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COGNITIVE PROCESSING IN WOMEN WITH DYSPAREUNIA:
WHAT IS MORE SALIENT, THE PAIN OR THE SEX?

by

Lea Thaler

Bachelor of Arts
McGill University
2004

A thesis submitted in partial fulfillment
of the requirements for the

Master of Arts in Psychology
Department of Psychology
College of Liberal Arts

Graduate College
University of Nevada, Las Vegas
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ABSTRACT

Cognitive Processing in Women with Dyspareunia: What is More Salient, The Pain or The Sex?

by

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A debate exists in the literature over whether dyspareunia should be classified as a sexual dysfunction or as a pain disorder in the Diagnostic and Statistical Manual of Mental Disorders. We do not know, however, the extent to which women with this disorder experience it as more of a pain problem, or more of a sexual problem, or whether both aspects are equally salient. Cognitive methodologies have been informative in the study of sexual information and stimulus processing. By examining visual attention and basic memory for pain- and sex-related words, this study aimed to elucidate whether there was a differential saliency between the pain and sex aspects of dyspareunia. Twenty women with dyspareunia and twenty women experiencing no sexual dysfunction (controls) participated in visual attention and memory protocols designed to detect differences as a function of group membership and type of stimulus. In terms of visual attention, results revealed that all women attended more to pain words than to sex words. In terms of memory, all women had better recall for sex-related words; however, women
with dyspareunia evidenced more false memories for pain words than did control women, and pain words elicited more false memories than any other type of word for women with dyspareunia. Results are interpreted to indicate that repeated activation through experience contributed to women with dyspareunia 1) having stronger semantic networks related to pain than no-pain controls, 2) having stronger semantic networks for pain than for sex, 3) and that, in comparison to no-pain controls, activation of pain networks was more easily triggered by pain-related stimuli.
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CHAPTER 1

INTRODUCTION

Dyspareunia, defined as recurrent pain in the genital region during sexual intercourse, is one of the most common types of female sexual dysfunction encountered in both general and gynecological practice (Wouda et al., 1998). To date, many mysteries surround this disorder. Various etiologies have been proposed, ranging from malformations of the genitals, to chronic infections, to prior aversive sexual experiences (Meana & Binik, 1994). It is often the case, however, that a clear cause for any one woman’s dyspareunia pain is hard to isolate, even when physiological pathology seems to exist. For example, even in certain subtypes of dyspareunia wherein the pain is felt in a very small and specific genital region [i.e., Vulvar Vestibulitis Syndrome (VVS), a condition in which severe pain is elicited upon light stimulation of the vulvar vestibule], we still do not know how or why this tiny area becomes hyperalgesic. To further complicate matters, the factors that precipitated the pain may be different from the ones that maintain it. Once pain is paired with intercourse, a classical conditioning process can be instated that makes pain persist even after the purported originating cause has been resolved. The experience of pain can become indistinguishable from the experience of sex. The complexity of the factors potentially involved has led to a debate in the literature regarding the optimal classification of dyspareunia. Some argue that dyspareunia is
currently appropriately classified in the DSM as a sexual dysfunction, while others insist that it should be removed from this category and be classified as a pain disorder instead.

The debate is, in part, fueled by the fact that much remains unknown about the psychological and cognitive correlates of this disorder, despite the recent surge of interest and research into dyspareunia. While some studies find higher rates of affective disorders and psychological distress in women with dyspareunia, other studies do not. What is known is that women with dyspareunia experience disturbances in sexual functioning. They report greater sexual dissatisfaction (Gates & Galask, 2001), lower frequencies of intercourse and self-stimulation, lower levels of desire, arousal, pleasure, lubrication, and orgasmic capacity (Gates & Galask, 2001; Jantos & White, 1997; Meana, Binik, Khalife, & Cohen, 1997b; Nunns & Mandal, 1997; Reissing, Binik, Khalife, Cohen, & Amsel, 2003). They also report more negative attitudes and thoughts towards sexuality, more negative sexual self-concepts, and more depressive symptoms than controls (Gates & Galask, 2001; Nunns & Mandal, 1997). It seems reasonable to hypothesize that these sexual problems would exist as a result of the pain these women experience. Upon cessation of the pain, one would expect the woman’s sexual problems to resolve.

However, clinician reports and outcome studies often find that this is not the case. After treatment significantly diminishes or completely eradicates the pain, women often fail to report a higher frequency of intercourse, nor higher levels of desire, arousal, lubrication, etc. These data seem to support the notion of dyspareunia as a complicated, multidimensional and difficult disorder to treat.

Furthermore, little is known about what goes on in the mind of a woman who is experiencing painful sexual intercourse. Research on cognitive processes related to
sexuality in normal populations and in sexually dysfunctional ones generally indicates that sexual information tends to be processed and represented in memory differently than non sexual material (Geer & Manguno-Mire, 1996; Lykins, Meana, & Kambe, in press). However, none of this research has targeted women with dyspareunia. At the moment, all we know is that women with dyspareunia process pain related information in a different manner than women without the disorder. They tend to exhibit a hypervigilance for pain-related information, and catastrophize more about their genital, as well as non-genital, pain (Payne, Binik, Amsel, & Khalifé, 2005; Pukall, Binik, Khalifé, Amsel, & Abbott, 2002). We do not know how they process sexual information. It is possible that women with dyspareunia experience pain as sex and sex as pain. It could be that sex and pain have become so intertwined that it is quite difficult to tease them apart. As theorists and researchers debate among themselves whether dyspareunia is primarily a sexual problem or a pain problem, it might be particularly germane to try to access how women with dyspareunia process sexual and pain stimuli. Do women with dyspareunia experience this disorder as more of a pain problem or as more of a sexual problem? Asking them directly is problematic. They may not consciously know or their answers may be contaminated by the inherent problems of self-report, such as the pull of social desirability. But we can apply cognitive methodologies to investigate whether pain and sexual stimuli are attended to and remembered differently by women with dyspareunia. Although this type of investigation will by no means answer the myriad of questions about the complexity of this disorder, it might elucidate the extent to which women themselves experience dyspareunia as a pain disorder or a sexual one, or both.
CHAPTER 2

THE CLASSIFICATION CONTROVERSY

Currently, a controversy exists in the literature over the classification of dyspareunia as either a sexual dysfunction or as a pain disorder. A review of the history and evolution of the term, dyspareunia, and its classification sheds some light on the origins of the current controversy. Barnes (1874) coined the term “dyspareunia,” which literally means difficult or painful mating in ancient Greek, in an attempt to encompass a variety of painful conditions that interfere with intercourse. The word clearly emphasizes interference with function (intercourse) rather than the properties of the pain (e.g. location). Barnes’ etiological view of the condition was physiologically based with an emphasis on multiple etiological pathways, a view which is commonplace in gynecology today (Binik, 2005). However, a different view of dyspareunia emerged in the mental health literature during the twentieth century. Psychoanalysis introduced the concept of hysterical pain (Binik, 2005), and this construct of psychogenic pain was applied to pain experienced during intercourse and treated accordingly via psychodynamic interventions (Singer-Kaplan, 1983). In the 1970’s, Masters and Johnson (1970) rejected the psychoanalytic approach and re-adopted the original conceptualization of dyspareunia as an organically based disorder. However, a group of psychologically minded sexologists who did not subscribe to either the strictly physiologic or psychoanalytic
conceptualizations of dyspareunia persisted with a more multidimensional formulation of the disorder. These sexologists viewed dyspareunia as caused by a variety of factors, including childhood abuse and inadequate sexual technique (Binik, 2005). Today, we are left with a term (dyspareunia) that describes a pain solely on the basis of interference with function (penile vaginal penetration) and that is used quite differently by physiologically based physicians and psychologically based mental health professionals (Binik, 2005).

Binik (2005) formalized the classification debate in the literature with his article entitled “Should Dyspareunia be Retained as a Sexual Dysfunction in DSM-V? A Painful Classification Decision”. In it, he advocated for a reclassification of dyspareunia into the pain disorder section of the DSM based on the argument that the current diagnostic criteria for dyspareunia make little sense and that dyspareunia is more accurately characterized as a urogenital pain disorder than as a sexual dysfunction. Binik develops his argument both theoretically and empirically and a number of other researchers appear to support his plea for re-classification along these lines (Kaler, 2005; Markos, 2005; Townsend, 2005).

From a theoretical standpoint, Binik (2005) states that the rationale behind the evolution of the classification of dyspareunia is unclear. Classified as a psychosomatic disorder in the DSM-II (American Psychiatric Association, 1968), it was moved to the newly introduced category of sexual dysfunction in the DSM-III (American Psychiatric Association, 1980). Sexual dysfunction was defined with reference to the sexual response cycle, and consequently disturbances of desire, arousal and orgasm became the main categories of sexual dysfunction (Binik, 2005). In the DSM-III-R (American Psychiatric
Association, 1987), dyspareunia remained classified as a sexual dysfunction but was then grouped with vaginismus under the new subcategory of “sexual pain disorders.” The only subsequent change in the DSM-IV (American Psychiatric Association, 1994) was the mention of dyspareunia as a possible symptom of somatization.

Binik (2005) finds the evolution of this classification somewhat puzzling. Dyspareunia came to be classified as a sexual dysfunction despite the fact that it is not etiologically linked to nor interferes specifically with any stage of the sexual response cycle. Although disturbances in desire, arousal and orgasm are often evidenced in women with dyspareunia, these are generally considered to be a natural consequence of the pain. Furthermore, Binik takes issue with the term “sexual pain disorder,” considering that the major symptom of dyspareunia is pain rather than a sexual complaint. The pain of dyspareunia is not limited to sexual intercourse and can occur during a variety of non-sexual activities that involve genital contact, including tampon insertion, urination, sports, and gynecological examinations (Binik, 2005). Sometimes, the onset of the pain actually precedes a woman’s first sexual experience. Women suffering from vulvar vestibulitis syndrome (VVS), a common form of dyspareunia, will often report avoiding the use of tampons during adolescence due to the pain experienced upon insertion.

Binik (2005) also argues that interference with intercourse does not constitute a valid classification criterion for either sexual dysfunction or for a pain disorder. First, if sexual dysfunctions are defined by interference with a particular stage of the sexual response cycle (desire, arousal, orgasm), dyspareunia does not fit. The focus on interference with intercourse equates the behavior of intercourse with processes underlying desire, orgasm, and arousal, all of which encompass much more than just
behavior. Second, the definition of dyspareunia solely by the activity with which it interferes is suspect, considering that functional interference is never a classification criterion for pain, which favors descriptors such as location and onset. Binik illustrates that dyspareunia maps easily onto 4 of the 5 dimensions of the International Association for the Study of Pain's (IASP) taxonomy for classifying pain (anatomical region, organ system, temporal characteristics of the pain and pattern of occurrence, intensity and time since onset, etiology) (Merskey & Bogduk, 1994). Furthermore, dyspareunia currently lumps together the many different clinical presentations of the disorder that exist, overlooking differences between them that could indicate differential interventions.

In addition to the aforementioned theoretical arguments for a pain disorder classification for dyspareunia, Binik goes on to provide arguments based on empirical data. The first set of findings he refers to are those indicating that the pain of dyspareunia is similar to other pains. When examining the characteristics and intensity of the pain experienced by women suffering from dyspareunia, Meana, Binik, Khalife, and Cohen (1997a) found that the clinical characteristics of the pain were similar to the characteristics of other pain disorders (e.g. phantom limb, lower back pain). The intensity of the pain varied on a continuum from mild to extremely severe, and this intensity correlated significantly with interference with intercourse in a complex manner. Some women who reported excruciating pain continued to regularly engage in sexual intercourse, while others who experienced relatively mild pain abstained from sexual contact of any kind. For almost all the women in the Meana et al. (1997a) study, the pain was not limited to intercourse but was experienced in non-sexual situations, such as sports, urination and gynecological examinations. Furthermore, the pain occurred in
different anatomical locations ranging from the vulva to pelvic areas. Based on data obtained from this study, Meana and colleagues (1997a) concluded that the pain of dyspareunia is not likely to be a unitary disorder. They classified the women in their sample into 4 distinct categories: 1) no physical findings; 2) VVS; 3) postmenopausal dyspareunia; and 4) mixed findings. They also found that the IASP classification system outperformed the DSM-III-R in categorizing the subjects in their study.

Binik (2005) also points to data suggesting that the physical and psychosocial correlates of dyspareunia are more akin to those found in pain syndromes than in sexual dysfunctions. In terms of sensory function, women with dyspareunia are characterized by generalized sensory disturbances that are not limited to the site of pain. Pukall and colleagues (2002) found that sensory dysregulation existed in their sample of women with VVS, since both the touch and pain thresholds of various bodily sites of these women were lower than those of control women. Pukall et al. (2005) also demonstrated that during painful vulvar stimulation, women suffering from VVS exhibited the typical neural “pain signature” seen during brain imaging of other pain syndromes.

In terms of psychosocial correlates of dyspareunia, the scarce empirical data that exist do not differentiate between a pain syndrome and a sexual dysfunction approach, according to Binik (2005). The empirical literature yields contradictory findings concerning levels of depressive symptoms, anxiety, somatic complaints, hypervigilance, comorbidity of other sexual dysfunctions and physical abuse in women with dyspareunia (e.g. Harlow and Stewart, 2003; Granot, Friedman, Yarnitsky, & Zimmer, 2002; Meana, Binik, Khalifé, & Cohen, 1997b; Meana, Binik, Khalifé, & Cohen, 1999; Payne et al., 2005; van Lankveld, Weijenborg & Ter Kuile, 1996;). It is also possible that different
subtypes of dyspareunia possess different psychosocial characteristics and only once these subtypes can be correctly and carefully sorted will we be able to examine appropriate psychosocial correlates (Binik, 2005).

Data from treatment outcome studies also lead Binik (2005) to conclude that therapies for pain are more effective than therapies for sex in treating dyspareunia. Until recently, dyspareunia had been treated in a "serial unidisciplinary" fashion. Treatment generally began with medical interventions, followed by psychotherapy and/or sex therapy and then possibly surgery (Binik, 2005). This model has not been successful in treating dyspareunia. Data from the only two randomized controlled trials inspired by this unidisciplinary approach suggest that medication was not better than placebo in treating women suffering from VVS (Bornstein, Livnaat, Stolar, & Abramovici, 2000; Njirjesy, Stobel, Weitz, Leaman, & Small, 2001). In contrast, the prevailing model for treating chronic pain is multidisciplinary, with multiple treatment modalities used (Binik, 2005). Applying this approach to the treatment of dyspareunia could expand the range of possible treatments (e.g. pelvic floor physical therapy, acupuncture, hypnosis, cognitive-behavioral therapy). In a randomized controlled clinical trial inspired by this multidisciplinary model, Bergeron and colleagues (2001) compared the relative efficacies of vestibullectomy, pelvic floor biofeedback, and group cognitive behavioral pain management for the treatment of VVS. They found that vestibullectomy resulted in the greatest pain reduction (70%) in comparison to group CBT (40%) and pelvic floor biofeedback (40%). All groups improved equally and significantly on sexual functioning, but did not return to normal sexuality. These results highlight the important facts that a) it is possible to significantly reduce the pain of dyspareunia; b) pain reduction is possible
through vastly different treatments with differing therapeutic mechanisms; and c) there is an important need for intervention to promote sexuality even if pain is reduced since pain reduction does not guarantee a return to "normative" sexuality (Binik, 2005).

Thus, for all of the aforementioned reasons, Binik believes that the pain disorder category is a better fit for dyspareunia than the sexual dysfunction category. The question of accurate classification is arguably an important one because it can determine who treats a disorder, what interventions are used, and the extent to which the afflicted feel their condition is validated or represented.

However, Binik's appeal for re-classification is not without opponents. Numerous medical researchers, psychologists, and other academics wrote responses to Binik's article expressing their disagreement. The points leveled against his case can be summarized into three main counter arguments: 1) Moving dyspareunia into the pain disorder category denies the centrality of sexuality in this disorder; 2) Most of the available data on which Binik bases his arguments is from VVS samples and may not adequately represent all sub-types of dyspareunia; and 3) The reclassification would not ultimately be of much clinical utility.

Many critics of Binik's proposal argue that moving dyspareunia into the pain disorders category of the DSM denies the centrality of sexuality inherent in the disorder. Basson (2005) and Graziottin (2005) find fault with Binik's claim that the multiple etiologies of the pain represented in dyspareunia render the disorder unfit for classification as a sexual dysfunction. They argue that these different etiologies are in fact typical and appropriate for a sexual dysfunction and that any major symptom may be caused by and related to different etiologies and involve different biological systems.
Acknowledging the vastly different causes of similar sexual symptoms should simply serve to encourage clinicians to use contextual descriptors within a diagnostic framework. The fact that dyspareunia can have different etiologies does not preclude the use of one term to encompass them all. Meana (2005) argues that some dyspareunia subtypes do not even fit the bill of a standard pain disorder. While VVS does possess the characteristics of a pain disorder, the no-obvious pathology group in her sample (Meana et al., 1997a, 1997b) does not. This group of women had relatively high levels of psychological symptomatology and they evidenced pain that did not seem to have a specific location, and was more exclusively linked to sexual situations. Payne (2005) joined Meana (2005) in expressing concerns that overstating the primacy of pain in dyspareunia might result in the neglecting of sexual function considerations. Even if one considers dyspareunia to be a pain disorder, it is a pain disorder that interferes with sexual function in a direct fashion, with undeniable interference at every stage of the sexual response cycle. This interference is manifest in lower frequencies of sexual intercourse and self-stimulation; lower levels of desire, arousal, pleasure, and lubrication; less success at achieving orgasm and more negative feelings and attitudes regarding sexuality. Strassberg (2005) further argues that it is the sexual feature of dyspareunia that is usually the impetus for women seeking treatment.

A second point made by the critics of reclassification is that most of the data on which Binik bases his arguments is from VVS samples and may not adequately represent all sub-types of dyspareunia. Carpenter and Andersen (2005), First, (2005), Graziottin (2005), Meana (2005), and Strassberg (2005) all state that while VVS may actually fit the diagnostic criteria for a pain disorder in the DSM, this subtype of dyspareunia accounts
only for a subset of all dyspareunia cases and, as such, the generalizability to all
dyspareunia cases is questionable. Perhaps future research will demonstrate that most
pre-menopausal dyspareunia is, in fact, VVS. Until then, it is premature to liken all forms
of dyspareunia to VVS.

Binik’s opponents also argue that reclassifying dyspareunia as a pain disorder
would be of little clinical utility. Binik claims that since classification systems determine
which clinicians are considered experts in a certain area, moving dyspareunia to the pain
disorder category would result in the biopsychosocial integration of pain specialists,
gynecologists and sex therapists in the treatment of the disorder (Binik, 2005). Basson
(2005), First (2005), Levine (2005), and Strassberg (2005) do not see re-classification as
a pre-requisite to a multidisciplinary approach. Dyspareunia is often co-morbid with
other sexual dysfunctions in both women and their partners, and moving dyspareunia out
of the sexual dysfunctions category could reduce the likelihood that these other co-
morbid sexual dysfunctions would be diagnosed and treated, especially by pain
management teams with little expertise in sexuality. In fact, the current treatment of other
pain disorders is often far less integrative than is suggested by Binik. There is thus little
indication that pain specialists will prove to be more integrative in the treatment of
dyspareunia than gynecologists or sex therapists have already proven to be. These critics
conclude that women with dyspareunia would be best served by keeping the disorder
within the sexual dysfunctions category. As such, their pain should be managed with
current chronic pain interventions within a sexual dysfunction framework, by a clinician
trained in sexual medicine.
In summary, there are various theoretical, empirical, and practical arguments for and against a conceptualization of dyspareunia as primarily a pain disorder or primarily a sexual dysfunction. We do not know, however, the extent to which women with this disorder experience it as one or the other, or both. This question can be investigated in at least two possible ways. One way would be through straight self-report, both psychometric and experiential – simply asking women about their experience of dyspareunia and the aspects of its symptomatology that are most prominent to them. The second way would be to use cognitive methodologies to bypass some of the notorious reliability problems inherent in self-report methods. These methodologies might be useful to try to gain less socially mediated access to the primacy of pain or of sex in the cognitive processing of women with dyspareunia. Cognitive psychology has been very informative in the study of sexuality and sexual dysfunction for over three decades. Therefore, a review of the ways in which cognition has been studied in relation to sex seems an appropriate next step in our effort to investigate the ways in which the experience of dyspareunia could be thus accessed.
CHAPTER 3

COGNITION AND SEXUALITY

Over the last three decades, the study of cognitive factors in sex has been somewhat sporadic, with different lines of inquiry relating to normal sexual function on the one hand and sexual dysfunction on the other. Experimental research on normal sexuality has been primarily focused on gender differences in the processing of sexual stimuli, while clinical research has focused disproportionately on erectile dysfunction. The variables of interest have been attention and distraction, memory, voluntary control, and expectations. The methodological approaches to the study of the role of these factors in sexuality have ranged from self-report to experimental cognitive paradigms. Although we have made some advances in our understanding of the role of cognition in sexuality, we are far from having a reasonable grasp of the interplay of brain and body in the sexual experience. A review of research in this area follows.

Attention

Formal research on attention in normal sexuality began in the 1970’s when Geer and Fuhr (1976) turned their focus on attentional variables in sexuality. They had men perform distracting computational cognitive tasks presented to one ear while listening to an erotic story in their non-attended ear. Results showed that in the most distracting condition, subjects showed no genital arousal, while in the no-distraction condition, subjects demonstrated high levels of arousal. Clearly, the suggestion here was that
attention played a key role in arousal. Having noted the impact of distraction on sexual arousal, Geer and colleagues then turned their attention away from arousal and onto the impact of sexual content on information processing. They posited that individuals would respond more slowly in identifying a stimulus when an erotic element was present than when there was no erotic element present (Geer & Manguno-Mire, 1996). They called this effect the sexual content induced delay (SCID).

In a series of studies examining the SCID, lexical decision tasks (LDT) were used. In LDT, subjects are asked to determine whether a string of letters is a word (Geer & Manguno-Mire, 1996). Geer and Bellard (1996) asked subjects to make lexical decisions about sexual, romantic, and neutral words in homogeneous and mixed contexts—meaning in the context of words similar to the target word or different from them. The authors found that both men and women took longer to make lexical decisions when the target word was explicitly sexual. This delay was accentuated in women. Furthermore, the decision times of women were even slower when the target words were sexual and embedded within the context of other sexual words. For men, decision times to sexual words were slowed in the context of romantic words. Geer and Melton (1997) used LDT to examine the SCID phenomenon using double entendre words. Men and women were asked to make lexical decisions to associated sexual or neutral words (e.g. sex, sleep) that followed priming sentences ending with double-entendre words (e.g. lay, hump). The authors found that targets associated with the erotic meaning of the double-entendre words had slower decision times than neutral targets. Furthermore, decision times to neutral and sexual words were slowed when the priming sentence was erotic. These findings showed slowed decision making to erotic stimuli, with the delay being
accentuated in women. Geer and Melton (1997) thus proposed a model in which sexual words evoke a more complex processing sequence than neutral words. The model suggests that sexual content triggers appraisal and checking or editing mechanisms, which are accentuated in women.

Spiering, Everaerd, and Elzinga (2002) asked subjects to categorize sexual and neutral pictures that were primed by sexual, threatening, and neutral primes. The authors demonstrated that the SCID effect emerged only when sexual primes were ignored and that subjects recognized sexual pictures faster when primed sexually. They suggested that SCID can be interpreted as the activation of regulatory modules by emotional stimuli in the stage of elicitation of emotional response. In contrast, when the sexual system is already activated, it appears that decisions regarding sexual information are facilitated.

Perhaps because of the urgency of seeking treatment for individuals experiencing sexual difficulties, the role of attention in sexual dysfunction has been investigated to a far greater extent than in normal sexuality. A series of studies conducted by Barlow in the 1980's served to elucidate the complex role of attention in erectile function. Abrahamson, Barlow, Beck, Sakheim, and Kelly (1985a) investigated the effects of a distracter on sexual arousal in functional and dysfunctional men. While both groups of men achieved penile response with no distraction, distraction decreased the tumescence of non dysfunctional subjects and did not affect the tumescence of dysfunctionals. In fact, the erections of dysfunctional subjects increased slightly during the distraction condition (Abrahamson et al., 1985). Further findings from Abrahamson et al. (1985), Abrahamson, Barlow, Sakheim, Beck, and Athanasiou (1985), and Beck, Barlow, and Sakheim (1983) demonstrate that, compared to viewing a woman who was minimally aroused, viewing a
highly aroused woman produced less arousal in dysfunctional men, but more in normals. The generally accepted explanation for this is that viewing highly aroused women produced performance related concerns that were distracting to dysfunctional men (van den Hout & Barlow, 2000). Thus, neutral distraction interfered with the erectile responding of functionals by shifting attention away from the processing of erotic stimuli. Dysfunctionals did not show this effect since they were already focusing their attention on non-erotic performance related concerns. In summary, van den Hout and Barlow (2000) have suggested that those with sexual dysfunction feel anxious in the context of sexual performance and that an association between anxiety and dysfunction is mediated by attention selectivity (i.e. the narrowing of attention). In those with sexual dysfunction, anxiety can lead to a focus on task-irrelevant internal and performance related concerns, whereas in functionals, anxiety can produce a farther attentional focus on external erotic cues.

Research on the processing of response information in sexual dysfunction also reveals differences between functionals and dysfunctionals in the perception of arousal. Abrahamson, Barlow, and Abrahamson (1989) showed that performance demand distraction (self-focused attention) elevated the penile responding of functional subjects compared to neutral distraction, while performance demand distraction decreased responding of dysfunctional men and was significantly lower than the arousal of functional men in this condition. The authors concluded that 1) the process of self-focused attention might be associated with erectile dysfunction but not because of a fully occupied attentional capacity and 2) dysfunctionals focus exclusively on the threat-related aspects of sexual arousal.
Cranston-Cuebas, Barlow, Mitchell, and Anthanasiou (1993) examined the effect of placebo pills associated with different expectations. Functionals who believed that they had taken an erection enhancer pill, tended to produce smaller erections; if they believed an erection distracter was taken, their actual erection tended to be larger. This is known as the ‘reverse placebo effect’ (Cranston-Cuebas et al., 1993). In contrast, dysfunctional men showed an ordinary placebo effect. They produced larger erections when they thought they had taken the enhancing pill and smaller erections when thought they had taken the distracting pill. This suggests that functional men are hyposensitive when it comes to perceiving dimensions of physical arousal. In other experiments conducted in Barlow’s laboratory, subjects are asked to estimate their erectile response using a cognitive lever, which they could move between points of 0 and 100 (e.g. Wincze, Venditti, Barlow, & Mavissakalian, 1980). In this and other studies, sexually dysfunctional subjects underestimated their erections while functional subjects were more accurate (Abrahamson et al., 1985a,b, 1989; Sakheim et al., 1987; Wincze et al., 1980).

Drawing from numerous studies on attention and erectile dysfunction, Barlow (1986) developed a model of the role of cognitive distraction and arousal in the development and maintenance of sexual dysfunction as follows. The perception of a sexual context associated with the possibility of having to perform elicits a negative affective response, including perceptions of lack of control or inability to obtain desired results. At this point, a critical shift of attention occurs from an external focus (on erotic stimuli) to an internal, self-evaluating focus, including autonomic signs and symptoms of arousal itself. Since increasing arousal narrows attention, the negative affective content
becomes even more salient. Dysfunctional men thus become distracted from what they are doing which can then interfere with performance.

Most of the afore-mentioned research focused on men and it remained unclear the extent to which Barlow's model or conclusions would effectively apply to women's sexuality. A number of studies since then indicate that women's sexuality may be regulated differently and by different types of concerns.

In an early study, Adams, Haynes, and Brayer (1985) showed that cognitive distraction interfered with arousal in sexually functional women. Subjects evidenced decreases in subjective and physiological arousal when a distraction task was added to the erotic condition, much as had been found in men. However, important differences arose in subsequent studies. Palace and Gorzalka (1990) examined the effects of anxiety on sexual arousal in sexually functional and dysfunctional women. Each subject was presented with two videotaped stimulus sequences. Each sequence began with a one minute presentation of the word relax, followed by a one-minute neutral orientation stimulus, a three-minute neutral or anxiety pre-exposure stimulus, and finally a three-minute erotic experimental stimulus. In comparison to the neutral pre-exposure video, pre-exposure to the anxiety video enhanced the rate and magnitude of genital arousal for both functionals and dysfunctionals. Both groups reported less subjective sexual arousal after anxiety pre-exposure. Functional subjects exhibited greater physiological but not subjective arousal than dysfunctional in both conditions. These results highlight a desynchronous relationship between subjective and physiological sexual response. Evidence that dysfunctional women's genital arousal is facilitated by exposure to an anxiety-eliciting stimulus is opposite to the pattern generally observed in men.
Returning to the impact of self-evaluation, Faith and Schare (1993) investigated whether spectatoring [defined by Masters and Johnson (1970) as cognitively fixating on negative aspects of one's body and operationalized in this study by body image measures] would significantly predict sexually avoidant behavior. They found that body image scores predicted the frequency of sexual behaviors for men and women, while general psychological adjustment and sexual knowledge did not. Subjects who perceived their bodies in a negative way were more likely to be sexually avoidant, with women more likely than men to report negative body image (Faith & Schare, 1993). These findings are consistent with the Barlow model suggestion that negative, internal self-evaluation hampers sexual function.

In an attempt to separate cognitive distraction into content areas, Dove and Weiderman (2000) investigated the relationship of retrospectively reported appearance-based distraction and performance based distraction during sex in a sample of women. They found that women reported as much appearance-based as performance-based distraction and that these types of distraction combined predicted lower sexual esteem, less sexual satisfaction, less consistent orgasms, and a higher incidence of pretending orgasm. Meana and Nunnik (2006) investigated gender differences in the content of cognitive distraction during sex, as well as the relationship of these two types of distraction to self-reported sexual function in a college sample. While women reported equal amounts of appearance- and performance-based distraction, men reported more performance than appearance-based distraction. In both men and women, appearance-based distraction was predicted by negative body image and not being in a relationship, while performance-based distraction was predicted by negative body image and sexual
dissatisfaction. Additionally, psychological distress predicted both types of distraction in women. There was no evidence found of a relationship between distraction and sexual function, but the sample was young and unlikely to have developed significant and persistent sexual dysfunction.

The results from studies on attention and sexuality have demonstrated the powerful effect attention has on the processing of sexual information, as well as the perception of and experience of sexual arousal. Slowed decision making to erotic stimuli, such as sexual words, has shown that erotic material captures attention and puts a greater demand on attentional capacities than non-sexual information. The manipulation of attention also has a strong impact on sexual functioning, as evidenced by the fact that cognitive distraction impairs sexual arousal in both men and women, and that self-focused attention has been associated with erectile dysfunction in men and decreased sexual functioning in women.

Memory

The search to understand the role of cognition in sexuality has also expanded to questions of memory, with an emphasis on gender differences. While studies on attention alert us to low levels of information processing, studies on memory start to touch on issues of higher-order processing and meaning-making.

In one of the first studies on memory for sexual and other content, Geer and McGlone (1990) investigated memory for a sexual story containing romantic, erotic and neutral elements. The authors found that women were faster and more accurate in recognizing romantic sentences, whereas men recognized erotic sentences faster. Geer and McGlone explain that perhaps these findings are due to the fact that men and women
simply attend more to what interests them. If men spent more time reading the erotic elements in the story, and women spent more time reading the romantic elements, then elaborative encoding could account for the increased memory effect for relevant information (Geer & Manguno-Mire, 1996).

These possible mechanisms were examined in a study by Geer, Judice, and Jackson (1994) employing the same methodology as that of Geer and McGlone (1990), with the exception that the paragraph was presented one sentence at a time. In addition, a measure of erotophobia-erotophilia was included since it was previously suggested that erotophobic individuals would be more likely to avoid sexual material. The authors found that subjects with higher erotophobia scores read all categories of sentences more slowly and that both men and women read erotic sentences for longer periods of time than romantic and neutral sentences. Similar to the findings of Geer and McGlone (1990), men were more accurate in their recognition of erotic sentences. Geer and colleagues (1994) concluded that erotophobia-erotophilia does not appear to be a dimension that significantly influences the way individuals process erotic information, and that there may be something intrinsic about erotic material that causes it to be processed differently by individuals, regardless of gender.

Extending these findings, Kirsch-Rosenkrantz and Geer (1991) proceeded to investigate recall memory. Subjects were presented with a sexual story containing both erotic and romantic elements. Men made more mistakes in the recall of erotic elements than did women and, in a recognition task, both genders endorsed more false positives of a sexual nature than of a romantic nature. The authors concluded that perhaps men show more distortions concerning any material that accompanies explicit erotic material.
Castille and Geer (1993) sought to introduce some sexual priming effects to the study of memory. They presented an ambiguous story to men and women and manipulated the content of advance information (i.e. titles and descriptor sentences) that could lead the subjects to interpret the story as sexual or nonsexual. The authors found that when the story was preceded by sexual content, subjects tended to attribute sexual meaning to the story, whereas subjects attributed nonsexual meaning to the same story when it was preceded by nonsexual information. These results indicate that individuals' understanding of and memory for an ambiguous story are strongly influenced by contextual information.

The findings from these studies on memory clearly illustrate that the genders differ in their memory for sexual information but that erotic information is processed differently than non-erotic information by both men and women. Men are faster and more accurate in remembering information of sexual nature, while women are faster and more accurate in remembering information that is romantic in nature. Memory errors, however, are common in the recall of sexual material, particularly when contextual variables are present (Geer & Manguno-Mire, 1996).

Some recent studies have attempted to distinguish among the different types of memory. The role of sexual and emotional stimuli on implicit (nonconscious) and explicit (conscious) memory has been examined using the process-dissociation paradigm (Jacoby, 1991). This process attempts to separate the effects of conscious and nonconscious influences on memory. Subjects are presented with a list of words followed by a list of word stems to complete. In the simple recall task, they are asked to complete the word stems with previously presented words. Otherwise, they are asked to use only words that have not been previously presented. In this latter task, subjects need to consciously
attempt to exclude those words that have been presented, and when previously presented words are inadvertently used, it is assumed that this results from implicit memory processes. In this way, conscious and nonconscious memory are placed in opposition to each other (Geer & Manguno-Mire, 1996).

Using the process-dissociation procedure to separate out the influence of sexual and emotional information on implicit and explicit memory, Bush and Geer (1996) examined this influence using sexual, negative emotional, and neutral words. The authors found that women recalled more negative emotional words than did men and that sexual words were much better recalled than negative emotional or neutral words by both men and women (Bush & Geer, 1996). The authors interpreted these findings to mean that sexual words may be encoded more readily because of their saliency, and would therefore be represented to a greater extent in conscious memory.

Lastly, Spiering, Everaerd and Janssen (2003) investigated implicit versus explicit activation of the sexual system using a priming paradigm in which sexual pictures were preceded by either sexual or neutral primes. The authors found that sexual representations in memory can be activated automatically and that the activation of subjective experience (sexual arousal) requires conscious cognitive elaboration in functional men (Spiering et al., 2003).

The results from the preceding studies on memory illustrate the notion that while the genders may differ in their memory for sexual information, sexual information is processed differently than nonsexual information by both men and women. Furthermore, in comparison to other material of an emotional nature, sexual material is encoded more rapidly and is therefore more present in conscious memory.
Voluntary Control, Expectations and Schema

Aside from the more established cognitive constructs of attention and memory, research has also focused on 1) the extent to which individuals can cognitively control sexual situations, 2) the effect of certain expectancies on an individual’s sense of control, and 3) the more complex network of expectations and beliefs generally referred to as schema. Research on these secondary constructs addresses issues more directly related to real-world sexual situations and accounts for the complexity of such situations, while simultaneously illuminating lower-level cognitive processes, such as attention.

Studies have shown that subjects can voluntarily increase their erectile responding to a sexually explicit film or fantasy when given instructions to do so through any means possible (Cranston-Cuebas & Barlow, 1990). Other studies have shown that men can inhibit their erectile responding when given instructions to suppress tumescence (Henson & Rubin, 1971; Mavissakalian, Blanchard, Abel, & Barlow, 1975). When subjects in these studies were asked how they were able to suppress their erectile responding, they reported concentrating on nonsexual, off-task thoughts such as arithmetic computations (Cranston-Cuebas & Barlow, 1990). Beck, Barlow and Sakheim (1982) demonstrated that both functional and dysfunctional men are able to voluntarily suppress their erections in the presence of erotic stimuli. Whereas functionals were aware of their success in suppressing their erectile response and were able to describe the cognitive strategies they had used, dysfunctional were neither aware that they had been successful, nor could they report the cognitive strategies they had used (Beck et al., 1982 in Cranston-Cuebas & Barlow, 1990). These studies suggest that shifts in attentional focus might be a key to voluntary control (Cranston-Cuebas & Barlow, 1990).
Expectations in sex may also be important in the elucidation of the cognitive processes involved in the development and maintenance of sexual dysfunction. When anxiety is involved, expectations generally relate to cue-harm associations; in sexual dysfunctions the harm is specifically that of unsuccessful performance (van den Hout & Barlow, 2000). Functional and dysfunctional men possess differential vulnerabilities to the formation of negative expectancies about performance in a sexual situation. Both functionals and dysfunctionals enter a sexual situation with differential expectancies for their performance (van den Hout & Barlow, 2000). Functionals have a resistance to the formation of negative expectancies, and a resistance to a dysfunctional mentality (Abramson et al., 1985a,b) created by ignoring evidence (i.e. overlooking small changes in their performance and failing to report decreases in physiological arousal) that may support negative expectancies of performance. Since dysfunctional men tend to underreport their physiological arousal (Sakheim, Barlow, Abrahamson, & Beck, 1987), one can conclude that they ignore evidence that supports positive performance expectancies. Providing dysfunctional men with positive expectancies from an external source (i.e. as in the reverse placebo study) aided in their arousal (van den Hout & Barlow, 2000). Functional men maintain positive expectancies for their performance despite experimental attempts to manipulate this and despite physiological evidence that their performance is decreased (van den Hout & Barlow, 2000). On the other hand, dysfunctional men underreport their erections, maintaining negative expectancies of their performance, except when provided with external sources of positive reinforcement (van den Hout & Barlow, 2000).
These findings have led to a broader conceptualization of the role of schema in sexual dysfunction. Dysfunctionals’ negative expectancies arising from a sexual context are proposed to be due to the formation of a sexual schema that is rigid and unrealistic. When dysfunctional men are faced with a sexual situation, their performance often does not match their schema (explaining why they under-report tumescence since they hold their erectile response up to some unrealistic standard) (van den Hout & Barlow, 2000). The discrepancy between schema and actual performance of dysfunctionals may add to the autonomic arousal they experience, and may increase their focus on “off-task” cognitions (such as negative evaluative thoughts) which results in dysfunctional performance (van den Hout & Barlow, 2000). Much work needs to be done in this complex area, although clearly many of the empirically supported treatments of sexual dysfunction are focused on the challenging of negative or damaging sexual schema.

The Role of Cognitive Factors in Dyspareunia and Pain

As mentioned previously, much of the research on cognitive factors in sexual dysfunction has been conducted on erectile dysfunction. The few studies that included women with sexual dysfunction chose participants with desire and arousal difficulties. We thus know little about the role of cognitive factors in the development and maintenance of dyspareunia. Only one study has directly investigated this question. In a multidimensional investigation of pain-hypervigilance in women with VVS, seventeen women suffering from VVS and an equal number of age and education matched control women completed an emotional Stroop and memory recall task, in addition to a series of questionnaires assessing pain-hypervigilance, state and trait anxiety, fear of pain, and anxiety sensitivity (Payne et al., 2005). Stimuli for the emotional Stroop task consisted of
4 sets of ten words in the following categories; pain, social-threat, positive, and neutral words. Results showed that women suffering from VVS displayed hypervigilance for pain relevant information. Specifically, VVS women displayed greater Stroop interference for pain words as compared with control women, and also reported experiencing more hypervigilance to pain during intercourse on a self-report measure. The data provide evidence in support of a mediating role for anxiety and fear of pain in dyspareunia (Payne et al., 2005).

Other theoretical and data driven reasons exist to believe that cognitive factors play a role in dyspareunia. Cognitive Behavioral Therapy (CBT) has been shown to be effective in treating VVS, as evidenced by improvements on measures of psychological adjustment and sexual functioning post treatment, as well as pain reduction (Bergeron et al., 2001). In Bergeron and colleagues’ (2001) randomized controlled trial, various cognitions were targeted as part of treatment in group CBT. Women in the CBT groups were asked to identify the negative, automatic thoughts that occur when they are anticipating pain, when they are experiencing pain, and after an episode of painful intercourse. Participants learned about the concepts of catastrophizing and hypervigilance, both of which are linked to increased pain intensity. These women were then taught to replace their maladaptive cognitions with more positive ones, and were taught to use coping self statements (i.e. Worrying won’t help; I won’t get overwhelmed; I need to take some slow, deep breaths and relax). The cognitive interventions used in this treatment showed promising results in that group CBT reduced anxiety by giving participants more control over their pain and by changing the meaning of the situation for them, thereby affecting cognitive and emotional factors (Bergeron et al., 2001).
Psychological factors have also been examined in VVS samples, indicating that they report more anxiety (Nunns & Mandal, 1997; Gates & Galask, 2001; Payne et al., 2005), depression (Jantos & White, 1997; Dunn, Croft, & Hackett, 2002), and have higher levels of somatization than controls (Van Lankveld, Weijenborg, & Ter Kule, 1996). Similarly, women who suffer from VVS report more catastrophizing in relation to pain experienced during intercourse as opposed to other recurrent pains (Pukall et al., 2002). Since cognitive processes are highly implicated in the aforementioned conditions, these findings suggest an important role for cognition in the experience of dyspareunia.

Perhaps the strongest theoretical reason to posit that cognitions play a significant role in dyspareunia emanates from the empirical literature investigating the role of cognition and emotion in almost all types of pain. Decades of directed research on the topic have evidenced consistent support for the mediating role of cognition and emotion in the phenomenology of pain.

The Gate Control Theory of Pain, proposed by Melzack and Wall (1965) was the first theory of pain incorporating the central control processes of the brain (Melzack & Katz, 2004). It proposes that the transmission of nerve impulses from afferent fibers to spinal cord transmission cells is modulated by a gating mechanism in the spinal dorsal horn. The gating mechanism is influenced by the relative amount of activity in large and small diameter fibers, such that small fibers open the gate (i.e. facilitate transmission) whereas large fibers close the gate (inhibit transmission). In addition, the gating mechanism is influenced by nerve impulses that descend from the brain. When the output of spinal transmission cells exceeds a critical level, it activates the action system – those neural areas that underlie the complex, sequential patterns of behavior and experience
characteristic of pain. Previous theories of pain had dismissed psychological factors as simply reactions to pain, yet the Gate Control Theory posited these factors as being an integral part of pain processing thereby opening new avenues for pain control through psychological therapies (Melzack & Katz, 2004).

It has been demonstrated that cognitive coping strategies are effective in alleviating pain (Fernandez & Turk, 1989). In a meta-analysis of studies utilizing various cognitive coping strategies to control pain, it was found that 85% of the studies analyzed demonstrated cognitive strategies as having a positive effect in enhancing pain tolerance/threshold or in attenuating pain ratings as compared to no treatment. After dividing the cognitive strategies into six categories (external focus of attention, neutral imaginings, pleasant imaginings, dramatized coping, rhythmic cognitive activity and pain acknowledging), the authors found that each class of strategy attenuated pain significantly. The imagery strategies were found to be the most effective, whereas strategies that involved repetitive cognitions or acknowledgement of sensations associated with pain were the least effective. Fernandez and Turk (1989) explained this finding by suggesting that, given the finite capacity of attention in the face of competing stimuli, there is a selective filtering out of parts of the incoming information. Cognitive coping strategies thus impinge on the amount of attention available for nociception. They act as distraction which displaces the processing of nociceptive information, thereby attenuating the perception of pain. Imagery strategies thus produce greater distraction from pain than other strategies and are therefore more effective. Pain acknowledging is limited in its distracting properties since it requires the individual to pay attention to the objective sensations of the pain. The authors concluded that cognitive coping strategies
ameliorate pain by producing changes in attention that are accompanied by definite patterns of neurophysiological activity that inhibits that transmission of pain signals (Fernandez & Turk, 1989).

It has been shown that pain demands attention and that the manipulation of attentional focus affects the perception of pain as shown by distraction (McCaul & Malott, 1984). Distraction has been shown to reduce distress as compared with uninstructed and placebo control conditions. Distraction techniques that require more attentional capacity are more effective than ones requiring less attentional capacity. Furthermore, distraction has stronger effects on pain stimuli of low intensity, and for mild pain stimuli, distraction is more effective than sensation redefinition (McCaul & Malott, 1984).

Chronic pain patients also tend to display an attentional bias toward sensory pain words. Using a Stroop task, Pearce and Morley (1989) demonstrated that patients with chronic pain show more interference to words drawn from the McGill Pain Questionnaire (Melzack, 1975). Using a computer version of the emotional stroop task, a study investigating attentional bias to pain-related information in chronic low back patients demonstrated that these patients were slower in color naming of sensory pain words (i.e. flickering, stiff, shooting, etc.) as compared to neutral control words (Crombez, Hermans, & Adriaensen, 2000). Furthermore, the patients' current pain intensity was the best predictor of attentional bias to sensory pain words, such that the attentional bias to these words enlarged with increasing pain intensity (Crombez et al., 2000).

Another individual dimension shown to be related to attention and pain is sensitivity to anxiety. When completing a dot-probe task designed to evaluate attentional...
allocation to cues thematically related to pain and injury, chronic pain patients did not differ from controls in their patterns of responses to dot-probes that were presented following pain- or injury-related cues (Asmundson, Kuperos, & Norton, 1997). However, different results emerged when the patients with chronic pain were divided based on their scores on the Anxiety Sensitivity Index (Peterson & Reiss, 1992), a measure related to fear of anxiety. Those with low anxiety sensitivity shifted attention away from stimuli related to pain whereas those with high anxiety sensitivity responded similarly to all stimuli (i.e. they did not selectively attend to pain-related stimuli). Asmundson et al. concluded that the style of information processing in which one shifts attention away from cues related to pain may be related to coping strategies characterized by avoidance and distraction. Furthermore, a failure to process pain related cues beyond the level of attention may lead to an underestimation of their importance or impact. Combined with shifting attention away from pain cues, this may promote participation in activities that can promote reinjury and continued pain in patients with low fear of pain.

Pain-related fear has also been shown to play a significant role in back pain disability. A series of studies conducted by Crombez, Vlaeyen, Heuts, and Lysens (1999) demonstrated that pain-related fear was more disabling than pain itself and that pain-related fear was related to poor behavioral performance on a task assessing the functional capacity of the trunk flexors and extensors. The authors discussed the origin of pain-related fear as stemming in part from catastrophic thinking and negative affect. This study found that pain catastrophizing was superior in predicting pain-related fear than biomedical status and pain severity. Another study demonstrated that pain-free volunteers with a high frequency of catastrophic thinking about pain became more fearful when...
threatened with the possibility of occurrence of intense pain than volunteers with a low frequency of catastrophic thinking (Crombez, Eccleston, Baeyens, & Eelen, 1998). In addition to catastrophic thinking, negative affect can be seen as a moderating variable in the emergence of pain-related fear. Since persons with high negative affect are hypervigilant for all forms of threat, those who also experience pain may make pain the most salient threat and pain-related fear may emerge (Crombez et al., 1999).

Evidence for altered information processing in chronic pain patients can be seen when patients are asked to perform a word completion task. When asked to complete word stems, chronic pain sufferers produced significantly more pain-related word completions than did non-patient controls (Edwards & Pearce, 1994). These findings suggest that personal experience with pain is the crucial factor in developing altered patterns of information processing in chronic pain. This direct personal experience with long-term pain results in internal representations of pain that are in a higher state of activation (Edwards & Pearce, 1994). These representations may be highly elaborated and therefore highly accessible to these patients (Edwards & Pearce, 1994). This underlying level of activation most likely plays a significant role in the explicit memory biases towards pain related stimuli in patients with chronic pain (Edwards & Pearce, 1994).

These findings clearly illustrate the role that cognition plays in the perception of pain. Attention plays a key role because pain demands attention and the manipulation of attention, such as distraction, significantly attenuates the perception of pain and reduces distress. Furthermore, patients suffering from chronic pain conditions also pay more attention to pain cues. The perception of pain and its disabling effects have also been
linked to two constructs of a cognitive nature: anxiety sensitivity and pain related fear, which stems in part from catastrophic cognitive patterns and negative affect. Finally, the notion that personal experience with pain is the crucial factor in developing altered patterns of information processing in chronic pain clearly affirms the connection between various cognitive processes and pain.

Aims of the Study

The current literature has much to say about cognitive processes and their impact on sexual functioning. Attention plays an important role in sexuality as evidenced by the fact that material of a sexual nature requires more attention and captures attention more rapidly than non-erotic material. Attention also affects levels of sexual arousal and how arousal is interpreted and processed in individuals with dysfunctions. Studies on memory illustrate that, in addition to the differential processing of erotic information, memory errors are also common in the recall of sexual material. Existing data have also shown that individuals can consciously control their sexual responding and that different expectancies can affect the individual's sexual responding in certain situations.

Pain, however, also seems to be a magnet for attention. While higher function in relation to sexuality appears to depend on resistance to distraction, higher function in relation to pain requires the opposite – an ability to indulge in distraction. While much research has been conducted into the aforementioned cognitive variables in both sexually functional and dysfunctional individuals and in people experiencing pain, little data exist regarding cognitive processes in relation to dyspareunia, a disorder that combines both sex and pain. With the exception of one study to date, virtually nothing is known about how the experience of dyspareunia affects the cognitive processing of women suffering
from this condition. Since the disorder of dyspareunia contains both the elements of a sexual dysfunction and a pain condition, it would be assumed that women with dyspareunia would process information related to sexuality and pain differently than women without the disorder.

Furthermore, since there is an ongoing debate about how this disorder should be classified in the DSM (sexual dysfunction or pain disorder), it seems germane to investigate the ways in which women with dyspareunia process stimuli related to sex and pain. Using cognitive methodology, we hope to gain some insight as to which stimuli are more salient for women with dyspareunia; sexual ones or pain ones. Do the negative effects of dyspareunia on women's sexual functioning (i.e. decreased arousal, orgasm, desire, etc.) result in more, less, or equivalent cognitive interference than the pain-related aspects of their problem? Furthermore, do women suffering from dyspareunia actually process information related to pain and sex differently than do women without the disorder? This study aims to investigate this question.

Hypotheses

At the current time, there is insufficient evidence to support the making of a specific hypothesis on how women with dyspareunia will differentially process pain and sexual information. However, based on the preponderance of research on dyspareunia in the last 10 years focusing on the pain aspects of the disorder, the general hypothesis proposed here is that pain stimuli will be more interfering than sex stimuli for women with dyspareunia. Rather than delineating each hypothesis for each dependent measure, general hypotheses are presented below as follows:
**Visual Attention**

1. Control women and women with dyspareunia will evidence longer reading times for both sex and pain words as compared to neutral words.

2. Women with dyspareunia will show longer total reading times for sex and pain words than control women.

3. Women with dyspareunia will evidence longer total reading times for pain than sex words, whereas the reverse will be true for control women.

**Memory**

4. Control women and women with dyspareunia will have better recognition and recall of both sex and pain words as compared to neutral words.

5. Women with dyspareunia will show better recognition and recall of sex and pain words than control women.

6. Women with dyspareunia will evidence better recognition, recall and more intrusions of pain than sex words, whereas the reverse will be true for control women.
CHAPTER 4

METHODOLOGY

Participants

Participants were recruited via two different methods. Women in Psychology 101 classes at the University of Nevada, Las Vegas were offered research credit in exchange for completing the Female Sexual Functioning Inventory (FSFI: Rosen et al., 2000). This measure was used a screening tool to select women with no sexual dysfunction (control group) and women with dyspareunia who were also willing to participate in the study. Participants were also recruited via an advertisement placed in the UNLV Psychology Subject Pool Website calling for the participation of women who experience pain during intercourse as well as women who experience no sexual difficulties. After signing up for the experiment via this method, potential participants were administered the FSFI in the lab.

A total of 494 women from Psychology 101 classes at UNLV were screened. Out of the 494, 363 women (73.5%) indicated that they had answered the FSFI truthfully and were willing to be contacted to participate in the experimental phase of the study. Eighteen of these women met criteria for dyspareunia and attempts were made to contact all of them. Six were successfully contacted and agreed to participate. The first 24 of the remaining 345 women who met criteria for the control group were called in a consecutive fashion based on the chronological order in which they were screened. Seven were
successfully contacted and agreed to participate. T tests were performed to determine whether differences existed between the contacted women who agreed to participate and those who did not return telephone calls or who were successfully contacted but chose not to participate. There was no significant difference in total FSFI score between participants and non-participants (contacted and refused or did not return phone calls) in either the control condition \( (t(35) = -.30, p = .77) \) or the dyspareunia condition \( (t(30) = .64, p = .53) \). The remaining 27 participants (14 from the dyspareunia group and 13 from the control group) were recruited via the subject pool website.

A total of 40 women between the ages of 18 and 30 participated in the study, 20 of whom reported persistent pain with intercourse (dyspareunia) and 20 of whom reported no sexual dysfunction (controls). The validity of group assignment was confirmed by a significant group difference in FSFI total score (a measure of global sexual function with higher scores indicating better sexual function) \( (t(38) = 5.23, p < .001) \); with the dyspareunia group \( (M = 22.10, SD = 6.45) \) scoring lower than the control group \( (M = 30.26, SD = 2.65) \). There were also significant differences in intercourse pain score (with higher scores indicating less pain) between the dyspareunia group \( (M = 2.62, SD = 1.00) \) and the control group \( (M = 5.14, SD = 1.34), (t(38) = 6.75, p < .001) \). In terms of the dyspareunia group, the mean intensity of pain experienced during sex was 5.94 on a 10-point scale \( (SD = 1.98) \) and they had had this problem for mean of 1.92 years \( (SD = 1.65) \). The majority of these women (88.9%) reported experiencing pain during sex on 50% or more intercourse attempts.

The mean age of the entire sample was 20.48 \( (SD = 2.80) \), with no significant difference in mean age between the dyspareunia group \( (M = 20.90, SD = 3.35) \) and the
control group ($M = 20.05$, $SD = 2.11$). All participants identified as heterosexual and 95% were right handed. Ethnic and religious distributions are summarized in Table 1. We found a significant difference between the control and dyspareunia groups with regard to ethnicity, $\chi^2 (4, N = 40) = 10.30, p = .04$. This difference seemed to be due to the fact that all African American women ($N = 6$) were in the dyspareunia group. We did not, however, analyze results as a function of ethnicity as our sample was not sufficiently large to do so. No significant group difference was found for religion, $\chi^2 (4, N = 40) = 6.53, p = .16$.

**Stimuli**

Three lists of 16 English words were used as stimuli. List A and List B were used to assess memory in the participants. List C was used to assess visual attention to specific categories of words. Each list was divided into four categories: words related to sex, words related to pain, pleasant words not related to sex (as a control for the sex words) and unpleasant words not related to pain (as a control for the pain words). Words from all four categories were equated based on word length, frequency of usage in the English language, and level of general arousal. Pain and unpleasant non-pain words were equated on the dimension of pleasure, and sex and pleasant non-sex words were also equated on this dimension.

Information regarding usage was obtained from Kucera and Francis' *Computational Analysis of Present-Day American English* (1967). This text contains a collection of lexical and statistical information obtained from analysis of the Standard Corpus of Present-Day Edited American English, a computer-processible corpus of language texts assembled at Brown University between 1963 and 1964 containing
1,014,232 words of natural-language text (Kucera & Francis, 1967). The mean length and usage of words in this study were equated across groups since lower frequency words tend to be fixated on for longer than higher frequency words. Furthermore, the longer a word is, the more likely a reader is to refixate it, producing increased gaze duration (Liversedge & Findlay, 2000). General arousal and pleasure ratings were obtained from Bradley and Lang’s Affective Norms for English Words (ANEW) (1999). This volume provides a set of normative emotional ratings for a large number of words in the English language which have been rated in terms of pleasure, arousal, and dominance via the Self-Assessment Manikin (SAM), an affective rating system originally devised by Lang (1980).

Lists A and B were used to assess memory in the participants. List A was composed of the following words: burn, agony, discomfort, hurt (pain words); kiss, orgasm, intercourse, naked (sex words); circus, hopeful, alert, adventure (pleasant non-sex words); penalty, offend, bankrupt, prison (unpleasant non-pain words). List B contained: pain, dagger, distressed, dreadful (pain words); nipple, sexy, caress, ecstasy (sex words); jewel, reunion, festive, bouquet (pleasant non-sex words); garbage, debt, demon, maggot (unpleasant non-pain words). Words were selected such that within each list, there was no significant difference between word categories in terms of length (List A: $F(3,12) = .17, p = .92$; List B: $F(3,12) = .70, p = .57$), frequency of usage (List A: $F(3,12) = .003, p = 1.00$; List B: $F(3,12) = 1.02, p = .42$), and general arousal (List A: $F(3,12) = 2.74, p = .09$; List B: $F(3,12) = .25, p = .86$). In addition, there was no significant difference between the pain and unpleasant non-pain word groups with regard to pleasure (List A: $t(6) = -.25, p = .82$; List B: $t(6) = .14, p = .89$), and no significant
difference between the sex and pleasant non-sex word groups with regard to pleasure (List A: $t(6) = -.10, p = .93$; List B: $t(6) = .19, p = .86$). To test for equivalency of words across lists A and B, we conducted 16 t-tests comparing each of the word groups (sex, pain, pleasant non-sex, unpleasant non-pain) on each of the four dimensions of usage, length, arousal, and pleasure. Even without correcting for the increased probability of Type I error when conducting multiple univariate tests of significance, there were no significant differences between word lists on any dimension for any category.

List C (SEE APPENDIX I) was used to assess visual attention to different word groups using eye tracking methodology. This list contained: ache, anguished, cut, pinch (pain words); vagina, breast, aroused, pleasure (sex words); blond, merry, laughter, friendly (pleasant non-sex); crime, crisis, neglect, poverty (unpleasant non-pain). Words were selected such that within each list, there was no significant difference between word categories in terms of length ($F(3,12) = .32, p = .81$), frequency of usage ($F(3, 12) = .21, p = .89$), and general arousal ($F(3,12) = .10, p = .96$). In addition, there was no significant difference between the sex and pleasant non-sex word group ($t(6) = -1.09, p = .32$) and the pain and unpleasant non-pain word group ($t(6)=1.43, p = .20$) in regards to pleasure.

List C was presented in a 4 x 4 matrix on a computer screen for 10 seconds, during which time participants’ eye movements were recorded using an eye-tracking device as they read through the list of words.

Measures

Female Sexual Functioning Inventory (FSFI; Rosen et al., 2000). The FSFI (SEE APPENDIX II) was used as a screening instrument. The questionnaire is a brief self-
report measure of female sexual function composed of 19 questions divided into 6 subscales: desire (questions 1-2), subjective arousal (questions 3-6), lubrication (questions 7-10), orgasm (questions 11-13), satisfaction (questions 14-16), and pain (questions 17-19). Each question pertains to a separate component of the subscale (i.e. frequency, difficulty, and satisfaction for orgasm). The questions addressing sexual pain inquire about the frequency of discomfort or pain during vaginal penetration (question 17), frequency of discomfort or pain following vaginal penetration (question 18), and the level of pain during or following vaginal penetration (question 19). Possible responses to the items pertaining to frequency of pain include: 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), or Almost never or never. For the item regarding level of pain, participants can respond with: Did not attempt intercourse, Very high, High, Moderate, Low, or Very low or none at all. Participants were considered to meet criteria for dyspareunia if they responded with “Sometimes (about half the time)” or more to items 17 and 18 and “Moderate” or higher to item 19. For a woman to meet criteria for the dyspareunia group, she had to have a pain score of 3.6 or less indicating that she was experiencing pain at least half of the times she engaged in sexual intercourse and had at least a moderate intensity of pain. For a woman to meet criteria for the control group she had to have a pain score above 3.6 (see Rosen et al., 2000). Note that higher pain scores on the FSFI indicate more sexual function and less pain.

The FSFI has been found to have high test-retest reliability ($r = .79-.86$) and high internal consistency (Cronbach’s alpha values of 0.82 and higher) (Rosen et al., 2000). In our sample, the FSFI showed very high reliability, with a Cronbach’s alpha value of 0.94.
The FSFI possesses acceptable discriminate validity as evidenced by a significant difference between scores of women with a sexual pain disorder and control groups and those with a pain disorder and all other sexual dysfunctions (Wiegel, Meston, & Rosen, 2005). Divergent validity has been found using the Locke-Wallace Marital Adjustment Test (Meston, 2003).

**Body Shape Questionnaire (BSQ; Cooper et al., 1987)**

The Body Shape Questionnaire (SEE APPENDIX III) was used to determine if any fundamental differences in body image exist between the two groups (dyspareunia and control). It is a short self-report measure of concerns about body shape, which can be completed in 10 minutes. Items were empirically derived by interviewing both patients with eating disorders and other women. Significant correlations between the BSQ and the total score on the Eating Attitudes Test (EAT) ($r = .35$ for women with bulimia; $r = .61$ for control women) and the Body Dissatisfaction subscale of the Eating Disorder Inventory ($r = .66$ for women with bulimia) establishes its concurrent validity. Its discriminant validity has also been shown to be satisfactory, as evidenced by significant difference between scores of women with bulimia and a control group. In our sample, the BSQ showed very high reliability, with a Cronbach’s alpha value of 0.97.

**Conners’ Continuous Performance Test (CPT; Conners, 1992)**

The Conners’ Continuous Performance Test (CPT) was used to determine if any fundamental differences in attention exist between the two groups (dyspareunia and control). The CPT is a simple test of vigilance, measuring the capacity to ward off distractions to selective attention. It is widely used in ADHD research and clinical assessments for respondents aged 6 or older. Response patterns on the CPT II provide
information that enables the practitioner to better understand the type of deficits that might be present, such as inattentiveness or impulsivity, activation/arousal problems, or difficulties maintaining vigilance.

The standard protocol of the CPT test uses a short practice exercise prior to the administration of the full test to ensure that the respondent fully understands the task prior to proceeding. After the practice exercise, a new administration is begun and it is a requirement of the standard protocol that an administrator remain present during this administration. CPT respondents are required to press the space bar or click the mouse whenever any letter except the letter ‘X’ appears on the computer screen. The inter-stimulus intervals (ISIs) are 1, 2 and 4 seconds with a display time of 250 milliseconds. The unique CPT paradigm is a test structure consisting of 6 blocks and 3 sub-blocks, each containing 20 trials (letter presentations). The presentation order of the different ISIs varies between blocks.

The CPT provides four measures of attention based on test performance: 1) omissions (i.e., any letter other than “X” appeared and the participant did not press the space bar), considered to be a measure of inattentiveness; 2) commissions (i.e., the letter “X” appeared and the participant pressed the space bar), considered to be a measure of impulsivity; 3) hit rate reaction time (a measure of how long it took the participant to respond); and 4) d’, a measure of the balance between errors of omission and errors of commission. All four measures are calculated into T-scores (M = 50, SD = 10) and are adjusted for age and level of education. The CPT takes approximately 14 minutes to complete, and has proved useful in distinguishing between normal and abnormal attentional function. Data from a large normative sample reveals that adults with ADHD
have a higher rate of commission errors than control subjects (Barkley, 1997). They also make omission errors and have high reaction time variability (Walker, Shores, Trollor, Lee, & Sachdev, 2000).


The CVLT was used to determine if any fundamental differences in memory exist between the two groups (dyspareunia and controls). The CVLT-II provides a short, individually administered assessment of the strategies and processes involved in learning and remembering verbal information. It can be administered to individuals ages 16 to 89 and it assesses the amount of verbal material remembered as well as how verbal learning occurs or fails to occur. The CVLT-II measures both recall and recognition of two lists of words over a number of immediate and delayed memory trials. The CVLT-II has very high split-half reliability ($r = .94$), and test-retest reliability ($r = .82$), as well as significant but moderate correlation with the Vocabulary subtest of the *Wechsler Abbreviated Scale of Intelligence* (WASI) (Delis et al., 2000). For the purposes of accounting for or ruling out fundamental memory differences between the dyspareunia group and the control group, a single trial recall test of the first list of the CVLT will be administered.

**Modified Sexual-Pain California Verbal Learning Test (SP-CVLT)**

List A and List B (previously described in the Stimuli section of the Method) were used in a modified version of the California Verbal Learning Test Second Edition (CVLT-II; Delis, Kramer, Kaplan, & Ober, 2000). List A and List B replaced the word
lists normally used in the CVLT-II, creating a modified version of the memory test, the Sexual-Pain California Verbal Learning Test (SP-CVLT).

Apparatus

Eye Tracking

Eye-tracking methodology is considered a reliable and valid measure of visual attention in reading and scene perception (Rayner, 1995). It has been used to investigate the attentional biases of individuals with anxiety disorders (Mogg, Millar, & Bradley, 2000) and dispositional traits, such as optimism (Isaacowitz, 2005). Furthermore, eye-movement data provide an excellent on-line indication of the cognitive processes that underlie reading (Liversedge & Findlay, 2000). Eye-trackers are designed to measure and record the eye movements of participants presented with visual stimuli. The data they yield provides a continuous and unobtrusive measure of cognitive and visual information processing, although they are limited in what they reveal about higher-order processes.

When reading text, a normal eye-movement record is composed of a series of fixations and saccades. During each fixation, the subject extracts the visual information that they process after which they make a saccade to relocate the point of fixation elsewhere in the text (Liversedge & Findlay, 2000). The application of eye-tracking to the study of the processing of sexual information (both words and images) has the potential to inform us about the process of visual attention in relation to sexuality. Using eye-tracking methodology, Lykins et al. (2006) demonstrated that sexual information may be processed in a different manner than non-sexual information at the level of visual attention.
Stimulus words were displayed at a resolution of 1024 x 768 pixels x 256 colors on a Plug and Play Gateway monitor using a Radon VE ATI Graphics card operating at a refresh rate of 75 Hz. Eye movements were recorded using an ASL Eye Track 6000 series Eye Start system. The EYESTART head mounted optics attached to a chinrest eye tracker is designed to accurately measure a person’s pupil diameter and point of gaze on a stationary (room fixed) scene space. The eye tracker optical components are attached to an adjustable chinrest. This chinrest provides a very stable platform for the optics and is comfortable. The system uses infra-red (940nm) video-based technology to simultaneously track the eyes and head position composition. Eye positions were sampled at 120 Hz. Viewing was binocular, although only the position of the left eye was tracked.

Procedure

Participants were recruited from Psychology 101 classes at the University of Nevada, Las Vegas through two different means. In the first, the primary experimenter or a research assistant went into Psychology 101 classes and announced that they were conducting a study on female sexuality and cognition. All willing female students were asked to complete the FSFI. On the last page, the students were invited to leave a name and phone number for us to contact them if they were interested in participating in the study for research credit. The completed FSFI’s with contact information were scored and those that indicated the presence of dyspareunia or the absence of sexual dysfunction and agreed to be contacted were contacted. If contacted participants continued to express a desire to participate, then the study was described briefly and an appointment was set up for them to come to the lab for testing. In the second method of recruitment, an advertisement was placed on the subject pool website inviting women who experience
pain during intercourse to participate in a study regarding female sexuality and cognition. Those who signed up for the experiment online were administered the FSFI once they came into the lab for their appointment. If they met criteria for the study then they continued on with the experiment.

Participants arrived at the lab and began the experiment by reading and signing the informed consent which described the nature of the experiment. If they had not already completed the FSFI, they were asked to complete it at this stage. Participants were then asked whether they wear glasses or contact lenses, and if they are able to see the computer screen clearly.

Participants then completed the three measures designed to test for fundamental differences in attention and memory: the Continuous Performance Test, a single trial recall test of the first list of the CVLT-II, and the Body Shape Questionnaire. After these tests had been administered, participants continued on with the experimental protocol.

The experimenter described the eye-tracking equipment and participants were encouraged to ask questions at any time. Once they were ready, the experimenter asked the participant to place her chin on the chin rest of the apparatus. The eye-tracker was then calibrated by having the participant fixate nine markers on the computer screen. The calibration was verified by having the participant perform the same task again. The EYESTART system was calibrated to each individual until the average error in gaze position was 0.5°. Participants were instructed to remain as still as possible once the eye tracker was calibrated up until the end of the testing. They were then presented with the 16 words from List C which appeared on the screen in a 4 x 4 matrix. They were
instructed to simply read the words on the screen. The matrix of words was presented for 10 seconds.

After completion of the eye-tracking portion of the experiment, the experimenter proceeded to administer the SP-CVLT. The SP-CVLT was administered exactly according to the instructions outlined in the CVLT-II manual (Delis et al., 2000) as follows: The memory test began with a test of immediate free recall that consisted of 5 trials. In trial 1, the experimenter read the first list of 16 words to the participant (List A). The participant was then asked to listen carefully and try to recall as many of the words as she could in any order once the experimenter was done reading the list. The participant’s responses were recorded on a response sheet. The experimenter then read the list again and asked the participant to recall as many words as possible, including those said in the previous trial. Once again, the responses were recorded. The experimenter administered 3 more trials of the same word list for a total of 5 trials, reading the list each time before asking the participant to recall the words. The experimenter then read the second list of 16 words (List B) and asked the participant to recall as many of the words as she could from this list. Once this was done, the participant was asked to recall as many words as possible from List A (short-delay free recall). Then she was asked to recall all the words from List A that were related to sex, all the words that were related to pain, and all the pleasant non-sexual words and all the unpleasant non-pain words (short-delay cued recall).

Next the participant watched a DVD of nature scenes with no narration and set to classical music during the long-delay interval which lasted 20 minutes. The DVD, entitled “The Greatest Places” (1999; produced by Lobo & Associates), was obtained
from amazon.com. After completion of the interval, the participant was asked to recall as many words as possible from List A (long-delay free recall). Then she was asked to recall words from List A that were related to sex, related to pain, and the pleasant non-sexual and the unpleasant non-pain words (long-delay cued recall). Next the participant completed the recognition task. A list of 48 words, including the 16 words from List A, the 16 words from List B, plus 16 words that were not on either list was read to the participant (SEE APPENDIX IV). Of the additional 16 words not previously seen on the SP-CVLT, 8 were words unrelated to any of the 4 categories and 8 were additional sex, pain, pleasant non-sex and unpleasant non-pain words. After the experimenter read each word in the list of 48 words, the participant was asked to indicate whether this word was on the first list of 16 words (List A).

Once the SP-CVLT was completed, participants completed a short questionnaire (SEE APPENDIX V) regarding demographic variables (e.g. age, ethnicity, religious affiliation) and some questions pertaining to the pain experienced during sexual intercourse and any other chronic pain conditions the participant may have had. The questions inquired about the frequency, intensity and duration of the pain. The participant was then given a debriefing form and asked if she had any further questions. If not, then the session was over. Women reporting dyspareunia were offered referrals to health professionals and information about treatment options.

All participants recruited from the Psychology 101 classes were given 1.5 course credits for participation. The study protocol was approved by the Institutional Review Board of the University of Nevada, Las Vegas.
Data Analysis and Hypotheses

Descriptive analyses were computed for participant socio-demographic and background variables. T tests were conducted to determine if there were fundamental group differences on the CPT, the single trial recall of the first list of the original CVLT-II, and the BSQ. If differences existed, then the scores on the CPT, CVLT-II, and/or BSQ were used as covariates in subsequent analyses.

Attention

Each word presented on the screen represented a different scene region, totaling 16 word scene regions. These were collapsed into 4 scene regions pertaining to each of the word category groups (sex, pain, unpleasant non-pain, pleasant non-sex). The dependent measures of interest were total fixation duration, total reading time, and total number of fixations. These variables are commonly reported in literature on reading and eye-tracking (e.g. McDonald & Shillcock, 2003; Frisson, Rayner, & Pickering, 2005; Frazier, Pacht, & Rayner, 1999). Total reading time is the sum of time spent in a region, including rereading, and this is a measure of sustained attention. A Repeated Measures ANOVA was performed for each dependent measure in order to examine between and within group differences in the means of total fixation durations, total reading times and total number of fixations for different word types. Hypotheses were as follows:

Hypothesis #1: A Group x Word Type interaction will be evidenced, whereby women with dyspareunia will show longer total fixation durations, total reading times and more total number of fixations for pain words than sex words, whereas control women will show longer first fixation durations and total reading times for sex words than for pain words.
Hypothesis #2: A main effect for word type will be evidenced, whereby both groups will show longer total fixation durations, total reading times and more total number of fixations for pain than for
a. Pleasant non-sex words
b. Unpleasant non-pain words

Hypothesis #3: A main effect for word type will be evidenced, whereby both groups will show longer total fixation durations, total reading times and more total number of fixations for sex than for
  c. Pleasant non-sex words
d. Unpleasant non-pain words

Hypothesis #4: Simple effects will reveal that women with dyspareunia will show longer total fixation durations, total reading times and more total number of fixations for pain words than will control women.

Hypothesis #5: Simple effects will show that women with dyspareunia will show longer total fixation durations, total reading times and more total number of fixations for sex words than will control women.

Memory

The dependent measures of interest from the SP-CVLT included: number of words recalled from each category for trials 1 and 5, number of words recalled from each category from the short-delay free recall task, number of words recalled from each category from the long-delay free recall task, plus word-type-specific intrusions (words recalled that were not on the target list) for each of the above recall tasks. Furthermore, the number of correct words recognized from each category from the recognition task, as
well as the number of false-positives from each category were computed. What category an intrusion or false positive fell into was determined by the experimenter. Words such as ‘pain’, or ‘painful’ were coded as being pain intrusions or false positives, whereas words such as ‘sex’ or ‘sexual’ were coded as being sex intrusions or false positives. If a word was incorrectly recalled by the participant, and it was not clear if it was a pain or sex word, it was thus coded as either pleasant non-sex or unpleasant non-pain. A Repeated Measures ANOVA was performed for each dependent measure. Hypotheses for memory were as follows:

Hypothesis #6: A Group x Word Type interaction will be evidenced, whereby women with dyspareunia will show better recall and recognition as well as more intrusions and false positives of pain words than sex words, whereas control women will show better recall and recognition as well as more intrusions and false positives of sex words than pain words.

Hypothesis #7: A main effect for word type will be evidenced, whereby both groups will show better recall and recognition as well as more intrusions and false positives of pain words than

e. Pleasant non-sex words
f. Unpleasant non-pain words

Hypothesis #8: A main effect for word type will be evidenced, whereby both groups will show better recall and recognition as well as more intrusions and false positives of sex words than

g. Pleasant non-sex words
h. Unpleasant non-pain words
Hypothesis #9: Simple effects will reveal that women with dyspareunia will show better recall and recognition as well as more intrusions and false positives of pain words than will control women.

Hypothesis #10: Simple effects will show that women with dyspareunia will show better recall and recognition as well as more intrusions and false positives of sex words than will control women.
CHAPTER 5

RESULTS

Overview of Analyses

T tests were conducted to determine if there were fundamental memory, body shape concerns and/or attention group differences as indicated by the single trial recall of the first list of the original CVLT-II, the BSQ, and the CPT. We then examined whether group differences as well as word type differences existed for the attention variables. The same analyses were conducted for the memory variables.

Covariates

No significant group difference was found on the single trial recall of the first list of the original CVLT-II ($t(38) = -0.97, p = .34$), nor was there a significant difference for total scores on the BSQ ($t(38) = -0.20, p = .84$). A MANOVA containing the four dependent measures from the CPT (omissions T score, commissions T score, Hit Rate T score, and d’ T score) was conducted. No significant difference was found for group ($F(4, 35) = .70, p = .60$). These analyses confirmed that there were no fundamental differences between the control and dyspareunia groups on basic memory, body shape concerns, or attention. These variables were thus not used as covariates in subsequent analyses.
Attention

Means and standard deviations for total fixation duration, total reading time, and number of fixations are shown in Table 2 for each group and for the combined sample. Mixed design, 2 (Group: Dyspareunia vs. Control) X 4 (Word Type: Pain, Sex, Pleasant Non-sex, Unpleasant Non-pain) ANOVAs were conducted for total fixation duration, total reading time, and total number of fixations.

For total fixation duration, there was no main effect for group, a significant main effect for word type, $F(3,36) = 4.70, p < .01$, and no significant group X word type interaction (see Table 3). Pairwise comparisons using Bonferroni correction for multiple comparisons indicated that all women had longer total fixation durations for pain words than for sex words, $p < .05$, and for unpleasant non-pain words than for sex words, $p < .01$.

For total reading time, there was no main effect for group, a significant main effect for word type, $F(3,36) = 7.45, p = .001$ and no significant group X word type interaction (see Table 4). Pairwise comparisons using Bonferroni correction for multiple comparisons indicated that all women had longer total reading times for pain words than for sex words, $p < .01$, for pleasant non-sex words than for sex words, $p < .01$, and for unpleasant non-pain words than for sex words, $p = .001$.

For total number of fixations, there was no main effect for group, a significant main effect for word type, $F(3,36) = 5.26, p < .01$ and no significant group X word type interaction (see Table 5). Pairwise comparisons using Bonferroni correction for multiple comparisons indicated that all women had more fixations on pain words than on sex words, $p < .01$, and on unpleasant non-pain words than on sex words, $p < .01$. 

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There was thus no support for Hypothesis #1 as we found no group by word type interaction with any of the attention dependent measures. We also found no support for hypotheses #2 and 3 which had predicted that our stimulus words (pain and sex) would capture more attention than our control words (pleasant non-sex and unpleasant non-pain). Hypotheses #4 and 5, which predicted simple effects contingent on an interaction, were also disconfirmed as we did not find an interaction.

Memory

Means and standard deviations for total number of words recalled, total number of words recognized, total number of intrusions, and total number of false positives for each group and for the combined sample are shown in Table 6. Mixed design, 2 (Group) X 4 (Word Type) ANOVAs were conducted for each of the aforementioned dependent measures of memory.

For total recall across all recall trials (sum of trials 1 and 5 of the immediate recall task, the short and long delay tasks), there was no main effect for group, a significant main effect for word type, $F(3,36) = 13.80, p < .001$, and no significant group by word type interaction (see Table 7). Pairwise comparisons using Bonferroni correction for multiple comparisons indicated that all women had better recall of sex words than pain words, $p < .001$, pleasant non-sex words, $p < .001$, and unpleasant non-pain words, $p < .001$. Women also had better overall recall for pain words than for unpleasant non-pain words, $p = .01$.

For total number of words recognized, there were no significant main effects and no interaction (see Table 8).
For total number of intrusions across all recall trials (sum of intrusions for Trials 1, 5, short delay and long delay), there was no significant main effect for group, a significant main effect for word type, $F(3,36) = 6.28, p < .01$, and a significant group X word type interaction, $F(3,36) = 5.30, p < .01$ (see Table 9 and Figure 1). Although main effects are not usually analyzed when there is an interaction, our hypotheses relating to word type differences in the combined sample require this analysis. Pairwise comparisons of the word type main effect revealed that all women had more intrusions of pain words than pleasant non-sex words, $p = .001$, and unpleasant non-pain words, $p < .05$. The group X word type interaction was analyzed using simple main effects. There was a simple main effect for group such that the dyspareunia group had significantly more pain word intrusions than the control group, $p < .01$, while there were no group differences for intrusions of sex, pleasant non-sex, or unpleasant non-pain words. There was also a simple main effect for word type in the dyspareunia group, $F(3,57) = 7.49, p < .001$. Pairwise comparisons indicated that for women in the dyspareunia group, pain words were more often intrusions than were sex words, $p < .05$, pleasant non-sex words, $p < .01$, and unpleasant non-pain words, $p = .001$. There was also a simple main effect for word type in the control group, $F(3,57) = 3.03, p < .05$. Pairwise comparisons indicated that for women in the control group, sex words were more often intrusions than were pleasant non-sex words, $p < .05$.

For number of false positives, there was no main effect for group, a significant main effect for word type, $F(3,36) = 5.59, p < .01$, and a significant group X word type interaction, $F(3,36) = 2.72, p = .058$ (see Table 10 and Figure 2). Although main effects are not usually analyzed when there is an interaction, our hypotheses relating to word
type differences in the combined sample require this analysis. Pairwise comparisons of
the word type main effect revealed that all women had more false positives of pain words
than sex words, $p < .001$, pleasant non-sex words, $p < .01$, and unpleasant non-pain
words, $p < .01$. The group X word type interaction was analyzed using simple main
effects. There was a simple main effect for group such that the dyspareunia group had
significantly more pain word false positives than the control group, $p < .01$, while there
were no group differences in false positives for sex, pleasant non-sex, or unpleasant non-
pain words. There was also a simple main effect for word type in the dyspareunia group,
$F(3, 57) = 14.3, p < .001$. Pairwise comparisons indicated that in the dyspareunia group,
pain words were more often false positives than were sex words, $p < .001$, pleasant non-
sex words, $p = .001$, and unpleasant non-pain words, $p < .001$. There was no simple main
effect for word type in the control group.

We thus found partial support for Hypothesis #6 as we found a group by word
type interaction for intrusions and false positives although not for recall and recognition.
Hypothesis #7 was also partially supported in that we found more intrusions and false
positives of pain words compared to the control words for all women. We found partial
support for Hypothesis #8 in that all women had better recall for sex words as compared
to the control words. The prediction of Hypothesis #9 that women with dyspareunia
would exhibit better memory for pain words than control women was partially supported
by our findings of this difference for intrusions and false positives. Finally, we found no
support for Hypothesis #10 which had predicted that women with dyspareunia would
have better memory for sex words than would control women.
CHAPTER 6

DISCUSSION

The present research aimed to investigate whether the pain or the sexual interference of dyspareunia are differentially salient for women suffering from this condition, as indicated by specific tests of attention and memory. Using pain and sex related words as stimuli, this overarching question was tested using the cognitive methodologies of eye tracking to measure visual attention and memory testing to measure recall and recognition. Relevant dependent measures, for both attention and memory, were used to examine between-group as well as within-group differences based on word type. In the realm of attention, we failed to find significant results relating directly to our hypotheses. The findings for memory, on the other hand, provided some support for the study’s hypotheses, with the most interesting results being that 1) in comparison to sexually functional controls, women with dyspareunia evidenced more false memories for pain words, and; 2) in comparison to other word types, pain words were more often falsely remembered by women with dyspareunia. We will first discuss the significance of the memory findings, followed by an examination and speculation about our lack findings in relation to attention.

Our memory findings suggest that women with dyspareunia may be privileging pain stimuli more than women with no sexual dysfunction and that they may be privileging pain stimuli over sex and other stimuli to the extent that pain stimuli interfere
with recall and recognition. This was evident in our sample by the fact that the dyspareunia group had more memory distortions (intrusions and false positives) for pain words than the control group, and additionally, had more intrusions and false positives for pain words than for any other word type. The group and word type differences for intrusions and false positives point to the importance and salience of pain relevant information in women who experience pain during sexual intercourse.

This finding supports previous research demonstrating that women with dyspareunia cognitively process pain information differently than women without the condition (e.g. Payne et al., 2005; Pukall et al., 2002). It has been shown that they display a hypervigilance for pain relevant information. Payne and colleagues (2005) demonstrated that women vulvar vestibulitis syndrome (VVS) displayed greater Stroop test interference for pain words as compared with control women, and also reported experiencing more hypervigilance to pain during intercourse on a self-report measure. Pukall and colleagues (2002) also found that women who suffer from VVS report more catastrophizing in relation to pain experienced during intercourse as opposed to other recurrent pains. In concordance with these findings, our results weigh in on one side of the debate about how dyspareunia should be classified in the DSM. If pain relevant factors seem to be more salient for these women than sexual ones, this lends support to the assertion by Binik and colleagues (2005) that dyspareunia may be better conceptualized and categorized as a pain disorder than as a sexual dysfunction.

However, our findings raise an intriguing question. Why were there more pain intrusions and false positive for pain words and yet no such parallel results in our recall
and recognition data, as expected? The answer may lie in the fact that these measures relate to different aspects of memory.

The immediate free and short delay recall trials from the CVLT-II (and theoretically the SP-CVLT) measure basic memory and retention for words presented to the participant. Our findings for immediate and short delayed free recall show that all women had better recall for sex words than any other word type. These results parallel findings from previous research stating that material of a sexual nature tends to be more present in memory and more easily recalled (e.g., Geer & Manguno-Mire, 1996; Geer & McGlone, 1990). All words used in the SP-CVLT were high frequency words in the English language. Therefore, what we found was that the sexual words used for the SP-CVLT tended to be more memorable for all women perhaps due to their distinctiveness.

The saliency of pain words for women with dyspareunia did not emerge in basic recall but did appear when we looked at memory distortions. While measures of recall relate to how well an individual can learn things of a verbal nature (Delis et al., 2000), measures of memory distortions (i.e. intrusions and false positives) can be seen as errors in recall or verbal learning (Fisher & Sloutsky, 2004). According to the CVLT-II manual (Delis et al., 2000), intrusions are among the most important data analyzed on the test. Fisher and Sloutsky (2004) state that both intrusions and false positives can be seen as memory errors, or confabulations. People often distort memories in systematic and predictable ways and they often use prior knowledge in that they falsely recognize new information when it is consistent with their knowledge (Alba & Hasher, 1983).

Previous research on memory errors has demonstrated that systematic memory distortions are often found with word lists. Deese (1959) first demonstrated these
predictable memory distortions. He presented participants with word-lists (e.g., “bed”, “rest”, and “awake”) consisting of associates of a single non-presented word (e.g., “sleep”). He then asked participants to recall the words from the list, and they often incorrectly recalled words consistent with the overall theme of the list, which was never actually presented (Deese, 1959). Roediger and McDermott (1995) replicated Deese’s results, demonstrating that memory intrusions of non-presented words persist in recall as well as in recognition, thus giving the acronym of DRM (for Deese-Roediger-McDermott) to this phenomenon.

A major explanation for the DRM phenomenon is the activation-monitoring approach (Gallo & Roediger, 2002). According to this theory, when a participant is studying a word list, semantic associates to list words may be consciously or unconsciously activated through either elaborative processing of the list or spreading activation through a semantic memory network. The critical item is the highest semantic associate to the list words, and false memory for critical items results from their activation during encoding (Gallo & Roediger, 2002). According to Fisher and Sloutsky (2004), participants perceive both studied items, and semantically related critical lures, to be more familiar than unrelated distracters. Because familiarity strongly affects the decision criterion for accepting items as studied or “old”, those items that have elevated familiarity are more likely to be accepted both correctly and erroneously.

This was true of pain words for the dyspareunia women. They had more intrusions of pain words as compared to the control women, and more intrusions of pain words than sex or the control words. This is likely to have occurred as a function of the semantic priming and activation of the concept of pain. While this activation theoretically
occurred in all women when they were exposed to the pain words, additional activation of semantically related words occurred in women with dyspareunia. It seems reasonable to posit that the pain words had an elevated familiarity for these women due to their personal experience with chronic pain and they thus tended to falsely recall words related to pain that were either on the distracter list or not on either word list. This repeated activation through experience is likely to have contributed to women with dyspareunia developing stronger networks related to pain and that these networks were more likely to be activated in this context.

Additional support for this claim can be found in Winograd, Peluso and Glover's (1998) study of individual differences in susceptibility to memory illusions using the DRM paradigm. Using measures of individual differences in cognition and personality, they found that the tendency to intrude words in recall and to falsely recognize distractor words in a recognition memory test were significantly correlated with reports of dissociative experiences and vivid mental imagery (Winograd, Peluso & Glover, 1998). Perhaps the women with dyspareunia in our study had stronger mental imagery for words related to pain than any other type of word due to the distress associated with pain words.

Turning now to attention, a closer look at the lack of significant results obtained for the visual attention variables is warranted. The data did not support our hypotheses that women with dyspareunia would show longer total fixation durations, total reading times and more total number of fixations for pain words than sex words, while control women would show longer first fixation durations and total reading times for sex words than for pain words. While no interaction was found, we did see within group differences for word type for the three dependent variables measured. However, even these
differences failed to follow the pattern of results we expected (i.e., that both pain and sex words would be more attention grabbing than the two groups of control words). What we did find was that pain words seemed to capture the attention of all women more than sex words, and the control words were fixated on for longer than the sex words. This result clearly stands in sharp contrast to the voluminous existing data illustrating that material of a sexual nature tends to capture attention more than neutral material (e.g. Geer & Bellard, 1996; Geer & Melton, 1997; Spiering, Everaerd, & Elzinga, 2002). We can only conclude that our eye tracking paradigm was seriously flawed and that our failure to find these differences are attributable to methodological error.

One possible flaw in our paradigm concerns the placement of the words on the computer screen. It may be that the way the words were placed in the 4 x 4 matrix on the favored some words over others (see APPENDIX I). Words were placed in a pseudo-random manner in the matrix. Words were placed in the matrix so that there were not too many words from one category bunched together. The exception to this was the bottom line of the word matrix. One word from each category was placed on the bottom line so as not to favor any particular category in the event that a participant would not be able to finish reading all the words within the 10-second time limit. Despite this precaution, a re-examination of the placement of words in the matrix revealed some flaws in the design. Three of the four words related to sex (vagina, breast and aroused) were placed on the edges of the screen (in the first or fourth column). Tatler (2007) states that when observers view scenes presented on computer monitors, they tend to look more frequently to the middle of the screen than to the outer edges. Perhaps when participants had time to re-fixate on words, they tended to re-fixate more on words that were located centrally.
Three of the four pain words (ache, anguished, cut) were located in the central part of the screen. Furthermore, participants were instructed to simply read the words on the screen as they normally would and most participants proceeded to read the words from left to right, line by line. Most were able to finish reading all the words before the presentation terminated and thus had the chance to re-read some of the words. If the participants continued to use the same reading strategy, then they would have gone back to the first word and read across the top line. Considering that most participants did not have enough time to re-read all the words, perhaps they were able to re-fixate on the first 2-3 words but did not have the opportunity to re-fixate on the word “vagina”, thereby biasing the data against the sex words.

The placement of words dilemma also begs the question of whether our paradigm was more of a reading exercise or a scene viewing exercise. It appears that our word matrix stimulus was part a reading exercise and part a scene viewing exercise. Reading studies often use a moving window paradigm in which a participant is presented with a line of text in which a window moves along with the participant’s eyes (Henderson, 1992). While we know that eye tracking using scene perception has been effective at demonstrating differences in gazing patterns based on region of the picture (e.g. Lykins, Meana & Kambe, 2006), no study to date has used eye tracking to measure visual attention to discrete words and analyzed the looking patterns of participants based on category of word. It is possible that the word matrix paradigm we employed was not well suited to finding differences in visual attention for different categories of words.

Of additional note was the fact that we found significant differences between groups with regard to ethnicity. All six of our African American participants were in the
dyspareunia group. While we were not able to analyze our results by ethnicity due to our small sample size, this ethnic group difference is quite interesting. We do not yet have sound epidemiological estimates of dyspareunia by ethnicity, but it remains an area worthy of investigation as there may be both physiological and cultural correlates of ethnicity that may predispose women to this problem.

There are clear limitations to this study. The first concerns the methods used. As aforementioned, the eye tracking paradigm we used was the first of its kind and perhaps not well suited for our research question. We created a hybrid type of stimuli of sorts, in that we wanted our participants to read but did not provide them with sentences. The hybrid nature of our stimuli makes it difficult to compare to the existing literature on eye tracking, in that it is not completely a reading study and neither truly a scene perception study. The memory test we employed was also experimental in that we took an existing, validated memory test and changed the word lists. All efforts were taken to ensure that the words within each word type were matched according to frequency of usage in the English language, length and positive or negative valence. However, the CVLT-II does not examine recall, recognition, nor false memory by word type. While the CVLT-II does use 4 distinct word categories, scoring is not done as function of word types since there is no reason to believe that participants would have better recall for vegetables than for furniture. It is possible that the design of the CVLT-II is not optimally suited for analysis by word type, due to the very small number of words involved (i.e., only 4 words per word type).

Would we have found more pronounced and larger differences between word types if we had used a paradigm similar to that of Deese and Roediger and McDermott?
Perhaps using numerous word lists, each pertaining to a different category and each with its own critical lure, would speak better to the question of what is more prominent for women with dyspareunia, the pain or the sex aspects of the disorder. A study using word lists related to sexual intercourse, foreplay, romantic relationships, physical pain, and emotional pain might also highlight more finely potential differences in false memory for different types of sexual activity and pain.

A further limitation also relates to the structure of the SP-CVLT. The original CVLT-II used words in four discrete categories of concrete objects (animals, furniture, vegetables, and ways of traveling). The SP-CVLT used four categories of words that did not have concrete objects as their members. While these word groups were constructed in order to maximize similarity and cohesion within categories and minimize them between categories, we still ended up with words that arguably could have fit into more than one category. This most notably may have occurred for the pain words and the unpleasant non-pain control words. Words such as prison and bankrupt (two of the unpleasant non-pain control words) could have been interpreted to be ‘pain words’. The distinction between these two categories may have been blurred for some women.

A final limitation concerns our dyspareunia sample. The majority of women in our study evidenced only a moderate level of pain during sex ($M = 5.94/10$, $SD = 1.98$). While we do know that the women with dyspareunia had significantly worse sexual functioning than control women as evidenced by their total FSFI scores, the pain levels in this sample may not have been sufficiently high to instate the attention and memory effects we expected.
From a clinical standpoint, our study may have some valuable implications. If women with dyspareunia are prone to creating false memories of pain, then cognitive interventions may be particularly germane to the management of this pain condition/sexual dysfunction. Our results indicate that semantic networks for pain are differentially developed in women with dyspareunia and that these networks may work to create a hypervigilance for pain cues, a catastrophization of pain, and an exacerbation of the pain experience. Educating women about this internal bias may be useful as awareness has sometimes been shown to be an effective intervention all on its own. Furthermore, challenging the magnification effect of this pain network could be accomplished by creating new semantic networks for these women through 1) the behavioral activation of pleasant sexual experiences through activities other than penetration and 2) the practicing of new meanings for pain experiences (e.g., this is uncomfortable but it does not mean that something terrible is going to happen). Sensate focus exercises are one such intervention that can impact semantic networks related to pain. Challenging cognitive distortions about pain can be another.

Future studies on visual attention and memory may be well served by more traditional reading studies using eye-tracking methodology, as well as by testing memory for sexual and pain details from narratives that include these components. Perhaps having women read descriptions of sexual activity, some with pain and some without would demonstrate some of the effects we had hypothesized, both for visual attention and memory. It may also be interesting for future research to investigate in more detail how pain and sex relevant information is processed by these women, without necessarily pitting one against the other. Using fMRI, it would be particularly interesting to see what
regions of the brain are activated when reading different kinds of words. Do words related to pain activate the basolateral amygdala, a region associated with fear conditioning (Vazdarjanova, 2002)? Would words related to sex activate pleasure centers differentially in women with and without dyspareunia?

Addressing the question of what aspect of dyspareunia is more salient for women who suffer from the disorder is important from a theoretical as well as a clinical standpoint. A debate continues to rage in the literature about how to best describe, categorize, and treat this extremely complex and multifaceted disorder. Using lower level cognitive processes of visual attention and basic memory, this study attempted to inform this debate. Our findings hint at the salience of pain over sex for women in this disorder. This supports the decade long research push to refocus our efforts on the pain of women with dyspareunia in addition to its interference with their sexual and relationship lives. More importantly, it provides further guidance in the development of interventions that can help women with a distressing problem.
REFERENCES


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APPENDIX I

EYE TRACKING WORDS

<table>
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<tr>
<th>Friendly</th>
<th>Ache</th>
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<tr>
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<td>Anguished</td>
<td>Poverty</td>
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<td>Blond</td>
<td>Crime</td>
<td>Cut</td>
<td>Aroused</td>
</tr>
<tr>
<td>Pinch</td>
<td>Pleasure</td>
<td>Laughter</td>
<td>Crisis</td>
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</tbody>
</table>
APPENDIX II

FSFI

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.

Have you ever had sexual intercourse?

□ YES  □ NO

How often do you engage in sexual activity (i.e. intercourse or other sexual activities) per month?

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 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) or 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 the 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 following vaginal penetration?
□ Did not attempt intercourse
□ Very high
□ High
□ Moderate
□ Low
□ Very low or none at all
APPENDIX III

BSQ

We should like to know how you have been feeling about your appearance over the PAST FOUR WEEKS. Please read each question and circle the appropriate number to the right. Please answer all the questions.

| Never | | Rarely | | Sometimes | | Often | | Very often | | Always |
|-------|---|--------|---|-----------|---|---------|---|-----------|---|

1. Has feeling bored made you brood about your shape? 1 2 3 4 5 6
2. Have you been so worried about your shape that you have been feeling you ought to diet? 1 2 3 4 5 6
3. Have you thought that your thighs, hips or bottom are too large for the rest of you? 1 2 3 4 5 6
4. Have you been afraid that you might become fat (or fatter)? 1 2 3 4 5 6
5. Have you worried about your flesh being not firm enough? 1 2 3 4 5 6
6. Has feeling full (e.g. after eating a large meal) made you feel fat? 1 2 3 4 5 6
7. Have you felt so bad about your shape that you have cried? 1 2 3 4 5 6
8. Have you avoided running because your flesh might wobble? 1 2 3 4 5 6
9. Has being with thin women made you feel self-conscious about your shape? 1 2 3 4 5 6
10. Have you worried about your thighs spreading out when sitting down? 1 2 3 4 5 6
11. Has eating even a small amount of food made you feel fat? 1 2 3 4 5 6
12. Have you noticed the shape of other women and felt that your own shape compared unfavourably? 1 2 3 4 5 6
13. Has thinking about your shape interfered with your ability to concentrate (e.g. while watching television, reading, listening to conversations)? 1 2 3 4 5 6
14. Has being naked, such as when taking a bath, made you feel fat? 1 2 3 4 5 6
15. Have you avoided wearing clothes which make you particularly aware of the shape of your body? 1 2 3 4 5 6
16. Have you imagined cutting off fleshy areas of your body? 1 2 3 4 5 6
17. Has eating sweets, cakes, or other high calorie food made you feel fat? 1 2 3 4 5 6
18. Have you not gone out to social occasions (e.g. parties) because you have felt bad about your shape? 1 2 3 4 5 6
19. Have you felt excessively large and rounded? 1 2 3 4 5 6
20. Have you felt ashamed of your body? 1 2 3 4 5 6
21. Has worry about your shape made you diet? 1 2 3 4 5 6
22. Have you felt happiest about your shape when your stomach has been empty (e.g. in the morning)? 1 2 3 4 5 6
23. Have you thought that you are in the shape you are because you lack self-control? 1 2 3 4 5 6
24. Have you worried about other people seeing rolls of fat around your waist or stomach? 1 2 3 4 5 6
25. Have you felt that it is not fair that other women are thinner than you? 1 2 3 4 5 6
26. Have you vomited in order to feel thinner? 1 2 3 4 5 6
27. When in company have your worried about taking up too much room (e.g. sitting on a sofa, or a bus seat)? 1 2 3 4 5 6
28. Have you worried about your flesh being dimply? 1 2 3 4 5 6
29. Has seeing your reflection (e.g. in a mirror or shop window) made you feel bad about your shape? 1 2 3 4 5 6
30. Have you pinched areas of your body to see how much fat there is? 1 2 3 4 5 6
32. Have you taken laxatives in order to feel thinner? 1 2 3 4 5 6
33. Have you been particularly self-conscious about your shape when in the company of other people? 1 2 3 4 5 6
34. Has worry about your shape made you feel you ought to exercise? 1 2 3 4 5 6
APPENDIX IV

RECOGNITION WORD LIST

1. milk
2. prison
3. jewel
4. dagger
5. circus
6. sex
7. garbage
8. orgasm
9. agony
10. clock
11. devil
12. nipple
13. reunion
14. alert
15. diver
16. evil
17. naked
18. burn
19. distressed
20. headache
21. lake
22. bees
23. sexy
24. debt
25. joy
26. hurt
27. pizza
28. kiss
29. bouquet
30. bankrupt
31. dreadful
32. stinging
33. caress
34. book
35. demon
36. adventure
37. pain
38. discomfort
39. intercourse
40. happy
41. sugar
42. festive
43. prison
44. ecstasy
45. vest
46. hopeful
47. sexual
48. maggot
APPENDIX V

QUESTIONNAIRE

1. Age ____________

2. Gender M F

3. What is your ethnicity?
   □ African-American □ Caucasian □ Native-American □ Other
   □ Asian □ Hispanic □ Pacific Islander

4. What is your religious affiliation?
   □ Catholic □ Jewish □ Muslim □ Other _____________
   □ Christian □ Mormon □ None

5. Are you left or right handed? L R

6. What is your sexual orientation (optional)?
   □ Heterosexual/straight
   □ Homosexual/gay
   □ Bisexual

7. How often do you engage in sexual intercourse (per month)? ______

8. Do you experience pain during sexual intercourse? Y N (If no, please skip to question #12).

9. How long have you had this pain? (years) ______________
10. How often do you experience pain during sexual intercourse?

1. Less than 50% of the time you engage in sexual intercourse
2. About 50% of the time you engage in sexual intercourse
3. More than 50% of the time you engage in sexual intercourse
4. Almost every time, or every time you engage in sexual intercourse

11. On a scale from 1-10 (1 being no pain and 10 being the worst pain you can imagine), on average, how intense is the pain that you experience during sexual intercourse?

1  2  3  4  5  6  7  8  9  10

12. Do you suffer from any chronic pain condition other than pain during intercourse?

Y  N  (If no, then finish here).

13. If yes, what kind of pain? ________________________________

a. How often do you experience this pain? (per week) ____________________

b. On a scale from 1-10 (1 being no pain and 10 being the worst pain you can imagine), on average, how intense is this pain that you experience?

1  2  3  4  5  6  7  8  9  10
Table 1

Demographic Characteristics of Sample (N = 40)

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<td>30</td>
<td>9</td>
<td>45</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jewish</td>
<td>1</td>
<td>5</td>
<td>2</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>3</td>
<td>15</td>
<td>6</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>15</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 2

Means and Standard Deviations: Total Fixation Duration, Total Reading Time and Total Number of Fixations as a Function of Group and Word Type

<table>
<thead>
<tr>
<th>Word Type</th>
<th>Dyspareunia Group</th>
<th>Control Group</th>
<th>Combined Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Fixation Duration (ms)</td>
<td>Total Reading Time (ms)</td>
<td>Number of Fixations</td>
</tr>
<tr>
<td>Pain</td>
<td>2.06 ± 1.02</td>
<td>2.66 ± 1.02</td>
<td>5.55 ± 2.65</td>
</tr>
<tr>
<td>Sex</td>
<td>1.59 ± .79</td>
<td>1.95 ± .90</td>
<td>4.15 ± 1.79</td>
</tr>
<tr>
<td>Pleasant non-sex</td>
<td>1.79 ± .81</td>
<td>2.35 ± .88</td>
<td>5.00 ± 2.08</td>
</tr>
<tr>
<td>Unpleasant non-pain</td>
<td>2.32 ± 1.39</td>
<td>2.83 ± 1.49</td>
<td>5.80 ± 3.09</td>
</tr>
</tbody>
</table>

Note: Means sharing superscript differ significantly from each other for relevant analyses.
Table 3

Summary of Repeated Measures Analysis of Variance on Total Fixation Duration as a Function of Group and Word Type

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>F</th>
<th>( \eta^2 )</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>1</td>
<td>.27</td>
<td>.01</td>
<td>.61</td>
</tr>
<tr>
<td>Word Type</td>
<td>3</td>
<td>4.70</td>
<td>.28</td>
<td>.007</td>
</tr>
<tr>
<td>Group X Word Type</td>
<td>3</td>
<td>.23</td>
<td>.02</td>
<td>.87</td>
</tr>
<tr>
<td>Residual</td>
<td>36</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 4

Summary of Repeated Measures Analysis of Variance on Total Reading Time as a Function of Group and Word Type

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>F</th>
<th>η²</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>1</td>
<td>.60</td>
<td>.02</td>
<td>.44</td>
</tr>
<tr>
<td>Word Type</td>
<td>3</td>
<td>7.45</td>
<td>.38</td>
<td>.001</td>
</tr>
<tr>
<td>Group X Word Type</td>
<td>3</td>
<td>.74</td>
<td>.06</td>
<td>.54</td>
</tr>
<tr>
<td>Residual</td>
<td>36</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 5

Summary of Repeated Measures Analysis of Variance on Total Number of Fixations as a Function of Group and Word Type

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>F</th>
<th>$\eta^2$</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>1</td>
<td>.98</td>
<td>.03</td>
<td>.33</td>
</tr>
<tr>
<td>Word Type</td>
<td>3</td>
<td>5.26</td>
<td>.31</td>
<td>.004</td>
</tr>
<tr>
<td>Group X Word Type</td>
<td>3</td>
<td>.22</td>
<td>.02</td>
<td>.88</td>
</tr>
<tr>
<td>Residual</td>
<td>36</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 6

Means and Standard Deviations: Recall, Intrusions, Recognition, and False Positives as a Function of Group and Word Type

<table>
<thead>
<tr>
<th>Word Type</th>
<th>Dyspareunia Group</th>
<th>Control Group</th>
<th>Combined Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Recall</td>
<td>Intrusions</td>
<td>Recognition</td>
</tr>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
<td>$M$</td>
</tr>
<tr>
<td>Pain</td>
<td>9.40</td>
<td>1.88</td>
<td>1.69</td>
</tr>
<tr>
<td>Sex</td>
<td>11.55</td>
<td>2.62</td>
<td>.30</td>
</tr>
<tr>
<td>Pleasant non-sex</td>
<td>9.20</td>
<td>2.28</td>
<td>.25</td>
</tr>
<tr>
<td>Unpleasant non-pain</td>
<td>8.15</td>
<td>2.83</td>
<td>.40</td>
</tr>
</tbody>
</table>

Note: Means sharing superscript differ significantly from each other for relevant analyses.
Table 7

Summary of Repeated Measures Analysis of Variance on Total Words Recalled as a Function of Group and Word Type

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>F</th>
<th>$\eta^2$</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>1</td>
<td>.09</td>
<td>.00</td>
<td>.77</td>
</tr>
<tr>
<td>Word Type</td>
<td>3</td>
<td>13.80</td>
<td>.54</td>
<td>.001</td>
</tr>
<tr>
<td>Group X Word Type</td>
<td>3</td>
<td>.14</td>
<td>.01</td>
<td>.94</td>
</tr>
<tr>
<td>Residual</td>
<td>36</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 8

Summary of Repeated Measures Analysis of Variance on Total Words Recognized as a Function of Group and Word Type

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>F</th>
<th>η²</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>1</td>
<td>.33</td>
<td>.01</td>
<td>.57</td>
</tr>
<tr>
<td>Word Type</td>
<td>3</td>
<td>1.59</td>
<td>.12</td>
<td>.21</td>
</tr>
<tr>
<td>Group X Word Type</td>
<td>3</td>
<td>1.08</td>
<td>.08</td>
<td>.37</td>
</tr>
<tr>
<td>Residual</td>
<td>36</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 9

Summary of Repeated Measures Analysis of Variance on Total Number of Intrusions as a Function of Group and Word Type

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>F</th>
<th>$\eta^2$</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>1</td>
<td>2.33</td>
<td>.06</td>
<td>.14</td>
</tr>
<tr>
<td>Word Type</td>
<td>3</td>
<td>6.28</td>
<td>.34</td>
<td>.002</td>
</tr>
<tr>
<td>Group X Word Type</td>
<td>3</td>
<td>5.30</td>
<td>.31</td>
<td>.004</td>
</tr>
<tr>
<td>Residual</td>
<td>36</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 10

Summary of Repeated Measures Analysis of Variance on Total Number of False Positives as a Function of Group and Word Type

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>F</th>
<th>$\eta^2$</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>1</td>
<td>.96</td>
<td>.03</td>
<td>.33</td>
</tr>
<tr>
<td>Word Type</td>
<td>3</td>
<td>5.59</td>
<td>.32</td>
<td>.003</td>
</tr>
<tr>
<td>Group X Word Type</td>
<td>3</td>
<td>2.73</td>
<td>.19</td>
<td>.06</td>
</tr>
<tr>
<td>Residual</td>
<td>36</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Figure 1

Mean Number of Intrusions Across all Recall Trials as a Function of Word Type and Group
Figure 2

Mean Number of False Positives as a Function of Word Type and Group

![Graph showing mean number of false positives for different word types and groups]
VITA

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