Dyspareunia in women : a painful affair : the role of fear of pain and sexual arousal

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C H A P T E R 7

General discussion

According to the prevailing cognitive-behavioral model of dyspareunia, fear of pain and diminished sexual arousal are key components in the onset and maintenance of this poorly understood condition (Spano & Lamont, 1975). The present thesis was designed to gain more insight into the role of these factors in dyspareunia. For that purpose, a multi-method research project was initiated, consisting of four experimental studies and one observational study, in which women with superficial dyspareunia were compared to women without sexual complaints. In this concluding chapter the main outcomes of the studies will be summarized and recapitulated in terms of the main research question. Next, the findings will be discussed in relation to theory and other relevant findings in this field. After considering the limitations of the studies, implications of our conclusions for future research as well as for the treatment of dyspareunia will be presented.

SUMMARY OF THE STUDIES

Psychophysiological research

The experimental study described in Chapter 2 focused on the question whether women with dyspareunia are characterized by a generally impaired genital responsiveness or that they exhibit a conditioned fear response to stimuli that may induce fear of pain (i.e., coitus). To address this issue, participants were exposed to both a non-coital and a coital sex film fragment. While viewing these fragments, participants' genital arousal levels and subjective reports were assessed. In apparent contrast to Wouda et al.'s (1998) finding of diminished genital arousal in symptomatic women while viewing a coitus scene, we observed that the dyspareunia group reacted with comparable levels of genital arousal to both the non-coital and coital sex film fragments as control women. As such, these data did not confirm Spano & Lamont's hypothesis (1975) that fear of pain would lead to diminished sexual response. Although the dyspareunia group reported, as predicted, less positive affect in response to both erotic stimuli than the control group, they unexpectedly did not differ from the control group in the level of reported anxiety nor other negative emotions to exposure to the coitus stimulus. We considered this latter finding as support for our suggestion that the coitus clip was not a true aversive stimulus for the dyspareunia group because it did not incorporate any direct associ-

ations with pain, and therefore, no reduction in genital response to the coitus clip had occurred.

Elaborating on this study, the purpose of the second study (Chapter 3) was to induce fear of pain in more ecologically valid circumstances. Threatening with painful stimuli during exposure to a sexual stimulus was considered an effective operationalization of pain-related fear. Participants were told that they had a 60% chance of receiving painful stimuli (i.e., electrical stimulation on the ankle) while being exposed to one of two erotic film clips. While viewing these fragments, participants' genital arousal levels and subjective reports were assessed. Skin conductance levels and ratings of experienced threat, which were assessed as a manipulation check, were significantly elevated in both groups of women when threatened. These findings assured us that pain-related fear was adequately elicited. In line with predictions, pain-related fear inhibited genital arousal in both women with and without dyspareunia. However, the dyspareunia group, unexpectedly, did not display a stronger reduction in genital arousal when threatened than the control group. Instead, they showed similar genital responsiveness during both the threatening as well as the non-threatening condition as controls. As hypothesized, pain-related fear impeded ratings of positive affect, whereas it amplified negative affect in both groups of women. In addition, the dyspareunia group did report, as expected, overall more negative affect than the control group. The outcomes of this study provided direct evidence for Spano & Lamont's (1975) hypothesis that fear reduces sexual arousal.

In the third psychophysiological study (Chapter 4), the appraisal of a sexual stimulus was manipulated by providing discrepant information regarding that stimulus prior to viewing it, with either a focus on genital pain or sexual enjoyment. A neutral instruction served as a control condition. The experimental manipulation appeared to evoke the intended patterns of genital arousal levels. That is, women who received negative information concerning the erotic film fragment (focus on genital pain) prior to viewing it tended to respond with lower levels of genital arousal as compared to women who received positive information about the fragment (focus on sexual enjoyment). However, this finding was only marginally significant. Again, as in Chapter 2 and 3, symptomatic women did not differ from controls in genital responsiveness. The experimental manipulation also had the intended impact on ratings of negative affect such that women who received the genital pain instruction

reported significantly more negative affect relative to women who received the sexual enjoyment instruction. Particularly in controls the instructions had the hypothesized effects with highest ratings of positive affect in the sexual enjoyment instruction condition relative to the other two conditions. The dyspareunia group reported only significantly less positive affect in response to the sexual stimulus than controls in the sexual enjoyment instruction condition, but reported, as expected, albeit marginally significantly, more negative affect in all instruction conditions. We concluded that the findings of this study provided evidence for the modulatory effects of appraisal of sexual stimuli on subsequent genital responding and affect in both women with and without sexual complaints.

All three studies clearly demonstrated that women with dyspareunia did not differ from sexually functional women in genital responsiveness while being exposed to various kinds of visual sexual stimuli, however, they consistently reported to have experienced less positive affect and/or more negative affect than women without sexual complaints.

Indirect measure

Chapter 5 focused on a study that tested the hypothesis that automatic fear-related associations with sexual stimuli are involved in superficial dyspareunia. To assess automatic affective sex-related associations, we used the Affective Simon Task (AST) (De Houwer & Eelen, 1998), a reaction time paradigm designed to capture the unintentional influence of the affective value of a stimulus on task performance. In this paradigm, participants are instructed to choose as fast as possible between a positive and a negative response on the basis of a non-affective stimulus feature meanwhile ignoring the valence of the presented stimuli. With respect to the sex-AST, participants were instructed to respond as fast as possible by verbalizing either "positive" or "negative" to sex stimuli, depending on whether they were presented in a landscape format or a portrait format. Reaction times (RT) are typically shorter when the valence of the required response matches with the valence of the stimulus, thereby revealing indirectly the valence of the stimulus for the participant (De Houwer & Eelen; 1998; De Houwer, Crombez, Baeyens, & Hermans, 2001).

Contrary to our expectations, for both symptomatic and control women, responses were faster when the required response was "positive" than when the required

response was "negative". These findings indicate that there is no strong evidence that women with dyspareunia are characterized by especially negative automatic affective associations with sexual stimuli. The strength of the positive automatic associations was similar for stimuli depicting heterosexual acts without any form of penetration, and stimuli depicting explicit vaginal penetration. However, with respect to self-reported ratings of the sexual stimuli, the dyspareunia group was, as hypothesized, characterized by both weaker positive (i.e., arousal and desire) and stronger negative (i.e., fear and aversion) associations with sexual stimuli. We concluded that the discordance between automatic and deliberate sex-related associations in women with dyspareunia points to the relevance of conscious appraisal and deliberate rather than automatic processes in the onset and maintenance of dyspareunia.

Self-report measures

In Chapter 6, an observational study was documented, in which variables related to sexuality (sexual functioning, sexual distress, sexual attitudes, and affect experienced during women's latest sexual encounter), chronic pain (pain catastrophizing, pain intensity), psychopathology (depression, anxiety, and somatisation), and relational well-being were assessed by means of validated self-report questionnaires. Although women with dyspareunia differed from complaint-free controls on all variables in the expected directions, sexuality related measures (i.e., sexual function, sexual distress, and negative and positive affect as experienced during women's latest sexual encounter) contributed most significantly to the prediction of group membership. Furthermore, dyspareunia subgroups based on the presence or absence of a concomitant diagnosis of vulvar vestibulitis syndrome (VVS) were only distinguishable on pain intensity but did not differ on cognitive-affective variables related to sexuality, pain, and well-being. Our finding that sexuality related measures were the most important variables that discriminated between women with dyspareunia and controls emphasizes the relevance of psychosexual factors in dyspareunia.

RECAPITULATION

When evaluating the results of the present thesis in the light of the main research question *-are fear of pain and diminished sexual arousal key components in dyspareunia?-* the following answers can be generated: First, fear of pain (Chapter 3) and anticipation to pain (Chapter 4) indeed inhibit genital and subjective sexual arousal responses. Second, since both women with and without dyspareunia reacted with a similar decline in genital arousal in reaction to the experimental manipulations, these data point to a general mechanism in women to respond with diminished genital arousal when they experience fear of pain or anticipate on pain within a sexual context, rather than a response that is typical for women with dyspareunia. Furthermore, taking into consideration that there were also no differences in genital responding between both groups of women during non-manipulated conditions (Chapter 2, and the control conditions in Chapter 3 and 4), we can not infer from these results that the potential to become genitally aroused to explicit sexual stimuli is impaired in dyspareunia. It is possible, however, that differences in genital arousal would become apparent in the naturalistic situation at home, with symptomatic women responding with insufficient genital arousal during a sexual encounter because of the expectation and/or fear of pain, and women without sexual complaints responding with adequate genital arousal because they are not bothered by fearful thoughts. Our third answer is that, despite the undecided role of genital arousal in dyspareunia, the current results (Chapter 2, 3, 4, 5, and 6) convincingly evidenced that the subjective component of sexual arousal is implicated in women with dyspareunia.

DISCUSSION

In this section the main empirical findings will be evaluated along the line of the theoretical frameworks that were chosen to guide the present thesis, particularly the prevailing cognitive-behavioural model of dyspareunia by Spano & Lamont (1975).

The negative impact of the pain-related fear manipulation on genital arousal and affect (Chapter 3) provided direct evidence for Spano & Lamont's (1975) model, and also bears striking resemblance with Barlow's model of sexual arousal (1986) and

the information processing model of sexual arousal (Janssen et al., 2000), in the sense that all three models assume that fear is critically involved in inhibited sexual arousal responses. Our findings are in line with another recent study that induced pain threat in women with VVS (Payne, Binik, Pukall, Thaler, Amsel, & Khalifé, 2007) and with other experimental studies in women that induced fear simultaneously with the exposure to an erotic stimulus (Beggs, Calhoun, & Wolchik, 1987; Both, Everaerd, & Laan, 2003; Laan, Everaerd, & Evers, 1995).

Additional support has been obtained for the information processing model of sexual arousal (Janssen, Everaerd, Spiering, & Janssen, 2000) given that appraisal of a sexual stimulus has been found to influence genital and subjective arousal (Chapter 4). These results corroborate the modulatory effects of appraisal on physiological responses to other emotional stimuli (see e.g., Ochsner & Gross, 2005).

The combined findings of Chapter 3 and 4 indicate that the way in which women evaluate or anticipate a sexual situation (e.g., negative expectations of suffering from pain during intercourse) influences genital responsiveness and subjective experience of sexual arousal, irrespective of women's sexual function status. How is this decline in genital responding due to pain-related fear (Chapter 3) and negative appraisal (Chapter 4) to be understood? In terms of Barlow's model (Barlow, 1986; Sbrocco & Barlow, 1996), it is thought that fear and negative, worry-related expectations demand attention at the expense of sexually arousing cues. This cognitive distraction from erotic cues is assumed to subsequently impede sexual arousal. Support for this assumption stems from two laboratory studies demonstrating that cognitive distraction reduces both genital and subjective arousal to erotic stimuli in sexually functional and dysfunctional women (Elliott & O'Donohue, 1997; Salemink and van Lankveld, 2006).

All three psychophysiological studies (Chapter 2, 3, and 4) clearly demonstrated that women with dyspareunia did not differ from sexually functional women in genital responsiveness while being exposed to various kinds of visual sexual stimuli, in both experimental and control conditions. The absence of different genital arousal responses between women with and without dyspareunia concurs with other laboratory research showing that, as opposed to controls, women with dyspareunia (Payne et al., 2007) and also women with sexual arousal dysfunction (e.g., Brotto, Basson, & Gorzalka, 2004; Laan, van Driel, & van Lunsen, in press; Meston &

Gorzalka, 1996; Morokoff & Heiman, 1980; Salemink & van Lankveld, 2006) were equally genitally responsive in reaction to explicit visual sexual stimuli. Therefore, we conclude that women with dyspareunia are able to become genitally sexually aroused to a similar degree as women without sexual complaints. Stated differently, there is no such thing as lack of responsiveness of the sexual system in women with dyspareunia as long as they are exposed to explicit visual sexual stimuli.

Rather than genital responsiveness, subjective arousal is implicated in dyspareunia. Paralleling psychophysiological research in women with dyspareunia (Payne et al., 2007) and other female sexual dysfunction groups (e.g., Laan et al., in press; Meston, 2006; Morokoff and Heiman, 1980), dyspareunia populations consistently reported less positive affect and/or more negative affect while being exposed to explicit erotic film fragments and photos in a laboratory context (Chapter 2, 3, 4, 5) as compared to controls. These laboratory findings extend to the home situation (Chapter 6) (e.g., Nunns & Mandal, 1997; van Lankveld, Weijenborg, & ter Kuile, 1996). Taken together, our results are in favour of recent reconceptualizations of sexual problems in women, which emphasize the relevance of subjective sexual arousal problems (Basson et al., 2003; Everaerd, Laan, Both, & van der Velde, 2000; Laan, Everaerd, & Both, 2005).

A negative meaning of sexual stimuli in symptomatic women was found to be restricted to a conscious level. In other words, there are no indications that fear-related automatic (in the sense of fast and non-intentional) affective sex-related associations are implicated in dyspareunia (Chapter 5). These findings are in conflict with the information processing model of sexual arousal (Janssen et al., 2000), which posits that in sexually dysfunctional individuals a threat processing template is automatically activated in specific, personally relevant, sexual situations. Our observation that sex-related associations at an automatic level tended to be positive in symptomatic women, was explained in terms of prevailing emotion theories (e.g., Lang, Bradley, & Cuthbert, 1990; Ohman, 1993), stating that species survival requires that emotionally significant stimuli are detected by automatic processing mechanisms, which immediately activate physiological responses. In the case of stimuli that promote survival, such as sexual stimuli, approach responses are primed (e.g., vaginal vasocongestion). Deliberate sex-related associations, in contrast, are assumed to be under control of higher-level conscious cognitive processing, and

may be partially determined by sexually rewarding or unrewarding experiences in the past (Janssen et al., 2000; Everaerd, Both, & Laan, 2006; Spiering, Everaerd, & Laan, 2004; van der Velde, & Everaerd, 2001).

Replicating many other psychophysiological studies in women, there were low correlations between genital arousal and subjective reports (Chapter 2, 3, and 4). Apparently, women seem not to attend to genital sexual responses when assessing their subjective feeling of sexual arousal, but instead, to their conscious appraisal of erotic stimuli (cf. Laan & Janssen, 2007).

In harmony with previous research in women with dyspareunia, the study reported in Chapter 6 revealed that symptomatic women (either with or without a concomitant diagnosis of VVS) reported significantly higher levels of catastrophizing to pain in general, depression, state and trait anxiety, and marginally significant higher levels of somatisation than controls (e.g., Danielsson, Eisemann, Sjöberg, & Wikman, 2001; Gates & Galask, 2001; Granot, 2005; Granot & Lavee, 2005; Granot, Friedman, Yarnitsky, & Zimmer, 2002; Meana, Binik, Khalifé, & Cohen, 1997; Nunns & Mandal, 1997; Nylanderlundqvist & Bergdahl, 2003; Payne, Binik, Amsel, & Khalifé, 2005; Pukall, Binik, Khalifé, Amsel, & Abbott, 2002; van Lankveld et al., 1996; Wylie, Hallom-Jones, & Harrington 2004). Sensory testing on the ankle (Chapter 3) indicated that only women with dyspareunia with VVS demonstrated enhanced sensitivity to pain (e.g., Granot, 2005; Granot & Lavee, 2005; Granot et al., 2002; Payne et al., 2005; Pukall et al., 2002). All above variables have also been identified as important factors in several other medically unexplained chronic pain conditions such as low back pain, headache, and fibromyalgia (e.g., Leeuw, Goossens, Linton, Crombez, Boersma, & Vlaeyen, 2007; Okifuji, Turk, & Marcus, 1999; Vlaeyen & Linton, 2000). The resemblance between women with dyspareunia and chronic pain sufferers was one of the reasons, for some researchers, to argue that dyspareunia should be reconceptualized as a pain disorder instead of a sexual dysfunction (e.g., Binik, 2005). However, as we found that only sexuality-related measures significantly predicted group membership (dyspareunia/control) whereas measures related to pain, and individual and relational well-being did not, we feel that it is necessary to stress how important psychosexual aspects are in dyspareunia, and that dyspareunia should not be solely regarded as a pain disorder.

In conclusion, the studies in the present thesis were the first to experimentally

investigate the role of fear of pain and diminished sexual response in women with dyspareunia. Our results add to the limited evidence for the prevailing model of dyspareunia (Spano and Lamont, 1975), and to increasing evidence for general models on sexual arousal (Barlow, 1986; Janssen et al., 2000). Our findings definitely encourage further examination of the interplay between the components that constitute Spano & Lamont's model in order to enhance our understanding of how these components play a role in the onset and maintenance of superficial dyspareunia.

LIMITATIONS

The studies presented in this thesis have a number of limitations, of which some have already been discussed in the discussion sections of the respective chapters. The most important ones will be dealt with below.

Ecological validity

Considering the observation that women with dyspareunia were able to achieve genital arousal responses as high as controls in both experimental and control conditions (Chapter 2, 3, and 4), a critical question that arises is whether the laboratory situation has targeted the specific domain of fears present in women with dyspareunia. Apart from pain (threat), perhaps other stimuli (e.g., actual engagement in coitus with the partner, performance demand related concerns), present at home but absent in the laboratory, tap into the specific fear that symptomatic women may have, which, as such, would lead to impaired genital responding in private sexual encounters.

Another threat to the ecological validity is related to the kind of sexual stimuli (i.e., erotic films depicting explicit sexual activity) that were used to induce sexual arousal in the laboratory. Specifically, we presume that these stimuli were much stronger than the sexual stimuli that are available in the home situation, at least for women with dyspareunia. Explicit erotic film fragments are found to be superior in eliciting genital arousal as compared to other stimulus materials (e.g., pictures, fantasies, narratives and scripts) , and almost immediately induce enhancements in genital arousal, as such reflecting a highly automatized response mechanism (e.g., Laan & Everaerd,

1995; Chivers & Bailey, 2005). The use of such strongly genital arousal eliciting film fragments thus might have overridden the possible differential effects of the experimental manipulations on genital arousal levels (Chapter 2, 3 and 4) in the two groups of women. The overriding effects of erotic film stimuli on experimental manipulations has been evidenced by previous studies into sexual arousal in sexually functional women (e.g., Laan, Everaerd, van Aanhold, & Rebel, 1993; Laan, Everaerd, van Bellen, & Hanewald, 1994; Laan, Everaerd, van Berlo, & Rijs, 1995). For instance, when an erotic fantasy condition was compared to an erotic film condition in a study investigating the effects of performance demand on sexual arousal (Laan et al., 1993), the effects of the manipulation only became visible in the erotic fantasy condition. Hence, it is recommended to use less intense sexual stimuli, such as self-generated erotic fantasies or sexual scripts, in order to study the differential impact of experimental manipulations on genital arousal in women with versus without dyspareunia.

External validity

The dyspareunia and control samples consisted mainly of volunteers who self-selected to participate on basis of advertisements or media attention. Given that participants in sex research have been found to hold more liberal sexual attitudes, experience less sex guilt, evaluate explicit sexual stimulus materials more positively, and are more sexually active than nonparticipants (e.g., Catania, Gibson, Chitwood, & Coates, 1990; Wolchik, Braver, & Jensen, 1985), it is conceivable that volunteer bias, in both the dyspareunia and the control population, has threatened the external validity of the results. Although comparisons between our dyspareunia samples and a sample of dyspareunia patients visiting the outpatient clinic for sexology of the Leiden University Medical Center consistently revealed that both samples were similar with respect to demographic variables and sexual dysfunction, it is still possible that both samples differed on other characteristics. Potentially, severely distressed symptomatic women experiencing high levels of fear (of pain) may have failed to respond to advertisements for psychophysiological studies on sexual arousal responses. As a consequence, the participants sample may have been constituted of a less severely impaired group than a patient sample. It is unclear whether different research outcomes would have been obtained with a more severe sample of

symptomatic women.

Furthermore, it is also noteworthy that a considerable part of women participated in several studies presented in this thesis. More specifically, two psychophysiological studies (Chapter 2 and 4) reported on data obtained from the same study sample, and the observational study (Chapter 6) reported on data obtained from women who participated in the psychophysiological studies (Chapter 2, 3, and 4). This suggests that we may have relied on a selective group of women with dyspareunia. However, the majority of the study samples (approximately two-third) in both the psychophysiological study described in Chapter 3 and the study on automatic affective sex-related associations (Chapter 5) consisted of newly recruited women. When, for the purpose of the present discussion, analyses for each study were repeated for exclusively new participants, the same pattern of results was found for the study in Chapter 3. With respect to the study in Chapter 5, similar findings on the control-AST and the explicit ratings of sexual stimuli were obtained, but dissimilar findings on the sex-AST. That is, symptomatic women were now equally fast with saying "positive" or "negative" to sexual stimuli, whereas controls were, similar to the original sample, faster with saying positive than negative. Thus, in symptomatic women, it seems that there has been a shift in automatic sex-related associations from positive to ambivalent. Based on inspection of the pattern of data in the original study sample, we already suspected that positive associations were not as strong in women with dyspareunia as in controls, and therefore, we recommended a replication study to further investigate the strength of positive automatic associations in symptomatic women. At present, it is unclear whether the divergent results are due to differences in characteristics between women who have and women who have not participated in psychophysiological studies on sexual arousal or that other factors may explain these different findings. Hence, a replication study to gain more insight into automatic sex-related associations in dyspareunia is warranted. At the very least, these findings together do not suggest that women with dyspareunia are typified by particularly negative automatic sex-related associations.

Construct validity

We did not assess pelvic floor muscle function in response to sexual stimuli, although it occupies a central role in the model of dyspareunia of Spano & Lamont (1975).

According to this model, fear of pain not only results in diminished genital arousal, but also in increased pelvic floor muscle tension as part of a protective reaction. Lack of lubrication in combination with increased pelvic floor muscle tone may cause friction between penis and vulvar skin, which, in turn, results in genital pain. Aside from making vaginal entry more difficult, pelvic floor muscle tension may result in muscle pain and in reduced blood flow to the vulva and vagina, and consequently in reduced lubrication (Binik, Bergeron & Khalifé, 2000). The few studies that have measured pelvic floor muscle function point to pelvic floor pathology in women with VVS (Glazer, Jantos, Hartmann, & Swencionis, 1998; Reissing, Binik, Khalifé, Cohen, & Amsel, 2004; Reissing, Brown, Lord, Binik, & Khalifé, 2005; White, Jantos, & Glazer, 1997). Moreover, two experimental studies have shown that women react with increased pelvic floor muscle activity in threatening situations (van der Velde, & Everaerd, 2001; van der Velde, Laan, & Everaerd, 2001). As such, these combined findings certainly promote further study into the role of pelvic floor muscle function in women with dyspareunia.

Another issue worth of discussing in the context of construct validity pertains to the fact that we assessed vaginal vasocongestion (a pooling of blood) as a correlate of genital sexual arousal rather than vaginal lubrication itself, which is thought to be the result of the passage of blood plasma in the capillaries through the vaginal epithelium, due to the increased pressure inside the capillaries during vasocongestion (Levin, 1992). It is very difficult, however, to demonstrate the increase in vaginal lubrication during sexual arousal in laboratory studies, particularly because there are no reliable methods available to collect and quantify fluid volumes (i.e., on absorptive material that is weighted before and after), particularly of a squamous surface such as that of the vaginal epithelium (Levin, 1999). Other disadvantages of this weighing procedure are its relative intrusiveness and the possibly drying of the mucosa by the device used for fluid absorption (Levin, personal communication March 2008). Also pH levels have been assessed in order to determine the amount of vaginal lubrication, but it has been disapproved as a reliable index because the pH response to sexual arousal appeared to be heterogeneous (Levin, 2003). For these reasons, vaginal lubrication quantity was not used as a measure of sexual arousal in the present studies. Given that lubrication is assumed to represent transudate resulting from increased blood pressure in the capillaries of the vaginal wall, vaginal photoplethysmography may be the best measure we have to date for

vaginal lubrication. However, the strength of the relationship between vaginal blood flow and vaginal lubrication has not been investigated experimentally. Based on Spano and Lamont's assumption that lack of lubrication causes friction between penis and vulvar pain which subsequently results in painful intercourse, it would be important to develop a method to adequately assess the quantity of lubrication in order to obtain data of the amount of vaginal lubrication in rest and its increase during sexual arousal in women with dyspareunia versus women without sexual complaints.

RECOMMENDATIONS FOR FUTURE RESEARCH

The present studies have provided useful leads for further research into the interplay of the components that constitute Spano & Lamont's explanatory model of dyspareunia (1975).

In first instance, a few suggestions for future research directly follow from the limitations of the current studies. Some of them will be discussed here. As noted before, it is advised to use less intense sexual stimuli rather than strongly genital arousal eliciting visual erotic stimuli to be better able to detect potential differential effects of experimental manipulations on genital arousal in women with versus without dyspareunia. Another means of improving the ecological validity of laboratory research into the psychophysiological assessment of sexual arousal in women with dyspareunia might be to invite the partner in the laboratory in future studies. An experimentally induced prospect on sexual activity (with the partner) or just the presence of the partner in itself may elicit specific (performance-related) concerns present in women with dyspareunia, which may result in diminished genital response. Finally, in order to improve construct validity, it would be valuable to develop a reliable method for quantitative measurement of vaginal lubrication and to simultaneously assess genital arousal and pelvic floor muscle activity in response to erotic stimulation. Halfway the present research project a vaginal device was developed that enables simultaneous measurement of both variables. Although the first study on the validity of this new device in sexually functional women showed that accurate measurements were obtained for genital response as well as for voluntary pelvic floor activity, EMG responses during emotional states showed limited sensitivity of the device to small, involuntary, changes in pelvic floor activity (Both & Laan,

2007). Research validating an improved version of this so-called "combi-probe" is currently underway, and, hopefully, this one will provide a useful tool in future research on dyspareunia.

There are several other interesting areas of future research that focus on a better understanding of the interplay between the components that constitute Spano & Lamont's model of dyspareunia. For instance, a fruitful area of research pertains to the role of aversive conditioning in dyspareunia. Following Spano & Lamont's model of dyspareunia (1975), it is hypothesized that when sexual stimuli (e.g., a certain touch, a certain feeling, the partner) are associated repeatedly with (anticipated) pain, a learned aversive response may be acquired through classical conditioning, which subsequently may result in diminished genital and subjective sexual response and enhanced pelvic floor muscle tone to sexual stimuli as a protective reaction against imagined or real harm. To our knowledge, we recently started the first study to test the hypothesis of diminished sexual arousal to erotic stimuli as a consequence of aversive conditioning in both women with and without dyspareunia.

Another concept of Spano & Lamont's model (1975) that deserves further investigation, is fear of pain during penetration. Although Spano and Lamont assumed that women with dyspareunia are fearful of pain upon intercourse (1975), they did not specify what particular aspects of pain-related fear are assumed to be involved. Research on fear of pain in medically unexplained chronic pain conditions has indicated that several aspects of pain-related fear can be distinguished, including cognitive, motoric and physiological responses (see e.g., McCracken, Gross, Aikens, & Carnrike, 1996). Yet, it has not been investigated what specific aspects of pain-related fear are most prominent in women with dyspareunia when it comes to pain due to penetration. For instance, fear of pain may reflect the belief that penetration will result in damage of the vulva/vagina, the belief that pain is caused by underlying and serious medical problems (anatomical abnormalities resulting in being "too tight"), the belief of being (un)able to control the pain during penetration, or the belief of being an inadequate sexual partner when intercourse hurts. Recently, a self-report measure (questionnaire) has been developed to tap specific aspects of pain-related fear in relation to penetration. A validation study on this measure in a sample consisting of women with dyspareunia, primary vaginismus and sexually functional women is underway.

As one of our main findings is that women with dyspareunia appraise sexual stimuli

predominantly in a negative way, future research should be conducted to shed more light on the causal relationship between appraisal of sexual stimuli and dyspareunia complaints. In relation to this issue, it is imaginable that due to a negative appreciation of sexual stimuli, women with dyspareunia might refrain from seeking out competent sexual stimuli which are necessary to become or remain sexually aroused (genitally and subjectively). Following this, the interplay between the appraisal of sexual stimuli and the approach to and avoidance from sexual stimuli in women with versus without dyspareunia needs to be further studied, for example using behavioural tasks or facial EMG.

IMPLICATIONS FOR CLINICAL PRACTICE

The data presented in this thesis have implications for the treatment of women suffering from superficial dyspareunia. On the basis of our finding that women with dyspareunia consistently appraise sexual stimuli in a predominantly negative way, we argue that treatment must comprise techniques aimed at reappraisal of sexual stimuli in order to enhance subjective sexual arousal. This view is in agreement with cognitive theory of psychopathology, stating that modification of cognitions will impact on affect and subsequent behaviour because the meaning of the experience is being reconstructed (Beck, Emery & Greenberg, 1985).

To promote a more positive appraisal of sexual stimuli, women must be encouraged to search actively for attractive sexual stimuli (e.g., sexual fantasy, explicit erotic material, masturbation) to become or remain sexually aroused (genitally and subjectively) and expand the range of available sexual arousal eliciting stimuli. The present thesis' finding that symptomatic women are equally genitally responsive as women without sexual complaints in the presence of adequate sexual stimulation, may be used to stress the necessity to search for strong sexual stimuli in order to elicit sexual arousal. This may help women to overcome eventual abstention regarding self-exploration of sexual stimuli. As optimal personal, relational and environmental circumstances form a prerequisite to become and remain sexually aroused, women should be stimulated to create these circumstances. In this context, it is important to temporarily ban coitus or other sexual activities that induce pain, which often leads to relieve in symptomatic women and enables them to (re-) establish sexual arousal during exploration of other sexual activities. Meanwhile,

other forms of sexual activity (e.g., nonpenetrative sex or so-called outercourse) should be promoted, not as surrogates of coitus, but as worthy alternatives for coitus. Self-exploration of adequate sexual stimulation in private and, in a later stage, sensate focus practices (cf. Masters & Johnson, 1970) for the woman and her partner, may further be helpful in promoting sexual pleasure without coitus (or threat of coitus). In this way, positive, thus rewarding, sexual experiences may be (re-) established, whereby sexual stimuli have acquired a positive, lustful meaning. Rewarding experiences, in turn, may (re-)introduce a positive feedback cycle, such that further approach to sexual stimuli and sexual activity is reinforced (cf., Sbrocco & Barlow, 1990; van den Hout & Barlow, 2000).

Our finding that fear of pain leads to diminished genital and subjective sexual arousal advocates the use of techniques directly aimed at alleviating fear (of pain) in the sexual situation. For that purpose, gradual exposure under applied relaxation may be employed using a personal hierarchy of steps of increasing difficulty. As fear of pain in these women may be maintained by avoidance behaviours based on erroneous cognitions (e.g., "penetration will always cause pain and the pain becomes more terrible over time"), specific interventions aimed at reducing avoidance behaviour and increasing successful penetration experiences are needed so that erroneous cognitions can be disconfirmed. This could be realized, for example, by prolonged therapist-aided exposure in vivo therapy (cf. ter Kuile, Bulté, Weijenborg, Beekman, Melles, & Onghena, 2008).

In fact, techniques aimed at reappraisal of sexual stimuli in order to enhance sexual arousal as well as reduction of fear of pain are main ingredients of regular cognitive-behavioural therapy for dyspareunia (e.g., Bergeron et al., 2001b; Bergeron & Lord, 2003; ter Kuile & Weijenborg, 2006). The present findings underscore the relevance of addressing these issues in treatment and promote incorporation of the above described techniques into other treatment modalities. This is not to say that they should substitute other treatment interventions. In our view, optimal care for women with dyspareunia can only be offered within the context of a multidisciplinary approach, in which interventions are directed at pain alleviation, reappraisal of sexual stimuli, reduction of fear of pain during sexual activity, improvement of sexual function, relationship adjustment and individual well-being. Above all, the ultimate goal of treatment is that intercourse becomes an enjoyable sexual activity rather than a painful affair.