

# Effects of Depressive Symptoms and Experimentally Adopted Schemas on Sexual Arousal and Affect in Sexually Healthy Women

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The present study examined the effects of depressive mood symptoms and experimentally adopted sexual schemas on women's sexual arousal and affect. Women's vaginal response, subjective sexual arousal, and affect were measured in response to sexually explicit visual material in a laboratory setting. At baseline on a self-report measure, women with depressive mood symptoms ( $n = 28$ ) reported significantly lower sexual desire than women with normal mood ( $n = 28$ ), but no significant differences in arousal, orgasm, satisfaction, or pain. Participants were asked to adopt both a positive and negative sexual self-schema prior to viewing erotic stimuli. Women in both mood groups demonstrated significantly greater subjective sexual arousal, vaginal response, and positive affect in the positive schema condition than in the negative schema condition when controlling for anxiety. There were no main effects for mood symptoms. These findings support an information processing conceptualization of sexual arousal and suggest that an acute dose of cognitive sexual schemas can significantly impact subsequent sexual and affective responses. Implications of findings for the assessment and treatment of sexual dysfunction are noted.

**KEY WORDS:** mood; sexual schema; female sexual arousal; depression.

## INTRODUCTION

Depressive disorders are a serious health problem affecting more than 20% of women in the United States (Kessler et al., 1994) and can have a variety of negative effects on women's functioning. Sexual functioning in particular is negatively impacted by depression but has received relatively little empirical attention. Although several researchers have examined the negative effects of antidepressant medication on women's sexual functioning (e.g., Ekselius & von Knorring, 2001; Ferguson, 2001; Kennedy, Eisfeld, Dickens, Bacchiochi, & Bagby, 2000), fewer have explored the effects of the disorder itself, and

the studies have not been experimental in design. This is an important omission given that sexual functioning impacts relationship stability and dyadic cohesion (e.g., McVey, 1997), which may in turn weaken a depressed woman's resources and further impact her depression and sexual functioning in a cyclic manner. Obtaining baseline information about sexual dysfunction associated with depressed mood is also important in order to assess accurately the effects or side effects of treatment (Phillips & Slaughter, 2000).

It has been demonstrated that individuals with depression have a higher prevalence of sexual dysfunction than the general population (e.g., Angst, 1998; Segraves, 1998). In studies involving women not taking antidepressant medication, depression has been associated with various sexual difficulties, including reduced sexual activity and arousal (Kennedy, Dickens, Eisfeld, & Bagby, 1999), as well as inhibited orgasm and enjoyment (Dunn, Croft, & Hackett, 1999). Further, depression has been a strong predictor of dyspareunia, which has been shown to increase as severity of depression increases (Dunn et al.,

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1999). Depression also has been associated with decreased desire (Casper et al., 1985; Channon & Ballinger, 1986; Ekselius & von Knorring, 2001), which study participants described experiencing as worse than any other symptom of depression (Casper et al., 1985).

When comparing women with and without sexual dysfunction, women with Hypoactive Sexual Desire Disorder (HSDD) are significantly more likely to have histories of depression as compared to controls (Hartmann, Heiser, Ruffner-Hesse, & Kloth, 2002; Schreiner-Engel & Schiavi, 1986), and the onset of the sexual dysfunction coincides with the onset of the depressive episode (Schreiner-Engel & Schiavi, 1986).

When comparing women with HSDD who are depressed with those who are not depressed, those who are depressed are more likely to experience declines in marital functioning and drop out of psychosexual therapy than those who are not depressed (McVey, 1997). According to the author, this finding may have been attributable to the effects of the depression itself, and it points to the importance of examining the role of depression in the development and treatment of sexual dysfunction.

Some studies have found no changes in sexual function or increases in libido associated with depression (e.g., Angst, 1998; Mathew & Weinman, 1982; Mathew, Weinman, & Mirabi, 1981); however, these findings may be related to methodological issues such as recently discontinuing antidepressant medications or lack of standardized measures of sexual symptoms. In addition, the percentage of women reporting libido increases was relatively low (e.g., Angst, 1998).

Much of the research in this area is based on correlational, retrospective, self-report data and, in some cases, based on non-standardized measures of sexual functioning, informal dialogue with patients, or anecdotal information (Ekselius & von Knorring, 2001). More empirical work is needed to understand sexual functioning in depressed women given that it is associated with poorer relationship functioning and experienced as a more negative depressive symptom by depressed individuals.

One factor that may contribute to sexual dysfunction in depressed women is their cognitive schemas. According to the cognitive theory of depression, schemas are relatively stable cognitive patterns that form the basis for interpretations of a particular set of situations and may play a role in the development and/or maintenance of depressed mood (Beck, Rush, Shaw, & Emery, 1979). Schemas are developed through past experiences and determine how future experiences will be perceived (Beck, 1964). When a person faces a particular situation, a schema related to that situation is activated and forms the basis for screening out, differentiating, or coding

stimuli that the individual is experiencing (Beck et al., 1979). For example, if a woman holds a schema that she is incompetent, she will interpret the world through this framework and selectively extract and mold the details of her environment as further evidence of her incompetence. This may predispose her to develop or maintain a depressed mood. Cognitive-behavioral therapy (CBT) involves identifying and restructuring these negative interpretations into a more realistic framework (Beck et al., 1979). CBT has been empirically-validated as efficacious for the treatment of depression (e.g., DeRubeis, Gelfand, Tang, & Simons, 1999; Dobson, 1989; Elkin et al., 1989; Fava, Rafanelli, Grandi, Conti, & Belluardo, 1998; Keller et al., 2000; Mohr, Boudewyn, Goodkin, Bostrom, & Epstein, 2001; Segal, Gemar, & Williams, 1999), suggesting that changing cognitions or schemas play an important role in the treatment of depression.

Cognitive theory would predict that people develop schemas about their sexual abilities and identities. Hindmarch (1998) suggested that schemas are the foundation of sexual behaviors and responses (e.g., genital engorgement, initiation, orgasm, pleasure). Sexual self-schemas have been defined as cognitive generalizations about sexual aspects of the self that can be positive or negative in valence (Andersen & Cyranowski, 1994). Sexual schemas are thought to be derived from past experience, influence the way sexually relevant information is processed, and guide future sexual behavior. For example, if a woman holds a schema that is negative in valence, she will interpret sexual situations through this negative framework, which may predispose her to develop or maintain sexual problems and/or relationship difficulty. In fact, women with positive sexual self-schemas have been found to enter sexual relationships more willingly and evidence more positive emotions when in sexual situations, whereas women with negative sexual self-schemas are less likely to have intimate relationships and are less comfortable when they occur (Cyranowski & Andersen, 1998).

Information processing theory has been used to explain how these cognitive processes might affect sexual arousal, specifically by dividing sexual arousal into two stages: an appraisal stage and a response generation stage. Recent research (Janssen, Everaerd, Spiering, & Janssen, 2000) drawn from theoretical perspectives of Barlow (1986), Frijda (1986), and Öhman (1986) conceptualizes the appraisal stage as the mechanism that involves processes of encoding and matching stimuli in memory and gives emotional meaning to a stimulus. The response generation stage is seen as an integrative stage, in which meaning is integrated with response, leading to subjective sexual arousal and genital response. Together, these two stages (appraisal and response generation)

form the central pathway, mediating between stimuli and responses (Janssen et al., 2000), and are proposed to operate on an automatic or preattentive level. Controlled or attentional processes that involve higher-level cognitive processes both affect and are affected by central pathway operations.

Janssen et al. (2000) theorized that sexual arousal begins with a relevant stimulus that is encoded and matched with various elements available in memory, which primes genital responses and triggers attentional processing. When a stimulus provokes predominantly sexual meaning in the memory system, attentional processes and the central pathway operate in synchrony. Attention then enhances the processing of sexual meaning and automatic cognitive processes lead to the activation of the genital response. However, when other (non-sexual) meanings also are present, processing of non-sexual or emotionally negative meanings can result in low levels of sexual arousal and/or negative affect (Janssen et al., 2000).

We thus can expect that if a woman has a positive sexual schema, a sexual stimulus may provoke sexual meaning in the memory system and genital/subjective responses will be activated. However, if a woman has a negative sexual schema, a sexual stimulus may be appraised in a predominantly non-sexual or negative way, the genital/subjective response will not be activated, and her arousal may be inhibited. Depressed mood and more negative schemas in general may promote negative sexual schemas, which in turn inhibit sexual responding. Hindmarch (1998) suggested that depressed individuals have an impaired ability to utilize sexual cues properly because the cues do not have the same valence and, consequently, they are less able to respond to these cues in the same way as non-depressed individuals.

The aim of this research was to explore the effects of depressive mood symptoms and sexual schemas on women's sexual arousal and affect in a laboratory setting. Specifically, a possible differential impact of experimentally adopted positive and negative schemas on women with depressive and normal mood symptoms evaluated the application of an information processing conceptualization of sexual arousal. In addition, we wanted to examine the acute (immediate) effects of a cognitive strategy on sexual and affective responses that could potentially be a component of a CBT intervention for sexual dysfunction. We were not interested in modifying women's pre-existing self-schemas in the present study, but rather, we were interested in the effects of a temporarily adopted schema on arousal and affect. Women's subjective and physiological sexual arousal, as well as affect, were measured in response to sexually explicit visual material and exam-

ined by variables of normal/depressed mood symptoms and positive/negative (adopted) sexual schema. To date, experimental methods have been used to understand the relationship between sexual arousal and depressed mood in men (e.g., Meisler & Carey, 1991; Mitchell, DiBartolo, Brown, & Barlow, 1998), but not in women. This method permits an extension beyond retrospective self-report data and examines sexual schema principles and sexual arousal in a controlled setting. In sum, the purpose of this experimental method was to determine if temporarily adopting a particular sexual schema might begin to impact sexual response and how depressive symptomatology might modulate this response.

## Hypotheses

### *Sexual Arousal*

We hypothesized that: (1) women with depressive mood symptoms would show lower subjective sexual arousal and vaginal response to visual sexual stimuli (VSS) than women with normal mood across schema conditions (main effect of mood) and (2) an experimentally adopted positive sexual schema would lead to higher subjective sexual arousal and vaginal response than an experimentally adopted negative sexual schema (main effect of schema). Interactions between depressive mood and experimentally adopted schemas were explored.

### *Affect*

We hypothesized that: (1) women with depressive mood symptoms would show lower positive and higher negative affect than women with normal mood across schema conditions (main effect of mood) and (2) an experimentally adopted positive sexual schema would lead to higher positive affect and lower negative affect than an experimentally adopted negative sexual schema across mood groups (main effect of schema). Interactions between depressive mood and experimentally adopted schemas were explored.

## METHOD

### Participants

A total of 56 women participated in the study. Participation was restricted to those individuals who were premenopausal, not pregnant, not taking antidepressant medication, had no current sexual dysfunction, and

self-identified as either heterosexual or bisexual. All participants were recruited through flyers and university newspaper advertisements from a northwestern United States metropolitan city and were paid \$30 for their participation.

The mean age of participants was 28.8 years (range, 21–49). The sample was predominantly Caucasian/White (78.6%), heterosexual (91.1%), and college-educated (98.2%). About 7% of the sample identified as African-American/Black, 5.4% as Asian/Asian American, 1.8% as Chicana/Latina, and 7.2% as Bi-racial or Other. Five participants (8.9%) self-identified as bisexual. About 48% of the sample indicated that they were single, 37.5% were in a committed dating relationship, 7.1% were married, and 7.2% were separated/divorced/other. Most participants were currently sexually active (92.9%) and had viewed erotic films in the past (62.5%). The two mood groups did not significantly differ on any demographic variables, including age, race, relationship status, length of relationship, sexual orientation, education level, employment status, and lifelong number of dating relationships.

## Measures

All participants completed the following measures prior to the experimental condition.

### *Demographics*

Participants provided information about age, race, education, sexual orientation, relationship status, and frequency of sexual activity.

### *Beck Depression Inventory-II (BDI-II)*

The BDI-II (Beck, Steer, & Brown, 1996) is a widely used 21-item self-report measure that assesses the presence and intensity of symptoms that reflect the *Diagnostic and Statistical Manual of Mental Disorders* (American Psychiatric Association, 1994) criteria for depression. Response choices ranged from 0–3, and items were summed to yield total scores ranging from 0–63, with higher scores indicating greater depressive symptomatology. Alpha reliability for the BDI-II in the present study was .92.

Participants were selected and divided into two groups based upon self-report scores on the BDI-II (Beck et al., 1996): normal mood (score  $\leq 9$ ) and depressive mood symptoms (score  $\geq 10$ ). A cut-off score of 10 was

used to divide the groups based on the ranges outlined by Beck et al. that indicate depressive symptomatology. Twenty-eight participants were in each group, and their mean scores on the BDI-II differed significantly from each other: normal mood group ( $M = 3.64$ ,  $SD = 2.96$ ), depressive mood symptom group ( $M = 17.00$ ,  $SD = 5.36$ ),  $t(54) = -11.54$ ,  $p < .001$ . The mean for the depressive mood symptom group (hereafter referred to as depressed mood group) fell within the mild-moderate range of depressive symptoms according to the BDI-II.

Some researchers have suggested that assigning subjects to depressed mood groups using cut-off scores on self-report measures is problematic due to lack of specificity and a failure to validly separate depressed from non-depressed cases (e.g., Kendall & Flannery-Schroeder, 1995; Kendall, Hollon, Beck, Hammen, & Ingram, 1987; Tennen, Hall, & Affleck, 1995). Tennen et al. have argued that a cut-off score of 10 may be obtained even if the essential features of sad mood or loss of interest/pleasure may not be endorsed by participants. The present study examined these items and only two (7.1%) participants in the depressed mood group did not endorse any items measuring sad mood, loss of pleasure, or loss of interest, whereas four (14.3%) participants endorsed one symptom, and 22 participants (78.6%) endorsed two or all three of these symptoms. There was a significant difference between the depressed mood and normal mood groups on these critical items,  $\chi^2(7, N = 56) = 32.74$ ,  $p < .001$ , indicating that the depressed mood group was experiencing some mood disturbance that was qualitatively different than those in the normal mood group.

### *Beck Anxiety Inventory (BAI)*

The 21-item BAI (Beck, Epstein, Brown, & Steer, 1988) was administered to assess the degree of anxiety symptoms experienced by participants. Items measure subjective, somatic, and panic-related symptoms of anxiety. Response choices ranged from 0–3, and items were summed to yield total scores ranging from 0–63, with higher scores indicating greater anxiety symptomatology. Alpha reliability for the BAI in the present study was .90.

### *Female Sexual Function Index (FSFI)*

The FSFI (Rosen et al., 2000) is a validated and widely used 19-item self-report measure of women's sexual function. Six separate domains are included: desire, arousal, lubrication, orgasm, satisfaction, and pain. Domain items are summed and multiplied by the domain

factor. A full-scale score is obtained by summing the six domain scores. Higher scores indicate better sexual functioning. Cronbach's alpha has been reported at .82 and higher for all six domains (Rosen et al., 2000). Alpha reliabilities for the present study were .75–.99 for the six domains and .93 for the full-scale score.

#### *Sexual Self-Schema Scale (SSS)*

The SSS (Andersen & Cyranowski, 1994) is a 26-item self-report measure of sexual self-concept. These 26 items were embedded within 50 adjectives and each was rated on a 7-point rating scale ranging from 0 (not at all descriptive of me) to 6 (very much descriptive of me). Responses were summed to yield three separate factor scores (Factor 1 = Passionate-Romantic, Factor 2 = Open, and Factor 3 = Embarrassed-Conservative). The total SSS score was calculated by adding Factors 1 and 2 and then subtracting Factor 3. Higher scores indicate more positive sexual self-schemas. Cronbach's alphas for the SSS have been reported at .82 (full scale), .81 (Factor 1), .77 (Factor 2), and .66 (Factor 3) (Andersen & Cyranowski, 1994). In the present study, alpha values were .86, .84, .75, and .75 for the full scale, and Factors 1, 2, and 3, respectively.

#### *Sexuality Scale*

The 30-item Sexuality Scale (Snell & Papini, 1989) measures sexual-esteem, sexual-depression, and sexual-preoccupation. Sexual-esteem is defined as positive regard and self-efficacy for experiencing sexuality in a satisfying way; sexual-depression refers to the experience of feelings of depression regarding one's sex life; and sexual-preoccupation is defined as the tendency to think about sex excessively. This scale was included to assess aspects of participants' existing schemas about their sexuality. Each item was rated on a 5-point Likert scale, ranging from +2 (agree) to -2 (disagree). Higher positive scores on each subscale indicate greater sexual-esteem, sexual-depression, or sexual-preoccupation. Cronbach's alphas have been reported at .92 (sexual-esteem), .90 (sexual-depression), and .88 (sexual-preoccupation) for the three subscales. Alpha reliabilities in the present study were .93, .88, and .92 for the sexual-esteem, sexual-depression, and sexual-preoccupation subscales, respectively.

Participants responded to the following questionnaires immediately after viewing each video segment for a total of three times (Post-test 1, Post-test 2, Post-test 3).

#### *Tape/Film Scale*

The Tape/Film scale (Hackbert & Heiman, 2002; Heiman, 1977) is a 39-item scale that measures perceived affective, physical, and sexual reactions to visual sexual stimuli. Each item was rated on a 7-point Likert scale ranging from 1 (not at all) to 7 (intensely). Twelve items were selected from the original scale and summed as a measure of overall subjective sexual arousal. These items were selected based on their descriptions of sexual arousal (rather than affect) and their correlation with item 1 ('sexually aroused') (i.e.,  $r > .80$ ). Cronbach's alpha for this 12-item scale at Post-test 1 was .98.

#### *Positive and Negative Affect Scale*

The state version of the Positive and Negative Affect Scale (PANAS; Watson, Clark, & Tellegen, 1988) was administered to assess participants' affective states following exposure to the video segments. The PANAS consists of 20 descriptive terms, with 10 terms for Positive Affect (PA) and 10 terms for Negative Affect (NA). Responses were on a 5-point Likert format, ranging from 1 (very slightly or not at all) to 5 (extremely). Alpha reliabilities previously reported for the PANAS are .89 for PA and .85 for NA. Alpha reliabilities in the present study at Post-test 1 were .90 for PA and .86 for NA.

#### *Profile of Mood States (POMS)*

The POMS is a 65-item adjective rating scale designed to measure multiple dimensions of affect (McNair, Lorr, & Droppelman, 1971). Each item was rated on a 5-point scale ranging from 0 (not at all) to 4 (extremely). The POMS includes six subscales, and the following four were of interest in the present study: Tension-Anxiety (9 items, Range: 0–36), Depression-Dejection (15 items, Range: 0–60), Anger-Hostility (12 items, Range: 0–48), and Vigor-Activity (8 items, Range: 0–32). Alpha reliabilities have ranged from .84–.95 for the original six subscales. Items for each subscale were summed, and alphas ranged from .76–.92 for the four subscales of interest in the present study at Post-test 1.

#### *Schema Identification Questions*

Face valid questions were developed for the present study to measure how well participants felt they were able to adopt the sexual sense of self (schema) presented and how much they believed it inhibited or enhanced their sexual response. Examples of schema identification

questions include, “How able were you to take on this sexual sense of self during the video?” and “How much do you think the statements enhanced (increased) your sexual response?” Six items were rated on an 8-point scale following the final video segment. Higher scores on each item indicated either a greater ability to adopt the sexual schemas or greater enhancement of their sexual response. These items were analyzed separately rather than as a combined measure of schema identification given their low intercorrelation. Participants responded to these questions at Post-test 3 only.

#### *Vaginal Photoplethysmography*

A vaginal photoplethysmograph (Behavioral Technology Instruments, Salt Lake City, UT) measured vaginal pulse amplitude (VPA) responses. The vaginal photoplethysmograph is a reliable and valid measure of genital arousal in women (Heiman, 1998; Laan, Everaerd, & Evers, 1995). The software program Acqknowledge III, version 3.3 (BIOPAC Systems, Inc., Santa Barbara, CA) and data acquisition unit (model MP100WS, BIOPAC Systems, Inc.) were used with a personal computer (Power Macintosh 6100/70, Apple, Cupertino, CA) to collect, convert (from analog to digital), and transform data.

#### *Visual Sexual Stimuli*

Two different 5-minute erotic video segments provided visual sexual stimulation. The video segments were selected from commercially available erotica produced specifically for a female audience. Both erotic video segments portrayed heterosexual couples engaging in similar sexual acts, including foreplay, intercourse, and orgasm. Participants viewed the video segments on a monitor positioned in front of them and listened through headphones. The researcher controlled the VCR from the adjacent room with leads connected to the monitor in the participants' room.

#### *Sexual Cognitive Schema Adoptions*

The schema adoption scripts were statements presented in second person (e.g., “You like your sexuality a lot”). They included dimensions of sexual response or enjoyment-discomfort, which mirrored those that women often raise in psychotherapy (e.g., Heiman, 2000). Prior to hearing each schema adoption script, participants were given instructions to imagine that the schema described them (Appendix A). Neither the schema content nor the instructional set suggested that the participants were to get

more or less aroused. It was rather to “try on the identity” of someone who had a positive or negative sense of her sexual self.

The *positive sexual schema* suggested that participants viewed sex as an important and enjoyable part of their lives and their bodies as responsive to sexual stimuli (Appendix B). The *negative sexual schema*, similar in length and subject, suggested that participants did not enjoy sex and their bodies did not respond favorably to sexual stimuli (Appendix C).

All of the instructions and schema adoption scripts were professionally pre-recorded by the same female voice and presented through the VCR's audio so participants could hear them clearly through the headphones. The video screen remained blank while the instructions and schema adoption scripts were presented so as not to distract participants.

### **Design and Procedure**

The study was a repeated measures mixed factorial design. All participants received both types of sexual cognitive schema adoptions (i.e., positive and negative), and watched the same video segments. The presentation order of the two erotic video segments and positive/negative sexual schema were counterbalanced across participants in both groups.

The investigator screened participants over the telephone to determine study eligibility. Participants were asked to abstain from sexual activity and alcohol use for 8 hours prior to the experiment given that these activities may have potential confounding effects on the psychophysiological data. Participants were scheduled for individual experimental sessions.

Upon arrival at the university medical clinic, participants provided informed consent, completed baseline questionnaires, and were introduced to the sexual psychophysiology laboratory. Participants were seated in a small, private room and they were instructed on the use of the vaginal photoplethysmograph. They were asked to sit in a comfortable, relaxed position in a reclining chair and remain as still as possible to minimize potential movement artifacts. After the investigator left the room, participants inserted the vaginal probe and notified the experimenter by intercom when they were ready to proceed.

A 15-minute adaptation period ensured that the probe adapted to the participant's body temperature. During the adaptation period, participants were asked to sit quietly in the reclining chair and were allowed to occupy their time as they wished (e.g., read, rest) provided that they sat still. The last 10 min of the adaptation period

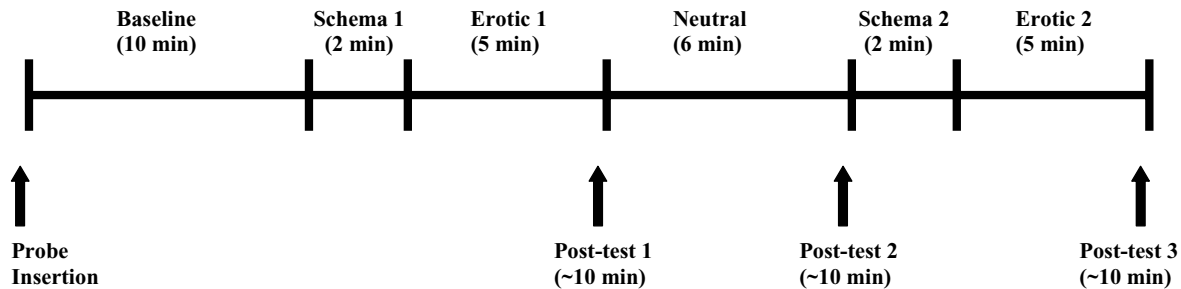


Fig. 1. Schematic of experimental protocol. The Tape-Film scale, PANAS, and POMS were administered at Post-tests 1, 2, and 3.

served as a baseline measure of VPA (Baseline). The baseline period was followed by preparatory instructions, a positive or negative sexual schema script (Schema 1), and a 5-minute erotic video segment (Erotic 1). Participants then were instructed to “release the sexual identity” and relax (see Appendix D), and they completed post-test questionnaires (Post-test 1). Participants then watched a 6-minute nature video (Neutral) and completed post-test questionnaires (Post-test 2). The neutral video condition was included to allow for participants’ sexual arousal to return near baseline and to potentially inhibit Schema 1 from interfering with Schema 2. Finally, participants received preparatory instructions, heard the opposite (i.e., positive or negative) sexual schema script (Schema 2), and watched a different 5-minute erotic video segment (Erotic 2). After being instructed to release the second sexual identity and relax, participants completed the third packet of post-test questionnaires (Post-test 3). When they were finished, participants received instructions to remove the vaginal probe. Participants moved into an office, and an exit interview and debriefing followed. See Fig. 1 for a schematic of the experimental protocol.

### Data Sampling and Reduction

Vaginal responses to the visual stimuli were measured continuously from the baseline period throughout the experimental protocol. Physiological responses were sampled at a rate of 60 samples per second. The BIOPAC software permitted an automated transformation of raw data into VPA data that were used in subsequent statistical analyses. Vaginal pulse amplitude scores were obtained by averaging individual calculations of peak-to-trough changes across each 30-sec interval contained in the baseline and 5-minute erotic video segments. Vaginal response used in data analyses was calculated as VPA during each erotic segment minus VPA during baseline.

## RESULTS

### Depressed Mood and Anxiety

Researchers have noted that high scores on depression measures may be accompanied by, and consequently confounded with, relatively high levels of anxiety (e.g., Ingram & Hamilton, 1999). In the present study, total scores on the BDI-II (depression) and BAI (anxiety) were significantly and positively correlated,  $r(54) = .77$ ,  $p < .01$ . An independent samples  $t$ -test on total BAI anxiety scores by mood group revealed a significant difference between the normal and depressed mood groups,  $t(54) = -4.82$ ,  $p < .001$ . Women in the depressed mood group reported significantly greater anxiety ( $M = 11.14$ ,  $SD = 8.14$ ) than women in the normal mood group ( $M = 3.32$ ,  $SD = 2.74$ ). As depressive and anxiety symptoms were highly correlated in the present sample, and we did not want to incorrectly attribute to depression what might have been due to anxiety, we partialled out the effects of anxiety and entered it as a covariate in the following analyses.

### Sexual Functioning

A multivariate analysis of covariance was conducted on participants’ responses to the FSFI to compare sexual functioning by mood group. At baseline, the normal mood group reported significantly higher sexual desire ( $M = 4.73$ ,  $SD = 1.02$ ) than the depressed mood group ( $M = 4.02$ ,  $SD = 1.16$ ),  $F(1, 43) = 5.18$ ,  $p < .05$ , as measured by the FSFI (Rosen et al., 2000), when controlling for anxiety. However, there were no significant differences between mood groups in reported difficulties with arousal, lubrication, orgasm, satisfaction, or pain. There were also no significant differences between mood groups on measures of sexual-esteem, sexual-depression, or sexual-preoccupation as measured by the Sexuality Scale (Snell & Papini, 1989), or any of the sexual self-schema

**Table I.** Means, Standard Deviations, and *F*-Values of Main Effects for Adopted Schema Type on Arousal and Affect Measures (*N* = 56)

	Possible range	Adopted schema type				<i>F</i>
		Positive		Negative		
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Subjective sexual arousal	12–84	54.17	18.10	40.51	16.16	16.67***
Vaginal response (VPA)	0.00–0.24 <sup>a</sup>	0.08	0.05	0.07	0.05	5.52*
Positive affect	1–50	30.01	8.82	24.02	7.65	13.50***
Negative affect	1–50	11.44	2.26	13.28	4.41	7.07**
Tension-anxiety	0–36	5.34	4.11	7.24	5.63	9.60**
Depression-dejection	0–60	2.46	3.44	3.97	4.57	9.69**
Anger-hostility	0–48	1.71	2.31	3.22	3.94	1.98
Vigor-activity	0–32	14.61	7.68	10.11	6.42	11.54***

Note. VPA = vaginal pulse amplitude ( $\Delta mV$ ).

<sup>a</sup>The values indicated reflect the range of VPA difference scores for the present sample, given that VPA is a relative measure and there are no established lower or upper bound values for VPA at this time.

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

factors (i.e., Passionate-Romantic, Open, Embarrassed-Conservative), as measured by the Sexual Self-Schema scale (Andersen & Cyranowski, 1994) when controlling for anxiety.

### Sexual Arousal

A mixed factorial repeated measures ANCOVA was conducted on subjective sexual arousal and vaginal response with between-subjects factors of mood and schema order and a within-subjects factor of adopted schema type. Anxiety was entered as a covariate. Results for main effects of adopted schema type are reported in Table I.

#### Subjective Sexual Arousal

The predicted main effect for schema type was significant (Table I). Subjective sexual arousal was higher in the positive schema condition than in the negative schema condition. No significant main effect for mood or mood  $\times$  schema interactions was found.

#### Vaginal Response

The predicted main effect for schema type was significant with VPA difference scores higher in the positive schema condition than in the negative schema condition (Table I). An unpredicted schema order  $\times$  schema type interaction emerged,  $F(1, 51) = 20.78$ ,  $p < .001$ . Vaginal

pulse amplitude difference scores were similar in the positive and negative schema conditions for participants who received the positive schema first (regardless of mood); however, VPA difference scores were higher in the positive schema condition than in the negative schema condition for those who received the negative schema first (regardless of mood) (Fig. 2). No significant main effect for mood or mood  $\times$  schema interaction was found.

In order to explore possible residual effects of arousal from the positive schema condition and erotic stimuli influencing this finding, VPA in the neutral video conditions that followed the positive versus negative schema conditions were compared. No significant difference in VPA was found between the neutral video (return-to-baseline) conditions (though it was slightly elevated from original baseline in both conditions),  $F(1, 54) < 1$ , *ns*, suggesting that an equivalent return-to-baseline was established in the neutral video condition following both the positive and negative schema conditions. Thus, the residual effect from the positive schema condition on the following neutral video condition was unlikely to be accounting for this interaction.

In order to confirm that VPA changed between the erotic and non-erotic conditions overall, VPA difference scores were averaged across erotic conditions and compared to VPA difference scores between the neutral video and baseline conditions. A one-sample *t*-test revealed a significant difference between the erotic and non-erotic conditions,  $t(55) = 11.54$ ,  $p < .001$ , indicating that the erotic stimuli resulted in a significant increase in women's vaginal response.



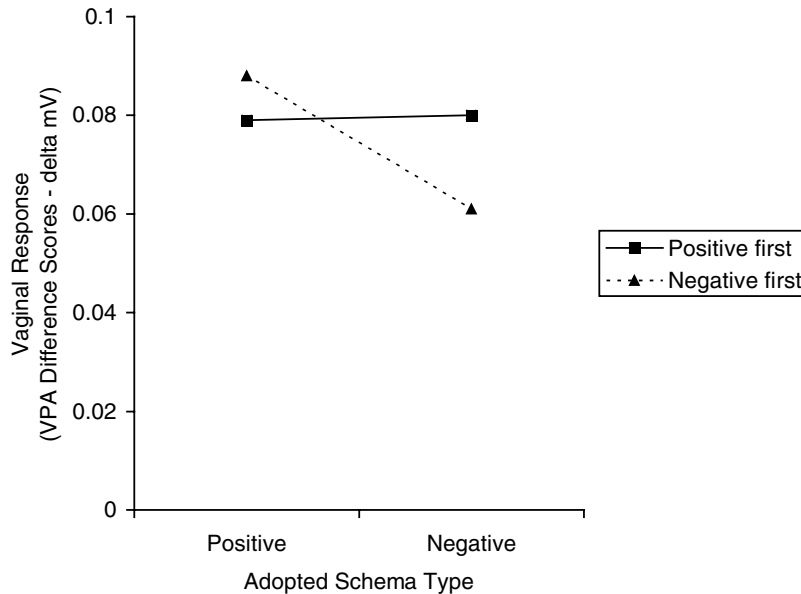


Fig. 2. Schema type  $\times$  schema order for vaginal response (as measured by VPA).

### Relation Between Subjective Sexual Arousal and Vaginal Response

Kendall's rank correlation revealed that the subjective sexual arousal composite score was not significantly correlated with vaginal response ( $\tau s = -.01-.15$ ) across schema conditions.

### Affect

Separate mixed factorial repeated measures ANCOVAs were conducted for each measure of affect: Positive and Negative Affect, Tension-Anxiety, Depression-Dejection, Anger-Hostility, and Vigor-Activity. The model included between-subjects factors of mood and schema order and a within-subjects factor of adopted schema type. Anxiety was entered as a covariate. Main effects of mood and schema type and a significant mood  $\times$  schema type interaction were expected with regard to affect. Due to the large number of simultaneous tests conducted with regard to affect measures, a Bonferroni correction was applied, and alpha was set at .008. Results for main effects of adopted schema type are reported in Table I.

For *Positive Affect*, there was a significant main effect for schema type. Positive Affect was higher in the positive schema condition than in the negative schema condition. No significant main effect for mood or mood  $\times$  schema interaction was found.

*Negative Affect* was higher in the negative schema condition than in the positive schema condition, but not significantly at the corrected .008 alpha level. No significant main effect for mood or mood  $\times$  schema interaction was found.

*Tension-Anxiety* was higher in the negative schema condition than in the positive schema condition, but not significantly at the corrected .008 alpha level. No significant main effect for mood or mood  $\times$  schema interaction was found.

*Depression-Dejection* was higher in the negative schema condition than in the positive schema condition, but not significantly at the corrected .008 alpha level. No significant main effect for mood or mood  $\times$  schema interaction was found.

For *Anger-Hostility*, no significant main effect for schema or mood and no significant mood  $\times$  schema interaction were found.

For *Vigor-Activity*, there was a significant main effect for schema type. Vigor-Activity was higher in the positive schema condition than in the negative schema condition. No significant main effect for mood or mood  $\times$  schema interaction was found.

### Schema Identification

Participants' responses on the schema identification questions were examined to determine the degree to which they felt they were able to adopt the positive and

negative sexual cognitive schemas. Women reported a greater perceived ability to adopt the positive schema ( $M = 6.52$ ,  $SD = 1.62$ ) than the negative schema ( $M = 4.00$ ,  $SD = 2.03$ ), which did not differ by mood group [adopt positive:  $F(1, 54) < 1$ ; adopt negative:  $F(1, 54) < 1$ ]. Ability to adopt the positive schema was significantly and positively correlated with subjective sexual arousal, Positive Affect, and Vigor-Activity ( $r_s = .38-.52$ ,  $p < .01$ ). Ability to adopt the negative schema was significantly and positively correlated with Negative Affect, Depression-Dejection, and Anger-Hostility ( $r = .29-.33$ ,  $p < .05$ ) and negatively correlated with Vigor-Activity ( $r = -.33$ ,  $p < .05$ ). Ability to adopt the negative schema was negatively (but nonsignificantly) correlated with subjective sexual arousal ( $r = -.24$ ,  $p = .08$ ) and Positive Affect ( $r = -.25$ ,  $p = .06$ ).

### Pre-Existing Sexual Self-Schemas

Pearson's correlational analyses revealed that the ability to adopt the positive schema was significantly positively correlated ( $r = .32$ ,  $p < .05$ ) and the ability to adopt the negative schema was significantly negatively correlated ( $r = -.32$ ,  $p < .05$ ) with participants' pre-existing sexual self-schemas (high scores = more positive self-schemas). The possible interactions of experimentally adopted schemas, women's pre-existing self-schemas, and mood on sexual arousal were examined in order to explore the relative contribution of both pre-existing and experimentally adopted sexual self-schemas and begin to identify what might be influencing women's sexual and affective responses in this laboratory situation.

A median split on the Sexual Self-Schema Scale was used to divide people into positive ( $M = 79.07$ ,  $SD = 10.37$ ) and negative ( $M = 50.52$ ,  $SD = 9.94$ ) sexual self-schema groups. This approach was taken because the testing of adopted sexual schemas in women is novel, and we wanted to connect the results of the current study with existing literature on sexual self-schemas (see Andersen & Cyranowski, 1994 for a similar approach). The means for each group in the present study are similar (although higher) to those reported in the scale's validation study (positive schema:  $M = 75.78$ ,  $SD = 5.66$ , negative schema:  $M = 41.04$ ,  $SD = 9.04$ ) (Andersen & Cyranowski, 1994). As expected, the groups significantly differed in sexual self-schema scores,  $F(1, 54) = 110.32$ ,  $p < .001$ .

Separate mixed factorial repeated measures ANCOVAs were conducted on subjective sexual arousal, vaginal response, and each measure of affect: Positive and Negative Affect, Tension-Anxiety, Depression-Dejection,

Anger-Hostility, and Vigor-Activity. The model included between-subjects factors of mood and *pre-existing* sexual self-schema type and a within-subjects factor of *experimentally adopted* schema type. Anxiety scores were entered as a covariate. Due to the large number of simultaneous tests conducted with regard to affect measures, a Bonferroni correction was applied, and alpha was set at .008.

A significant main effect of *experimentally adopted* schema type was found for subjective sexual arousal, Positive Affect, and Vigor-Activity. Subjects reported higher subjective sexual arousal in the positive schema condition ( $M = 54.18$ ,  $SD = 18.70$ ) than in the negative schema condition ( $M = 40.55$ ,  $SD = 16.16$ ),  $F(1, 51) = 18.07$ ,  $p < .001$ . They also reported higher Positive Affect in the positive schema condition ( $M = 30.04$ ,  $SD = 8.82$ ) than in the negative schema condition ( $M = 24.04$ ,  $SD = 7.65$ ),  $F(1, 51) = 14.13$ ,  $p < .001$ . Finally, they reported higher Vigor-Activity in the positive schema condition ( $M = 14.59$ ,  $SD = 7.68$ ) than in the negative schema condition ( $M = 10.11$ ,  $SD = 6.42$ ),  $F(1, 51) = 11.65$ ,  $p < .001$ . There were no other significant main effects for affect (at the corrected .008 alpha level), *pre-existing* sexual self-schema scores, or mood  $\times$  *pre-existing* sexual self-schema type interactions.

### Mood and Sexual Arousal

As mood did not appear to exert a direct effect on subjective sexual arousal and vaginal response, we examined the possibility that this may have been due to the categorical nature of the mood variable in the present study (i.e., normal versus depressed). Zero-order correlations were conducted to determine the relationship between a continuous measure of mood (BDI total raw scores) and subjective sexual arousal/VPA. There was no significant correlation ( $r = .00-.16$ ) between the continuous measure of mood and subjective/vaginal measures of sexual arousal in either the positive or negative schema conditions.

## DISCUSSION

The present study was the first to examine the interaction of depressed mood symptoms and experimentally adopted sexual schemas on women's subjective sexual arousal, vaginal response, and affect using experimental psychophysiological methods. These methods offer the advantage of examining the differential impact of positive and negative schemas on the sexual responses of women

with depressed (but not on antidepressant medication) and normal mood in a controlled setting while mood symptoms are present. The effects of anxiety were controlled, allowing a more precise examination of the effects of depressive mood symptoms.

At study entry, women in the depressed mood group reported significantly lower sexual desire in their relationships than the normal mood group (though within the functional range compared to clinical samples; see Rosen et al., 2000). However, there were no significant differences with respect to sexual arousal, lubrication, orgasmic functioning, satisfaction, or genital pain between the normal and depressed mood groups.

This supports prior data demonstrating that depressed mood is particularly associated with lower sexual desire (Casper et al., 1985; Channon & Ballinger, 1986; Ekselius & von Knorring, 2001), here found for women with mild to moderate levels of depressed mood. However, decreased arousal, orgasmic problems, and dyspareunia have also been reported in prior research for women with depressed mood (Dunn et al., 1999; Ekselius & von Knorring, 2001). One explanation for these contradictory results may be related to antidepressant medication. It was not clear in the Dunn et al. (1999) study whether their participants were taking antidepressant medication. Orgasm difficulty is frequently cited as a side effect of antidepressant medication (Gitlin, 1995; Rosen, Lane, & Menza, 1999) and may have been a factor, along with the lack of a standard measure of sexual function, in the Dunn et al. (1999) study. Another explanation for this difference is that the present sample included women with mildly depressed mood symptoms who were not required to meet actual diagnostic criteria for Major Depressive Disorder. In contrast, in the Ekselius and von Knorring (2001) study, participants met DSM-III-R criteria for depression as well as reached a cut-off score on a self-report measure. Perhaps more sexual dysfunction occurs at more severe levels of depressive symptomatology, as noted by Dunn et al. (1999). Women with more severe depressive symptomatology may have been underrepresented in the present study due to being less likely to volunteer to participate in a study involving sexuality or because this sample was recruited primarily from a university population. Nevertheless, given that milder forms of depression represent a great majority of affective conditions throughout the world (Ingram & Hamilton, 1999), this is an important group to study.

Women demonstrated greater sexual arousal responses (subjective and vaginal) and greater positive affect in the positive schema condition than negative schema condition. The fact that experimentally adopted cognitive sexual schemas in the presence of erotic stimuli

can have immediate and marked effects on sexual arousal at subjective, emotional, and physiological levels is rather striking, particularly given that subjects were only moderately confident that they adopted the negative schema. As an information processing model would predict, a sexual stimulus in the context of a positive sexual schema may provoke sexual meaning, thus activating the sexual response. In contrast, a sexual stimulus in the context of a negative sexual schema may be appraised in a non-sexual or sexually negative way and interfere with the (full) activation of the sexual response. Over repeated exposures of sexual stimuli in the context of a negative sexual schema, more general avoidance or inhibition and even decreased sexual desire might be possible outcomes. Although this information processing model may explain the general pattern of decreased sexual response found in the negative schema condition, an alternative possibility is that participants were distracted (e.g., Barlow, 1986; Janssen et al., 2000), given their reported difficulty in adopting the negative schema. However, the fact that women's perceived ability to adopt both schemas was correlated with affect and sexual arousal in the expected direction runs counter to a distraction hypothesis.

The negative sexual schema was designed to reflect beliefs commonly reported by women in therapy for sexual dysfunction and the positive sexual schema was in direct contrast to these beliefs (e.g., Heiman, 2000). The results suggest that adopting a positive sexual schema can lead to greater subjective sexual arousal and vaginal response than a negative sexual schema, even if a woman experiences depressive symptoms. Certainly, this is not unlike some assignments in cognitive-behavioral therapy applied to depression, and it is useful to know that the effects of cognitions on sexual arousal can be quite immediate. The present study selected women who self-reported as sexually functional at screening, and thus, these effects may not apply to sexually dysfunctional women. It would be useful to explore the effects of sexual schemas on women with sexual dysfunction to evaluate how cognitive frameworks may contribute to their sexual difficulties and options for treatment.

Another possible explanation for the present findings is that the observed effects were due solely to manipulations of affect rather than to the schema adoptions. It is difficult to completely separate the effects of cognitions and affect in the present design, as the schemas had both elements embedded within them. According to the cognitive theory of depression, altering cognitions impacts affect and subsequent behavior because the meaning of the experience is being reconstructed (e.g., Beck et al., 1979). In the present study, we believe that manipulations of affect are potentially mediated by the

schema adoptions. Future research might explore the specific factors impacting sexual and affective responses and what is most likely to lead to immediate and long-lasting effects.

No main effects of mood were found on measures of sexual arousal or affect in the present study. The sexually relevant stimuli and experimentally adopted schema appeared to override mood effects in the present design. However, the lack of mood effects may be because the majority of women in the depressed mood group endorsed mild depressive symptoms. As depression worsens, individuals become more dominated by negative schemas and find it difficult to believe that their negative interpretations are erroneous (e.g., Beck et al., 1979). Therefore, women with more severe depression (and perhaps more negative sexual self-schemas) may be impacted differently by the sexual schemas when compared to women with normal or mildly depressed mood.

It is of note that there was no main effect for women's *pre-existing* sexual self-schemas on their sexual arousal and affect in this laboratory situation. This is in contrast with Andersen and Cyranowski's (1994) predictions that positive sexual self-schemas would have affect or emotion-regulating properties such that women would be more likely to experience positive emotions and/or sexual arousal with sexual experiences. One explanation for these contrasting findings is that pre-existing sexual self-schemas may determine how people see themselves on a day-to-day basis but not necessarily how they respond when involved in a specific sexual situation. In other words, a woman's sexual self-schema may determine whether or not she enters a sexual situation but not necessarily how she responds when in a situation where a sexual stimulus (e.g., erotic video) is provided. Another possibility is that the women in the present study tended toward higher self-schemas in general than the women in Andersen and Cyranowski's (1994) validation study. In fact, the mean sexual self-schema scores of women in both the positive and negative sexual self-schema groups in the present study were one standard deviation higher than in the original study. This is not surprising given that these were all sexually healthy women who volunteered to participate in a sexual arousal study. Perhaps this is more evidence that women with higher sexual self-schemas are more likely to enter (potentially) sexual situations. Nonetheless, the experimentally adopted positive and negative schemas had a significant impact on subjective sexual arousal and positive affect independent of pre-existing self-schemas. As an information processing model might suggest (e.g., Janssen et al., 2000), perhaps experimentally adopted schemas influence women's appraisal of sexual stimuli and possibly override the memory

systems that include women's pre-existing self-schemas (at least in the short term), which in turn, affects their attentional processing and sexual arousal and affective responses. It is unknown, however, how long these effects would continue beyond the immediate laboratory context. The endurance of effects is a topic for future study and of clinical interest.

There are several limitations with respect to interpreting the results of this study. The sample consisted of volunteers who self-selected to participate in a study on sexuality. Given that volunteer bias has been found in studies involving sexuality (Wolchik, Braver, & Jensen, 1985), the generalizability of these results to a larger population of women is unknown. In addition, the depressed mood sample was restricted to the mild-moderate range of depressive symptoms. Further, it is possible that more significant effects of the schema adoptions were not found because of our conservative approach to address the large number of analyses conducted and our relatively small sample size. And, although no performance requirement was implied during the schema inductions, it is possible that demand characteristics may have impacted participants' sexual and affective responses. As it is difficult to know from the present investigation whether or not the instructions to "release the sexual identity" were effective, it might be useful to separate the schema adoption periods into two different data collection sessions to reduce any potential residual effects of the previous schema adoption and possible carry-over effects on the post-test questionnaires from repeating them over a short period of time. In addition, the between-groups results on vaginal response should be regarded cautiously given that VPA is a relative measure with no absolute zero-point; however, between-groups differences may be interpreted in terms of patterns of response. Finally, because this study took place in a laboratory setting, it did not examine sexuality in the context of relationships, which is likely to be a source of important contributing information.

In spite of these limitations, the present study offers a unique exploration of mood and sexuality in women in an experimental setting. It suggests the power of an "acute dose" of experimentally adopted cognitive sexual schemas in the presence of erotic stimuli on subjective sexual arousal, vaginal response, and affect. It also indicates that women with milder levels of depressed mood suffer from selective sexual problems (i.e., lower desire) that are likely to impact their relationships, which may further impact their mood and sexuality. It is important to understand the impact of depression itself on sexual functioning in order to improve our ability to assess the effects or side effects of treatment, especially as sexual side effects contribute to medication noncompliance. It would be useful to explore

the effects of schemas on women with sexual dysfunction and/or moderate to severe levels of depression in order to deepen our understanding of the relationship between mood and sexuality and to develop effective treatments for these life-impacting disorders.

#### **APPENDIX A: SCHEMA INDUCTION INSTRUCTIONS**

In a moment, you will hear several statements. Imagine that they describe you and your sexuality, whether or not they are actually true for you at the moment. Listen to these descriptions, and allow yourself to believe that they are true for you. Imagine they describe you. Let yourself “try on” the identity and make these statements about you. As you hear each statement, just try to absorb it. Listen to the words, and let yourself become the person described. If you get distracted, bring your mind back to the content and continue to let yourself listen to, absorb, and take on the identity.

#### **APPENDIX B: POSITIVE SCHEMA SCRIPT**

You like your sexuality a lot. Sex is a very important part of your life. As a sexual person, you are comfortable with your sexual desire. You like to initiate sex, and you enjoy sexual feelings. You are easily aroused and respond quickly to sexual caresses. You like how your body feels when you are aroused and you look forward to how your body will respond physically. You enjoy the feeling of being “turned on.” You enjoy being touched and having your genitals touched. You get a lot of pleasure from having sex, and you become quickly excited in sexual situations. You are uninhibited during sex, and you feel you can really let go sexually. Your orgasms are strong and satisfying. You like the way you express yourself sexually, and you feel good about your sexual sense of who you are. (Pause) Try to keep this sense of yourself in mind as you watch the following video.

#### **APPENDIX C: NEGATIVE SCHEMA SCRIPT**

You do not like your sexuality. Sex is not very important in your life. You are not a particularly sexual person, and you don’t really enjoy sex. You have little sexual desire, and you almost never initiate sex. It is difficult for you to become aroused. Your body takes a long time, and you don’t like how it feels when you actually do get aroused. You are afraid of how your body will

respond physically. You don’t like the feeling of being “turned on.” You don’t enjoy being touched or having your genitals touched. Sex gives you little pleasure, and you are tense in sexual situations. During sex, you hold back, and you really can’t let go. You have trouble having orgasms, and they are unsatisfying. You find it difficult to express yourself sexually and you are uncomfortable with your sexual sense of who you are. (Pause) Try to keep this sense of yourself in mind as you watch the following video.

#### **APPENDIX D: SCRIPT FOR RELEASING ADOPTED SEXUAL SCHEMA**

Now, release the sexual identity that you just tried on. Take a moment to relax and allow these images to fade away. Just clear your mind, take a few slow, deep breaths and relax.

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