may interfere more substantially.

*Key words:* lifelong vaginismus, dyspareunia, thermography, sexual response, psychophysiology

**A psychophysiological investigation of sexual arousal in women with lifelong vaginismus: A clinical thermography study**

Vaginismus is a sexual dysfunction defined by interference with vaginal penetration (American Psychiatric Association (APA), 2000). Currently listed in the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR; APA, 2000) under the sexual pain disorders along with dyspareunia, the diagnosis based on vaginal spasm has been widely criticized as the vaginal spasm criterion lacks validity and reliability (Reissing, Binik, Khalifé, Cohen, & Amsel, 2004). Due to the lack of evidence supporting the validity of the current definition of vaginismus and the difficulty of researchers to clearly differentiate vaginismus and dyspareunia, a combination of vaginismus and dyspareunia has been suggested for the upcoming DSM-5: *Genito-Pelvic Pain/Penetration Disorder* (GPPPD; Binik, 2010). Even though vaginismus is classified as a sexual dysfunction in the DSM and the proposed diagnosis of GPPPD will remain in this category, very little information is available on the sexual function and response of women with vaginismus. This study was designed to provide initial data evaluating physiological sexual arousal using thermography along with an investigation of subjective responses to erotic stimuli in women with lifelong vaginismus.

Reports on sexual function in women with vaginismus range from unimpaired sexual function if penetration is not anticipated or attempted (APA, 2000; Kaplan, 1974; Leiblum, Pervin, & Campbell, 1989; Reissing, Binik, & Khalifé, 1999) to significantly affected across the sexual response cycle (Ben-Zion, Rothschild, Chudavok, & Aloni, 2007; Dogan, 2009; Kabakçi & Batur, 2003; Lamont, 1978; Munasinghe, Goonaratma, & de Silva, 2004; Reissing, Armstrong, & Allen, in press; Reissing, Binik, Khalifé, Cohen, & Amsel, 2003; Scholl, 1988; Seo, Choe, Lee, & Kim, 2005; ter Kuile, van Lankveld, Vlieland, Willekes, &

Weijenborg, 2005; Silverstein, 1989; van Lankveld et al., 2006; Ward & Ogden, 1994; Yasan & Akdeniz, 2009). Many questionnaire studies, however, include significant methodological limitations such as the inclusion of questionnaire items that refer to intercourse (Kabakçi & Batur, 2003; Reissing et al., 2003; ter Kuile et al., 2005) or the lack of a comparison or control group (Ben-Zion et al., 2007; Dogan, 2009; Lamont, 1978; Munasinghe et al., 2004; Scholl, 1988; Seo et al., 2005; Silverstein, 1989; Ward & Ogden, 1994; Yasan & Akdeniz, 2009). Studies using the Female Sexual Function Index (FSFI), a measure of sexual function in the context of either intercourse or other sexual activity, have found that women with vaginismus report lower desire, arousal, lubrication, orgasm, and satisfaction compared to a normative group (Reissing, Armstrong, & Allen, in press; van Lankveld et al., 2006). The majority of research appears to suggest that sexual difficulties in women with vaginismus are not limited to interference with vaginal penetration. Women with dyspareunia have also been found to have difficulty with sexual function compared to women without sexual complaints, including less desire, arousal, lubrication, orgasm, and satisfaction, and more negative feelings (Brauer, Laan, & ter Kuile, 2006; Brauer, ter Kuile, Janssen, & Laan, 2007; Payne et al., 2007; Reissing et al., 2003).

Subjective responses to stimuli depicting intercourse have been evaluated in women with vaginismus. When exposed to sexually explicit films or slides, women with vaginismus report increased feelings of threat (Borg, de Jong, & Weijmar Schultz, 2010; de Jong & Peters, 2009) and fewer positive feelings (de Jong & Peters, 2009). Disgust has also emerged as a very salient response in women with vaginismus. Compared to women with dyspareunia or women with no symptoms, those with vaginismus demonstrate increased activity in the facial levator labii muscle, indicative of disgust, while viewing an erotic film (Borg et al., 2010). Research on information processing also supports a role for disgust in vaginismus.

Using the Implicit Association Task, women with vaginismus and dyspareunia showed stronger automatic associations between disgust and sexual penetration compared to a control group (Borg et al., 2010). An experiment using the Extrinsic Affective Simon Task resulted in positive automatic appraisals of sexual penetration images relative to neutral images by women with vaginismus; however, women with vaginismus rated sexual images as negative compared to dyspareunia or sexual complaint-free groups when asked to provide ratings for the images on a visual analogue scale (Huijding, Borg, Weijmar Schultz, & de Jong, 2011). These findings suggest that disgust plays a role in vaginismus, whether at an automatic or deliberate level, whereas a global negative rating may only be involved at a deliberate level (Borg et al., 2010; Huijding et al., 2011). Overall, women with vaginismus appear to respond negatively to depictions of intercourse; however, this research has been limited to the exploration of disgust, threat, annoyance, and global ratings of negative response. In addition, stimuli have been limited to depictions of sexual activity with vaginal penetration and it is unclear whether the negative responses would also be evoked in response to erotic stimuli that do not include penetration.

Subjective responses to erotic stimuli have also been explored in women with dyspareunia, but the findings have been variable. Some studies have supported group differences between women with and without dyspareunia in response to erotic films, as women with dyspareunia reported less positive affect (Brauer et al., 2006), more negative affect (Brauer et al., 2007), and less desire to engage in intercourse (Payne et al., 2007), as well as less positive sexual affect and more negative affect in response to erotic pictures (Brauer, de Jong, Huijding, Laan, & ter Kuile, 2009). Other research has found no group differences between women with and without dyspareunia during erotic film stimuli on subjective variables such as negative affect (Brauer et al., 2006), anxiety (Boyer, Pukall,

Chamberlain, 2012; Brauer et al., 2006), sexual arousal (Boyer et al., 2012; Wouda et al., 1998), positive effect (Brauer et al., 2007), and relaxation and enjoyment (Payne et al., 2007).

No studies have investigated the genital arousal of women with vaginismus; however, experimental studies involving women with dyspareunia have been conducted. Two studies found that women with dyspareunia showed less genital arousal than women without dyspareunia (Boyer et al., 2012; Wouda et al., 1998). In Wouda and colleagues (2006), the lower level of genital arousal occurred solely in response to depictions of coitus and there were no group differences in genital arousal with depictions of oral sex. However, other studies have found no group differences in genital responsiveness to erotic film stimuli between women with dyspareunia and women without sexual problems (Brauer et al., 2006; Brauer et al., 2007; Brauer, ter Kuile, & Laan, 2009; Payne et al., 2007).

The findings regarding the genital responsiveness of women with dyspareunia suggest that women with vaginismus may respond to sexual stimuli with vasocongestion; however, there are cognitive and affective factors that are known to interfere with arousal (Palace, 1995) that are typically experienced by women with vaginismus. Distraction is one cognitive factor that has been shown to impede physiological genital response in women with and without sexual difficulties (hypoactive sexual desire disorder, sexual aversion, orgasmic disorder, and dyspareunia; Adams, Haynes, & Brayer, 1985; Elliott & O'Donohue, 1997; Salemink & van Lankveld, 2006). Women with dyspareunia have been found to attend less to the sexual aspects of sexual images compared to women with low desire or no sexual problems, which the authors attributed to cognitive avoidance through distraction (Lykins, Meana, & Minimi, 2011). Given the greater avoidance in women with vaginismus compared to women with dyspareunia (Reissing et al., 2004), women with vaginismus may be even

more likely to distract themselves from sexual images. Negative expectations regarding genital response to sexual stimuli may also play a role in sexual dysfunction (Palace, 1995). Women with vaginismus endorse more negative expectations (e.g., intercourse will hurt) and maladaptive cognitions than women with dyspareunia and women with acquired vaginismus (e.g., beliefs of genital incompatibility; Klaassen et al., 2009; Reissing, 2012). Thus, expectations associated with penetration may interfere with the information processing of the erotic stimuli for women with vaginismus and distract from attending to sexually relevant sensations (Adams et al., 1985; Elliott & O'Donohue, 1997; Salemink & van Lankveld, 2006). Although moderate levels of anxiety appear to facilitate genital arousal in women with (low desire, inorgasmia, and dyspareunia) and without sexual difficulties (Palace & Gorzalka, 1990), high levels of state anxiety are associated with lower genital response in women (Bradford & Meston, 2006; Payne et al., 2007). Since women with vaginismus may experience high levels of anxiety and distress with attempted vaginal penetration (Biswas & Ratnam, 1995; Reissing et al., 2004) and may report disgust and threat when viewing depictions of sexual penetration (Borg et al., 2010), it is reasonable to assume that the level of anxiety of women with vaginismus is beyond the level of facilitating autonomic arousal (Bradford & Meston, 2006) and may actively interfere with genital arousal.

Despite past methodological constraints (e.g., vaginal photoplethysmography, which involves the insertion of a sensor into the vagina), newer technology now permits researchers to examine physiological arousal in women with vaginismus without the need for vaginal penetration or genital contact. Thermography, a technique that involves measuring temperature by detecting the infrared signals emitted by the skin, has recently been validated as a measurement tool for the assessment of sexual arousal in men and women from the ages of 18 to 45 (Kukkonen, Binik, Amsel, & Carrier, 2007; Kukkonen,

Binik, Amsel, & Carrier, 2010). It has been used to measure the temperature change associated with increased blood flow to the external genitals that occurs during physiological sexual arousal (Salonia et al., 2010). There is no contact between measurement equipment and the participant, making the technique non-invasive.

This study will explore the subjective and physiological sexual responses of women with lifelong vaginismus compared to women with dyspareunia and women with no genital pain. As a result of the current diagnostic deliberations of combining the sexual pain diagnoses of vaginismus and dyspareunia (Binik, 2010) and the emergent body of literature reporting differences between the two sexual pain disorders (Borg et al., 2010; de Kruiff, ter Kuile, Weijnenborg, & van Lankveld, 2000; Huijding et al., 2011; Klaassen & ter Kuile, 2009; Reissing et al., 2003; Reissing et al., 2004; ter Kuile et al., 2005), women with dyspareunia were included as a comparison group. The physiological arousal of the group of women with lifelong vaginismus was expected to be lower while viewing erotic stimuli with penetration and similar to the comparison groups during no-penetration film stimuli. Subjective responses were expected to follow a similar pattern. Women with vaginismus were expected to report increased negative subjective reactions and decreased subjective sexual arousal to erotic stimuli depicting penetration and similar levels of negative reactions and sexual arousal as the comparison groups during depictions of non-penetrative sexual activity (Borg et al., 2010; de Jong & Peters, 2009; Huijding et al., 2011). It was expected that women with vaginismus would report less sexual arousability and more sexual anxiety compared to both comparison groups. Since age has been related to differences in genital arousal to erotic stimuli with younger women demonstrating greater physiological responsivity (Kukkonen et al., 2010; Laan & Everaerd, 1995), the relationship between age and physiological response will be explored.

## Method

### Participants

Women with lifelong vaginismus, lifelong dyspareunia, and no pain/penetration-related problems were recruited through advertisements in the community, online, and from healthcare professionals. General inclusion criteria for all women were being between the ages of 18 and 44 and being fluent in English. General exclusion criteria for all participants included pregnancy and medical conditions that interfere with blood circulation.

Given the current discourse on changing diagnostic criteria for vaginismus (Binik, 2010) and empirical evidence that a focus on vaginal spasm is neither valid nor reliable (Reissing et al., 2004), a behavioural description based on an international multidisciplinary committee's description of vaginismus as "persistent difficulties to allow vaginal entry of a penis, finger, and/or any object, despite the woman's expressed wish to do so" was used to formulate the inclusion criteria for lifelong vaginismus (Basson et al., 2003, p. 226). This description has been used in previous research to differentiate women with lifelong vaginismus from those with acquired vaginismus and from women with dyspareunia (e.g., Borg et al., 2010; de Jong, van Overveld, Weijmar Schultz, Peters, & Buwalda, 2009; Huijding et al., 2011; Reissing, 2012; ter Kuile et al., 2009). Inclusion criteria for the lifelong vaginismus group (VagG) were as follows: (a) never having been able to experience vaginal intercourse; or (b) having attempted vaginal intercourse, but never having been able to tolerate full penile insertion or thrusting/moving. Two additional participants were included in the vaginismus group; one had experienced some success with penetration in the context of treatment for vaginismus and the other had experienced successful penetration just prior to her participation in the study. However, both women continued experiencing

vaginal penetration problems consistent with the Basson and colleagues definition of vaginismus.

Women with dyspareunia with symptoms consistent with Provoked Vestibulodynia (PVD) were chosen as a comparison group because PVD is the most common cause for dyspareunia in premenopausal women and this group has been frequently compared to vaginismus in the literature (Engman, Wijma, & Wijma, 2007; Reissing et al., 2003; Reissing et al., 2004). In addition, symptoms of PVD are limited to vaginal contact, which is comparable with the experience of vaginismus. The inclusion criteria for lifelong dyspareunia (DyspG) have also been used in previous research (Bergeron et al., 2001; Reissing, Brown, Lord, Binik, & Khalifé, 2005) and included the following: (a) experiencing pain at the entrance of the vagina that starts with vaginal touch, pressure, and/or penetration (penis, tampon, finger insertion, etc.) and has occurred during a minimum of 50% of intercourse experiences since first intercourse; and (b) the quality of the pain is described as burning, raw, sharp, or knife-like.

Inclusion criteria for the no-pain control group (ConG) were: (a) no current or past experiences with dyspareunia, (b) no difficulties with pelvic examinations or tampon insertion, and (c) no chronic pelvic pain.

Forty-nine women were tested; however, four participants were excluded for not meeting full inclusion criteria or measurement problems (e.g., pubic hair interfering with temperature measurement). The data from the remaining 45 participants were used for analysis (15 women per group).

A significant group difference for age was observed,  $F(2, 42) = 6.92, p < .01$ ; post hoc analysis indicated that the DyspG was younger than the VagG ( $p < .01$ ; VagG:  $M = 30.20, SD = 5.80$ , DyspG:  $M = 23.40, SD = 4.22$ , ConG:  $M = 26.60, SD = 4.88$ ). Age has

been related to differences in genital arousal to erotic stimuli with younger women demonstrating greater physiological responsivity (Kukkonen et al., 2010; Laan & Everaerd, 1995). In order to confirm whether age affected any of the dependent variables, the correlations between age and these variables were calculated (Table 1). None of the correlations were significant. Analyses of the dependent variables also demonstrated no effect of age on the dependent variables. Age was therefore not used as a covariate, except with a repeated measures ANOVA examining the temperature change difference scores. The analysis using age as a covariate is presented to provide confirmation that age did not affect the results.

Table 1

*Correlations between Age and Dependent Variables<sup>a</sup>*

	Questionnaires	No-Penetration Film	Penetration Film
SAI-E arousability items			
Total	-.18		
Cunnilingus	-.12		
Manual stim by partner	-.02		
Manual stim of partner	-.10		
Intercourse	-.17		
Erotic film	-.16		
SAI-E anxiety			
Total	.07		
Cunnilingus	-.04		
Manual stim by partner	-.03		
Manual stim of partner	.07		
Intercourse	.13		
Erotic film	.24		
Subjective Responses			
Negative		.19	.03
Positive		-.18	-.04
Mental Arousal		-.12	-.05
Self-Report Physiological Arousal		.11	.11
Temperature			
Baseline		.05	.14
Peak		.16	.21
Difference score		.16	.10

*Note.* No significant correlations between age and dependent variables.

<sup>a</sup>*N* = 45.

ANOVA and chi-square analyses were used to examine group differences in demographic data. Fisher's Exact Test was used when chi-square assumptions were not met. There were no significant group differences in education, relationship status, satisfaction with relationship, importance of religion, birth outside Canada, use of hormonal contraception, and past experience with erotic films (see Table 2). There was adequate power to detect large effect sizes for goodness-of-fit tests; however, power was limited to detect large effect sizes for ANOVA between-group differences ( $p = .64$ ). All participants were nulliparous.

Table 2

<i>Participant Characteristics</i>			
	<u>Vaginismus<sup>a</sup></u>	<u>Dyspareunia<sup>a</sup></u>	<u>No-Pain<sup>a</sup></u>
	%	%	%
Education			
Secondary	7	0	0
College/undergraduate	40	73	40
Graduate/professional degree	53	27	60
Relationship			
No relationship	33	20	27
Dating	27	47	47
Living together/common law	13	20	13
Married	27	13	13
Hormonal contraception use	40	53	47
Religion important to participant	40	33	33
Seen erotic films	87	87	93

*Note.* No group differences.

<sup>a</sup>*n* = 15.

Eight of the women in the VagG reported a diagnosis of vaginismus and seven had not received a diagnosis related to difficulties with intercourse. Two women also reported diagnoses of provoked vestibulodynia (*n* = 1) and vulvodynia (*n* = 1). Diagnoses reported by the dyspareunia group included: none (*n* = 9), provoked vestibulodynia (*n* = 2), dyspareunia (*n* = 1), fibroids (*n* = 1), vulvodynia (*n* = 1), and unsure (*n* = 1). In addition to superficial pain, three women in the dyspareunia group also reported provoked, internal pain that occurred at least 50% of intercourse experiences; however, superficial dyspareunia was endorsed as the pain that caused most distress for these women. Groups also differed on history of gynecological examination ( $p < .001$ ), with none of the women with vaginismus able to have a difficulty-free examination compared to 53% of women with dyspareunia and all of the pain-free women (except one who had never attempted an examination) who reported no difficulties with examinations.

## Materials

**Film stimuli.** Two neutral and two erotic film sets were presented. The neutral film stimuli consisted of two 15-minute film clips from nature documentaries. One set of three 5-minute erotic films depicted opposite-sex couples engaged in penetration-free sexual activities (e.g., kissing, caressing, cunnilingus, and manual stimulation). The other set of three 5-minute erotic films depicted opposite-sex couples kissing, caressing, and having penile-vaginal intercourse. Films were female-oriented; sexual activity in the films was female-initiated and focused on the attraction, sexual desire, and pleasure of both actors (Laan, Everaerd, van Bellan, & Hanewald, 1994). The film excerpts were chosen from a larger selection of films that had been pilot tested for highest subjective ratings of sexual arousal. The edited films, consisting of six different excerpts, were further piloted to confirm their effectiveness in eliciting increased genital arousal. The order of the films within each set was counterbalanced between participants.

The films were displayed to participants on I-O display systems iTheater video eyewear (Sacramento, CA). The films were played on a Panasonic VD-LS91 portable DVD player controlled by the female investigator. A standard intercom was used for communication during the testing procedures.

## Measures

**Physiological sexual arousal.** Thermography was used to assess temperature by detecting the infrared radiation that is emitted by living tissues, such as skin. This technology has been validated for the assessment of sexual response in men and women (Kukkonen et al., 2007; Kukkonen et al., 2010). The VarioCAM HiRes infrared camera (Jenoptik, Germany) recorded genital temperature. The camera has a sensitivity of  $0.06^{\circ}\text{C}$  and a temperature measuring range of  $-40^{\circ}\text{C}$  to  $1200^{\circ}\text{C}$ . Data was recorded by Irbis Online

2.4 (InfraTec GmbH, Germany) and analyzed with IRT Analyzer (Grayess, Inc., USA). Data was recorded at the rate of one frame per second while the participant viewed the films. The infrared camera was placed on a tripod at a distance of 43 cm from the bed, directly facing the participant. A region on the left labia minora was used for analyses of temperature change.

**Subjective responses to erotic stimuli.** After viewing each set of films, participants rated their subjective positive and negative responses, mental sexual arousal, and physiological sexual response on a 42-item measure adapted from Heiman & Rowland (1983). Items were endorsed on a scale ranging from 1 (*not at all*) to 7 (*intensely*). Composite variables were created for 11 negative responses (e.g., anxiety, threat), 7 positive responses (e.g., pleasure, interest), 4 items on mental sexual arousal (e.g., sexually aroused, mentally sexually aroused), and 6 items on physiological sexual arousal (e.g., physically sexually aroused, genital pulsing or throbbing). The internal consistency of the subscales ranged from Cronbach's  $\alpha = .85$  to Cronbach's  $\alpha = .92$  in response to the no-penetration film and from Cronbach's  $\alpha = .79$  to Cronbach's  $\alpha = .94$  for the penetration film.

**Effect of thermography.** Following the films, participants were asked, "Did the process of having your vulva temperature recorded affect you in any way?" (Yes - describe or No)? and "Did it decrease or increase sexual arousal and to what extent?" (*not at all* (0) to *the most possible* (10); Kukkonen et al., 2010).

**Sexual arousability and sexual anxiety.** The Sexual Arousability Inventory-Expanded (SAI-E) was used to evaluate the level and specificity of sexual arousability and interfering sexual anxiety (Hoon, Hoon, & Wincze, 1976). This 28-item self-report inventory was completed twice: once to assess sexual arousability in response to different sexual activities (e.g., "When you caress a loved one's genitals with your fingers") and a second

time to measure sexual anxiety. The scales range from -1 (*arousal subscale: adversely affects arousal, unthinkable, repulsive, distracting; anxiety subscale: relaxing, calming*) to 5 (*arousal subscale: always causes sexual arousal, extremely arousing; anxiety subscale: always causes anxiety, extremely anxiety producing*). Higher scores represent greater arousability and anxiety. The internal consistencies of the subscales were excellent (arousability, Cronbach's  $\alpha = .96$ ; anxiety, Cronbach's  $\alpha = .95$ ). The SAI-E does not include subscales.

### **Procedures**

Potential participants were contacted for a telephone screening during which the researcher described the study and determined the eligibility of the participants. Eligible women participated in two testing sessions during the first 12 days (follicular phase) of their menstrual cycle (Kukkonen et al., 2010), after menstruation ended (Session 1:  $M = 8.35$ ,  $SD = 1.79$ ; Session 2:  $M = 10.31$ ,  $SD = 1.33$ ).

During the first session, participants completed a semi-structured interview and questionnaires on sexual function and behaviour as part of a larger study examining the sexual health of women with vaginismus. Prior to viewing the films, participants were informed whether the erotic film would include vaginal penetration in order to maximize emotional responses and external validity. Once the female researcher had left the room, participants removed their clothing below the waist and placed themselves in a comfortable, lithotomy position on a birthing-type bed with leg rests. The videos were shown in a private room, locked from the inside and maintained at a comfortable temperature (no-penetration film:  $M = 24.59^{\circ}\text{C}$ ,  $SD = 0.86$ ; penetration film:  $M = 24.62^{\circ}\text{C}$ ,  $SD = 0.61$ ). The researcher controlled the presentation of the stimuli from an adjacent room and recorded the temperature of the vulva with Irbis Online software.

In order to habituate to the testing environment and for the skin temperature to adjust to the ambient temperature, the participants viewed one of two neutral films for 15 minutes. The order of the films was counterbalanced between participants. Following the neutral film, the Film Scale was presented via the video eyewear. Participants' reported their responses over intercom, which were recorded by the researcher. This was followed by a 1-minute clip of the just-viewed neutral film to provide a baseline measure of physiological arousal. This was immediately followed by a 15-minute set of erotic film clips depicting either sexual activity without penetration or including vaginal intercourse. The order of presentation of the two sets of erotic films was counterbalanced between participants and women were aware of which film condition they would view. Following the film presentation, participants completed the Film Scale. At the end of the session participants met with the researcher for debriefing. During the debriefing women were asked about their experiences with the thermography process and their reactions to the films. Women also were informed that they could approach the principle investigator (who is a clinical psychologist specializing in sexual pain disorders) if they had further questions regarding the study or wished to discuss their reactions to the study.

The second testing session occurred during the same follicular cycle (except for one participant who rescheduled to the next menstrual cycle due to illness). The participants viewed the second set of neutral and erotic films. The researcher met with participants after testing and provided more information on the purpose of the study. Treatment options were discussed with women in the vaginismus and dyspareunia groups and a brochure on sexuality-related information and resources was provided to all participants. Participants were compensated \$50. The study was approved by the researchers' University Research Ethics Board.

## Data Analysis

The data set was examined for normality of distribution. Where variables were skewed, transformations were applied when they improved the normal distribution. Group differences were assessed using ANOVAs or MANOVAs. Tukey honestly significant difference post hoc analyses were used to follow up on significant differences in ANOVAs or MANOVAs. Partial eta squared is presented as a measure of effect size. Power estimates, calculated using GPower 3.1.3, are provided where results were non-significant.

## Results

### Physiological Arousal

**Neutral films.** One-way ANOVAs with one repeated factor (time) were used to examine differences in vulvar temperature across the neutral films. The 15-minute neutral films resulted in the expected habituation to setting and room temperature with a decrease of vulvar temperature. There was a significant effect of time with both neutral films; vulvar temperature was greater during the first minute of the neutral film compared to the final minute (neutral film prior to no-penetration film:  $F(1, 41) = 96.45, p < .001, \eta_p^2 = .70$ ; neutral film prior to penetration film:  $F(1, 42) = 56.02, p < .001, \eta_p^2 = .57$ ). For both films, there was no interaction between time and group and no main effect of group. For repeated measures ANOVA between subject analyses, the power to detect a large effect size with alpha set at .05 was .74 for the neutral film prior to the no-penetration film and .79 for the neutral film prior to the penetration film.

**Erotic Films.** One-way ANOVAs with one repeated factor were used to examine differences in vulvar temperature from baseline to peak vulvar temperature. The measurement points included the mean temperature during a minute-long viewing of a previously seen neutral film immediately prior to the erotic film presentation (baseline) and

the mean temperature during a one-minute period of peak vulvar temperature while the erotic film was viewed. The analyses were conducted separately for the penetration and no-penetration films.

For the no-penetration film, there was a significant increase in vulvar temperature,  $F(1, 42) = 124.96, p < .001, \eta_p^2 = .75$ , from baseline ( $M = 33.64^\circ\text{C}, SD = 0.13$ ) to peak temperature ( $M = 34.73^\circ\text{C}, SD = 0.14$ ; see Table 3). However, there were no group differences,  $F(2, 42) = 0.43, p = .66, \eta_p^2 = .02$ , and no interaction between time and group,  $F(2, 42) = 1.15, p = .33, \eta_p^2 = .05$ . For repeated measures ANOVA between subject analyses, the power was .70 to detect a large effect size with alpha set at .05. There was sufficient power (>.80) to detect within-between interactions.

Table 3

*Means and Standard Deviations of Vulvar Temperature*

	<u>Vaginismus<sup>a</sup></u>		<u>Dyspareunia<sup>a</sup></u>		<u>Control<sup>a</sup></u>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
No-penetration film ( $^\circ\text{C}$ )						
Baseline	33.60	0.78	33.60	0.91	33.73	0.89
Peak	34.82	0.73	34.48	1.25	34.90	0.71
Penetration film ( $^\circ\text{C}$ )						
Baseline	33.74	0.80	33.29	0.75	33.97	0.51
Peak	34.91	0.43	34.25	1.12	35.04	0.71
Change in temperature from baseline to peak ( $^\circ\text{C}$ )						
No-penetration	1.22	0.62	0.88	0.69	1.17	0.66
Penetration	1.17	0.79	0.96	0.77	1.07	0.81

*Note.* No significant group differences.

<sup>a</sup> $n = 15$ .

There was also a significant increase in vulvar temperature from baseline to peak temperature during the film depicting penetration,  $F(1, 42) = 8.39, p < .01, \eta_p^2 = .17$ , but no significant interaction between time and group,  $F(2, 42) = 0.02, p = .98, \eta_p^2 = .001$ . There was a significant main effect of group,  $F(2, 42) = 4.77, p < .05, \eta_p^2 = .19$ . Tukey honestly significant differences post hoc analyses indicated that DyspG had a significantly lower

temperature than ConG ( $p = .01$ ). For repeated measures ANOVA between subject analyses, the power was .78 to detect a large effect size with alpha set at .05. There was sufficient power ( $>.80$ ) to detect within-between interactions.

### **Physiological Arousal Across Film Conditions**

To determine whether the amount of vulvar temperature change differed between film conditions, a repeated measure ANOVA was used to examine the difference scores for temperature change from baseline to peak temperature for both film conditions. The difference score was calculated by subtracting baseline temperature from peak temperature during the erotic film (no-penetration film:  $M = 1.09^{\circ}\text{C}$ ,  $SD = 0.66$ , penetration film:  $M = 1.07^{\circ}\text{C}$ ,  $SD = 0.78$ ; see Table 3). There was no interaction between the film conditions and group,  $F(2, 42) = 0.33$ ,  $p = .73$ ,  $\eta_p^2 = .02$ , and no significant main effect of group,  $F(2, 42) = 0.70$ ,  $p = .51$ ,  $\eta_p^2 = .03$  or erotic film condition,  $F(1, 42) = 0.06$ ,  $p = .81$ ,  $\eta_p^2 = .001$ . The power to detect between subject differences was .72. The power to detect within subject differences and within-between interactions was sufficient.

To ensure that age did not affect physiological response, the repeated measures ANOVA was also conducted using age as a covariate. There was no interaction between film condition and group,  $F(2, 41) = .28$ ,  $p = .76$ ,  $\eta_p^2 = .01$ , or between film condition and age,  $F(1, 41) < .001$ ,  $p = .99$ ,  $\eta_p^2 < .001$ . There was no main effect of film condition,  $F(1, 41) = .001$ ,  $p = .97$ ,  $\eta_p^2 < .001$ , or group,  $F(2, 41) = .34$ ,  $p = .71$ ,  $\eta_p^2 = .02$ .

### **Subjective Responses**

**No-penetration film.** For the no-penetration film, a MANOVA indicated that group had a significant effect on subjective responses,  $F(8, 80) = 4.62$ ,  $p < .001$ ,  $\eta_p^2 = .32$  (see Table 4). Univariate analyses found a main effect of group on negative responses,  $F(2, 42) = 18.43$ ,  $p < .001$ ,  $\eta_p^2 = .47$ , positive responses,  $F(2, 42) = 4.96$ ,  $p < .05$ ,  $\eta_p^2 = .19$ , and mental

sexual arousal,  $F(2, 42) = 3.44, p < .05, \eta_p^2 = .14$ . There were no group differences on self-reported physiological sexual arousal,  $F(2, 42) = 0.93, p = .40, \eta_p^2 = .04$ . Post hoc analyses revealed that VagG reported significantly higher levels of negative responses compared to DyspG ( $p = .01$ ) and ConG ( $p < .001$ ), and DyspG had higher levels of negative responses than ConG ( $p < .01$ ). The VagG reported lower levels of positive responses and mental sexual arousal compared to ConG ( $p < .05$ ). There was limited power (.64) to detect large effect sizes with alpha set at .05 for the ANOVAs with both the no-penetration and penetration films, thus significant findings reflect quite large effect sizes.

Table 4

*Means and Standard Deviations of Subjective Responses for No-Penetration Film*

	<u>Vaginismus<sup>a</sup></u>		<u>Dyspareunia<sup>a</sup></u>		<u>No-Pain<sup>a</sup></u>	
	M	SD	M	SD	M	SD
Negative <sup>***</sup>	2.72	1.56	1.54	0.56	1.11	0.14
Positive <sup>*</sup>	2.72	1.31	3.57	1.32	4.13	1.30
Physiological sexual arousal	3.30	1.18	3.33	1.49	3.88	1.22
Mental sexual arousal <sup>*</sup>	3.53	1.54	4.23	1.50	4.58	1.28
Anxiety <sup>***</sup>	3.67	2.19	1.60	0.91	1.07	0.26
Worry <sup>***</sup>	3.13	2.17	1.13	0.52	1.00	0
Disgust <sup>**</sup>	3.33	2.44	1.67	1.05	1.20	0.56
Threat <sup>**</sup>	2.13	2.00	1.00	0	1.00	0

*Note.* Possible scores for the subjective measure subscales ranged from 1 to 7.

<sup>a</sup> $n = 15$ .

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

In order to further explore which negative responses were more highly endorsed by VagG during the no-penetration film, four negative responses of theoretical relevance (anxiety, worry, disgust, and threat; Borg et al., 2010; Reissing, 2012; van der Velde & Everaerd, 2001) were analyzed via MANOVA (results for all Film Scale items are presented in Appendix A). Overall, there was a group difference on these negative responses,  $F(8, 80) = 4.10, p < .001, \eta_p^2 = .29$ . Univariate ANOVAs found that groups differed on all four subjective responses (anxiety,  $F(2, 42) = 12.92, p < .001, \eta_p^2 = .38$ ; worry,  $F(2, 42) = 15.55,$

$p < .001$ ,  $\eta_p^2 = .43$ ; disgust  $F(2, 42) = 6.46$ ,  $p < .01$ ,  $\eta_p^2 = .24$ ; and threat  $F(2, 42) = 6.68$ ,  $p < .01$ ,  $\eta_p^2 = .24$ ). Post hoc tests found that VagG reported significantly more anxiety than DyspG ( $p < .01$ ) and ConG ( $p < .001$ ), more worry ( $p < .001$ ) and threat ( $p < .01$ ) than both other groups, and more disgust than ConG ( $p < .01$ ). There was a trend towards more disgust in VagG compared to DyspG ( $p = .07$ ). DyspG and ConG did not differ on these negative responses.

**Penetration Film.** For the film that depicted penetration, a group difference for subjective responses was found using a MANOVA,  $F(8, 78) = 5.16$ ,  $p < .001$ ,  $\eta_p^2 = .35$ . Follow up ANOVAs found that negative responses,  $F(2, 42) = 19.75$ ,  $p < .001$ ,  $\eta_p^2 = .49$ , and mental sexual arousal,  $F(2, 42) = 3.37$ ,  $p < .05$ ,  $\eta_p^2 = .14$ , differed significantly across the groups (see Table 5). Positive responses,  $F(2, 42) = 1.73$ ,  $p = .19$ ,  $\eta_p^2 = .08$ , and self-reported physiological arousal,  $F(2, 42) = 1.46$ ,  $p = .25$ ,  $\eta_p^2 = .07$ , did not differ between groups. Post hoc analyses indicated that both VagG and DyspG reported higher levels of negative responses compared to ConG ( $p < .001$ ) and VagG endorsed a lower level of mental sexual arousal compared to ConG ( $p < .05$ ).

Table 5

*Means and Standard Deviations of Subjective Responses for Penetration Film*

	<u>Vaginismus<sup>a</sup></u>		<u>Dyspareunia<sup>a</sup></u>		<u>No-Pain<sup>a</sup></u>	
	M	SD	M	SD	M	SD
Negative <sup>***</sup>	2.43	1.03	1.89	0.67	1.16	0.18
Positive	2.92	1.40	3.27	1.64	4.02	1.41
Physiological sexual arousal	3.53	1.33	3.21	1.57	4.11	1.48
Mental sexual arousal <sup>*</sup>	3.86	1.31	4.13	1.34	4.96	1.30
Anxiety <sup>***</sup>	3.27	1.67	2.67	1.23	1.20	0.56
Worry <sup>***</sup>	3.00	1.73	1.80	1.21	1.00	0
Disgust <sup>***</sup>	2.87	1.68	1.60	0.91	1.13	0.35
Threat <sup>*</sup>	1.80	1.26	1.20	0.56	1.00	0

Note. <sup>a</sup> $n = 15$ .

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

To further understand which negative responses women with vaginismus or dyspareunia endorsed to a greater degree, a MANOVA was used to analyze group differences on anxiety, worry, disgust and threat (results for all Film Scale items presented in Appendix A). There was a significant main effect of group,  $F(8, 80) = 4.08, p < .001, \eta_p^2 = .29$ . The groups differed on their levels of anxiety,  $F(2, 42) = 12.46, p < .001, \eta_p^2 = .37$ , worry,  $F(2, 42) = 14.05, p < .001, \eta_p^2 = .40$ , disgust,  $F(2, 42) = 9.27, p < .001, \eta_p^2 = .31$ , and threat,  $F(2, 42) = 4.86, p < .05, \eta_p^2 = .19$ . Post hoc analyses indicate that VagG ( $p < .001$ ) and DyspG reported higher levels of anxiety (DyspG  $p < .01$ ) and worry (DyspG  $p < .05$ ) compared to ConG. VagG also reported more disgust than DyspG ( $p < .05$ ) and ConG ( $p < .001$ ), more worry than DyspG ( $p < .05$ ), and more threat than the ConG ( $p = .01$ ).

### **Concordance Between Subjective and Physiological Responses**

The relationship between subjective responses and genital temperature change during each set of erotic films was analyzed using Pearson product-moment correlations (see Table 6). With the no-penetration film, change in genital temperature was significantly correlated with subjective physiological sexual arousal,  $r(43) = .37, p = .01$ , and mental sexual arousal,  $r(43) = .32, p < .05$ . Looking at the groups separately, follow up analyses of the correlations between temperature change and subjective physiological and mental sexual arousal found that vulvar temperature change did not correlate with emotional responses for VagG or DyspG. However, for ConG, physiological sexual arousal ( $r(13) = .65, p < .01$ ) and mental sexual arousal ( $r(13) = .61, p < .05$ ) were correlated with vulvar temperature change during the no-penetration film. For the correlational analyses, there was limited power ( $< .80$ ) to detect large effect sizes with alpha set at .05 overall or within groups for both the no-penetration and penetration films.

Table 6

*Correlations Between Genital Temperature Change and Subjective Responses*

	<u>No-penetration film</u>				<u>Penetration film</u>			
	All <sup>a</sup>	VagG <sup>b</sup>	DyspG <sup>b</sup>	ConG <sup>b</sup>	All <sup>a</sup>	VagG <sup>b</sup>	DyspG <sup>b</sup>	ConG <sup>b</sup>
Negative	-.05	-.24	.10	-.48	.18	.40	.08	-.29
Positive	.18	.15	-.04	.59*	.12	-.16	.17	.37
Mental sexual arousal	.32*	.47	.14	.61*	.09	.20	-.02	.13
Physiological sexual arousal	.37***	.14	.33	.65**	.27	.18	.17	.45

Note. <sup>a</sup> $N = 45$ . <sup>b</sup> $n = 15$ .

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

With the penetration film, none of the composite subjective response variables were significantly correlated with change in vulvar temperature, although there was a trend toward significance for subjective physiological sexual arousal ( $p = .07$ ). A follow up of the correlation between subjective physiological arousal and temperature change by group found no correlation for VagG or DyspG. There was a trend toward significance for a correlation between temperature change and subjective physiological arousal for ConG ( $r(13) = .45$ ,  $p = .09$ ).

### **Effect of Thermography on Arousal**

Following the no-penetration film, 56.8% of women reported no effect of the thermography process, 38.6% reported a decrease in arousal, and 4.5% reported an increase. After viewing the penetration film, 64.4% of women reported no effect of the thermography process on arousal, 28.9% reported a decrease in arousal, and 6.7% reported an increase. A chi-square analysis found no differences between the groups on their endorsement of the effect of thermography on arousal during either film condition.

### **Sexual Arousability and Anxiety**

In addition to assessing group differences on the total scores of sexual arousability and anxiety via ANOVAs, five SAI-E items relevant to activities depicted in the films

(cunnilingus, manual stimulation of the genitals of the woman, manual stimulation of her partner's genitals, intercourse, and viewing an erotic film) were selected for further analysis in a MANOVA. The results for all SAI-E items are presented in Appendix A. There was limited power (.64) to detect a large effect size for the follow-up ANOVAs.

**Sexual arousability.** Using an ANOVA, group differences in sexual arousability on the SAI-E were found,  $F(2, 42) = 9.59, p < .001, \eta_p^2 = .31$ , with post hoc analyses indicating that VagG and DyspG reported significantly less arousability than controls ( $p < .01$ ; VagG:  $M = 62.73, SD = 34.86$ ; DyspG:  $M = 66.60, SD = 31.09$ ; ConG:  $M = 99.80, SD = 16.14$ ). Further examination of five items from the SAI-E using MANOVA also found group differences,  $F(10, 76) = 4.02, p < .001, \eta_p^2 = .35$ . Follow-up univariate ANOVAs revealed group differences in response to manual stimulation of the woman's genitals by her partner,  $F(2, 42) = 7.42, p < .01, \eta_p^2 = .26$ , the woman manually stimulating her partner's genitals,  $F(2, 42) = 6.25, p < .01, \eta_p^2 = .23$ , and intercourse,  $F(2, 42) = 22.15, p < .001, \eta_p^2 = .51$ . There were no group differences in arousability during cunnilingus or viewing a pornographic movie. Compared to ConG, VagG ( $p < .01$ ) and DyspG ( $p = .01$ ) reported less arousal when their partner stimulates their genitals with a finger, or when they stimulate their partners' genitals manually. Both groups reported less arousal compared to ConG during intercourse ( $p < .001$ ).

**Sexual anxiety.** An ANOVA indicated group differences in sexual anxiety measured by the SAI-E,  $F(2, 42) = 20.62, p < .001, \eta_p^2 = .50$ . The VagG and DyspG reported significantly more anxiety than ConG ( $p < .001$ ; VagG:  $M = 34.00, SD = 28.21$ ; DyspG:  $M = 16.53, SD = 16.82$ ; ConG:  $M = -7.40, SD = 10.27$ ). A MANOVA was used to examine five items of the SAI-E and group differences were revealed,  $F(10, 78) = 5.85, p < .001, \eta_p^2 = .43$ . Groups differed in level of anxiety associated with cunnilingus,  $F(2, 42) = 6.55, p < .01,$

$\eta_p^2 = .24$ , manual genital stimulation by a partner,  $F(2, 42) = 11.58, p < .001, \eta_p^2 = .36$ , manually stimulating a partner's genitals,  $F(2, 42) = 6.86, p < .01, \eta_p^2 = .25$ , intercourse,  $F(2, 42) = 48.69, p < .001, \eta_p^2 = .70$ , and viewing a pornographic movie,  $F(2, 42) = 4.27, p < .05, \eta_p^2 = .17$ . VagG reported more anxiety than ConG on all items (cunnilingus,  $p < .01$ ; stimulation of genitals by partner,  $p = .01$ ; stimulating partner's genitals,  $p < .01$ ; intercourse,  $p < .001$ ; and viewing a pornographic film,  $p < .05$ ). VagG also reported more anxiety than DyspG with respect to intercourse ( $p < .01$ ). DyspG, compared to ConG, indicated more anxiety during cunnilingus ( $p < .05$ ), genital stimulation by a partner ( $p < .01$ ), intercourse ( $p < .001$ ), and viewing a pornographic film ( $p < .05$ ).

### **Discussion**

The current study examined the physiological and subjective responses of women with lifelong vaginismus to sexually explicit film stimuli depicting sexual activities with penetration or no penetration, compared to women with lifelong dyspareunia and women with no pain. The main findings include: 1) no group differences in the amount of temperature change across erotic film conditions, 2) compared to women with no pain, women with lifelong vaginismus had higher levels of negative subjective responses and lower levels of mental sexual arousal to erotic films whether or not they included depictions of intercourse, 3) compared to the dyspareunia group, women with vaginismus reported a higher rating of negative subjective responses to the no-penetration film, 4) the correlation between subjective and physiological sexual arousal was significant overall and for the no-pain participants during the no-penetration film, 5) no significant correlations between subjective and physiological sexual arousal were observed for the vaginismus and dyspareunia groups with either film and correlations were not significant for the no-pain group during the penetration film, 6) on a questionnaire measure, the vaginismus group

reported more anxiety compared to the dyspareunia and control groups during intercourse, and 7) both vaginismus and dyspareunia groups reported more anxiety and lower subjective arousability during other sexual activities.

Thermography results indicate that women with vaginismus exhibited physiological sexual arousal similar to both comparison groups regardless of whether erotic films depicted penetration or not. Although this result was unexpected, the increased vulvar temperature of the symptomatic groups in response to the erotic films is consistent with the majority of the research on the physiological response of women with dyspareunia reporting no group differences (Brauer et al., 2006; Brauer et al., 2007; Brauer et al., 2009; Payne et al., 2007) as well as studies demonstrating that women respond with physiological sexual arousal to varied erotic stimuli, including those that are rated as less subjectively arousing (Chivers, Seto, & Blanchard, 2007). Despite reporting less arousability and more anxiety during a range of sexual activities on the SAI-E and more negative affective appraisals of the erotic films, the symptomatic groups continued to respond physiologically with an increase in vulvar temperature. These results suggest that physiological sexual response is not impaired, at least within a laboratory setting.

Despite the maintenance of physiological sexual response, the emotional reactions of the vaginismus group differed from the other groups with higher ratings of negative responses to erotic stimuli. These negative responses occurred not only in response to scenes of intercourse as hypothesized, but were also endorsed following the no-penetration film. During the latter, responses of worry, anxiety, disgust, and threat were significantly greater for women with vaginismus. During the film depicting penetration, the levels of anxiety and threat did not differ between the two symptomatic groups; however, women in the vaginismus group reported more disgust and worry. The negative responses of the

dyspareunia group appeared focused on anxiety, whereas the emotional responses of the vaginismus group were broader and non-specific, including disgust. These results are consistent with previous findings of reactions of disgust in response to depictions of intercourse in women with vaginismus (de Jong & Peters, 2009; de Jong et al., 2009). Our findings expand on these by demonstrating that disgust and threat are not specific to intercourse and occur in response to a range of sexual activities. These findings support the suggestion of a more generally enhanced dispositional disgust propensity in women with vaginismus (de Jong et al., 2009).

To summarize, women with vaginismus reported less sexual arousability, increased sexual anxiety, and more negative responses to sexual stimuli, yet physiological sexual arousal was similar to that of the comparison groups regardless of type of erotic stimuli. One possible explanation for this paradox lies in the complex relationship between physiological sexual arousal and negative emotions. Women can experience ambivalent emotions in response to erotic films, and negative affect does not preclude physiological sexual arousal (Peterson & Janssen, 2007). Anxiety and physiological sexual response have been shown to have a curvilinear relationship whereby moderate levels of anxiety facilitate physiological arousal compared to low or high anxiety potentially due to activation of the sympathetic nervous system (Bradford & Meston, 2006). Studies have confirmed fears of losing control in women with vaginismus during penetration (Klaassen & ter Kuile, 2009; Reissing, 2012) and the vaginismus group endorsed higher anxiety during intercourse, suggesting that anxiety interferes with arousal during sexual encounters. However, due to the relative perceived safety and control in the experimental setting, anxiety and other negative emotions experienced may not have been sufficient to impede physiological arousal. These emotional responses may have resulted in increased sympathetic activation, in fact facilitating

physiological sexual responding (Lorenz, Harte, Hamilton, & Meston, 2012; Meston, 2000). Actual attempts of intercourse may be perceived as less under the control of the woman because a partner may respond in unanticipated ways and women with vaginismus may experience far greater levels of anxiety resulting from feelings of threat, loss of control, and negative feelings (such as disgust). These emotional responses have been demonstrated in the laboratory setting but may be enhanced in the actual dyadic context and interfere more substantially with physiological arousal.

Despite rating their levels of subjective physiological arousal as similar to the no-pain group, no significant correlations between physiological sexual arousal and subjective ratings of physiological changes and mental sexual arousal were observed for women with vaginismus (and dyspareunia). This finding is consistent with research indicating that women with sexual dysfunction have lower concordance compared to women without sexual difficulties (Chivers, Seto, Lalumière, Laan, & Grimbos, 2010). Women with no pain showed concordance between physiological and subjective sexual arousal in response to the no-penetration film, and there was a trend toward concordance for the penetration film. These results support previous research using thermography in which subjective sexual arousal and vulvar temperature change were correlated in women without sexual dysfunction (Kukkonen et al., 2007; Kukkonen et al., 2010). Women with no pain may be better able to recognize physiological changes associated with sexual arousal or more accurately label the arousal as “sexual”. Given their greater subjective anxiety in response to the films, the women with vaginismus may misinterpret physiological changes, such as increased heart rate or increased bodily temperature, as signs of anxiety or other unpleasant emotional arousal rather than attributing them to sexual arousal. Increased vulvar temperature occurs specifically in response to sexual films and not with humorous, anxiety-provoking, or neutral

films, which provides further evidence that the temperature change was due to sexual arousal regardless of participants' subjective responses (Kukkonen et al., 2007; Kukkonen et al., 2010).

Some limitations for this study need to be considered. Self-selection for a laboratory study with exposure to erotica and thermography may have resulted in a sample that is not representative of the general population of women with lifelong vaginismus. However, both symptomatic groups endorsed higher levels of anxiety compared to the no-pain group and the vaginismus group consistently endorsed greater negative responses to the stimuli than the no-pain group and more negative responses on the no-penetration film compared to the dyspareunia group, indicating that participants were willing to participate despite potential discomfort. Other studies using invasive paradigms have also successfully recruited women with lifelong vaginismus (Reissing et al., 2004; ter Kuile et al. 2009; van der Velde & Everaerd, 2001). Current lack of consensus on diagnostic criteria for vaginismus necessitates a careful behavioural description of inclusion criteria for vaginismus and dyspareunia. Our inclusion criteria were those used most frequently in the literature with further description. We chose a homogeneous, symptomatic control group of women with lifelong symptoms consistent with provoked vestibulodynia as it is the most frequently used comparison group in vaginismus research and the most similar to vaginismus in terms of acute symptom onset (i.e., with attempted or actual vaginal penetration). However, this group is not representative of all women with dyspareunia. In a study that compared the sexual function of women with PVD to those with *dysesthetic vulvodynia* (DV; vulvar pain that can be unprovoked (i.e., spontaneous)), the level of sexual difficulties did not differ significantly between the groups (Masheb, Lozano, Richman, Minkin, & Kerns, 2004). However, the sample size of the DV group was small ( $n = 13$ ) and there was a trend toward more sexual dysfunction in the PVD

group ( $p = .08$ ), thus it is unclear whether sexual function might differ between dyspareunia subtypes. No psychophysiological studies have compared subjective and physiological sexual arousal across dyspareunia subtypes. Thus, it is unclear how the results of the present study would differ if the control group included women with different subtypes of dyspareunia. The small sample size in the present study resulted in limited power to detect large effect sizes for several analyses. However, the difference scores of temperature change for the vaginismus and controls groups were similar, suggesting that this finding would remain non-significant with a larger sample size. The amount of temperature change for the dyspareunia group was non-significantly lower and might be significantly different with a larger sample size allowing for the detection of medium effect sizes. One factor that may have affected physiological response was familiarity with erotic film stimuli. Lack of experience with erotic films has been related to increased physiological responding (Laan & Everaerd, 1995). In the present study, participants were asked one dichotomous question about previous experience with erotic films, and no group difference was found. However, a more sensitive measure of previous exposure might have found group differences. The overall vulvar temperature of women with dyspareunia was lower than that of the women with no pain during the penetration film. The average room temperature during the presentation of the erotic films was significantly lower ( $p = .01$ ) for the women in the dyspareunia group (DyspG:  $M = 24.3^{\circ}\text{C}$ ; ConG:  $M = 24.9^{\circ}\text{C}$ ). While still comfortable, the lower room temperature may account for differences in vulvar temperature. Missing room temperature data for some participants did not allow for covariate analyses; however, lower room temperature likely did not affect vulvar temperature change as there were no group differences in the temperature change difference score.

An older age has been linked to less genital responsivity to erotic films in women (Kukkonen et al., 2010; Laan & Everaerd, 1995). Since the vaginismus group was significantly older than the dyspareunia group, it is possible that age negatively affected the physiological response of the women with vaginismus, especially since an older age would likely be related to a longer history of unpleasant (e.g., anxiety-provoking and/or painful) sexual experiences for women with lifelong vaginismus. However, there were no significant group differences on physiological responding, and the vaginismus group showed the highest temperature change, suggesting that age had a limited effect on physiological response in this study. Age was initially used as a covariate for all analyses and did not have a significant effect on any dependent variable, further supporting that age did not affect physiological or subjective response in this study. Age might have had little impact as the women were relatively young and were all premenopausal. The differences in age may be due to different recruitment sources (more dyspareunia participants were recruited from a university campus). Perhaps women with vaginismus, who experience avoidance, may not seek out information about treatment until they decide to conceive, which would possibly occur in their early thirties (the mean age of participants with vaginismus).

Given the new finding of greater negative responses to film stimuli depicting non-penetrative sexual activity in women with vaginismus, further research using no-penetration visual or film stimuli is indicated. Future research could explore which aspects of erotic stimuli evoke negative responses (i.e., close-up images of genitalia, particular sexual activities, images of lubrication, sounds of sexual activity). Future research should include larger samples to ensure that similarity in genital responding is not due to limited power to detect differences. As this study explored the peak temperature change, future studies could

examine mean temperatures across time to understand whether the process of genital arousal differs in women with vaginismus.

Despite lower arousability and greater negative appraisals, women with vaginismus demonstrate physiological sexual arousal at levels comparable to the comparison groups. The results of this study have implications for the potential combination of vaginismus and dyspareunia into GPPPD. Similar findings on questionnaire measures of sexual arousability and anxiety support the suggestion of dimensional differences between the disorders (Binik, 2010). However, differential emotional responses to erotic stimuli provide evidence for categorical differences. This study adds to an emergent and consistent body of literature suggesting that negative emotional responses by women with lifelong vaginismus during *actual* exposure to sexuality-related stimuli or to experiences of vaginal penetration (e.g., gynecological exams) are a central feature differentiating the two sexual pain disorders (Borg et al., 2010; de Jong et al., 2009; Reissing et al., 2004). The results of the present study, along with other recent findings, suggest that differences in emotional responding distinguish women with vaginismus specifically.

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RUNNING HEAD: Sexual function and behaviour in vaginismus

A comparative examination of sexual function and behavioural repertoire of women with  
lifelong vaginismus: A questionnaire study

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### **Abstract**

Vaginismus is classified as a sexual dysfunction, yet there is limited research on the sexual function and behaviour of women with vaginismus. In order to address this gap in the literature, this study explores sexual function, sexual anxiety, and sexual behaviour in women with lifelong vaginismus, compared to women with lifelong dyspareunia and women with no pain during intercourse. Cognitions related to vaginal penetration, mental health, and sexual abuse were also investigated. Women between the ages of 18 and 44 recruited through online advertisements, health professionals, and word of mouth completed an online survey ( $N = 174$ ). The main findings indicated that, relative to both comparison groups, women in the vaginismus group reported a more limited range of sexual behaviour across the lifespan and more maladaptive cognitions about losing control of one's body and the situation during penetration. In comparison to the no-pain control group, the women with vaginismus endorsed more phobic anxiety. Both symptomatic groups reported more difficulties across several indicators of sexual function; more sexual anxiety; more limited sexual behaviour in the past year, and past month; and more maladaptive cognitions related to vaginal penetration. There were no group differences on sexual abuse abuse and overall psychological distress. This study provided empirical information on the sexual function and behaviour of women with vaginismus. Numerous difficulties, extending beyond problems with vaginal penetration, were confirmed, which has implications for treatment.

*Key words:* lifelong vaginismus, dyspareunia, sexual function, sexual behaviour

**A comparative examination of sexual function and behavioural repertoire of women with lifelong vaginismus: A questionnaire study**

Vaginismus is a sexual dysfunction defined by the central feature of interference with vaginal penetration (American Psychiatric Association (APA), 2000). It had previously been thought that a vaginal muscle spasm was the source of this interference with penetration (APA, 2000; Reissing, Binik, & Khalifé, 1999); however, the criterion of a vaginal muscle spasm has been found to be neither valid nor reliable (Reissing, Binik, Khalifé, Cohen, & Amsel, 2004). In addition, significant symptom overlap between vaginismus and dyspareunia has prompted a proposal to combine the two sexual pain disorders into one diagnosis in the upcoming DSM-5: *Genital Pelvic Pain Penetration Disorder* (GPPPD; Binik, 2010). GPPPD would be included in the category of sexual dysfunctions. However, despite the classification of the current diagnosis of vaginismus and the proposed GPPPD as a sexual dysfunction, there is a surprising lack of empirical information of the sexual response, function, and behaviour of women who are unable to experience intercourse.

The DSM-IV-TR and some reports suggest that the sexual function of women with vaginismus may be unimpaired, especially if penetration is not attempted or anticipated (APA, 2000; Burchardt & Catalan, 1982; Cooper, 1969; Ellison, 1972; Kaplan, 1974; Leiblum, Pervin, & Campbell, 1989; Stuntz, 1986; Wijma & Wijma, 1997). In two empirical studies, women with vaginismus were found to have good or better sexual functioning compared to a control group (Duddle, 1977) and compared to women with other sexual dysfunctions (Hawton & Catalan, 1990). However, recent research with validated measures suggests that the sexual functioning of women with vaginismus is impaired. These studies include methodical limitations such as no control group or comparisons to normative data (Ben-Zion, Rothschild, Chudakov, & Aloni, 2007; Dogan, 2009; Lamont, 1978;

Munasinghe, Goonaratma, & de Silva, 2004; Scholl, 1988; Seo, Choe, Lee, and Kim, 2005; Silverstein, 1989; Ward & Ogden, 1994; Yasan & Akdeniz, 2009) and the inclusion of questionnaire items that refer to intercourse (Kabakçı & Batur, 2003; ter Kuile et al., 2005; ter Kuile et al., 2009; Reissing, Binik, Khalifé, Cohen, & Amsel, 2003; Tuğrul & Kabakçı, 1997). However, women who engage in only non-coital sexual activities can complete the Female Sexual Function Index (FSFI). Research using the FSFI has resulted in reports of lower desire, arousal, lubrication, orgasm, and satisfaction in women with lifelong vaginismus compared to a normative group (Reissing, Armstrong, & Allen, in press; van Lankveld et al., 2006).

Women with vaginismus may engage in non-penetrative sexual activities (Blazer, 1964; Dawkins & Taylor, 1961; Ellison, 1968; Kaplan, 1974; Leiblum et al., 1989; Plaut & RachBeisel, 1997); but positive reports on sexual behaviour are limited to case studies or successful treatment outcome reports with significant methodological shortcomings. A number of reports indicate that women with vaginismus may avoid sexual expression and are completely avoidant of sexual intercourse (e.g., Basson et al., 2003; Beck, 1993; Ward & Ogden, 1994). Only three empirical studies with control groups are available. Women with vaginismus and dyspareunia reported engaging in less self-stimulation compared to pain-free controls (Reissing et al., 2003). Compared to women without sexual complaints, women with vaginismus endorsed less frequent non-coital penetrative behavior (e.g. digit/s or object insertion by the woman or her partner; ter Kuile et al., 2007) and less willingness to engage in a number of sexual activities (Borg, de Jong, & Weijmar Schultz, 2011). These findings suggest that women with vaginismus may experience a limited range of sexual behaviours and may engage in non-coital sexual activity significantly less frequently than women with

no sexual problems. However, no study has investigated specifically the sexual repertoire of women with vaginismus.

Thus, the more empirically sound evidence indicates that women with vaginismus experience a range of difficulties with sexual functioning. Specifically, it appears that difficulties extend to non-penetrative activities (e.g., van Lankveld et al., 2006) and, overall, women with vaginismus engage in less frequent and possibly less variable sexual activity (Reissing et al., 2003; ter Kuile et al., 2007). However, research on these two aspects of sexual health is limited with few studies using appropriate measures and little behavioural data. The current study is an investigation of sexual function and behaviour. This study expands on previous research by concurrently exploring sexual response and behaviour, including non-penetrative sexual activity. Potential differences in sexual function between women with vaginismus who have attempted intercourse in the past month and those who have not will also be examined.

Recent research, focusing largely on women with lifelong vaginismus, has shifted attention from the behavioural aspect of vaginal penetration to cognitive and emotional factors involved in processing sexual stimuli. A recently developed measure, the Vaginal Penetration Cognition Questionnaire (VPCQ), has helped to elucidate the cognitions of women with vaginismus that likely impact their interpretation of their sexual experiences (Klaassen & ter Kuile, 2009). Compared to women with dyspareunia and without sexual complaints, women with vaginismus reported more concerns about loss of control during penetration, self-image as it relates to penetration, more catastrophic and pain-related cognitions, and beliefs of genital incompatibility. Women with vaginismus and dyspareunia endorsed fewer positive thoughts about penetration compared to women without sexual difficulties. Another study of women with vaginismus also reported more pain

catastrophizing in general (i.e., not specific to sexual situations) than women with dyspareunia and those without sexual complaints (Borg, Peters, Weijmar Schultz, & de Jong, 2012). Women with lifelong and acquired vaginismus were queried on their causal attributions for their penetration problems in an online survey (Reissing, 2012). Women with lifelong vaginismus reported significantly more causal attributions related to fears of pain, injury, intimacy, and loss of control, and negative images of the body, their own genitals, and the penis, as well as disgust about intercourse.

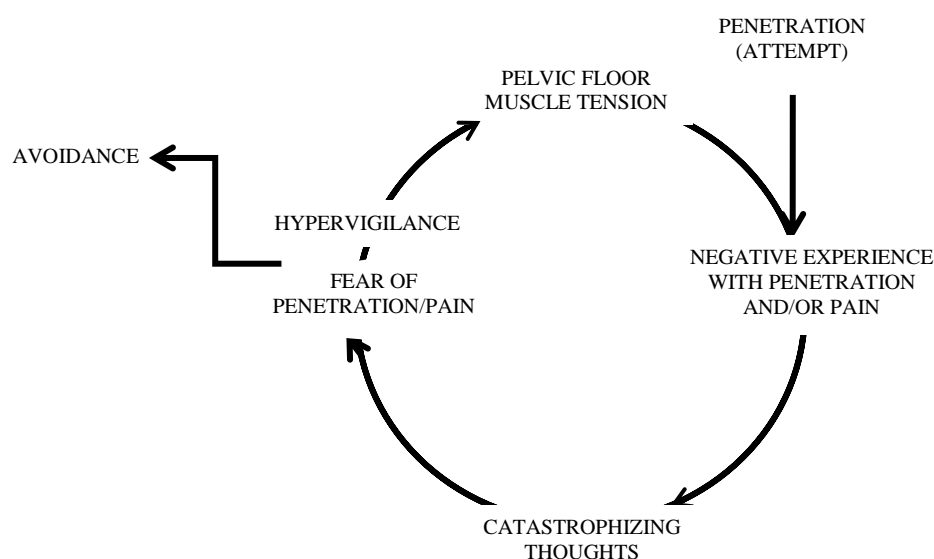
Along with negative appraisals and expectations, emotional processing of sexual stimuli appears to be negatively affected in women with vaginismus. Recent research has indicated that women with vaginismus respond differently to sexual stimuli compared to other women. Experimental studies have found greater endorsement of negative emotions in response to erotic films and slides (e.g., annoyance, threat, disgust, anxiety) and lower ratings of pleasant feelings (Borg, de Jong, & Weijmar Schultz, 2010; Cherner & Reissing, submitted; de Jong & Peters, 2009). In a recent empirical study of physiological and subjective sexual responses, Cherner and Reissing used thermography to evaluate physiological response in women with lifelong vaginismus and found that, compared to women with dyspareunia and no-pain controls, physiological sexual arousal was unimpaired. Despite this, women with vaginismus reported more negative emotions, including disgust, threat, worry, and anxiety, in response to viewing erotic films depicting intercourse or non-penetrative sexual activity. Another study using erotic stimuli found muscle activity indicative of disgust in women with vaginismus and stronger automatic association between disgust and sexual penetration using the Implicit Association Task, suggesting an automatic reflexive response that could potentially be related to defensive reactions (Borg et al., 2010). Despite positive automatic affective appraisals of sexual penetration images relative to

neutral images, women with vaginismus rated sexual images more negatively on a visual analogue scale compared to dyspareunia or sexual-complaint free groups (Huijding, Borg, Weijmar-Schultz, & de Jong, 2011).

Two other emotions that have been linked to vaginismus are fear and anxiety. Recent research has significantly contributed to the understanding of these emotions in women with vaginismus. For example, women with vaginismus display significantly more defensive reactions and report more anxiety compared to women without vaginismus during pelvic examinations (Lahaie, Binik, Khalifé, Amsel, & Pukall, 2008; Reissing et al., 2004), greater anxiety during intercourse (Cherner & Reissing, submitted), and higher levels of fear when thinking about intercourse or non-coital penetrative sexual activity (ter Kuile et al., 2007). It is unknown how the level of fear of intercourse compares to the level of fear during a gynecological examination for women with vaginismus. The feeling of threat has also been associated with heightened pelvic muscle activity (van der Velde & Everaerd, 2001; van der Velde, Laan, & Everaerd, 2001). Both women with and without vaginismus responded to film excerpts depicting sexual and non-sexual threatening situations with increased muscle activity in the pelvic floor. Increased muscle activity also occurred in the trapezius muscle, which is involved in general defensive reactions. Increased feelings of threat or disgust were related to increased pelvic floor activity, suggesting that the physical response of vaginismus may be part of a general defensive reaction (van der Velde & Everaerd, 2001).

It appears that the notion of interference with intercourse in women with lifelong vaginismus may be multidetermined and more complex than previously assumed. One explanation offered to understand this complexity is the Fear-Avoidance Model of Vaginismus (FAM-V; see Figure 1; Reissing, 2009; ter Kuile & Reissing, in press). The FAM-V posits that maladaptive, catastrophic thoughts about penetration result in fear of

penetration, which in turn leads to avoidance of intercourse or hypervigilance to cues that support these cognitions. Hypervigilance involves increased attention to physical sensations and emotions that facilitate or potentiate pain during intercourse attempts. Fear, hypervigilance, and negative emotions can also result in defensive contractions of the pelvic musculature resulting in difficulties with vaginal penetration and pain, thereby powerfully confirming negative expectations and perpetuating the cycle of the FAM-V. Avoidance of vaginal penetration and, potentially for some women, other aspects of sexual behaviour, results in a negative reinforcement of the FAM-V by eliminating fears and negative emotions temporarily. Renewed attempts are likely to be met by significant hypervigilance. Thus, cognitions and emotions have the potential to play a central role in the development and maintenance of vaginismus. Several components of this model have received empirical support (e.g., Klaassen & ter Kuile, 2009; Reissing et al., 2004; ter Kuile et al., 2007). If this model is correct, then one would expect that women with vaginismus will experience more sexuality-related anxiety due to negative appraisals of sexual stimuli/situations, resulting in avoidance of penetrative as well as non-penetrative sexual activity.



*Figure 1.* Fear-Avoidance Model of Vaginismus (FAM-V)

Negative experiences with vaginal penetration (e.g. negative experiences with pelvic examination, sexual abuse) have been historically associated with negative thoughts, anxiety, and avoidance of intercourse in women with vaginismus (Biswas & Ratnam, 1995).

However, the majority of research on abuse and vaginismus has not supported an increased incidence of abuse compared to women without vaginismus (Barnes, 1986; Hawton & Catalan, 1990; Lahaie, Boyer, Amsel, Khalifé, & Binik, 2010; van Lankveld, Brewaeys, ter Kuile, & Weijnen, 1995; van Lankveld et al., 2006). One empirical study found that more women with vaginismus reported sexual interference during childhood, but cautioned that it was necessary to replicate these findings with a larger sample (Reissing et al., 2003). Sexual abuse is explored in this study to further elucidate its relationship with vaginismus.

Mental health difficulties, such as anxiety and depression, have been linked with experiences of pain in sufferers of chronic pain as potential factors that exacerbate pain or occur in response to pain (Cano, Weisberg, & Gallagher, 2000; Meana, Binik, Khalifé, & Cohen, 1997) and therefore have the potential to reinforce the FAM-V. Studies investigating the mental health of women with vaginismus have resulted in findings of relatively healthy function (Duddle, 1977; Kennedy, Doherty, & Barnes, 1995; Reissing et al., 2003). One exception is a controlled study of sexual pain disorders by van Lankveld and colleagues (1995). Compared to the norms for Dutch population, the scores of the women with vaginismus were reported “above average” for all subscales of the Symptom Checklist-90, with the exception of somatisation and obsessive-compulsive symptoms, for which their scores were “average/above average.” The score for the vaginismus group for global distress was reported as “above average” compared to the greater mean score for the dyspareunia group, which was reported in the “high” range. Despite the lack of consistent findings in

questionnaire-based studies, other research has implicated a possible role of psychological factors, including anxiety, in the sexual function and behaviour of women with vaginismus (Lahaie et al., 2008; Reissing et al., 2004); therefore, an exploration of psychological distress will be included.

This study provides an empirical exploration of the sexual health of women with vaginismus compared to women with dyspareunia and women without pain during intercourse. It is expected that women with vaginismus will report impaired sexual function. In contrast to the comparison groups, women with vaginismus are expected to report a greater level of sexual anxiety, a more restricted range and frequency of sexual behaviour, and more maladaptive cognitions about penetration. In view of past research findings, we expect to confirm no group differences for sexual abuse and we will explore differences in mental health between groups.

## **Method**

### **Participants**

Participants included women with lifelong vaginismus, women with lifelong dyspareunia, and women with no pain with intercourse. General inclusion criteria for all women were being between the age of 18 and 44 and fluency in English. Exclusion criteria included reported vulvar pathology that would account for difficulty with intercourse (e.g., lichen sclerosis). Given the current discussion about the definition of vaginismus (Binik, 2010), the criteria for the vaginismus group were based on the description developed by an international multidisciplinary committee, that vaginismus involves “persistent difficulties to allow vaginal entry of a penis, finger, and/or any object, despite the woman’s expressed wish to do so” (Basson et al., 2003, p. 226). This definition has been used by other researchers to describe vaginismus group participants (Borg et al., 2010; de Jong et al., 2009; Huijding et

al., 2011; Reissing et al., in press; ter Kuile et al., 2009). For the current study, inclusion criteria for the lifelong vaginismus group (VagG) were: (a) never having been able to experience vaginal intercourse; or (b) having attempted vaginal intercourse, but never having been able to tolerate full penile insertion or thrusting/moving. The inclusion criteria for lifelong dyspareunia (DyspG) had also been used in previous research (Bergeron et al., 2001; Reissing, Brown, Lord, Binik, & Khalifé, 2005) and were the following: (a) experiencing pain at the entrance of the vagina that starts with vaginal touch, pressure, and/or penetration (penis, tampon, finger insertion, etc.) that occurred during a minimum of 50% of intercourse experiences; and (b) the quality of the pain was described as burning, raw, sharp, or knife-like. Women with dyspareunia consistent with Provoked Vestibulodynia (PVD; pain at the entrance of the vagina provoked by touch) were chosen as a comparison group because the symptoms of PVD and vaginismus are both provoked by vaginal penetration. The pain-free control group (ConG) inclusion criterion was that women had not experienced difficulties with intercourse (pain, anxiety, or pelvic muscle tension).

One hundred and seventy-four eligible women completed the questionnaires (VagG:  $n = 68$ , DyspG:  $n = 59$ , ConG:  $n = 47$ ). Of the VagG, 46 women had never experienced penetration and 22 had minimal penetration and could not tolerate full penile insertion or thrusting. There were three symptom groups for DyspG; those solely with provoked pain at the entrance of the vagina (i.e., introital pain;  $n = 31$ ), those with provoked introital pain and spontaneous/unprovoked pain ( $n = 9$ ), and provoked introital pain in combination with deep, internal pain ( $n = 19$ ). There were no group differences in age, education, use of medications that affect sexual function, and use of hormonal birth control (see Table 1). Groups differed in relationship status,  $\chi^2(2, N = 174) = 13.16, p = .001$ , whether they considered religion as

personally important,  $\chi^2 (2, N = 164) = 14.49, p = .001$ , parity,  $\chi^2 (2, N = 174) = 6.56, p < .05$ , and tampon use,  $\chi^2 (2, N = 173) = 78.81, p < .001$ .

Table 1

*Participant Characteristics*

	Vaginismus %	Dyspareunia %	Control %
Age <sup>a</sup> <i>M (SD)</i>	26.73 (5.24)	26.88 (4.23)	24.53 (5.41)
Education <sup>b</sup>			
Primary or secondary	9	5	9
College or university undergraduate	60	61	64
Graduate	31	34	28
In a Relationship <sup>b, ***</sup>	93	93	72
Religion considered important <sup>b, ***</sup>	51	43	16
Tampon Use <sup>c, ***</sup>			
Never tried	13	3	2
Tried, never possible	34	7	0
Can insert with great difficulty	31	42	2
No difficulty	21	48	96

*Note.* <sup>a</sup>vaginismus  $n = 56$ ; dyspareunia  $n = 50$ ; control  $n = 38$ . <sup>b</sup>vaginismus  $n = 68$ ; dyspareunia  $n = 59$ ; control  $n = 47$ . <sup>c</sup>vaginismus  $n = 67$ ; dyspareunia  $n = 59$ ; control  $n = 47$ . \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

Relationship status and parity were used as covariates where they demonstrated an effect on the dependent variables. Religion demonstrated no effect on the dependent variables and, therefore, was not used as a covariate. Despite the lack of group differences in age, age was found to correlate with some of the dependent variables (Table 2), thus age was used as a covariate for the analyses of sexual function (FSFI and SAI-E arousability), sexual behaviour in the previous year and month, and mental health.

Table 2

*Correlations Between Age and Dependent Variables<sup>a</sup>*

Dependent variables	<i>r</i>
FSFI (sexual function)	
Desire	-.32**
Arousal	-.12
Lubrication	-.08
Satisfaction	-.17
Orgasm	.10
SAI-E (sexual arousability and anxiety)	
Arousability	-.19*
Anxiety	.15
SAQ (sexual behaviour)	
Lifetime (no intercourse)	.08
Lifetime (with intercourse)	.07
Year (no intercourse)	-.34**
Month (no intercourse)	-.37**
Intercourse attempts	-.27
Self-stimulation	-.14
VPCQ (penetration-related cognitions)	
Control	-.17
Catastrophic/pain	.11
Self-image	.12
Positive	-.17
Genital incompatibility	.10
BSI (mental health)	
GSI	-.16
Somatisation	-.22*
Depression	-.14
Anxiety	-.07
Phobic anxiety	-.10

Note. <sup>a</sup>*N* = 174.

\* *p* < .05. \*\* *p* < .01.

**Measures**

**Sexual function.** The Female Sexual Function Index (FSFI), a 19-item self-report measure, is designed to assess the sexual function of women (Rosen et al., 2000). A particular advantage in using this measure with women with vaginismus is the relative absence of a focus on penetrative sex to measure overall sexual function as women can choose to answer the items with reference to sexual activity other than intercourse. It

assesses six domains of sexual function, including sexual desire, arousal, lubrication, orgasm, satisfaction, and pain. Participants indicate their responses on a 5- or 6-point scale, where 1 indicates difficulties with a specific domain within the past 4 weeks (e.g., *extremely difficult or impossible*), 5 indicates no difficulties (e.g., *not difficult*), and, on some items, 0 represents *no sexual activity*. The pain subscale and total score were excluded because the pain items do not apply to women who have not engaged in intercourse in the previous month. The internal consistencies of the desire, arousal, lubrication, orgasm and satisfaction subscales for this sample were good (Cronbach's  $\alpha = .89$  to  $.94$ ).

**Sexual arousability and sexual anxiety.** The Sexual Arousability Inventory Expanded (SAI-E) was used to evaluate the level and specificity of sexual arousability and interfering sexual anxiety (Chambless & Lifshitz, 1984; Hoon, Hoon, & Wincze, 1976). This 28-item self-report inventory is completed twice; once to assess sexual arousability in response to different sexual activities (e.g., “When you caress a loved one’s genitals with your fingers”) and a second time to measure sexual anxiety related to the same activities. The scales range from -1 (*arousal subscale: adversely affects arousal, unthinkable, repulsive, distracting; anxiety subscale: relaxing, calming*) to 5 (*arousal subscale: always causes sexual arousal, extremely arousing; anxiety subscale: always causes anxiety, extremely anxiety producing*). Higher scores represent greater arousability and anxiety. Only one item refers to penetration (i.e., intercourse), and the remaining items refer to non-penetrative activities. The internal consistency for this sample was very good for arousability (Cronbach's  $\alpha = .94$ ) and anxiety (Cronbach's  $\alpha = .92$ ). The SAI-E does not include subscales.

**Sexual behaviour.** A modified version of the Sexual Activity Questionnaire (SAQ; Ochs & Binik, 1999) was used to measure the range of sexual activities in which participants

have engaged in over their lifetime, the previous year, and the previous month. Participants indicated whether or not they had engaged in 48 sexual activities (e.g., “My partner kissed me on the body”; “I orally stimulated my partner’s genitals”) over those time points. The internal consistencies for this sample were good (lifelong: Cronbach’s  $\alpha = .86$ ; previous year: Cronbach’s  $\alpha = .87$ ; previous month: Cronbach’s  $\alpha = .90$ ). The SAQ does not include subscales.

**Penetration-related cognitions.** The Vaginal Penetration Cognition Questionnaire (VPCQ; Klaassen & ter Kuile, 2009) is a 40-item questionnaire that assesses cognitions in response to intercourse (attempts). It includes five subscales: control cognitions, catastrophic and pain cognitions, self-image cognitions, positive cognitions, and genital incompatibility cognitions. Each item (e.g., “I am afraid that my vagina is too narrow for penetration.”) is rated on a 7-point scale from *not at all applicable* to *very strongly applicable*. A higher score indicates greater endorsement of the cognitions. The internal consistencies of this sample were good, ranging from 0.81 (genital incompatibility) to 0.88 (catastrophic and pain cognitions).

**Sexual abuse.** Each question of the Sexual and Physical Abuse Interview, 16-item measure (Leserman, Drossman, & Li, 1995; Leserman et al., 1997), describes a specific behavioural event, such as, “By using force or threatening to harm you, has anyone ever made you watch a sexual act?” Participants are to indicate whether or not this event has ever occurred either during their childhood (under age 14) and/or in adulthood (14 years of age or older) and the frequency of the abuse. There are five items regarding attempted sexual abuse, five regarding forced sexual touching, and two items regarding vaginal or anal rape. With respect to physical abuse, there is one item on being beaten, hit, or kicked without the intent to kill or seriously harm, and two items on a physical attack with a threat to life. The internal

consistencies for sexual abuse were very good (childhood: Cronbach's  $\alpha = .96$ ; adulthood: Cronbach's  $\alpha = .90$ ). However, the internal consistencies for physical abuse were poor (childhood: Cronbach's  $\alpha = .43$ , adulthood: Cronbach's  $\alpha = .44$ ), thus, physical abuse results are not reported.

**Mental health.** The Brief Symptom Inventory (BSI), a 53-item self-report inventory, assesses psychological symptoms and includes nine symptom dimensions (Derogatis, 1992). Participants are to indicate how distressed they were in the past 7 days by 53 different symptoms, such as “nervousness or shakiness inside”. The response options range from *not at all* (0) to *extremely* (4). The internal consistencies of the measure ranged from good to very good (four subscales used in analysis: Cronbach's  $\alpha = 0.81$  to  $0.90$ ; Global Severity Index (GSI): Cronbach's  $\alpha = 0.97$ ).

### **Procedure**

Women with lifelong vaginismus, women with lifelong dyspareunia, and women with no pain during intercourse were recruited through advertisements on informational websites for sexual pain disorders (e.g., [www.nva.org](http://www.nva.org) (National Vulvodynia Association NVA)), [vaginismus.com](http://vaginismus.com), etc.), emails with study information sent by the NVA to its members, online classifieds, through healthcare professionals, and through word of mouth. This sample of women was independent of the women who participated in the psychophysiological study.

Participants were invited to complete the online survey, which was available through an online data collection service (SurveyMonkey) and took approximately 40 minutes to complete. Information on basic demographic characteristics and intercourse experiences were collected first, followed by questionnaires on sexuality, and the survey concluded with the questionnaire on mental health. Participants were able to consult the researchers' website

for information on sexual pain disorders, request specific resources on sexual health and sexual pain disorders from the researchers, and were also able to contact the researchers for a phone consultation about treatment options. The study was approved by the researchers' University Research Ethics Board.

### **Data Analysis**

ANOVAs and chi-square analyses were used to examine group differences in demographic data. Fisher's Exact Test was used when chi-square assumptions were not met. Where variables were skewed, transformations were applied when they improved the distribution. Group differences were explored using AN(C)OVAs or MAN(C)OVAs. Pairwise comparisons were used post hoc to identify group differences. Power estimates are described for non-significant results.

## **Results**

### **Sexual Function**

Women who indicated no sexual activity in the previous month were excluded from analysis of sexual function and arousability because lack of sexual activity results in FSFI scores that indicate (potentially inaccurate) low levels of sexual function. The dependent variables arousal, lubrication, satisfaction and and orgasm were non-normally distributed, and transformations were applied to improve the normality of the distributions. A MANCOVA, using age and relationship status as covariates, indicated that the groups differed significantly on sexual function and arousability within the previous month,  $F(12, 222) = 6.82, p < .001, \eta_p^2 = .24$ . Groups differed on desire,  $F(2, 114) = 12.09, p < .001, \eta_p^2 = .18$ , arousal,  $F(2, 114) = 30.01, p < .001, \eta_p^2 = .35$ , lubrication,  $F(2, 114) = 16.86, p < .001, \eta_p^2 = .23$ , satisfaction,  $F(2, 114) = 26.21, p < .001, \eta_p^2 = .32$ , orgasm,  $F(2, 114) = 5.90, p < .01, \eta_p^2 = .07$ , and sexual arousability,  $F(2, 114) = 12.20, p < .001, \eta_p^2 = .18$  (see Table

3). Post hoc analyses indicated that the VagG and DyspG reported less desire (VagG:  $p < .01$ , DyspG:  $p < .001$ ), arousal ( $p < .001$ ), lubrication ( $p < .001$ ), satisfaction ( $p < .001$ ), orgasm (DyspG:  $p < .01$ , VagG:  $p < .05$ ), and arousability ( $p < .001$ ) compared to the ConG. Whether or not women in the VagG had attempted intercourse during the past month or not did not affect their level of sexual difficulty on the FSFI subscales.

Table 3

*Means and Standard Deviations of Sexual Function*

	<u>Vaginismus<sup>a</sup></u>		<u>Dyspareunia<sup>b</sup></u>		<u>Control<sup>c</sup></u>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
FSFI (sexual function)						
Desire <sup>***</sup>	3.52	1.21	3.04	1.21	4.41	1.23
Arousal <sup>***</sup>	3.88	1.19	3.75	1.19	5.49	1.21
Lubrication <sup>***</sup>	4.26	1.39	4.04	1.39	5.69	1.42
Satisfaction <sup>***</sup>	3.38	1.32	3.30	1.32	5.25	1.34
Orgasm <sup>**</sup>	4.02	1.65	3.77	1.64	4.99	1.67
SAI-E (sexual arousability and anxiety)						
Arousability <sup>***</sup>	74.28	24.15	64.23	24.13	92.38	24.53

*Note.* The presented means and standards deviations are adjusted for age and relationship status.

<sup>a</sup> $n = 51$ . <sup>b</sup> $n = 50$ . <sup>c</sup> $n = 40$ .

<sup>\*\*</sup> $p < .01$ . <sup>\*\*\*</sup> $p < .001$ .

**Sexual Anxiety**

A one-way ANOVA was conducted to examine whether groups differed on sexual anxiety. As the distribution was non-normal, a transformation was applied. The SAI-E found a group difference on sexual anxiety,  $F(2, 165) = 8.06$ ,  $p < .001$ ,  $\eta_p^2 = .09$ . Post hoc analyses reveal that DyspG ( $p < .001$ ) and VagG ( $p = .01$ ) had higher levels of anxiety in response to a range of sexual activities compared to ConG (see Table 4).

Table 4

*Means and Standard Deviations of Sexual Anxiety*

	<u>Vaginismus<sup>a</sup></u>		<u>Dyspareunia<sup>b</sup></u>		<u>Control<sup>c</sup></u>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
SAI-E Anxiety <sup>***</sup>	12.60	23.63	16.07	19.20	1.53	13.24

Note. <sup>a</sup>*n* = 65. <sup>b</sup>*n* = 56. <sup>c</sup>*n* = 47.

<sup>\*\*\*</sup>*p* < .001.

### Sexual Behaviour

**Lifetime.** All women who currently or previously had a romantic relationship were included in a one-way ANOVA of lifetime sexual behaviour repertoire. Groups reported significant differences in the range of sexual repertoire over the lifespan,  $F(2, 164) = 12.24$ ,  $p < .001$ ,  $\eta_p^2 = .13$  (see Table 5). Women with vaginismus reported engaging in a more limited range of sexual behaviours compared to the DyspG ( $p = .01$ ) and ConG ( $p < .001$ ). There were no differences between DyspG and ConG ( $p = .08$ ). When intercourse was excluded, the group difference remained,  $F(2, 164) = 9.37$ ,  $p < .001$ ,  $\eta_p^2 = .10$ . VagG reported a more limited range of sexual behaviours than ConG ( $p < .001$ ); however, there was no statistically significant difference in the number of sexual behaviours reported by VagG and DyspG, with a trend toward a more limited range of lifetime sexual activities for the women with vaginismus ( $p = .07$ ).

Table 5

*Means and Standard Deviations of Lifetime Sexual Behaviour*

	<u>Vaginismus<sup>a</sup></u>		<u>Dyspareunia<sup>b</sup></u>		<u>Control<sup>c</sup></u>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
SAQ (sexual behaviour)						
Lifetime (no intercourse) <sup>***</sup>	33.22	5.63	35.47	5.80	37.95	5.35
Lifetime (with intercourse) <sup>***</sup>	33.58	5.68	36.47	5.80	38.95	5.35

Note. <sup>a</sup>*n* = 67. <sup>b</sup>*n* = 57. <sup>c</sup>*n* = 43.

<sup>\*\*\*</sup>*p* < .001.

**Previous year.** Women who reported a relationship within the previous year were included in an ANOVA of sexual behaviour during the past year. Since the distribution was non-normal, a transformation was applied. There was a significant group difference in the range of sexual repertoire (excluding intercourse) over the past year (see Table 6), controlling for the effects of age and parity,  $F(2, 130) = 7.31, p = .001, \eta_p^2 = .10$ . VagG and DyspG reported a more limited range of sexual behaviours compared to ConG ( $p < .01$ ).

Table 6

*Means and Standard Deviations of Sexual Behaviour in the Past Year*

	<u>Vaginismus<sup>a</sup></u>		<u>Dyspareunia<sup>b</sup></u>		<u>Control<sup>c</sup></u>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
SAQ (sexual behaviour) Year <sup>***</sup>	29.84	6.21	29.49	5.85	33.98	5.85

*Note.* The presented means and standards deviations are adjusted for age and parity.

<sup>a</sup> $n = 62$ . <sup>b</sup> $n = 58$ . <sup>c</sup> $n = 42$ .

<sup>\*\*\*</sup> $p < .001$ .

**Previous month.** Women who reported a relationship within the previous month were included in the analysis of sexual behaviour during the past month. The distributions for intercourse and self-stimulation during the past month were non-normal and transformations were applied to improve the normality of the distributions. Using a MANCOVA, controlling for age and parity, groups differed significantly on sexual behaviour during the previous month,  $F(6, 234) = 17.90, p < .001, \eta_p^2 = .32$ . Follow-up univariate analyses indicated that groups differed with respect to range of sexual behaviours (excluding intercourse) within the previous month,  $F(2, 119) = 5.32, p < .01, \eta_p^2 = .08$ , frequency of intercourse experiences/attempts,  $F(2, 119) = 60.65, p < .001, \eta_p^2 = .51$ , and frequency of self-stimulation,  $F(2, 119) = 3.37, p < .05, \eta_p^2 = .05$ . VagG ( $p < .01$ ) and DyspG ( $p < .05$ ) reported a more limited range of sexual behaviours (see Table 7). VagG reported fewer intercourse attempts/experiences than DyspG ( $p = .001$ ) and ConG ( $p < .001$ ),

and the DyspG indicated fewer intercourse experiences than ConG ( $p < .001$ ). DyspG indicated less frequent self-stimulation compared to ConG ( $p < .01$ ), whereas there was no difference between the VagG and ConG.

Table 7

*Means and Standard Deviations of Sexual Behaviour in the Past Month*

	<u>Vaginismus<sup>a</sup></u>		<u>Dyspareunia<sup>b</sup></u>		<u>Control<sup>c</sup></u>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
SAQ (sexual behaviour)						
Month <sup>**</sup>	20.94	6.51	21.22	6.57	25.68	6.57
Intercourse attempts <sup>***</sup>	1.04	5.14	2.86	5.06	11.74	5.06
Self-stimulation <sup>*</sup>	3.43	6.46	2.38	6.53	8.05	6.52

*Note.* The presented means and standards deviations are adjusted for age and parity.

<sup>a</sup> $n = 51$ . <sup>b</sup> $n = 45$ . <sup>c</sup> $n = 28$ .

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

### Penetration-Related Cognitions

A MANOVA was used to examine group differences regarding penetration-related cognitions. The groups differed on penetration-related cognitions as measured by the VPCQ,  $F(10, 332) = 26.21, p < .001, \eta_p^2 = .44$ . Follow-up univariate analyses found that the groups differed significantly on all five subscales (all  $ps < .001$ ; see Table 8). The VagG had significantly more concerns about losing control than DyspG ( $p < .01$ ) and ConG ( $p < .001$ ), and DyspG endorsed more control-related thoughts than the ConG ( $p < .001$ ). The VagG and DyspG reported more catastrophic/pain-related thoughts, concerns about their self-image, and cognitions related to genital incompatibility compared to ConG ( $p < .001$ ). There were no differences between the symptomatic groups on catastrophic/pain, self-image, and genital incompatibility cognitions. The DyspG reported fewer positive thoughts compared to the ConG ( $p < .001$ ) and the VagG ( $p < .01$ ). The VagG endorsed fewer positive thoughts than the ConG ( $p < .001$ ). For the ANOVAs, there was sufficient power ( $> .80$ ) to detect either medium or large effect sizes with alpha set at .05.

Table 8

*Means and Standard Deviations of Penetration-Related Cognitions*

	<u>Vaginismus<sup>a</sup></u>		<u>Dyspareunia<sup>b</sup></u>		<u>Control<sup>c</sup></u>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
VPCQ (penetration-related cognitions)						
Control <sup>***</sup>	2.11	1.54	3.00	1.47	5.79	0.40
Catastrophic/pain <sup>***</sup>	3.65	1.43	3.60	1.35	0.10	0.26
Self-image <sup>***</sup>	3.82	1.25	3.43	1.51	0.85	0.76
Positive <sup>***</sup>	2.59	1.38	1.86	1.17	4.71	0.98
Genital incompatibility <sup>***</sup>	3.88	2.08	3.11	1.89	0.38	0.72

Note. <sup>a</sup>*n* = 68. <sup>b</sup>*n* = 59. <sup>c</sup>*n* = 46.

<sup>\*\*\*</sup> *p* < .001.

**Mental Health**

An ANOVA was conducted to explore group differences on the GSI. A MANOVA was conducted using four BSI subscales: somatisation, depression, anxiety, and phobic anxiety (the GSI was analyzed separately due to issues with multicollinearity). These BSI subscales were selected for the following reasons: (a) somatisation: the role of pain in vaginismus (Reissing et al., 2004) and greater somatisation in women with dyspareunia compared to a control group (van Lankveld et al., 1996); (b) depression: the potential impact on mood, as greater levels of depression has been noted in dyspareunia and may, thus, occur with vaginismus (Meana et al., 1997); and (c) anxiety and (d) phobic anxiety: the fear demonstrated by women with vaginismus (Lahaie et al., 2008; Reissing et al., 2004). All of the BSI variables were positively skewed and transformations were applied to improve the normality of the distributions. There was no significant differences between the groups on the GSI of the BSI,  $F(2, 167) = 1.37, p > .05, \eta_p^2 = .02$  (see Table 9). However, significant differences resulted from a MANOVA of four BSI subscales (somatisation, depression, anxiety, phobic anxiety), adjusted for the effects of age and relationship status,  $F(8, 268) = 2.52, p = .01, \eta_p^2 = .07$ . Univariate analyses indicate that groups differed on phobic anxiety,

$F(2, 136) = 5.20, p < .01, \eta_p^2 = .07$ , and depression,  $F(2, 136) = 3.75, p < .05, \eta_p^2 = .05$ .

There were no significant differences on somatisation,  $F(2, 136) = 1.63, p = .20, \eta_p^2 = .02$ , and anxiety,  $F(2, 136) = 2.37, p = .10, \eta_p^2 = .03$ . Compared to ConG, VagG endorsed more phobic anxiety symptoms ( $p < .01$ ) and more depressive symptoms ( $p < .05$ ). The DyspG did not differ from the other groups on these variables. Groups reported similar levels of somatisation and anxiety. There was sufficient power to detect medium or large effect sizes with alpha set at .05 for the ANOVAs.

Table 9

*Means and Standard Deviations of Mental Health Data*

	<u>Vaginismus<sup>a</sup></u>		<u>Dyspareunia<sup>b</sup></u>		<u>Control<sup>c</sup></u>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
BSI (mental health)						
GSI	0.83	0.63	0.77	0.64	0.63	0.63
Somatisation	0.46	0.56	0.59	0.56	0.45	0.57
Depression <sup>*</sup>	1.23	0.91	1.12	0.91	0.63	0.93
Anxiety	0.87	0.80	0.88	0.80	0.66	0.82
Phobic anxiety <sup>**</sup>	0.53	0.51	0.28	0.50	0.13	0.52

*Note.* The means and standards were adjusted for age and relationship status.

<sup>a</sup> $n = 66$ . <sup>b</sup> $n = 59$ . <sup>c</sup> $n = 46$ .

<sup>\*</sup> $p < .05$ . <sup>\*\*</sup> $p < .01$ .

### **Sexual Abuse**

Fisher's Exact Test was used to examine sexual abuse experiences. Fisher's Exact Test was used because the assumptions for chi-square analyses were not met (e.g., expected cell count was less than 5 for most cells). There were no group differences in sexual abuse experiences in childhood or adulthood (see Table 10).

Table 10

<i>History of Sexual Abuse</i>			
	<u>Vaginismus<sup>a</sup></u>	<u>Dyspareunia<sup>b</sup></u>	<u>Control<sup>c</sup></u>
	%	%	%
Childhood sexual abuse			
Attempts at sexual abuse	4.7	1.8	2.3
Sexual abuse involving touch	12.5	7.3	15.9
Rape	0	3.6	2.3
Adult sexual abuse			
Attempts at sexual abuse	9.4	3.5	6.8
Sexual abuse involving touch	14.1	7.0	13.6
Rape	4.7	3.5	6.8

*Note.* No group differences.

<sup>a</sup>*n* = 64. <sup>b</sup>*n* = 55 for childhood sexual abuse; *n* = 57 for adult sexual abuse. <sup>c</sup>*n* = 44.

### Discussion

This study was intended to provide empirical information on the sexual health of women with lifelong vaginismus. The main findings indicate that, compared to both comparison groups, women in the vaginismus group reported 1) a more limited range of sexual behaviour across the lifespan and 2) more maladaptive cognitions about losing control of one's body and the situation during penetration. In comparison to the no-pain control group, the vaginismus group endorsed more phobic anxiety. Both symptomatic groups reported 1) more difficulties across several indicators of sexual function; 2) more sexual anxiety; 3) more limited sexual behaviour the past year and past month; and 4) more maladaptive cognitions. There were no group differences on sexual abuse and overall psychological distress.

These findings are in contrast to the description in the DSM and some reports in the literature suggesting that women with vaginismus experience difficulty-free sexual functioning until penetration is anticipated or attempted. The vaginismus group endorsed difficulties with desire, arousal, lubrication, orgasm, and satisfaction at levels similar to the dyspareunia group. These findings support previous research on sexual function indicating

that women with vaginismus have difficulty with sexual function (Kabakçi & Batur, 2003; ter Kuile et al., 2005; ter Kuile et al., 2009; Tuğrul & Kabakçi, 1997; van Lankveld et al., 2006) and these difficulties are similar to those of women with dyspareunia (van Lankveld et al., 1995). Although a number of studies have reported that women with vaginismus do not experience difficulty with orgasm (e.g., Kabakçi & Batur, 2003; Reissing et al., in press), the results of this study indicate that women with vaginismus experienced significant difficulty.

Findings with regard to sexual behaviour frequency and repertoire confirmed that women with vaginismus endorse a more limited range of non-penetrative sexual activities (Reissing et al., 2003; ter Kuile et al., 2007). In addition, the women in the vaginismus group reported a restricted range of sexual behaviour across the lifespan, previous year, and previous month. Women with vaginismus, compared to those with dyspareunia, reported a more limited range of lifetime sexual behaviour and lower number of intercourse attempts in the past month. One possible explanation for the findings of restricted sexual repertoire and lower frequency of sexual activity may be related to maladaptive cognitions endorsed by the vaginismus group.

The vaginismus group endorsed more maladaptive cognitions than the no-pain group and more control cognitions compared to the dyspareunia group. These cognitions could result in fears about vaginal penetration and the use of avoidance of intercourse as a coping mechanism to avoid fear and other negative emotions and cognitions. This study demonstrates that a restricted range of sexual behaviours, which may potentially be indicative of avoidance, extends beyond vaginal intercourse and includes other sexual activities. The latter may serve the purpose of reducing situations in which penetration may be suggested or attempted. On the other hand, this restricted range of behaviours, if due to global avoidance, may represent a more generalized, negative evaluation of sexual activity.

Negative reactions to sexual stimuli, such as disgust, have been demonstrated with images or films depicting intercourse (Borg et al., 2010; Huijding et al., 2011) and one study reported negative responses with films depicting non-penetrative activity (Cherner & Reissing, submitted). It would be interesting to further examine whether negative reactions extend to other sexual activities, thus supporting the suggestion of this study that global avoidance may be indicative of generalized negative evaluation of sexuality. Behavioural avoidance of vaginal penetration in particular or sexual activity in general negatively reinforces the contingencies outlined in the FAM-V model by temporarily reducing negative cognitions and emotions, thereby maintaining the cycle by not encountering opportunities to disconfirm maladaptive cognitions and fears.

The finding of increased phobic anxiety in the vaginismus group is consistent with previous research that reported greater fear about penetration and higher rates of phobias in women with lifelong vaginismus (Lahaie et al., 2008; Reissing, 2012; ter Kuile et al., 2007). On the other hand, the lack of additional mental health concerns (with the exception of increased depressive symptoms) also supports previous research that found very few differences on psychological measures (Duddle, 1977; Kennedy et al., 1995). The greater level of phobic anxiety among the women with vaginismus is consistent with the suggestion that vaginismus is similar to a specific phobia of vaginal penetration (Miller, 2005; ter Kuile & Reissing, in press). Treatment based on the principles of treating anxiety disorders associated with specific fears and phobias (i.e., focus on massed, in-vivo exposure to vaginal penetration) appears to be very successful in overcoming difficulties with penetration and the reduction of coitus-related fears (ter Kuile et al., 2009). However, exposure treatment, similar to other treatments reported in the literature, does not result in complete sexual

rehabilitation for a significant group of patients (Reissing et al., in press; ter Kuile et al., 2009; van Lankveld et al., 2006).

Results of this study support increased maladaptive cognitions in vaginismus; however, they differed from previous research with respect to the lack of differences between vaginismus and dyspareunia. Maladaptive cognitions reported by women with dyspareunia in this study were much higher than those reported in other research (Klaassen & ter Kuile, 2009). One explanation for the differences in scores could be that the present study only included women with lifelong pain with intercourse, whereas the Klaassen and ter Kuile study included women with both lifelong and acquired dyspareunia. A history of lifelong painful intercourse might impact cognitive processes differently compared to having experienced premorbid pain-free intercourse. Differences have been noted between women with lifelong and acquired PVD. Those with lifelong PVD endorsed greater anxiety and body self-consciousness during sexual activity than women with acquired PVD (Sutton, Pukall, & Chamberlain, 2009). During sensory testing, women with lifelong PVD were more sensitive to the sensation of warmth on the vulvar vestibule and displayed a lower heat pain threshold (Sutton et al., 2009). These differences on anxiety, self-consciousness, and greater physical sensitivity suggest that women who have had pain since their first intercourse experience may be hypervigilant for physical sensations in the vulva and may also have a greater number of negative cognitions than women who develop difficulties after a period with pain-free intercourse.

The finding of no group differences in sexual abuse is consistent with the literature. Despite the intuitive appeal of negative cognitions and emotions originating in past negative experiences in general and with vaginal penetration in particular, the majority of research does not support the role of abuse in the etiology of vaginismus (Barnes et al., 1986; Hawton

& Catalan, 1990; van Lankveld et al., 1995; van Lankveld et al., 2006). This study provided further empirical evidence of the lack of relationship between past abuse and vaginismus.

A potential limitation of this study was self-selection bias on the part of participants. Women with vaginismus and dyspareunia who experience more generalized sexual difficulties may have been more interested in participating than women with difficulties limited to vaginal penetration as it was relevant to their experiences. Alternatively, women who were more comfortable addressing sexual health may have been more likely to complete the questionnaires. If this was the case, the increased difficulties reported by the symptomatic groups may be an underestimation. A further limitation was the heterogeneity of the dyspareunia group. All dyspareunia participants had provoked introital pain; however, other types of genital pain, including unprovoked/spontaneous pain or deep, internal pain with intercourse were also reported. Since this study was conducted online, the setting in which the participants completed the questionnaires was not controlled, such as the degree of privacy in their environment. However, the high level of difficulties endorsed by the symptomatic groups suggests that they completed the questionnaires in an environment in which they were comfortable disclosing difficulties. No information on cultural background was collected, thus it was unclear whether differences in cultural background between the groups could have affected the findings.

The results of this study indicate that sexual function of women with lifelong vaginismus is impaired beyond difficulties with vaginal penetration. One implication is that treatment outcome may be significantly improved if focus on penetration/intercourse as treatment success is extended to address sexual rehabilitation more globally. The limited existing outcome studies also support the need for increased emphasis on global sexual function. Women with lifelong vaginismus who took part in group therapy or bibliotherapy

reported improvements in sexual functioning with respect to desire, arousal, and satisfaction post-treatment, albeit with small effect sizes (van Lankveld et al., 2006); however, there were no changes for lubrication and orgasm. The authors report that the program focussed mainly on behavioural and emotional changes related to penetration and sensate focus exercises were optional. Another treatment outcome study using in-vivo, massed exposure resulted in successful vaginal penetration but no clinical improvement in satisfaction with sexual functioning posttreatment, or at the 3-month follow-up and no significant change in the total GRISS scores between pre-treatment and posttreatment or follow-up (ter Kuile et al., 2009). It should be noted that half of the participants did not report other sexual function difficulties pre-treatment. Despite the importance of adapting treatment to better address sexual function, some women seek treatment with the goal of conceiving, rather than increasing sexual pleasure (Drenth, 1988). Thus, treatment goals may vary between women with vaginismus and need to be explicitly discussed (ter Kuile & Reissing, in press).

In conclusion, the results of this study provide empirical evidence that women with vaginismus experience difficulties with sexual function that extend beyond intercourse. In line with sexual problems extending beyond vaginal penetration, frequency and range of sexual behaviours are reduced. It remains to be seen if function and behaviour are compromised because women with vaginismus seek to avoid sexual situations that could lead to intercourse, or if the response of women with vaginismus towards sexuality in general is negative or aversive.

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## General Discussion

In response to the paucity of information on vaginismus and sexual health, this thesis research was designed to explore the sexual health of women with vaginismus. In order to do this, we examined physiological and subjective responses to erotic film stimuli, sexual arousability and anxiety, sexual function, and sexual behaviour repertoire and frequency in women with lifelong vaginismus compared to women with pain-free intercourse and women with lifelong dyspareunia. The dyspareunia comparison group made it possible to examine whether group differences exist between the two sexual pain disorders, which is relevant to explore because of the proposal to combine vaginismus and dyspareunia in DSM-5 (Binik, 2010).

In Study 1, a laboratory-based experiment, we sought to understand whether women with vaginismus differed from the two comparison groups with respect to their subjective and physiological responses to erotic film stimuli. Vulvar temperature was recorded as a measure of physiological sexual arousal and women completed a questionnaire measure of subjective responses to the films. A questionnaire measure assessed sexual anxiety and sexual arousability in daily life. As expected, women with vaginismus reported more negative emotions and less mental sexual arousal in response to the penetration film, which was consistent with previous experimental research using erotic stimuli (Borg et al., 2010; Huijding et al., 2011). However, women with vaginismus reported more negative emotions and less mental sexual arousal in response to the no-penetration film as well, which did not confirm the hypothesis. Also unexpected, women in the vaginismus group had an increase in vulvar temperature with both sets of films and there were no group differences in genital arousal; this increase in vulvar temperature was only expected for the no-penetration film. There was discordance between the subjective and physiological responses of the

symptomatic groups. However, women in the control group showed greater concordance, supporting other research which found a similar pattern of greater concordance between subjective and genital measures of sexual arousal in women without sexual difficulties compared to women with sexual dysfunction (Chivers, Seto, Lalumière, Laan, & Grimbos, 2010). The women in the vaginismus group also reported less arousability and more anxiety during a range of sexual activities compared to the control group, as well as more anxiety during intercourse than the other groups. This finding of greater level of anxiety supports previous research reporting more anxiety during pelvic examinations in women with vaginismus compared to women with dyspareunia or women with no-pain during intercourse (Lahaie, Binik, Khalifé, Amsel, & Pukall, 2008; Reissing et al., 2004) and higher levels of fear when thinking about intercourse or non-coital penetrative sexual activity (ter Kuile et al., 2007). The similar levels of overall sexual arousability and anxiety between women with vaginismus and dyspareunia were unexpected and counter to previous findings of differing levels of anxiety between these groups (Lahaie et al., 2008; Reissing, 2004). Given the limited power to detect differences for a number of analyses (including between subject analyses of temperature change), the results of Study 1 should be viewed as preliminary and need to be confirmed in a larger sample.

Study 2 was a questionnaire study administered online to further explore sexual function, sexual arousability, sexual anxiety, and sexual behaviour repertoire and frequency in a larger sample of women with lifelong vaginismus. Factors that could potentially affect sexual function and behaviour were explored, including cognitions related to penetration, history of sexual abuse, and mental health. The results of the study indicate that women in the symptomatic groups endorsed difficulties with sexual function, as expected and supported by previous research on vaginismus and sexual function (Ben-Zion, Rothschild,

Chudakov, & Aloni, 2007; Dogan, 2009; Kabakçi & Batur, 2003; Lamont, 1978; Munasinghe, Goonaratma, & de Silva, 2004; Reissing, Armstrong, & Allen, in press; Reissing, Binik, Khalifé, Cohen, & Amsel, 2003; Scholl, 1988; Seo, Choe, Lee, and Kim, 2005; Silverstein, 1989; ter Kuile et al., 2005; ter Kuile et al., 2009; Tuğrul & Kabakçi, 1997; van Lankveld et al., 2006; Ward & Ogden, 1994; Yasan & Akdeniz, 2009). The women in the symptomatic groups also endorsed more anxiety than the no-pain group, as hypothesized. However, women with vaginismus and dyspareunia endorsed similar levels of sexual difficulties and anxiety, which was unexpected. Consistent with the hypotheses and research reporting fewer intercourse attempts by women with vaginismus (Reissing et al., 2003), women with vaginismus reported a more limited lifetime range of sexual activity and fewer intercourse attempts during the previous month compared to the other groups. However, women in both symptomatic groups reported a more limited sexual repertoire in the previous year and previous month compared to women in the control group. Women with vaginismus endorsed concerns about a lack of control of their body and the situation during penetration attempts and both symptomatic groups reported more maladaptive cognitions. The lack of difference between the vaginismus and dyspareunia groups on maladaptive cognitions was unexpected as a validation study for the Vaginal Penetration Cognition Questionnaire found that women with dyspareunia endorsed lower maladaptive cognitions compared to women with vaginismus (Klaassen & ter Kuile, 2009). The discrepancy in results between this thesis research and the Klaassen and ter Kuile study may potentially be explained by the expected generally more severe symptom portrait of women with lifelong dyspareunia who participated in the current study versus women with acquired pain (included along with lifelong pain in the Klaassen & ter Kuile study). This result casts doubt on group differences in other studies comparing lifelong vaginismus with a mixed

group of women with dyspareunia. There were no group differences in the frequency of sexual abuse during either childhood or adulthood, which was consistent with the hypotheses and the majority of research literature that has not supported a relationship between vaginismus and sexual abuse (Barnes, 1986; Hawton & Catalan, 1990; Lahaie, Boyer, Amsel, Khalifé, & Binik, 2010; van Lankveld, Brewaeys, ter Kuile, & Weijnenborg, 1995; van Lankveld et al., 2006). Mental health of women with vaginismus was comparable to that of women with dyspareunia and women with no pain, with the exception of phobic anxiety and depressive symptoms, which were endorsed to a greater degree by women with vaginismus compared to no-pain controls.

A major contribution of this research was the finding that women with vaginismus respond with healthy physiological sexual arousal to erotic stimuli depicting penetration and no penetration. However, physiological responses were not in line with subjective responses. It had been expected that the cognitive factors, such as negative expectations (Klaassen & ter Kuile, 2009; Reissing, 2012) and distraction (Adams, Haynes, & Brayer, 1985; Elliott & O'Donohue, 1997; Salemink & van Lankveld, 2006), along with emotional variables, including anxiety (Bradford & Meston, 2006; Palace & Gorzalka, 1990), would interfere with mental and physiological sexual arousal in women with vaginismus, resulting in a lesser increase in vulvar temperature for the vaginismus group. However, the finding of resilient physiological response is consistent with other research on physiological arousal in women with sexual dysfunction (Brauer, Laan, & ter Kuile, 2006; Brauer, ter Kuile, Janssen, & Laan, 2007; Brauer, ter Kuile, & Laan, 2009; Meston & Gorzalka, 1996; Morokoff & Heiman, 1980). Physiological arousal was unimpaired during the erotic films possibly because the laboratory setting was less threatening and women felt more in control compared to a sexual encounter. Women knew that there would not be any penetration during the study

and that they had the option to end participation at their discretion, in contrast to a sexual encounter during which penetration may be anticipated or attempted and women may continue to think about their partner's actions and reactions.

The discrepancy between unimpaired physiological arousal and sexual difficulties reported on other measures of arousal (i.e., lower sexual function, less sexual arousability, more sexual anxiety, and less subjective mental sexual arousal) may also be due to difficulty on the part of women with vaginismus in recognizing the physiological sensations of sexual arousal. It has been suggested that discordance between physiological and subjective sexual arousal may be due to a lack of awareness of the physiological sensations of sexual arousal (Brotto, Seal, & Rellini, 2012). The concordance between physiological and subjective responses has been shown to increase after mindfulness training for women with sexual difficulties and a history of childhood sexual abuse, and the change in concordance was greater for the mindfulness-based treatment compared to a CBT approach (Brotto et al., 2012), suggesting that increased awareness of physical sensations may increase concordance between subjective and psychological responses.

Another possible explanation for the discordance between physiological and subjective sexual arousal may be that women with vaginismus noted activation of their sympathetic nervous system, but attributed physiological symptoms such as increased heart rate to anxiety instead of sexual arousal. This is possible since anxiety also involves activation of the sympathetic nervous system (Sexual arousal: Lorenz, Harte, Hamilton, & Meston, 2012; Masters & Johnson, 1966; Anxiety: Cook, Melamed, Cuthbert, McNeil, & Lang, 1988; Wendt, Lotze, Weike, Hosten, & Hamm, 2010; Wiederhold, Jang, Kim, & Wiederhold, 2002). Rosen and Beck (1988) highlighted the importance of appropriate cognitive labelling during a sexual situation for it to be perceived as sexual, therefore, in line

with physiological sexual arousal. Thus, women with vaginismus may not have labelled the situation consistent with their physiological reaction of arousal. Women with vaginismus endorsed sexual anxiety during a range of sexual activities, particularly intercourse, and during the films. Thus, they may experience physical symptoms of arousal/anxiety during sexual activity and interpret this sympathetic nervous system activity as a sign of anxiety even if physiological sexual arousal is occurring simultaneously. As women endorsed anxiety during the erotic films, some of the physiological activation may in fact have been due to anxiety; however, their increased vulvar temperature indicates that they also experienced physiological sexual arousal.

Despite the often-stated assumption that women with vaginismus do not experience sexual difficulties unless penetration is anticipated or attempted (APA, 2000), Study 2 provided empirical evidence that sexual function is in fact impacted beyond intercourse. The lower frequency of intercourse and self-stimulation reported was consistent with increased negative emotions, including greater anxiety during a range of sexual activities, particularly intercourse, and high level of maladaptive cognitions (e.g., loss of control and pain during penetration). The findings also provide the first empirical indication that women with vaginismus report a restricted range of non-penetrative sexual activity and negative emotions in response to film stimuli depicting non-penetrative sexual activity. The only prior research suggested that women with vaginismus endorse higher fear of non-coital sexual activity than women without sexual complaints (ter Kuile et al., 2007) and a lower frequency of self-stimulation (Reissing et al., 2003). There may be a relationship between sexual behaviour and sexual satisfaction whereby women who rate sexual activity as less satisfying (women with vaginismus or dyspareunia) may be less likely to seek out sexual activity that is experienced or perceived as not satisfying. Conversely, women may rate their sexual

satisfaction as lower if they are dissatisfied with the frequency and/or variety of sexual activity. These results indicate that the sexual health of women with vaginismus is multidetermined and more complex than previously suggested by a focus on vaginal penetration rather than overall sexual behaviour and frequency.

The findings of this thesis research are consistent with the Fear-Avoidance Model of Vaginismus (FAM-V; Reissing, 2009; ter Kuile, Both, & van Lankveld, 2010), which is useful in conceptualizing potential factors in the etiology of vaginismus and how different aspects of sexual health may be affected. The FAM-V posits that women with vaginismus experience maladaptive cognitions about penetration that result in fear. Consistent with the FAM-V, women with vaginismus endorsed more maladaptive cognitions (i.e., loss of control during penetration) as well as greater anxiety, both in response to a film depicting intercourse and on a questionnaire (SAI-E). Women with vaginismus also endorsed more threat, worry, and disgust. The FAM-V suggests that fear results in avoidance, which was potentially experienced by women with vaginismus who had a restricted range of sexual activities across the lifespan, in the previous year, and previous month. This restricted repertoire extended to a reduced frequency of intercourse. Avoidance interferes with future attempts, preventing women from disconfirming their negative expectations. The FAM-V also posits that women with vaginismus are hypervigilant for cues that support their maladaptive cognitions, such as physical sensations and anxiety. This part of the FAM-V has not been investigated directly; however, it may be that the discordance between physiological and subjective sexual arousal occurs as a result of women with vaginismus mistakenly identifying sympathetic activation due to sexual arousal as anxiety. If supported, this misattribution would suggest that women with vaginismus are indeed hypervigilant for physical sensations. The maladaptive cognitions, negative emotions, and (potentially)

hypervigilance experienced by women with vaginismus would be expected to interfere with sexual function during a sexual encounter, and difficulty with sexual function was indeed reported.

The FAM-V might be applicable beyond penetration and intercourse and may account for compromised sexual function and behaviour during non-penetrative sexual activities. Study 1 demonstrated that emotional responses are affected, as women with vaginismus reported greater negative emotions during the no-penetration film and reported more anxiety with non-penetrative sexual activities. The vaginismus group also endorsed a restricted range of non-penetrative sexual behaviours in Study 2, suggesting avoidance of these behaviours. Hypervigilance is also suggested by the discordance between physiological and subjective sexual arousal. To determine whether the FAM-V extends to non-penetrative sexual activities, researchers would need to explore the cognitions of women with vaginismus regarding non-penetrative sexual activity.

The use of psychophysiology and questionnaire measures offered several advantages and permitted the collection of in-vivo data on physiological sexual response along with information on the sexual function and behaviour experienced by women in their daily lives. Study 1 provided the first empirical information on how women with vaginismus respond physiologically to erotic stimuli and confirmed that, at least on a physiological level, women with vaginismus have the capacity to respond sexually. The measurement of subjective responses immediately following the presentation of the films was important in assessing emotional responding concurrently, rather than asking women to recall their emotions retrospectively after much time has elapsed. The results provided insight into the negative evaluation of erotic stimuli by women with vaginismus and provided a challenging contrast to physiological responding similar to that of no-pain controls. The survey component of the

study enabled access to a larger number of women. The survey also provided much needed data on basic sexual function of women with vaginismus as well as data on aspects of sexual behaviour for which there was previously only speculative accounts in the literature.

There were limitations that may have influenced the findings of this thesis research. The sample size in Study 1 was small, due to difficulties with recruitment, and, with the small sample size, it was only possible to detect large effect sizes for several analyses, whereas, for some analyses, there was limited power to detect even large effect sizes. Thus, the lack of group differences in physiological response with the erotic films could be due to difficulty detecting group differences because of sample size. However, the temperature change difference scores of the vaginismus and no-pain groups were quite similar, suggesting no group differences. The dyspareunia group did have a (non-significant) lower temperature change, which may have been significantly different from the other groups with a larger sample size. This limited power also suggests that significant group differences that were found in subjective responses are robust findings.

The vaginismus and dyspareunia groups in Study 1 differed significantly in age. As older women demonstrate less genital response to erotic stimuli (Kukkonen et al., 2010; Laan & Everaerd, 1995), the older age of the vaginismus group may have resulted in lower physiological responding, although there were no group differences in physiological response. The age of onset of penetration difficulties could also have an effect on the dependent variables as women who have a longer history of pain, anxiety, and distress would potentially experience more difficulty with sexual function, have a restricted range of sexual behaviour, and different cognitions about penetration. Age of onset was not assessed in the current study and future studies should consider age of onset and duration of penetration difficulties. However, all symptomatic participants had lifelong penetration

difficulties/pain that occurred, at the latest, during the first attempt at intercourse (many of the women also had a history of difficulty with tampon use and gynecological examinations). This thesis research investigated sexual function, behaviour, and sexual response in women who were premenopausal. However, the findings might differ with women with who are either peri- or postmenopausal. Future research should explore these variables in older women who are are peri- or postmenopausal, especially as no research has focused on women with vaginismus who have reached menopause.

As the eligibility process for both studies did not include a gynecological examination, specific diagnoses, such as provoked vestibulodynia, could not be confirmed; however, the absence of a gynecological examination also made the studies more accessible to women with vaginismus who were unable to tolerate a gynecological examination.

A volunteer bias also could have affected the results of the studies. Individuals who agree to participate in sexual psychophysiology studies have been found to report more sexual experience, a greater number of sexual partners, and less sexual guilt (Plaud, Gaither, Hegstad, Rowan, & Devitt, 1999; Strassberg & Lowe, 1995). Thus, the women who participated in Study 1 may have differed from women who either did not contact the researchers to participate or women who declined to participate after receiving a description of the study. However, given the negative responses to the erotic films by women with vaginismus, the women with vaginismus who participated appeared to do so despite discomfort with the stimuli. Research has also found differences in volunteers who agreed to participate in a questionnaire study on sexual attitudes, knowledge, and experiences. Volunteers reported more positive attitudes regarding sexuality compared to individuals who declined to participate (Strassberg & Lowe, 1995). Thus, the women who completed the online questionnaire study may have had more positive attitudes about sexuality than other

women. However, despite potentially more positive attitudes about sexuality, the symptomatic women still reported difficulties with sexual function and restricted sexual behaviour, suggesting that the selection bias may have had limited impact on the results of Study 2.

This thesis research advanced our empirical understanding of the sexual response, sexual function, and behaviour of women with vaginismus. In addition, several questions arose during the completion of the research. Each will be presented along with suggested future research to address the question.

**Questions 1. Is the lack of concordance between physiological and subjective arousal of the vaginismus group due to a misattribution of arousal as anxiety?**

Higher levels of negative emotions, including anxiety, worry, disgust, and threat, and lower mental sexual arousal in response to the erotic films distinguished the vaginismus group. However, the vaginismus group had a physiological sexual response similar to the other groups. One hypothesis about why women with vaginismus experienced discordance between physiological and subjective (perceived physiological sexual arousal, mental sexual arousal) responses is that they misattributed the increased sympathetic nervous system activity to anxiety, rather than attributing it to sexual arousal.

One option to determine whether women with vaginismus are more sensitive to the physiological symptoms of anxiety would be exploring anxiety sensitivity. Anxiety sensitivity involves fear of anxiety-related symptoms and concern that they have harmful effects (Reiss, Peterson, Gursky, & McNally, 1986). Higher anxiety sensitivity has been found in women with dyspareunia compared to a pain-free/low-pain control group (Meana & Lykins, 2009). The Anxiety Sensitivity Index (ASI) and the ASI-3, the most recent version of the measure, explore three dimensions of anxiety sensitivity: fear of physical, social, and

psychological consequences (Broman-Fulks et al., 2010; Reiss et al., 1986; Taylor et al., 2007). The items ask generally about thoughts related to physiological sensations (“It scares me when my heart beats rapidly”); thus, to explore whether anxiety sensitivity occurs during sexual experiences, additional items could be included to investigate fear of physical symptoms during sexual activity (e.g., “It scares me when my heart beats rapidly during sexual activity”). If women with vaginismus endorse higher anxiety sensitivity to the physical symptoms subscale, then it would support the possibility that physiological changes that are due to sexual arousal, such as increased heart rate and sensations of warmth, might be incorrectly attributed to anxiety. Consequently, women with vaginismus may be hypervigilant to physiological symptoms, interpreting physiological changes as anxiety, rather than recognizing physiological arousal as a sign of sexual arousal in response to a sexual stimulus. If anxiety sensitivity is heightened in women with vaginismus, then anxiety sensitivity might also be related to avoidance of penetration or sexual activity since anxiety sensitivity has been found to predict experiential avoidance (Schmidt & Koselka, 2000; Stewart, Zvolensky, & Eifert, 2002).

## **Question 2. What role do negative emotions play in vaginismus?**

Consistent with the literature, the women with vaginismus in Study 1 reported negative emotions when presented with erotic stimuli (Borg et al., 2010; Huijding et al., 2011). Comments of participants immediately following the viewing of the erotic films also support the strong role of negative emotions, including disgust and anxiety, in vaginismus. While the presentation of these reactions is based on personal impressions of the debriefing notes, the differences between the groups were striking and suggestive of categorical differences in emotional responding between vaginismus and dyspareunia. During the penetration films, negative reactions described by the vaginismus group included difficulty

relating to the film as they cannot experience intercourse, anxiety and nervousness about seeing penetration, and feelings of incompetence because they could not engage in intercourse. In response to the no-penetration films, women in the vaginismus group described repulsion, disgust, and guilt. Some described disgust with the close-up images of the actresses' vulvas and oral sex generally. Two participants from the vaginismus group cried after viewing the no-penetration films as they were upset by the explicitness and the depiction of cunnilingus. Two women from the vaginismus group consulted with the research supervisor to discuss their emotional responses to the films whereas no participants from the comparison groups took advantage of the offer of pro-bono consultations following participation in the study. However, some women with vaginismus did find these films less anxiety-provoking since there was no penetration.

Despite the results of Study 1 and other empirical research finding greater negative emotions in women with vaginismus, there have been some inconsistent results in the research literature. Huijding and colleagues (2011) found that, despite greater ratings of negative emotions on a visual analogue scale, women with vaginismus had positive automatic affective appraisals of sexual images. The disparate findings indicate that further investigation of negative emotions in women with vaginismus would be important in elucidating emotional variables that are potential targets for treatment.

One method to better understand the role of negative emotion in vaginismus may be the assessment of emotional valence of a stimulus with the use of the *eye blink startle response*. The eye blink reflex is one automatic aspect of the startle response in humans. The magnitude of this response can be measured with surface EMG sensors that capture activity of the orbicularis oculi muscle (Blumenthal et al., 2005). The startle reflex has been elicited in a research context by startling the participant with an unexpected auditory, tactile (e.g., air

puff), or visual stimuli. The magnitude of eye blink response can be used as an indicator of emotional state as an individual's emotional state modulates the response. If individuals are exposed to aversive stimuli (negative images, films) prior to the startle probe, then their eye blink response is of a greater magnitude, i.e., it is potentiated (Vrana, Spence, & Lang, 1988). This potentiation is attributed to the individual being prepared for defensive action as a result of the prior exposure to a negative stimulus. In contrast, when viewing stimuli with a positive (appetitive) emotional valence, the eye blink response is diminished relative to the reflex during negative and neutral stimuli (Bradley, Lang, & Cuthbert, 1993). This attenuation of the eye blink response also occurs with sexual stimuli (e.g., films, images). The eye blink reflex has differential responses with negative and sexual stimuli. It has been found to be significantly diminished during sexual stimuli compared to negative stimuli (Bradley, Codispoti, Sabatinelli, & Lang, 2001; Jansen & Frigda, 1994) and sometimes diminished compared to neutral stimuli (Giargiari, Mahaffey, Craighead, & Hutchison, 2005; Koukounas & McCabe, 2001).

The magnitude of the response during sexual stimuli compared to neutral and negative stimuli may clarify whether sexual stimuli are appetitive or aversive to women with vaginismus. If the eye blink magnitude of the vaginismus group during sexual stimuli is greater than that of other groups or is similar to the magnitude during negative stimuli, then that would indicate that the stimuli are aversive, further supporting negative emotions in vaginismus. The stimuli could be modified to examine whether the eye blink response varies during exposure to stimuli presenting different aspects of sexual activity (e.g., visual depictions of penetration, non-penetrative activity, images of genitals, and sounds of sexual activity).

### **Question 3. Do experimental studies provide a more accurate assessment of women with vaginismus?**

Until recently, the research literature on vaginismus has struggled to empirically distinguish this disorder from dyspareunia. However, it may be that the research methodology thus far has been inadequate in addressing the diagnostic conundrum. When women completed questionnaire measures in Studies 1 and 2 as well as in past research, their responses were typically similar to those of women with dyspareunia on most measurement tools, whether assessing sexual function (Reissing et al., 2003; van Lankveld, Brewaeys, ter Kuile, & Weijnenborg, 1995), mental health (Reissing et al., 2003; van Lankveld et al., 1995), or pain (de Kruiff, ter Kuile, Weijnenborg, & van Lankveld, 2000; Reissing et al., 2004). The limited exceptions in which women with vaginismus differed from women with dyspareunia included greater penetration-related concerns among women with vaginismus (Klaassen & ter Kuile, 2009) and higher levels of disgust sensitivity (Jong, van Overveld, Weijmar Schultz, Peters, & Buwalda, 2009). Group differences between vaginismus and dyspareunia on questionnaires in this thesis research were limited to greater anxiety with intercourse and concern about losing control during penetration.

However, experimental research that presents erotic stimuli (e.g., images or films; Borg, de Jong, & Weijmar Schultz, 2010; Huijding, Borg, Weijmar-Schultz, & de Jong, 2011) or involves in-vivo exposure to vaginal penetration (e.g., gynecological or pelvic floor musculature examinations; Lahaie et al., 2008; Reissing et al., 2004) tends to find differences between women with vaginismus and dyspareunia on emotional responses. This pattern of group differences during actual exposure to a sexual stimulus also occurred in this thesis research. In Study 1, the most striking group differences occurred when women were asked to rate their emotional responses immediately after viewing erotic film stimuli. On a

questionnaire measure (SAI-E), the symptomatic groups had endorsed similar levels of self-reported sexual anxiety to pornographic movies; yet, the vaginismus group endorsed significantly greater anxiety after actual exposure to erotic films. Reissing et al. (2004) also found that women with vaginismus and dyspareunia provided similar ratings on questionnaire measures (e.g., pain, pain catastrophizing, pain with (attempted) intercourse), yet demonstrated significantly more defensive reactions during gynecological and physical therapy examinations. These discrepancies suggest that questionnaire measures may not be sufficiently emotionally evocative, or, given that vaginismus may be characterized by avoidance, women with vaginismus may respond to questionnaires with limited experience. Actual exposure to sexual stimuli or penetration situations may clarify group differences because women with vaginismus are provided with the opportunity to confront the feared situation/stimulus, and emotional reactions are reflective of actual experiences. Thus, the approach to researching vaginismus needs to be adapted in order to identify valid differences between vaginismus and dyspareunia. Validity in research can be increased by including actual exposure to sexual/penetration stimuli or presentation of study stimuli in an evocative manner (e.g., virtual reality), rather than simply rely on questionnaire data.

#### **Question 4. Should vaginismus be considered a sexual dysfunction?**

With the upcoming revision of the DSM, there has been discussion about the classification of vaginismus and dyspareunia (Binik, 2010; Payne et al., 2006), including whether the disorders should be retained as sexual dysfunctions. Despite the classification of vaginismus as a sexual dysfunction, it does not fit the DSM sexual dysfunction category as clearly as other disorders. Sexual dysfunctions are oftentimes defined as “impairments in the physical components of the sexual response” (Kaplan, 1974, p. 146). According the DSM-IV-TR, “sexual dysfunctions are characterized by disturbance in sexual desire and in the

psychophysiological changes that characterize the sexual response cycle” (APA, 2000, p. 535). Despite the classification of vaginismus as a sexual dysfunction, this categorization is not supported empirically (Binik, 2010; Payne et al., 2006). With the exception of the sexual pain disorders, all other sexual dysfunctions described in the DSM are disruptions of the sexual response cycle (hypoactive sexual desire disorder, sexual aversion disorder, female sexual arousal disorder, female orgasmic disorder; APA, 2000). An examination of the diagnostic taxa of female sexual dysfunctions by an international, multidisciplinary group resulted in a number of suggestions to modify criteria but still defined sexual dysfunctions as interfering with sexual response (Basson et al., 2003). Despite the greater levels of sexual dysfunction (desire, arousal, lubrication, orgasm, satisfaction) reported by women with vaginismus, the increased frequency of sexual difficulties does not necessarily imply that vaginismus needs to be considered a sexual dysfunction. For example, other Axis I disorders, such as obsessive compulsive disorder, social phobia, and panic disorder, are associated with increased sexual difficulties and are not consequently diagnosed as sexual dysfunctions (Bodinger et al., 2002; van Minnen & Kampman, 2000).

Rather than a sexual dysfunction, the findings from recent studies suggest that vaginismus might be better conceptualized as a specific phobia to vaginal penetration. For example, there is an increased incidence of specific phobias in women with vaginismus (Reissing, 2012), greater level of distress and defensive reactions displayed by women when penetration is attempted in the context of a gynecological examination (Reissing et al., 2004), and higher levels of fear when thinking about intercourse or non-coital penetrative sexual activity (ter Kuile et al., 2007). The overlap in treatment approaches between vaginismus and phobia support the role of phobia in the maintenance of vaginismus. For example, the successful use of exposure techniques to successfully treat vaginismus suggests

that high levels of anxiety, potentially at a phobic level, are central to vaginismus (ter Kuile et al., 2009), and reduction of penetration-related fears and behavioural avoidance of penetration appear to mediate treatment outcome (ter Kuile et al., 2007).

Findings from Study 1 and Study 2 were supportive of the conceptualization of vaginismus as a phobia. In Study 1, the women with vaginismus reported higher levels of anxiety during intercourse attempts/experiences and greater negative reactions to erotic films, including anxiety, threat, and disgust. Increased anxiety and threat would be expected in individuals with a phobia being exposed to a representation of their phobic object/situation. Disgust is perhaps not intuitively linked to phobia; however, individuals with specific phobias have been found to endorse feelings of disgust upon exposure to images of their feared stimuli, specific phobia symptoms are correlated with disgust sensitivity, and it was posited that disgust may be involved in phobias (Davey & Marzillier, 2009; Hamm, Cuthbert, Globisch, & Vaitl, 1997; Muris, Merckelbach, Schmidt, & Tierney, 1999; van Overveld, de Jong, & Peters, 2011). Thus, the finding of greater disgust in women with vaginismus in response to erotic stimuli could also be indicative of a phobia. In Study 2, women with vaginismus reported negative cognitions about penetration, increased overall phobia symptoms, and behaviours that were suggestive of avoidance, such as fewer attempts at intercourse in the previous month and a restricted range of sexual behaviours. The negative thoughts about the consequences of penetration and avoidance of intercourse and related behaviours are consistent with a phobia.

Thus, past research findings (Lahaie et al., 2008; Klaassen & ter Kuile, 2009; Reissing et al., 2004; ter Kuile et al., 2007) and the results of Studies 1 and 2 suggest that a phobic-like response is central to vaginismus. The phobia is likely a fear of vaginal penetration, as supported by negative reactions to the erotic stimuli depicting penetration in

Study 1. However, negative responses were also noted with the no-penetration film and women reported a limited range of non-penetrative sexual activity. There are several possible explanations for these findings. One possibility is that women with vaginismus are sensitive to any cue that could signal penetration and may evoke thoughts such as, “this will lead to penetration;” thus, films of explicit sexual acts or engagement in non-penetrative sexual activities are anxiety-provoking even when they do not include intercourse as they indicate that intercourse is a possibility. Another potential explanation for the negative responses to the no-penetration films is that the emotion of disgust is crucial to this phobia. As described qualitatively by participants with vaginismus, the no-penetration films were disgusting because of explicit images of the actresses’ vulvas. A study using penetration and no-penetration films with equal levels of explicitness would help disentangle whether films depicting penetration evoke more negative reactions if the level of disgust is similar and whether the similar ratings of negative responses to the two sets of films in Study 1 were an artifact of the relative explicitness of the no-penetration film.

Recent findings about vaginismus also suggest similarities to Sexual Aversion Disorder (SAD). SAD is characterized by “persistent or recurrent extreme aversion to, and avoidance of, all (or almost all) genital sexual contact with a sexual partner” (APA, 2000, p. 542). Very limited research has been conducted on SAD (Katz, Gipson, Kearl, & Kriskovich, 1989; Katz, Gipson, & Turner, 1992) and its relationship to vaginismus has not been explored empirically. However, descriptively the two disorders share defining characteristics, such as high levels of disgust and anxiety with sexual activity and contact (Kaplan, 1995) and avoidance of sexual activity (Crenshaw, 1985). Interestingly, a reclassification of Sexual Aversion Disorder as a specific phobia has been suggested for DSM-5 (Brotto, 2010). If vaginismus was included in a reclassified SAD and considered a

specific phobia, specifiers would need to identify with which aspects of sexual behaviour women experienced aversion and avoidance.

Some research findings appear inconsistent with the hypothesis of vaginismus as a phobia to penetration, such as positive automatic affective appraisals of sexual penetration images (Huijding et al., 2011). However, a phobia of penetration is different from many specific phobias in that it is a fear of behaviour and stimuli that are typically perceived as pleasurable. Anxiety typically leads to avoidance, while sexual arousal usually elicits approach (van den Hout & Barlow, 2000). Despite the negative subjective responses of the vaginismus group, there were no group differences on subjective physiological response or positive emotions during the penetration film in Study 1, indicating that despite the negative reactions, erotic stimuli still hold some positive valence. It has been reported that, at times, women endorse high levels of both positive and negative emotions to the same erotic film (Peterson & Janssen, 2007). Thus, women with vaginismus, while experiencing many negative emotions, may simultaneously experience approach responses.

Despite this initial support for a consideration of vaginismus as a specific phobia, further exploration is required. One area for further investigation is the cognitions endorsed by women with vaginismus to better understand the focus of apprehension. One possible focus of apprehension includes thoughts related to physical sensations. There are only two questions on the VPCQ that are related to the construct of anxiety sensitivity (“I am afraid that I will panic during penetration,” and “It feels frightening not knowing what happens in my body during intercourse”). Women with vaginismus endorsed more of these cognitions relative to the comparison groups, suggesting that sensitivity to and fear of physiological sensations may be more involved in vaginismus than previously suggested. Other studies have found a range of negative cognitions specific to women with lifelong vaginismus (e.g.,

expectation of pain, fear of injury, fear of losing control, negative body and genital image, self image, genital incompatibility, fear of intimacy, dislike idea of having penis inside vagina; Klaassen & ter Kuile, 2009; Reissing, 2012). Further exploration of cognitions, including those related to physiological sensations, would indicate which thoughts contribute to the development and maintenance of vaginismus.

A future study using the ASI-3, including items about fear of physical, social, and psychological consequences of the anxiety, would give information about the potential roles of those fears in the development vaginismus. Items specific to sexual activity should be added to the ASI-3 to understand cognitions related specifically to sexual experiences. If the presence of fears or negative cognitions is greater in women with vaginismus compared to women without pain and women with dyspareunia, it would further support the role of anxiety and phobia in vaginismus.

Investigations using the eye blink startle response might also contribute to understanding whether vaginismus should be considered a specific phobia. When individuals with specific phobias view (phobic) fear-relevant stimuli, they respond to a probe stimulus with an eye blink of a greater magnitude than individuals without a phobia (Globisch, Hamm, Esteves, & Öhman, 1999; Wendt et al., 2010). The potentiated startle only differentiates a phobia group from a control group when a fear-relevant stimulus is presented (Hamm et al., 1997; Wendt et al., 2010). An experimental paradigm that would provide potential clarification about whether vaginismus should be considered a phobia would involve showing different film or visual stimuli (including erotic and neutral films or images) to participants and then eliciting a startle response. As the typical response to an erotic stimulus is a diminished eye blink and a fear-relevant phobic stimulus elicits a potentiated startle response, the use of this measure should allow for differentiation of the

responses. Thus, if the eye blink response is potentiated in women with vaginismus when presented with erotic stimuli compared to neutral stimuli, it would provide further support that these stimuli activate a defensive mechanism, supportive of a phobic element in vaginismus. In addition to exploring within group differences (comparing the eye blink responses of women with vaginismus to erotic and neutral films), the differential responses between groups of women (women with vaginismus compared to women with no-pain or dyspareunia) could elucidate the role of defensive responding in vaginismus. Thus, if women with vaginismus respond with greater startle response to erotic stimuli compared to neutral stimuli and their eye blink responses to erotic stimuli are greater than those of women without vaginismus, then these findings would suggest that women with vaginismus do respond to erotic stimuli defensively and phobia may play a role (at least) in the maintenance of vaginismus.

There is some research providing empirical support for the use of exposure in the treatment of vaginismus (Reissing et al., in press; ter Kuile et al., 2009). However, further outcome research with a control group comparing different modes of treatment for vaginismus (e.g., in-session exposure, CBT without in-session exposure) would confirm whether exposure is the most efficacious treatment. If exposure-based treatment is most successful, the finding that vaginismus is best treated using an approach also used for treating phobia would further support the role of phobic anxiety in vaginismus.

### **Implications**

Vaginismus and dyspareunia will likely be combined into one classification, Genito-Pelvic Pain Penetration Disorder, in DSM-5. However, the results of this thesis research have implications for this new diagnosis and the suitability of this diagnostic change should

be questioned. The findings of increased negative emotions in response to erotic films in Study 1 are supportive of categorical differences between vaginismus and dyspareunia.

A few years ago, the empirical literature was supportive of dimensional differences between these disorders on measures of pain, pelvic floor function, sexual function and psychological distress (Basson, 1996; de Kruiff et al., 2000; Reissing et al., 2003; Reissing et al., 2004; ter Kuile, van Lankveld, Vlieland, Willekes, & Weijnenborg, 2005; van Lankveld et al., 1995). However, recent evidence has been suggestive of categorical differences, such as more defensive/avoidant behavioural signs of distress and higher reports of anxiety by women with vaginismus during gynecological examinations (Lahaie et al., 2008), more negative ratings of sexual images (Huijding et al., 2011), more negative attribution style (Klaassen & ter Kuile, 2009; Reissing, 2012), facial expressions of disgust when viewing erotic films, and reported greater disgust to sex images and film clips (Borg et al., 2010). Perhaps the prior lack of differences was due to a research approach that focussed on questionnaire methods, rather than the recent approach of presenting women with exposure to stimuli and measuring their responses during or immediately after this experience. Thus, combining vaginismus and dyspareunia into GPPPD may be premature given the recent findings indicative of categorical differences.

The findings with regard to difficulties with sexual function have treatment implications. Although a cognitive-behavioural therapy group for vaginismus has received some empirical support (van Lankveld et al., 2006), the treatment modality that currently seems to be most effective is a cognitive-behavioural approach that involves 2-hour, therapist-guided vaginal penetration exposure sessions (ter Kuile et al., 2009). In a replicated single-case design, of 10 women who participated in treatment, nine were able to experience intercourse following a maximum of three 2-hour sessions (ter Kuile et al., 2009). This study

has recently been replicated with a larger sample with similar positive outcomes (ter Kuile & Reissing, in press). This treatment involves education about the fear and avoidance model of vaginal penetration, including cognitions and emotions, and vaginal penetration exercises conducted in the hospital and practiced at home. This exposure-based treatment and another cognitive-behavioural therapy group found that, despite some improvement in sexual functioning posttreatment, this aspect of treatment has been less successful (ter Kuile et al., 2009; van Lankveld et al., 2006). This limited improvement in sexual function is likely attributable to the primary treatment focus on penetration, rather than sexual rehabilitation. One of these programs offered optional *sensate focus* exercises (van Lankveld et al., 2006). Women in the other study did not receive intervention for sexual functioning, but the authors suggested that it may be indicated for some women (ter Kuile et al., 2009). This focus on exposure is important in treating the fear of penetration; however, the continued sexual difficulties seen in many women suggest that there is latitude to incorporate further sex therapy techniques into treatment.

### **Conclusion**

This thesis research was intended to provide data on physiological and subjective responses to erotic stimuli, sexual function, sexual arousability and anxiety, and sexual behaviour in women with lifelong vaginismus. Despite unaffected physiological sexual arousal in a laboratory setting, women with vaginismus reported difficulties with sexual functioning and a restricted range of sexual behaviour. The importance of emotional factors in vaginismus was striking. A greater range of negative emotions was implicated than expected, including anxiety and disgust, and these emotions were evoked in response to more diverse film stimuli than hypothesized. This research also identified areas for further investigation. Given the findings regarding emotional responding, future research should

investigate emotional variables, including of the potential role of anxiety in the discordance noted in women with vaginismus. Future research should include no-penetration sexual stimuli as the results of this study suggest that emotional responding and sexual function are affected beyond penetration. The findings of this study also suggest that the combination of vaginismus and dyspareunia might be premature, given the recent support for categorical differences in emotional functioning.

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**Appendix A**

**Results for Individual Items on the Film Scale and SAI-E**

Table 1

## Item Results for Film Scale for No-Penetration Film (Follow-up ANOVAs)

Film Scale Items	<i>F</i>	<i>p</i>	$\eta_p^2$
1. My highest level of sexual arousal	1.60	.213	.07
2. Sexually aroused	2.33	.109	.10
3. Mentally sexually aroused	1.69	.197	.07
4. Physically sexually aroused	2.50	.094	.11
5. Anxious <sup>a</sup>	12.92	.000	.38
6. Worried <sup>a</sup>	15.55	.000	.43
7. Angry	6.53	.003	.24
8. Disgusted <sup>a</sup>	6.46	.004	.24
9. Embarrassed	7.88	.001	.27
10. Guilty	6.20	.004	.23
11. Sensuous	1.01	.371	.05
12. A desire to be close to someone	5.42	.008	.21
13. Any physical reaction at all	0.45	.642	.02
14. Any genital feelings	1.33	.274	.06
15. Feelings of warmth	2.00	.148	.09
16. Genital pulsing or throbbing	0.25	.784	.01
17. Warmth in genitals	0.89	.420	.04
18. Genital wetness or lubrication	0.37	.695	.02
19. Perspiration	0.47	.628	.02
20. Breast sensations	1.42	.253	.06
21. Faster heart beat	0.40	.670	.02
22. Faster breathing	1.18	.317	.05
23. Pleasant	2.21	.122	.10
24. Interested	3.82	.030	.15
25. Attracted	3.04	.059	.13
26. Excited	1.42	.253	.06
27. Sexy	1.77	.183	.08
28. Feminine	0.78	.463	.04
29. Dirty	5.49	.008	.21
30. Loving	1.50	.234	.07
31. Sexually attractive	5.40	.008	.20
32. Inhibited	3.81	.030	.15
33. Easy to arouse	1.75	.186	.08
34. Incompetent	7.19	.002	.26
35. Sexually turned off	3.26	.048	.14
36. Aggressive	1.20	.311	.05

37. Threatened <sup>a</sup>	6.68	.003	.24
38. Relaxed	17.44	.000	.45
39. Masculine	0	1.00	0
40. Sexual desire	2.90	.066	.12
41. Pleasure	2.09	.137	.09
42. Uncomfortable	14.26	.000	.44

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*Note.* <sup>a</sup>denotes items that were described in Study 1. Df (2, 42) for analyses, except items 13 (df (2, 41)) and 42 (df(2, 37)).

Table 2

Items Results for Film Scale for Penetration Film (Follow-up ANOVAs)

Film Scale Items	<i>F</i>	<i>p</i>	$\eta_p^2$
1. My highest level of sexual arousal	2.33	.109	.10
2. Sexually aroused	1.30	.285	.06
3. Mentally sexually aroused	4.69	.015	.18
4. Physically sexually aroused	1.95	.154	.09
5. Anxious <sup>a</sup>	12.46	.000	.37
6. Worried <sup>a</sup>	14.05	.000	.40
7. Angry	4.44	.000	.17
8. Disgusted <sup>a</sup>	9.27	.000	.31
9. Embarrassed	5.53	.007	.21
10. Guilty	5.53	.007	.21
11. Sensuous	1.57	.220	.07
12. A desire to be close to someone	1.37	.265	.06
13. Any physical reaction at all	0.18	.840	.01
14. Any genital feelings	1.64	.205	.07
15. Feelings of warmth	0.16	.852	.01
16. Genital pulsing or throbbing	0.15	.865	.01
17. Warmth in genitals	0.97	.387	.04
18. Genital wetness or lubrication	1.53	.228	.07
19. Perspiration	0.75	.479	.03
20. Breast sensations	2.42	.102	.10
21. Faster heart beat	0.89	.419	.04
22. Faster breathing	1.26	.296	.06
23. Pleasant	2.38	.105	.10
24. Interested	0.94	.400	.04
25. Attracted	1.14	.329	.05
26. Excited	0.34	.712	.02
27. Sexy	2.72	.077	.12
28. Feminine	1.01	.372	.05
29. Dirty	5.53	.007	.21
30. Loving	0.65	.526	.03
31. Sexually attractive	1.95	.156	.09
32. Inhibited	3.09	.056	.128
33. Easy to arouse	1.36	.269	.06
34. Incompetent	9.02	.001	.30
35. Sexually turned off	1.67	.200	.07
36. Aggressive	1.96	.154	.09

37. Threatened <sup>a</sup>	4.86	.013	.19
38. Relaxed	4.03	.025	.16
39. Masculine	0.30	.745	.01
40. Sexual desire	3.54	.038	.14
41. Pleasure	2.05	.141	.09
42. Uncomfortable	8.90	.001	.33

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*Note.* <sup>a</sup>denotes items that were described in Study 1. Df (2, 42), except for item 42 (df (2, 37)).

Table 3

## Item Results for SAI-E Arousability for Study 1 (Follow-up ANOVAs)

SAIE – Arousability Items	<i>F</i>	<i>p</i>	$\eta_p^2$
1. When a loved one stimulates your genitals with mouth and tongue <sup>a</sup>	1.95	.155	.09
2. When a loved one fondles your breasts with his hands	4.14	.023	.17
3. When you see a loved one nude	4.40	.018	.17
4. When a loved one caresses you with his eyes	0.85	.436	.04
5. When a loved one stimulates your genitals with his finger <sup>a</sup>	7.42	.002	.26
6. When you are touched or kissed on the inner thighs by a loved one	3.12	.054	.13
7. When you caress a loved one's genitals with your fingers <sup>a</sup>	6.25	.004	.23
8. When you read a pornographic or "dirty" story	0.97	.389	.04
9. When a loved one undresses you	5.12	.010	.20
10. When you dance with a loved one	5.89	.006	.22
11. When you have intercourse with a loved one <sup>a</sup>	22.15	.000	.51
12. When a loved one touches or kisses your nipples	4.81	.013	.19
13. When you caress a loved one (other than genitals)	1.40	.259	.06
14. When you see pornographic pictures or slides	2.05	.141	.09
15. When you lie in bed with a loved one	2.88	.068	.12
16. When a loved one kisses you passionately	3.60	.036	.15
17. When you hear sounds of pleasure during sex	5.33	.009	.20
18. When a loved one kisses you with an exploring tongue	6.70	.003	.24
19. When you read suggestive or pornographic poetry	1.34	.273	.06
20. When you see a strip show	3.91	.028	.16
21. When you stimulate your partner's genitals with your mouth and tongue	6.84	.003	.25
22. When a loved one caresses you (other than genitals)	1.34	.272	.06
23. When you see a pornographic movie <sup>a</sup>	0.59	.558	.03
24. When you undress a loved one	5.60	.007	.21
25. When a loved one fondles your breasts with mouth and tongue	3.97	.026	.16
26. When you make love in a new or unusual place	6.00	.005	.22
27. When you masturbate	2.48	.096	.11
28. When your partner has an orgasm	5.79	.006	.22

*Note.* <sup>a</sup>denotes items that were described in Study 1. Df (2, 42) for all analyses.

Table 4

## Item Results for SAI-E Anxiety for Study 1 (Follow-up ANOVAs)

SAIE – Anxiety Items	<i>F</i>	<i>p</i>	$\eta_p^2$
1. When a loved one stimulates your genitals with mouth and tongue <sup>a</sup>	6.55	.003	.24
2. When a loved one fondles your breasts with his hands	3.86	.029	.16
3. When you see a loved one nude	6.82	.003	.25
4. When a loved one caresses you with his eyes	6.26	.004	.23
5. When a loved one stimulates your genitals with his finger <sup>a</sup>	11.58	.000	.36
6. When you are touched or kissed on the inner thighs by a loved one	10.50	.000	.33
7. When you caress a loved one’s genitals with your fingers <sup>a</sup>	6.86	.003	.25
8. When you read a pornographic or “dirty” story	1.96	.154	.09
9. When a loved one undresses you	5.88	.006	.22
10. When you dance with a loved one	2.88	.067	.12
11. When you have intercourse with a loved one <sup>a</sup>	48.69	.000	.70
12. When a loved one touches or kisses your nipples	4.85	.013	.19
13. When you caress a loved one (other than genitals)	4.31	.020	.17
14. When you see pornographic pictures or slides	3.32	.046	.14
15. When you lie in bed with a loved one	4.25	.021	.17
16. When a loved one kisses you passionately	3.84	.029	.16
17. When you hear sounds of pleasure during sex	4.97	.012	.19
18. When a loved one kisses you with an exploring tongue	6.69	.003	.24
19. When you read suggestive or pornographic poetry	2.79	.073	.12
20. When you see a strip show	4.68	.015	.18
21. When you stimulate your partner’s genitals with your mouth and tongue	9.08	.001	.30
22. When a loved one caresses you (other than genitals)	3.74	.032	.15
23. When you see a pornographic movie <sup>a</sup>	4.27	.020	.17
24. When you undress a loved one	1.92	.159	.08
25. When a loved one fondles your breasts with mouth and tongue	4.05	.025	.16
26. When you make love in a new or unusual place	2.93	.065	.12
27. When you masturbate	3.18	.052	.13
28. When your partner has an orgasm	4.26	.021	.17

*Note.* <sup>a</sup>denotes items that were described in Study 1. Df (2, 42) for all analyses.

**Appendix B**  
**Research Ethics Board Approval**

## SOCIAL SCIENCES AND HUMANITIES RESEARCH ETHICS BOARD

## CERTIFICATION OF ETHICAL APPROVAL

This is to certify that the University of Ottawa Social Sciences and Humanities Research Ethics Board (REB) has examined the application for ethical approval for the research project **The role of early, negative experiences, fear and aversion, couple functioning, and sexual self view in sexual disorders involving pain** (06-04-11B) submitted by Elke Reissing (PI) and Rebecca Cherner of the School of Psychology. The members of the REB found that the research project met appropriate ethical standards as outlined in the Tri-Council Policy Statement and in the Procedures of the University of Ottawa Research Ethics Boards, and accordingly have the research project a Category 1a (Approval).

This certification is valid for one year from the date indicated below.

July 21, 2008

Date

\_\_\_\_\_  
Catherine Paquet

Assistant-Director (Ethics)

For the Chair of the Social Sciences and Humanities REB

**Appendix C**  
**Notices of Study**

Are you unable to have intercourse?

Are you unable to insert a tampon?

Are you unable to have a gynecological exam?

Women (age 18-44) who have always had **difficulty with vaginal penetration** are invited to participate in a research project on genital pain at the School of Psychology of the University of Ottawa.

Participation involves:

- 2 visits to the university
- Completing a set of questionnaires
- Watching film clips while your physical reaction is measured (no physical contact)

This research is supported by the Social Sciences and Humanities Research Council of Canada and approved by the University of Ottawa Research Ethics Board.

You will be compensated for your time and receive information on treatment options.

Please call for more information.



# Do you experience PAIN with sexual activity?

Women (age 18-44) who **have always had pain during at least half of all intercourse occasions** are invited to participate in a research project on genital pain disorders at the School of Psychology of the University of Ottawa.

Participation involves:

- 2 visits to the University of Ottawa
- Completing a set of questionnaires
- Watching film clips while your physical reaction is measured (no physical contact)

This research is supported by the Social Sciences and Humanities Research Council of Canada and approved by the University of Ottawa Research Ethics Board.

You will be compensated for your time and receive information on treatment options.

Please call for more information.



# Women participants needed for sexual health research

Women (age 18-44) who **DO NOT experience pain with sexual intercourse** are invited to participate in a research project on genital pain disorders at the School of Psychology of the University of Ottawa.

Participation involves:

- 2 visits to the university
- Completing a set of questionnaires
- Watching film clips while your physical reaction is measured (no physical contact)

This research is supported by the Social Sciences and Humanities Research Council of Canada and approved by the University of Ottawa Research Ethics Board.

You will be compensated for your time.

Please call for more information.



**Appendix D**  
**Consent Forms**



### **Consent Form (Study 1)**

I am invited to participate in a research project entitled “The role of early, negative experiences, fear and aversion, couple functioning, and sexual self view in sexual disorders involving pain”, supported by a research grant from the Social Sciences and Humanities Research Council of Canada.

This study is conducted at the School of Psychology at the University of Ottawa. Rebecca Cherner, the researcher conducting this study, can be reached by phone or email. The principal investigator is Dr. Elke Reissing who can be contacted by phone or email.

Pain during sexual activity (dyspareunia) and difficulties with vaginal penetration (vaginismus) are surprisingly common but very frustrating women’s health problems. They can affect a woman’s sexuality, her relationship, her psychological well-being, her ability to take care of her gynecological health and, for some women, prevent the conception of a baby. This study will investigate factors that are related to the causes of these neglected women’s health problems. In particular, the researchers are investigating the role of fear and anxiety specific to sexuality and how these feelings contribute to the development of long-term difficulties with vaginal penetration.

My participation will involve 2 visits to the university. The first session will last about 1.5 hours, the second visit will last about 45 minutes. During the first session I will be asked to fill out questionnaires describing my general background (e.g., age, mental health) and my sexual background (e.g., difficulties, negative experiences such as unwanted sexual experiences and/or physical abuse). Following the questionnaires, I will also be invited to watch 2 film excerpts. Before and after the film I will be asked to indicate my emotional responses on a questionnaire; my physiological (physical) response will be measured using thermal equipment. During the viewing of the film excerpts, I will be in a completely private room, locked from the inside. If necessary, I can communicate with the experimenter via intercom. After explaining the equipment used for thermal imaging and answering all of my questions, the researcher will leave the room. I can lock the room from the inside. I will be asked to undress from the waist down. If I wish, I will be provided with clean leg warmers and can wear my socks. I will be comfortably seated in a semi-reclined position on a hospital-type bed and my legs will rest comfortably in leg supports. I will then watch a short film depicting a nature scene or a travel story and then watch about 15 minutes of erotic film excerpts.

The second session will involve viewing another nature or travel film and erotic film excerpt. I will again be asked to note my reactions to the films, but there will be no questionnaires prior to viewing the films. Following my participation in some or all aspects of the study, Rebecca Cherner will meet with me to provide all the information I would like

concerning the details of the study, arrange for having the final group results communicated to me via mail or email, and provide general information on sexual pain disorders, treatment and referral options specific to me.

I have been informed that filling out the questionnaires and watching the erotic film excerpts could make me feel uncomfortable, or I may have additional questions or concerns. Dr. Reissing, the principle investigator and a clinical psychologist specializing in sexual pain disorders, will be available for me to discuss any confusing or negative reaction should I wish to do so. A separate meeting with Dr. Reissing can be arranged at my convenience.

- 1) During or after my participation in the study, Rebecca Cherner will be present or available by phone if I have any questions or concerns. Dr. Reissing will also be available by phone and arrangements can be made to meet with her.
- 2) I will have complete privacy while viewing the erotic film excerpts. All communication during testing will occur via intercom and the testing room can be locked from the inside.
- 3) I will be provided with clear instructions on placing myself in front of the thermal measure and I will have the time I need to ask questions.
- 4) The thermal equipment is designed to be comfortable and unobtrusive. Should I find the equipment uncomfortable nevertheless, I will be able to terminate testing.
- 5) At the end of my participation in all or part of the study, I will receive a resource sheet that I can use to get additional information, referrals, or support in the future.

All the questionnaire and physiological results will remain **confidential** and only Dr. Reissing and Ms. Cherner have access to the data. The questionnaire data is entered only once several participants have completed questionnaires, hence my responses to questionnaire items will remain anonymous even to the researchers and **my name will not appear on the questionnaires or the computer data from the physiological measure.**

All original data will be secured in a locked filing cabinet by Dr. Reissing for 10 years and securely destroyed thereafter. The information collected will be used for research purposes only. The results of the study will be presented in a format (group results only) that protects my identity completely. Dr. Reissing and Ms. Cherner will never reveal my identity or the information obtained during testing.

This study is the first to examine sexuality in women with vaginismus and my participation will contribute significantly to the understanding of sexual health problems involving pain and vaginal penetration difficulties. Free parking will be provided for the testing sessions and I will receive \$50 (\$25 per session) as compensation for my time or any other expenses.

**I am aware that I have the right to decline to participate in the study without suffering negative consequences.** I understand that I have the right to withdraw from the study at any time and I can refuse to answer any questions.

I, \_\_\_\_\_, agree to participate in the above research study conducted by Rebecca Cherner and Dr. Elke Reissing of the School of Psychology at the University of Ottawa.

Questions about my rights as a research participant may be addressed to Protocol Officer for Ethics in Research.

There are two copies of the consent form, one of which I may keep for my records.

\_\_\_\_\_  
Participant's signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Researcher's signature

\_\_\_\_\_  
Date

## Information Sheet (Study 2)

**Study:** I am invited to participate in a research project entitled “The role of early, negative experiences, fear and aversion, couple functioning, and sexual self view in sexual disorders involving pain”, supported by a research grant from the Social Sciences and Humanities Research Council of Canada.

**Researchers:** This study is conducted at the School of Psychology at the University of Ottawa. Rebecca Cherner, the researcher conducting this study, can be reached by phone or email. The principal investigator is Dr. Elke Reissing who can be contacted by phone or email.

**Background:** Pain during sexual activity (dyspareunia) and difficulties with vaginal penetration (vaginismus) are surprisingly common but very frustrating women’s health problems. They can affect a woman’s sexuality, her relationship, her psychological well-being, her ability to take care of her gynecological health and, for some women, prevent the conception of a baby. This study will investigate factors that are related to the causes of these neglected women’s health problems. In particular, the researchers are investigating the role of fear and anxiety specific to sexuality and how these feelings contribute to the development of long-term difficulties with vaginal penetration.

**Participation:** My participation will involve the completion of a series of questionnaires, which should take approximately 45 minutes. The items on the questionnaires address areas such as my general background (e.g., age, mental health) and my sexual background (e.g., difficulties, negative experiences such as unwanted sexual experiences and/or physical abuse).

**Follow up:** I can contact Rebecca Cherner to answer any questions that I may have about the questionnaire items. She will be available via phone or email to provide me with all the information I would like concerning the details of the study and provide general information on sexual pain disorders and treatment options specific to me. The final results will be available to me on the Human Sexuality Research Laboratory website at <http://www.sciencessociales.uottawa.ca/hslab-labosh/>

**Benefits:** This study is the first to examine sexuality in women with vaginismus and my participation will contribute significantly to the understanding of sexual health problems involving pain and vaginal penetration difficulties.

**Risks:** Filling out the questionnaires could make me feel uncomfortable, or I may have additional questions or concerns. Dr. Reissing, the principle investigator and a clinical psychologist specializing in sexual pain disorders, will be available for me to discuss any confusing or negative reaction should I wish to do so. Contact with Dr. Reissing can be arranged at my convenience.

- 1) During or after my participation in the study, Rebecca Cherner will be available by phone or email if I have any questions or concerns. Dr. Reissing will also be available by phone and arrangements can be made to speak with her.

- 2) [I have access to additional information on sexual health and vulvo-vaginal pain disorders at http://www.sciencesociales.uottawa.ca/hslab-labosh/eng/resource\\_list.asp](http://www.sciencesociales.uottawa.ca/hslab-labosh/eng/resource_list.asp)

**Confidentiality and Anonymity:** All the questionnaire results will remain **confidential** and only Dr. Reissing and Ms. Cherner have access to the data. I will not be asked to give my name or other identifying information. The information in the questionnaires is also **anonymous** because the survey will not leave any markers or saving anything to my computer. The Internet company hosting the survey will not collect IP addresses. The results of the study will be presented in a format (group results only) that protects my identity completely.

**Conservation of Data:** Data are collected by an independent internet survey provider who will send the data to the researchers for analysis. Data are stored on a password-protected computer. All original data will be securely stored for 10 years and securely destroyed thereafter. The information collected will be used for research purposes only.

**Voluntary Participation: I am aware that I have the right to decline to participate in the study without suffering negative consequences.** I understand that I have the right to withdraw from the study at any time by closing the browser window and I can refuse to answer any questions.

Questions about my rights as a research participant may be addressed to Protocol Officer for Ethics in Research.

**Acceptance:** By clicking on the following link I am consenting to participate in the above research study by Rebecca Cherner and Dr. Elke Reissing, Human Sexuality Research Laboratory, School of Psychology, University of Ottawa.

I consent to participate in  
the research study

I DO NOT consent to  
participate in the  
research study

## **Appendix E**

**Measures of Sexual Arousability and Anxiety, Sexual Function, Sexual Behaviour,  
Vaginal Penetration Cognitions, Sexual and Physical Abuse, Demographics**

## Sexual Arousability Index-Expanded

*Instructions:* The experiences in this inventory may or may not be sexually arousing to you. There are no right or wrong answers. Read each item carefully, and then circle the number which indicates how sexually aroused you feel when you have the described experience, or how sexually aroused you think you would feel if you actually experienced it. *Be sure to answer every item.* If you aren't certain about an item, circle the number that seems about right. Rate feelings of **arousal** according to the scale below.

- 1 Adversely affects arousal; unthinkable, repulsive, distracting
- 0 Doesn't affect sexual arousal
- 1 Possibly causes sexual arousal
- 2 Sometimes causes sexual arousal; slightly arousing
- 3 Usually causes sexual arousal; moderately arousing
- 4 Almost always sexually arousing; very arousing
- 5 Always causes sexual arousal; extremely arousing

ANSWER EVERY ITEM

How you feel or think you  
would feel if you were actually  
involved in this experience

1. When a loved one stimulates your genitals with mouth and tongue	-1	0	1	2	3	4	5
2. When a loved one fondles your breasts with his hands	-1	0	1	2	3	4	5
3. When you see a loved one nude	-1	0	1	2	3	4	5
4. When a loved one caresses you with his eyes	-1	0	1	2	3	4	5
5. When a loved one stimulates your genitals with his finger	-1	0	1	2	3	4	5
6. When you are touched or kissed on the inner thighs by a loved one	-1	0	1	2	3	4	5
7. When you caress a loved one's genitals with your fingers	-1	0	1	2	3	4	5
8. When you read a pornographic or "dirty" story	-1	0	1	2	3	4	5
9. When a loved one undresses you	-1	0	1	2	3	4	5
10. When you dance with a loved one	-1	0	1	2	3	4	5
11. When you have intercourse with a loved one	-1	0	1	2	3	4	5
12. When a loved one touches or kisses your nipples	-1	0	1	2	3	4	5
13. When you caress a loved one (other than genitals)	-1	0	1	2	3	4	5
14. When you see pornographic pictures or slides	-1	0	1	2	3	4	5
15. When you lie in bed with a loved one	-1	0	1	2	3	4	5
16. When a loved one kisses you passionately	-1	0	1	2	3	4	5
17. When you hear sounds of pleasure during sex	-1	0	1	2	3	4	5
18. When a loved one kisses you with an exploring tongue	-1	0	1	2	3	4	5
19. When you read suggestive or pornographic poetry	-1	0	1	2	3	4	5
20. When you see a strip show	-1	0	1	2	3	4	5
21. When you stimulate your partner's genitals with your mouth and tongue	-1	0	1	2	3	4	5
22. When a loved one caresses you (other than genitals)	-1	0	1	2	3	4	5
23. When you see a pornographic movie	-1	0	1	2	3	4	5
24. When you undress a loved one	-1	0	1	2	3	4	5

25. When a loved one fondles your breasts with mouth and tongue	-1	0	1	2	3	4	5
26. When you make love in a new or unusual place	-1	0	1	2	3	4	5
27. When you masturbate	-1	0	1	2	3	4	5
28. When your partner has an orgasm	-1	0	1	2	3	4	5

Now rate each of the items according to how **anxious** you feel when you have the described experience. The meaning of anxiety is extreme uneasiness, distress. Rate feelings of anxiety according to the scale below.

- 1 Relaxing, calming
- 0 No anxiety
- 1 Possibly causes some anxiety
- 2 Sometimes causes anxiety; slightly anxiety producing
- 3 Usually causes anxiety; moderately anxiety producing
- 4 Almost always causes anxiety; very anxiety producing
- 5 Always causes anxiety; extremely anxiety producing

ANSWER EVERY ITEM

How you feel or think you  
would feel if you were actually  
involved in this experience

1. When a loved one stimulates your genitals with mouth and tongue	-1	0	1	2	3	4	5
2. When a loved one fondles your breasts with his hands	-1	0	1	2	3	4	5
3. When you see a loved one nude	-1	0	1	2	3	4	5
4. When a loved one caresses you with his eyes	-1	0	1	2	3	4	5
5. When a loved one stimulates your genitals with his finger	-1	0	1	2	3	4	5
6. When you are touched or kissed on the inner thighs by a loved one	-1	0	1	2	3	4	5
7. When you caress a loved one's genitals with your fingers	-1	0	1	2	3	4	5
8. When you read a pornographic or "dirty" story	-1	0	1	2	3	4	5
9. When a loved one undresses you	-1	0	1	2	3	4	5
10. When you dance with a loved one	-1	0	1	2	3	4	5
11. When you have intercourse with a loved one	-1	0	1	2	3	4	5
12. When a loved one touches or kisses your nipples	-1	0	1	2	3	4	5
13. When you caress a loved one (other than genitals)	-1	0	1	2	3	4	5
14. When you see pornographic pictures or slides	-1	0	1	2	3	4	5
15. When you lie in bed with a loved one	-1	0	1	2	3	4	5
16. When a loved one kisses you passionately	-1	0	1	2	3	4	5
17. When you hear sounds of pleasure during sex	-1	0	1	2	3	4	5
18. When a loved one kisses you with an exploring tongue	-1	0	1	2	3	4	5
19. When you read suggestive or pornographic poetry	-1	0	1	2	3	4	5
20. When you see a strip show	-1	0	1	2	3	4	5
21. When you stimulate your partner's genitals with your mouth and tongue	-1	0	1	2	3	4	5
22. When a loved one caresses you (other than genitals)	-1	0	1	2	3	4	5
23. When you see a pornographic movie	-1	0	1	2	3	4	5
24. When you undress a loved one	-1	0	1	2	3	4	5
25. When a loved one fondles your breasts with mouth and tongue	-1	0	1	2	3	4	5
26. When you make love in a new or unusual place	-1	0	1	2	3	4	5
27. When you masturbate	-1	0	1	2	3	4	5
28. When your partner has an orgasm	-1	0	1	2	3	4	5

## Female Sexual Function Index (FSFI)

**INSTRUCTIONS:** These questions ask about your sexual feelings and responses during the past 4 weeks. Please answer the following questions as honestly and clearly as possible. Your responses will be kept completely confidential. In answering these questions the following definitions apply:

Sexual activity can include caressing, foreplay, masturbation and vaginal intercourse.

Sexual intercourse is defined as penile penetration (entry) of the vagina.

Sexual stimulation includes situations like foreplay with a partner, self-stimulation (masturbation), or sexual fantasy.

**CHECK ONLY ONE BOX PER QUESTION.**

Sexual desire or interest is a feeling that includes wanting to have a sexual experience, feeling receptive to a partner's sexual initiation, and thinking or fantasizing about having sex.

1. Over the past 4 weeks, how **often** did you feel sexual desire or interest?
  - Almost always or always
  - Most times (more than half the time)
  - Sometimes (about half the time)
  - A few times (less than half the time)
  - Almost never or never
  
2. Over the past 4 weeks, how would you rate your level (degree) of sexual desire or interest?
  - Very high
  - High
  - Moderate
  - Low
  - Very low or none at all

Sexual arousal is a feeling that includes both physical and mental aspects of sexual excitement. It may include feelings of warmth or tingling in the genitals, lubrication (wetness), or muscle contractions.

3. Over the past 4 weeks, how **often** did you feel sexually aroused (“turned on”) during sexual activity or intercourse?

- No sexual activity
- Almost always or always
- Most times (more than half the time)
- Sometimes (about half the time)
- A few times (less than half the time)
- Almost never or never

4. Over the past 4 weeks, how would you rate your **level** of sexual arousal (“turn on”) during sexual activity or intercourse?

- No sexual activity
- Very high
- High
- Moderate
- Low
- Very low or none at all

5. Over the past 4 weeks, how **confident** were you about becoming sexually aroused during sexual activity or intercourse?

- No sexual activity
- Very high confidence
- High confidence
- Moderate confidence
- Low confidence
- Very low or no confidence

6. Over the past 4 weeks, how **often** have you been satisfied with your arousal (excitement) during sexual activity or intercourse?

- No sexual activity
- Almost always or always
- Most times (more than half the time)
- Sometimes (about half the time)
- A few times (less than half the time)
- Almost never or never

7. Over the past 4 weeks, how **often** did you become lubricated (“wet”) during sexual activity or intercourse?

- No sexual activity
- Almost always or always
- Most times (more than half the time)
- Sometimes (about half the time)
- A few times (less than half the time)
- Almost never or never

8. Over the past 4 weeks, how **difficult** was it to become lubricated (“wet”) during sexual activity or intercourse?

- No sexual activity
- Extremely difficult or impossible
- Very difficult
- Difficult
- Slightly difficult
- Not difficult

9. Over the past 4 weeks, how often did you **maintain** your lubrication (“wetness”) until completion of sexual activity or intercourse?

- No sexual activity
- Almost always or always
- Most times (more than half the time)
- Sometimes (about half the time)
- A few times (less than half the time)
- Almost never or never

10. Over the past 4 weeks, how difficult was it to **maintain** your lubrication (“wetness”) until completion of sexual activity or intercourse?

- No sexual activity
- Extremely difficult or impossible
- Very difficult
- Difficult
- Slightly difficult
- Not difficult

11. Over the past 4 weeks, when you had sexual stimulation or intercourse, how **often** did you reach orgasm (climax)?

- No sexual activity
- Almost always or always
- Most times (more than half the time)
- Sometimes (about half the time)
- A few times (less than half the time)
- Almost never or never

12. Over the past 4 weeks, when you had sexual stimulation or intercourse, how **difficult** was it for you to reach orgasm (climax)?

- No sexual activity
- Extremely difficult or impossible
- Very difficult
- Difficult
- Slightly difficult
- Not difficult

13. Over the past 4 weeks, how **satisfied** were you with your ability to reach orgasm (climax) during sexual activity or intercourse?

- No sexual activity
- Very satisfied
- Moderately satisfied
- About equally satisfied and dissatisfied
- Moderately dissatisfied
- Very dissatisfied

14. Over the past 4 weeks, how **satisfied** have you been with amount of emotional closeness during sexual activity between you and your partner?

- No sexual activity
- Very satisfied
- Moderately satisfied
- About equally satisfied and dissatisfied
- Moderately dissatisfied
- Very dissatisfied

15. Over the past 4 weeks, how **satisfied** have you been with your sexual relationship with your partner?

- Very satisfied
- Moderately satisfied
- About equally satisfied and dissatisfied
- Moderately dissatisfied
- Very dissatisfied

16. Over the past 4 weeks, how **satisfied** have you been with your overall sexual life?

- Very satisfied
- Moderately satisfied
- About equally satisfied and dissatisfied
- Moderately dissatisfied
- Very dissatisfied

17. Over the past 4 weeks, how **often** did you experience discomfort or pain during vaginal penetration?

- Did not attempt intercourse
- Almost always or always
- Most times (more than half the time)
- Sometimes (about half the time)
- A few times (less than half the time)
- Almost never or never

18. Over the past 4 weeks, how **often** did you experience discomfort or pain following vaginal penetration?

- Did not attempt intercourse
- Almost always or always
- Most times (more than half the time)
- Sometimes (about half the time)
- A few times (less than half the time)
- Almost never or never

19. Over the past 4 weeks, how would you rate your **level** (degree) of discomfort or pain during or follow vaginal penetration?

- Did not attempt intercourse
- Very high
- High
- Moderate
- Low
- Very low or none at all

**Thank you for completing this questionnaire**

## Sexual Activity Questionnaire (modified)

For each activity below, please indicate if you have EVER engaged in that activity, if you have done so in the past year, or in the past month (with a current or past partner).

Activity	Ever done activity?	Done activity in last year?	Done activity in last month?
1. Romantic Dining (e.g., candle light and wine)	Yes No	Yes No	Yes No
2. We danced together.	Yes No	Yes No	Yes No
3. We wrestled together, we roughhoused.	Yes No	Yes No	Yes No
4. I wore sexy clothing	Yes No	Yes No	Yes No
5. My partner wore sexy clothing.	Yes No	Yes No	Yes No
6. We looked at videos, magazines or other erotic materials.	Yes No	Yes No	Yes No
7. We used a sex toy (e.g., vibrator).	Yes No	Yes No	Yes No
8. I tied up my partner.	Yes No	Yes No	Yes No
9. My partner tied me up.	Yes No	Yes No	Yes No
10. I danced for my partner.	Yes No	Yes No	Yes No
11. My partner danced for me.	Yes No	Yes No	Yes No
12. I disrobed and/or stripped in front of my partner.	Yes No	Yes No	Yes No
13. My partner disrobed and/or stripped in front of me.	Yes No	Yes No	Yes No
14. I took my partner's clothing off, I undressed my partner.	Yes No	Yes No	Yes No
15. My partner took my clothing off, my partner undressed me.	Yes No	Yes No	Yes No
16. We undressed each other at the same time.	Yes No	Yes No	Yes No
17. We kissed on the lips, French kissing, deep kissing.	Yes No	Yes No	Yes No
18. I kissed my partner on the body (e.g., neck, stomach, back, etc. but not genitals)	Yes No	Yes No	Yes No
19. My partner kissed me on the body.	Yes No	Yes No	Yes No
20. We hugged each other, we held one another, we cuddled.	Yes No	Yes No	Yes No
21. I hugged my partner, I held my partner.	Yes No	Yes No	Yes No
22. My partner hugged me, my partner held me.	Yes No	Yes No	Yes No
23. I caressed & fondled my partner, lightly touched my partner (not genitals).	Yes No	Yes No	Yes No
24. My partner caressed & fondled me, partner touched me lightly (not genitals).	Yes No	Yes No	Yes No
25. I massaged my partner (non genital), I rubbed my partner.	Yes No	Yes No	Yes No
26. My partner massaged me (non genital), my partner rubbed me.	Yes No	Yes No	Yes No
27. I sucked, bit, or licked my partner's body (excluding the genitals).	Yes No	Yes No	Yes No

Activity	Ever done activity?	Done activity in last year?	Done activity in last month?
28. My partner sucked, bit, or licked my body (excluding my genitals).	Yes No	Yes No	Yes No
29. I orally stimulated my partner's genitals	Yes No	Yes No	Yes No
30. My partner orally stimulated my genitals.	Yes No	Yes No	Yes No
31. 69, sixty nine, fellatio and cunnilingus at the same time.	Yes No	Yes No	Yes No
32. I masturbated myself while my partner was present.	Yes No	Yes No	Yes No
33. My partner masturbated while I was present.	Yes No	Yes No	Yes No
34. I masturbated my partner with my hands, I rubbed my partner's genitals.	Yes No	Yes No	Yes No
35. My partner masturbated me with his hands.	Yes No	Yes No	Yes No
36. We simultaneously masturbated each other with our hands.	Yes No	Yes No	Yes No
37. I rubbed my partner's genitals with part of my body (not my mouth or hands).	Yes No	Yes No	Yes No
38. My partner rubbed my genitals with part of his body (not mouth or hands)	Yes No	Yes No	Yes No
39. We had a shower or a bath together.	Yes No	Yes No	Yes No
40. I put food on my partner (e.g., I put honey on my partner's chest & licked it off)	Yes No	Yes No	Yes No
41. My partner put food on me.	Yes No	Yes No	Yes No
42. I stimulated my partner's anus with my tongue (rimming).	Yes No	Yes No	Yes No
43. My partner stimulated my anus with his tongue (rimming).	Yes No	Yes No	Yes No
44. We engaged in anal intercourse.	Yes No	Yes No	Yes No
45. We engaged in vaginal intercourse.	Yes No	Yes No	Yes No
46. I masturbated alone	Yes No	Yes No	Yes No
47. I watched erotic or pornographic films alone.	Yes No	Yes No	Yes No
48. I used a sex toy alone.	Yes No	Yes No	Yes No
49. Other (please specify):	Yes No	Yes No	Yes No
50. Other (please specify):	Yes No	Yes No	Yes No

### Vaginal Penetration Cognition Questionnaire (VPCQ)

Women have various thoughts and feelings about vaginal penetration. Vaginal penetration means insertion of a penis, finger (yours or your partner's), tampon and/or another object into the vagina. This questionnaire asks about your thoughts concerning vaginal penetration. The questionnaire consists of statements about vaginal penetration. You will be asked to indicate the extent to which each is applicable to you. Your thoughts about vaginal penetration are important and you can fill in this questionnaire completely regardless of whether or not penetration is possible or has ever been possible for you. There are no "good" or "bad" answers to the questions or statements. Your answer is the best when it reflects your own thoughts and feelings with regard to vaginal penetration.

Please check or circle the answer that is most applicable to you. The possible answers range from '1 = not at all applicable' to '7 = very strongly applicable'.

The following is an example for clarification

*Example:*

I have the following thoughts about vaginal penetration:

<b>Thought</b>	<b>not at all applicable</b>						<b>very strongly applicable</b>
1. I am afraid that my vagina will not get moist (wet)	<input checked="" type="radio"/> 1	2	3	4	5	6	7

Suppose that you never have this thought, then you would then circle "1".

You can now begin

**I have the following thoughts about vaginal penetration:**

Thought	not at all applicable							very strongly applicable
1. I am afraid that my vagina is too narrow for penetration	1	2	3	4	5	6	7	
2. I am afraid that I will lose control over the situation with penetration	1	2	3	4	5	6	7	
3. Penetration will feel good	1	2	3	4	5	6	7	
4. Thinking about pain with penetration makes me very anxious	1	2	3	4	5	6	7	
5. Penetration is a moment of intimacy with my partner	1	2	3	4	5	6	7	
6. I am afraid I cannot do anything to change the pain from penetration	1	2	3	4	5	6	7	
7. I think about everything that can go wrong and fail with penetration	1	2	3	4	5	6	7	
8. I am afraid that I will panic during penetration	1	2	3	4	5	6	7	
9. If I had no pain, penetration would be possible	1	2	3	4	5	6	7	
10. I am afraid that penetration will become increasingly more difficult in the future	1	2	3	4	5	6	7	
11. I am only a complete woman when penetration is successful	1	2	3	4	5	6	7	
12. Penetration is a part of love	1	2	3	4	5	6	7	
13. I am afraid that the penetration pain will get worse in the future	1	2	3	4	5	6	7	
14. I feel "dirty" with penetration	1	2	3	4	5	6	7	
15. I am a poor partner when penetration fails	1	2	3	4	5	6	7	
16. Penetration surely won't succeed	1	2	3	4	5	6	7	
17. I am afraid that the inside of my vagina will be damaged by penetration	1	2	3	4	5	6	7	

**I have the following thoughts about vaginal penetration:**

<b>Thought</b>	<b>not at all applicable</b>							<b>very strongly applicable</b>
18. I will become sexually aroused with penetration	1	2	3	4	5	6	7	
19. Penetration gives me an unpleasant feeling in my vagina	1	2	3	4	5	6	7	
20. I will be able to have a sex life that includes penetration in the future	1	2	3	4	5	6	7	
21. Feeling my vagina with my own finger is scary	1	2	3	4	5	6	7	
22. My partner's penis is too big for my vagina	1	2	3	4	5	6	7	
23. I can easily let go of any unpleasant thoughts about penetration	1	2	3	4	5	6	7	
24. Penetration will be pleasurable	1	2	3	4	5	6	7	
25. I am afraid that what goes into my vagina possibly cannot come out	1	2	3	4	5	6	7	
26. I am the only one in the world for whom penetration is unsuccessful	1	2	3	4	5	6	7	
27. During penetration I experience a sense of control	1	2	3	4	5	6	7	
28. My vagina is abnormally shaped	1	2	3	4	5	6	7	
29. I am afraid of cramping up during penetration	1	2	3	4	5	6	7	
30. I feel guilty when penetration is not possible	1	2	3	4	5	6	7	
31. I can control the pain with penetration	1	2	3	4	5	6	7	
32. The pain with penetration is caused by an illness, infection or inflammation	1	2	3	4	5	6	7	
33. Penetration will result in an orgasm	1	2	3	4	5	6	7	
34. I am afraid that when penetration is not successful, my partner will leave / I will never have a partner	1	2	3	4	5	6	7	

**I have the following thoughts about vaginal penetration:**

<b>Thought</b>	<b>not at all applicable</b>					<b>very strongly applicable</b>	
35. My mind says "yes", but my body says "no" to penetration	1	2	3	4	5	6	7
36. I am afraid that I can have no influence on what happens during penetration	1	2	3	4	5	6	7
37. Penetration will not be painful for me	1	2	3	4	5	6	7
38. It feels frightening not knowing what happens in my body during penetration	1	2	3	4	5	6	7
39. I have concerns about penetration that I cannot get off my mind	1	2	3	4	5	6	7
40. Even if penetration is not successful, I am still a good sexual partner	1	2	3	4	5	6	7

Sexual and Physical Abuse Interview (Leserman et al., 1996)

Do you consider yourself abused: 1) PHYSICALLY: Yes No      2) SEXUALLY: Yes No

SEXUAL

*Attempts:* (positive response to any of the 5 items below)

“By using force or threatening to harm you, has anyone ever:

- 1) made you watch a sexual act,
- 2) tried to touch the sex parts of your body, but did not succeed,
- 3) tried to make you touch the sex parts of their body, but did not succeed
- 4) tried to make you have sex, but he did not succeed, and
- 5) attempted any other sexual experience not involving contact?”

*Touch:* (positive response to any of the 5 items below)

“Has anyone ever succeeded in touching the sex parts of your body by using force or threatening to harm you? By touch we mean:

- 1) with their hands, touched or fondled your sexual organs (breast, pubic area, anus)
- 2) with their mouth or tongue on your vagina or anus (oral sex), and
- 3) putting fingers or objects in your vagina or anus?

Has anyone ever succeeded in making you touch the sex parts of their body by force or threatening to harm you? By touch we mean:

- 1) made you touch or fondle their genital area, and
- 2) made you put their penis in your mouth (oral sex)?”

*Rape:* (positive response to any of the 2 items below)

“Has anyone made you have vaginal or anal sex by using force or threatening to harm you? By sex we mean:

- 1) vaginal intercourse (man putting his penis in your vagina), and
- 2) anal intercourse (man putting his penis in your anus)?”

	CHILD (13-)		ADULT (14+)		# TIMES	# of PERP.
	Yes	No	Yes	No		
1) made you watch a sexual act,	Yes	No	Yes	No		
2) tried to touch the sex parts of your body, but did not succeed,	Yes	No	Yes	No		
3) tried to make you touch the sex parts of their body, but did not succeed	Yes	No	Yes	No		
4) tried to make you have sex, but he did not succeed, and	Yes	No	Yes	No		
5) attempted any other sexual experience not involving contact?”	Yes	No	Yes	No		
1) with their hands, touched or fondled your sexual organs (breast, pubic area, anus)	Yes	No	Yes	No		
2) with their mouth or tongue on your vagina or anus (oral sex), and	Yes	No	Yes	No		
3) putting fingers or objects in your vagina or anus?	Yes	No	Yes	No		
1) made you touch or fondle their genital area, and	Yes	No	Yes	No		
2) made you put their penis in your mouth (oral sex)?”	Yes	No	Yes	No		
1) vaginal intercourse (man putting his penis in your vagina), and	Yes	No	Yes	No		
2) anal intercourse (man putting his penis in your anus)?”	Yes	No	Yes	No		

**PHYSICAL**

*Being beat, hit, or kicked:* (positive response to item below)

“Has anyone – including family members or friends – ever beat you up, hit you, kicked you, bit you, or burned you, regardless of when it happened or whether you ever reported it or not? (Include experiences that were outside the range of normal “spanking” or kids fighting).”

*Life threat:* (positive response to any of the 2 items below)

- 1) “Has anyone – including family members or friends – ever attacked you with a gun, knife, or some other weapon, regardless of when it happened or whether you ever reported it or not?”
- 2) Has anyone – including family members or friends – ever attacked you without a weapon, but with the intent to kill or seriously injure you?”

CHILD (13-)		ADULT (14+)		# TIMES	# of PERP.
				0=never 1=seldom 2=occasionally 3=often	
Yes	No	Yes	No		
Yes	No	Yes	No		
Yes	No	Yes	No		

## Demographics (Study 1)

→ 1. Please indicate your age: \_\_\_\_\_

→ 2. Education:

- Primary       Secondary       College       Bachelors  
 Masters       Doctorate  
 Other, please specify: \_\_\_\_\_

→ 3. Did you grow up in Canada? Yes  No

If no, where were you born: \_\_\_\_\_

When did you come to Canada? \_\_\_\_\_ years ago

→ 4. Is religion important in your life?

- Yes       No

→ 5. If yes, which religion do you practice?

- Catholic       Judaism       Protestantism       Islam       Hinduism  
 Other, please specify: \_\_\_\_\_

→ 6. What is your relationship status?

- No partner ever       No Partner for \_\_\_\_\_ months/years  
 Dating for \_\_\_\_\_ months/years       Married for \_\_\_\_\_ months/years  
 Living together for \_\_\_\_\_ months/years       Common-Law for \_\_\_\_\_ months/years  
     (less than 12 months)      (living together for more than 12 months)  
 Divorced/ Separated for \_\_\_\_\_ months/years       Widowed for \_\_\_\_\_ months/years

→ 6a. Length of current relationship: \_\_\_\_\_

→ 7. In your relationship, are you...

- Very happy       Moderately happy       Neither happy nor unhappy       Moderately unhappy       Very unhappy

→ 8. *Have you experienced childbirth?*

- Yes  No

→ 8a. *(If woman with vaginismus) How did you conceive?* \_\_\_\_\_

→ 9. *How many children do you have?* \_\_\_\_\_

→ 10. *When did you last menstruate?* \_\_\_\_\_ days ago

→ 11. *Which statement best describes your history with gynecological examinations:*

- I have never had a gynecological examination.
- I have had at least one gynecological examination, but needed to be anaesthetized.
- I have attempted at least one gynecological examination, but had to stop the exam early (because of fear, anxiety, pain, etc.)
- I can have gynecological examinations, but can tolerate exams inside my vagina only with great difficulty (e.g., anxiety, pain, etc.).
- I have minimal or no difficulty with all aspects of gynecological examinations.

→ 12. *Which statement best describes your history with tampon use?*

- I have never tried to insert a tampon.
- I have tried, but have never been able to insert a tampon.
- I can insert a tampon, but only with great difficulty.
- I have no problems with tampon insertion.

→ 13. *Have you received a previous diagnosis of vaginismus?*

- Yes  No

If yes, by whom: \_\_\_\_\_

→ 14. Please indicate the statement which best describes your current problem with vaginal intercourse

- I have never attempted vaginal intercourse (I am a virgin).
- I have attempted vaginal intercourse, but it was never possible (I am a virgin).  
**(Please indicate): I have attempted vaginal intercourse approximately \_\_\_\_ times.**  
**I last attempted intercourse: \_\_\_\_\_**

When you attempted intercourse, did you experience the following?

- |                          |                                                          |
|--------------------------|----------------------------------------------------------|
| Pain                     | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Anxiety/Fear             | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Vaginal muscular tension | <input type="checkbox"/> Yes <input type="checkbox"/> No |

If not currently, have you experienced the following during past attempts at intercourse?

- |                          |                                                          |
|--------------------------|----------------------------------------------------------|
| Pain                     | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Anxiety/Fear             | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Vaginal muscular tension | <input type="checkbox"/> Yes <input type="checkbox"/> No |

- I have attempted vaginal intercourse and was able to experience partial penetration (partial insertion of my partner's penis), but I was never able to tolerate penile thrusting or moving.

**(Please indicate): I have attempted partial vaginal intercourse approximately \_\_\_\_ times.**

**I last attempted partial intercourse: \_\_\_\_\_**

When you attempted intercourse with partial penetration, did you experience the following?:

- |                          |                                                          |
|--------------------------|----------------------------------------------------------|
| Pain                     | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Anxiety/Fear             | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Vaginal muscular tension | <input type="checkbox"/> Yes <input type="checkbox"/> No |

If not currently, have you experienced the following during past attempts at partial intercourse?:

- |                          |                                                          |
|--------------------------|----------------------------------------------------------|
| Pain                     | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Anxiety/Fear             | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Vaginal muscular tension | <input type="checkbox"/> Yes <input type="checkbox"/> No |

- I am able to experience vaginal intercourse, but not without significant difficulty (e.g., pain, anxiety, vaginal tightness, etc.).
- I have been able to experience vaginal intercourse in the past without difficulty, but I am no longer able to do so.
- I am able to experience vaginal intercourse less than half the time my partner and I try. (Other times, we have to stop before full penetration because of pain, and/or anxiety, or because of vaginal tightness, etc.).





## Demographic Questionnaire (Study 2)

*Please indicate your age: \_\_\_\_\_*

*Highest level of education (in progress or completed):*

- Primary       Secondary       College       Bachelors  
 Masters       Doctorate       Other, please specify: \_\_\_\_\_

*In what country were you born? \_\_\_\_\_*

*In what country are you currently residing? \_\_\_\_\_*

If you were born in a country other than your current country of residence, at what age did you arrive in the country of your current residence? \_\_\_\_\_

*Is religion important in your life?*

- Yes       No

*If religion is important in your life, which religion do you practice?*

- Catholicism    Judaism       Protestantism       Islam       Hinduism  
 Other (please specify): \_\_\_\_\_

*What is your current relationship status?*

- No partner ever       No Partner for \_\_\_\_\_years \_\_\_\_\_months  
 Dating       Married  
 Living together (for less than 12 months)    Common-Law (living together for more than 12 months)  
 Divorced/ Separated       Widowed

*Length of current relationship: \_\_\_\_\_years \_\_\_\_\_months*

*In your relationship, are you...*

- Very happy       Moderately happy       Neither happy nor unhappy       Moderately unhappy       Very unhappy

***(If no current relationship) Length of time since last relationship:***

\_\_years \_\_months\_\_weeks

***Are you taking hormonal contraception (eg. the Pill)?***

- No  Yes

***Are you taking any other medication?***

- No  Yes (Please list medication: \_\_\_\_\_)

***Have you experienced childbirth?***

- No  Yes

***(If woman with vaginal penetration problems) How did you conceive?***

\_\_\_\_\_

***To how many children have you given birth? \_\_\_\_\_***

***Which statement best describes your history with gynecological examinations:***

- I have never had a gynecological examination.  
 I have had at least one gynecological examination, but needed to be anaesthetized.  
 I have attempted at least one gynecological examination, but had to stop the exam early (because of fear, anxiety, pain, etc.)  
 I can have gynecological examinations, but can tolerate exams inside my vagina only with great difficulty (e.g., anxiety, pain, etc.).  
 I have minimal or no difficulty with all aspects of gynecological examinations.

***Which statement best describes your history with tampon use?***

- I have never tried to insert a tampon.  
 I have tried, but have never been able to insert a tampon.  
 I can insert a tampon, but only with great difficulty.  
 I have no problems with tampon insertion.

*Please indicate the statement which best describes your current experiences with vaginal intercourse*

**I have never attempted vaginal intercourse (I am a virgin).**

**I have attempted vaginal intercourse, but it was never possible for my partner's penis to enter my vagina (I am a virgin).**

I have attempted vaginal intercourse approximately \_\_\_\_ times in total.

Length of time since last intercourse attempt: \_\_\_\_\_

When I attempt intercourse, I experience the following: (Please select all that apply)

- Pain
- Anxiety/Fear
- Vaginal muscular tension
- Other (please specify)

If not currently, I have experienced the following during past intercourse attempts: (Please select all that apply)

- Pain
- Anxiety/Fear
- Vaginal muscular tension
- Other (please specify)

**I have attempted vaginal intercourse and was able to experience partial penetration (partial insertion of my partner's penis), but I was never able to tolerate penile thrusting or moving.**

I have attempted partial vaginal intercourse approximately \_\_\_\_ times in total.

Length of time since last partial intercourse experience: \_\_\_\_\_

Please describe what partial penetration involves: \_\_\_\_\_

When I attempt intercourse with partial penetration, I experience: (Please select all that apply)

- Pain
- Anxiety/Fear
- Vaginal muscular tension
- Other (please specify)

If not currently, I have experienced the following during past intercourse attempts: (Please select all that apply)

- Pain
- Anxiety/Fear
- Vaginal muscular tension
- Other (please specify)

- I have attempted vaginal intercourse and was able to experience only partial penetration (partial insertion of my partner's penis), and I could tolerate penile thrusting or moving.**

I have attempted partial vaginal intercourse approximately \_\_\_\_ times in total.

Length of time since last partial intercourse experience: \_\_\_\_\_

Please describe what partial penetration involves: \_\_\_\_\_

When I attempted intercourse with partial penetration, I experience: (Please select all that apply)

- Pain
- Anxiety/Fear
- Vaginal muscular tension
- Other (please specify)

If not currently, have you experienced the following during past intercourse attempts:

- Pain
- Anxiety/Fear
- Vaginal muscular tension
- Other (please specify)

- I am able to experience full vaginal intercourse, but not without significant difficulty.**

When you experience intercourse, I experience the following difficulties:  
(Please select all that apply)

- Pain
- Anxiety/Fear
- Vaginal muscular tension
- Other (please specify)

Location of genital pain: (Please select all that apply)

- At the entrance of my vagina
- Inside my vagina
- Deep in my vagina
- In my abdomen
- At my vulva
- Clitoris
- Other (please specify)

When does the genital pain begin?

- At the start of penetration
- With pressure on the vulva (e.g., tampon, tight clothing)
- Spontaneously (out of the blue, no touch or pressure on the vulva)
- Continuously
- Other (please specify)

Percentage of time that I experience genital pain during intercourse

- 0%-25%
- 26%-50%
- 51%-75%
- 76%-100%

The genital pain feels:

- Dull     Sharp     Burning     Throbbing     Shooting     Stabbing
- Aching     Tender     Heavy     Cramping     Lacerating
- Other (please specify)

- I have been able to experience vaginal intercourse in the past without difficulty, but I am no longer able to do so.**
- I am able to experience vaginal intercourse less than half the time my partner and I try. (Other times, we have to stop before full penetration because of pain, and/or anxiety, or because of vaginal tightness, etc.).**
- I used to have problems with vaginal intercourse, but my problem was solved and I am now able to have pain-free and anxiety-free intercourse.**

When I had problems with vaginal intercourse, these included: (Please select all that apply)

- Pain
- Anxiety/Fear
- Vaginal muscular tension
- Other (please specify)

- I have never had problems with vaginal intercourse.**
- Other.** Please explain:

***What diagnosis/es have you received?***

- Not applicable
- None received
- Vaginismus
- Vulvar Vestibulitis Syndrome / Provoked Vestibulodynia
- Essential/Dysethetic Vulvodynia
- Cyclical Vulvodynia
- Dermatitis/es
- Chronic Pelvic Pain
- Other: \_\_\_\_\_

***Which health care professional gave you the diagnosis/es? (Please select all that apply)***

- Family doctor / general practitioner
- Gynecologist
- Physiotherapist
- Psychologist
- Sex therapist
- Other (please specify)

***Have you received pelvic floor physiotherapy treatment for your difficulties with vaginal penetration?***

- No
- Yes, in the past
- Yes, currently
- Not applicable

***Number of physiotherapy sessions I have attended: \_\_\_\_\_***