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The effects of self-focused attention, performance demand, and dispositional sexual self-consciousness on sexual arousal of sexually functional and dysfunctional men

Jacques J.D.M. van Lankveld*, Marcel A. van den Hout, Erik G.W. Schouten

Department of Medical, Clinical and Experimental Psychology, Academic Hospital Maastricht, Maastricht University, P.O. Box 5800, 6202 AZ Maastricht, The Netherlands

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Abstract

Sexually functional ($N = 26$) and sexually dysfunctional heterosexual men with psychogenic erectile disorder ($N = 23$) viewed two sexually explicit videos. Performance demand was manipulated through verbal instruction that a substantial genital response was to be expected from the videos. Self-focused attention was manipulated by introducing a camera pointed at the participant. Dispositional self-consciousness was assessed by questionnaire. Performance demand was found to independently inhibit the genital response. No main effect of self-focus was found. Self-focus inhibited genital response in men scoring high on general and sexual self-consciousness traits, whereas it enhanced penile tumescence in low self-conscious men. Inhibition effects were found in both volunteers and patients. No interaction effects of performance demand and self-focus were found. Subjective sexual arousal in sexually functional men was highest in the self-focus condition. In sexually dysfunctional men, subjective sexual response proved dependent on locus of attention as well as presentation order.

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1. Introduction

Recent conceptualizations of the pathogeny and maintenance of male erectile disorder have emphasized the significance of cognitive factors (Barlow, 1986; Bruce & Barlow, 1990;

* Corresponding author. Fax: +31-43-3875682.

E-mail address: j.vanlankveld@dep.unimaas.nl (J.J.D.M. van Lankveld).

Cranston-Cuebas & Barlow, 1990; Janssen, Everaerd, Spiering, & Janssen, 2000; Sbrocco & Barlow, 1996). Specifically, attentional phenomena (Abrahamson, Barlow, Sakheim, Beck, & Athanasiou, 1985; Dekker & Everaerd, 1988; Geer & Fuhr, 1976) and performance demand, evoking performance anxiety, have been hypothesized to exert a strong influence on genital sexual responses to erotic stimulation in men. Sexually dysfunctional men are viewed as inclined to direct too much of their attention to bodily sensations (Bruce & Barlow, 1990) and to have become ‘spectators’ of their own sexual functioning (Masters & Johnson, 1970). They are also held to be preoccupied with normative cognitions concerning their sexual performance, which may distract them from attending to erotic cues. This processing of ‘task-irrelevant’ information (Barlow, 1986) may not only absorb an essential part of the limited central brain capacity that is needed to process sexual stimuli, but it may also access worry-related associative networks in memory and thus generate anxious and depressive affect, counteracting the deployment of the genital response (Barlow, 1986; Bruce & Barlow, 1990). In addition, the interaction of performance demand and self-focusing of attention might enhance or limit their independent influences. The social psychology literature has extensively documented the interaction effects of performance demand and self-focused attention on cognitive task performance. Tasks such as copying text in a foreign language and social interaction were impaired during self-focused attention, but only under performance demand conditions (e.g., Burgio, Merluzzi & Pryor, 1986; Liebling & Shaver, 1973; Panayiotou & Vrana, 1998; but see Bögels, Rijsemus & de Jong, 2002). In a more recent extension of Barlow’s cognitive model of sexual dysfunction, Sbrocco and Barlow (1996) incorporated aspects from self-regulation theory (cf. Scheier & Carver, 1988) and more specifically predicted the interaction effect of performance demand and self-focused attention. They hypothesized that men with and without experiences of erectile failure react differently to perceived discrepancy between their actual level of erection and the level they consider appropriate. Sexually dysfunctional men evaluate themselves as unable to improve or adjust their level of arousal and are inclined to disengage from further effort, whereas functional men view themselves as capable of attaining a desired level of genital arousal and, therefore, remain engaged in their task of reducing the discrepancy. In this model, performance demand serves to set high standards of performance, while self-focused attention enhances the individual’s monitoring of (changes in) the discrepancy between actual and normative level of functioning. With both factors absent, no such discrepancy will arise. When either performance demand or self-focused attention is induced, they will interact with already present propensities of dysfunctional males for performance demand and self-focus. When both performance demand and self-focused attention are induced, the full-blown effect of their interaction can be expected to ensue.

The investigation of performance demand and self-focused attention may have important implications for clinical practice. Current psychological treatment for erectile dysfunction comprises cognitive-behavioral interventions, that are held to address performance anxiety and problems with non-erotic attentional focus (Everaerd & Dekker, 1985; Everaerd et al., 1982; Masters & Johnson, 1970). Effect studies have indicated reliable positive outcome of cognitive-behavioral approaches for male erectile disorder (see Heiman & Meston, 1999). Psychological treatment might further be enhanced by parsing the composite effects of therapy into its effective ingredients. Below, we will review the experimental evidence of the effects of performance demand and attentional focus on sexual responding, either alone or in interaction.

Performance demand effects on sexual responding have been examined using different experimental paradigms. Among these were threat of electrical shock, to be administered if the subject would not reach a certain level of genital response during erotic stimulation (Beck & Barlow, 1986; Barlow, Sakheim, & Beck, 1983), explicit instruction to become genitally aroused (Heiman & Rowland, 1983; Lange, Wincze, Zwick, Feldman, & Hughes, 1981), and implicit demand induction, either by drawing attention to the high sexual arousal of the female actor in the erotic video, while identifying with the male actor (Beck, Barlow, & Sakheim, 1983), by telling subjects that most fellow subjects show high levels of genital arousal in the same laboratory conditions (Farkas, Sine, & Evans, 1979), or by instructing subjects to rate the level of their erection against a full erection, while their actual level of penile tumescence was fed back to them by video-monitoring (Abrahamson, Barlow, & Abrahamson, 1989). The emergent picture from these studies of the impact of performance demand on male genital sexual arousal remains inconsistent.

Sexually functional males showed increased penile responses under performance demand conditions in some studies (Abrahamson et al., 1989; Barlow et al., 1983; Beck et al., 1983; Heiman & Rowland, 1983), whereas other studies found no demand effect (Lange et al., 1981), or decreased genital response (Beck & Barlow, 1986). Farkas et al. (1979) found no main effect of performance demand, but an interaction of performance demand with (neutral) distraction, with performance demand increasing the genital response during distraction, but inhibiting genital response when subjects were undistracted.

Performance demand effects in sexually dysfunctional men were investigated in a series of studies of Barlow and co-workers (Beck & Barlow, 1986; Beck et al., 1983; Beck, Barlow, Sakheim, & Abrahamson, 1987). When demand was induced by means of shock threat on sub-average genital response, genital responding was either unaffected (Beck & Barlow, 1986), or diminished (Beck et al., 1987). Demand induced by video-feedback of their erectile response also resulted in decreased erection in dysfunctional men (Abrahamson et al., 1989). An interaction effect with attentional focus was found by Beck et al. (1983). When the subject was instructed to identify with the male actor in an erotic film, while the female co-actor was depicted as highly sexually aroused, this resulted in increased genital arousal when the subject was instructed to focus his attention on himself, but in decreased genital response under partner focus.

Experimental design differences may partially explain these discrepant findings. The predicted decreasing effect of demand on arousal was absent in studies performing within-subjects comparisons of demand and non-demand (Beck et al., 1983; Heiman & Rowland, 1983; Lange et al., 1981). This design entails the risk of carry-over effects resulting in smaller between-condition differences. Of studies that found an impeding effect of performance demand on genital arousal in sexually functional men, one had a between-subjects design (Farkas et al., 1979), and one had a within-subjects design (Beck & Barlow, 1986). In the present study, therefore, it was decided to test the effects of performance demand in a between-subjects design to avoid the carry-over effect.

As to self-focused attention, this was found not to affect the genital response in both sexually functional (Beck & Barlow, 1986; Beck et al., 1983; Lange et al., 1981) and dysfunctional men (Beck et al., 1983) when presented with a highly arousing sexual stimulus. In sexually functional men, self-focus appeared to decrease the genital response to a low-intensity sexual stimulus in some studies (Sakheim, Barlow, Beck, & Abrahamson, 1984; Wincze, Venditti, Barlow, &

Mavissakalian, 1980). The Beck et al. (1983) study, in contrast, found a stimulating effect of self-focus when presented with a low arousal stimulus in both sexually functional and dysfunctional men. Self-focus was induced in these studies by allowing subjects to view their genital area during visual erotic stimulation, whereas it was covered in the non-self-focus condition (Sakheim et al., 1984), or by instructing subjects to self-monitor their penile tumescence (Beck & Barlow, 1986; Beck et al., 1983; Lange et al., 1981; Wincze et al., 1980).

Two studies have directly investigated the interaction effect of self-focus and performance demand on the genital response (Beck & Barlow, 1986; Lange et al., 1981), and found no main effects or interaction effects in functional males. Both studies performed within-subjects comparisons for performance demand conditions, with the before-mentioned risk of a carry-over effect obscuring between-condition differences. Moreover, it is questionable whether the non-demand instruction in one study, to explicitly not focus on obtaining an erection (Lange et al., 1981), could succeed in diminishing performance demand, in view of empirical findings regarding thought suppression (Wegner, 1989). Furthermore, the self-focus manipulation in this study may have not been sufficiently powerful, since the induction of self-focused attention by having subjects operate a subjective lever was found to impede erection only at low intensity of sexual stimulation (Sakheim et al., 1984; Wincze et al., 1980).

In the present study, we readdress the independent and interaction effects of performance demand and self-focused attention on sexual arousal. An attempt is made to clarify the inconsistent findings from previous work by testing the effect of performance demand in a between-subjects design, and by choosing an operationalization of self-focused attention in line with the more consistent findings of the interaction effects of performance demand and self-focus in the experimental social psychology literature.

Furthermore, the effect of self-focused attention might be moderated by dispositional self-consciousness characteristics. Previous work in social psychology has shown interaction effects of state and trait aspects of self-focus on task performance (cf. Fenigstein & Abrams, 1993; Kimble, Hirt, & Arnold, 1985). For this purpose, the trait characteristics of private and public self-consciousness, and social anxiety (Fenigstein, Scheier, & Buss, 1975; Quadland, 1980), and of self-consciousness dimensions specifically related to sexuality (Hendriks, 1997) were selected.

As to subjective sexual arousal, Farkas et al. (1979) found no effect of performance demand in functional men. Heiman and Rowland (1983) also reported a null effect of performance demand in combination with self-focused attention on subjective arousal. Irrespective of condition, dysfunctional males reported less subjective arousal, compared with functional males. On the other hand, self-focus induced by an instruction to monitor penile tumescence has been found to result in higher subjective arousal for functional men, whereas dysfunctional men remained unaffected (Beck & Barlow, 1986). In the present study, subjective sexual arousal will also be investigated.

1.1. Summary of hypotheses

1. Performance demand and self-focus will have independent, impeding effects on genital response to erotic stimulation.
2. An interaction effect on the genital response to erotic stimulation will be found between self-focus and performance demand. When self-focus and performance demand are combined,

the genital response will be lower than when self-focus and performance demand are induced separately or when both are absent.

3. The interactive effects of self-focus and performance demand will occur only in, or will be larger in males who suffer from erectile dysfunction.
4. An interaction effect on genital reactivity will be found between dispositional self-consciousness dimensions on the one hand, and momentarily induced performance demand on the other. Such an effect is also expected of dispositional self-consciousness dimensions and self-focus. The impeding effects of self-focus and performance demand will be augmented in subjects with high scores on the respective dispositions.
5. Subjective sexual arousal in response to erotic stimulation will remain unaffected by the induction of performance demand.
6. The induction of self-focus will enhance subjective arousal in sexually functional participants, whereas sexually dysfunctional participants will remain unaffected.

2. Methods

2.1. Design

The study had a mixed between/within-subjects design. Between-subjects conditions were clinical status (sexually functional vs. dysfunctional males) and performance demand vs. non-demand. Participants within each clinical status group were randomly assigned to performance demand conditions. A within-subjects comparison was made of self-focus vs. non-self-focus. All participants underwent both the self-focus and the non-self-focus procedure. The order of both conditions was counterbalanced within the four cells of the between-subjects conditions (performance demand and clinical status).

2.2. Participants

Sexually functional participants ($N = 26$) were recruited through media advertisements. Sexually dysfunctional participants ($N = 26$) were recruited in the hospital's sexology and urology departments, as well as through media advertisements. The advertisements invited healthy men of 25 years and older, with and without erectile difficulties. The text further announced the assessment of physical sexual functioning and subjective sexual arousal during audiovisual erotic stimulation, and guaranteed privacy. The presence or absence of erectile dysfunction was assessed by means of sexual history taking. Only men with psychogenic erectile disorder meeting the DSM-IV criteria were included in the dysfunctional group. The recent occurrence of good erections upon awakening or during masturbation was considered sufficient evidence of the psychogenic nature of the problem (Everaerd, 1993). If the applicant reported having had no erections in the recent past, major biological causes were examined through waking erectile assessment using penile Doppler ultrasonography during visual erotic stimulation. As a cut-off rule, a maximum arterial velocity of 25 cm/s was used (Allen, Engel, Smolev, & Brendler, 1994; Althof & Seftel, 1995). Applicants for participation in the study were screened by means of

sexual history taking for exclusive or predominant heterosexual orientation. Men with premature ejaculation were excluded from the sexually dysfunctional sample because of possible differences in etiology between men with exclusive erectile disorder and men with both erectile disorder and premature ejaculation (Rowland, Cooper, & Slob, 1996). Persons were excluded in case a diagnosis was established of current major depression or psychotic disorder (Araujo, Durante, Feldman, Goldstein & McKinlay, 1998; Kockott & Pfeiffer, 1996; Mitchell, DiBartolo, Brown & Barlow, 1998; Schreiner-Engel & Schiavi, 1986), assessed by structured interviewing using the Composite International Diagnostic Interview (WHO, 1990). The CIDI is not suitable to assess DSM-IV diagnoses of erectile dysfunction and premature ejaculation. All participants were paid NLG 50 (US\$ 20) for their participation.

2.3. Assessment

2.3.1. Physiological recordings

An electromechanical strain gauge was used for penile circumference measurement (Barlow, Becker, Leitenberg, & Agras, 1970), connected to a BIO2 high sensitivity bio-amplifier (Pyslab; Contact Precision Instruments) and an IBM-compatible computer. The DC signal recorded changes in mV electrical output caused by penile circumference change. The participants were instructed to position the gauge on the midsection of the penile shaft with the gauge part at the dorsal side of the penis. The gauge was sterilized in ethanol 70% during 10 min before every usage, after 30 min soaking and brushing in a solution of water and antibacterial soap. Calibration was performed after every session using a round calibration device, with eight subsequent steps of 5-mm circumference increase, ranging from 95 to 130 mm.

2.3.2. Subjective measure of sexual arousal

It was decided to use real-time measurement of subjective sexual arousal. Wincze et al. (1980) found that real-time, continuous monitoring of experienced sexual arousal only interfered with genital arousal at low levels of sexual stimulation. Continuous monitoring has been repeatedly employed in psychophysiological studies of male sexual arousal (Abrahamson et al., 1989, 1985; Farkas et al., 1979). The participants received instructions to use the rotating dial of a potentiometer that was mounted on a small plastic box and could be moved through an 180° arc along a sliding scale to indicate their subjectively experienced sexual arousal. The box was mounted on the right hand armrest. The signal produced by the potentiometer was calibrated to a linear 0–100 scale, with 0 indicating absence of arousal and 100 indicating maximum subjective sexual arousal.

2.3.3. Trait characteristics

2.3.3.1. *Self-Consciousness Scale.* The Self-Consciousness Scale (SCS; Fenigstein et al., 1975) contains subscales measuring the traits of private self-consciousness (scoring range: 0–40), public self-consciousness (scoring range: 0–28), and social anxiety (scoring range: 0–24). It has 23 items with 5-point scales (scoring range: 0–4) and is validated for use in the Netherlands (Vleeming & Engelse, 1981).

2.3.3.2. *Sexual Self-Consciousness Scale.* The Sexual Self-Consciousness Scale (SSCS) was developed in Maastricht and purports to measure aspects of self-consciousness with regard to

sexuality and sexual functioning (Hendriks, 1997). The questionnaire contains 14 items with 5-point answering scales (scoring range: 0–4), of which the wording closely resembles that of the items of the Self-Consciousness Scale. The Sexual Self-Consciousness Scale has been submitted to a preliminary psychometric evaluation (Hendriks, 1997). In a population of university personnel, 86 persons (42 women, mean age 35.6 years; 44 men, mean age 37.6 years) completed questionnaires. Principal components analysis with oblimin rotation revealed four factors with eigenvalues >1.0 , together accounting for 64% of the variance. However, items were assigned to only three subscales termed ‘sexual anxiety and discomfort’, ‘sexual private self-consciousness’, and ‘sexual public self-consciousness’ for interpretation reasons. Subscale scoring range is 0–24. Overall internal consistency of the subscales was found satisfactory, with, respectively, Cronbach’s $\alpha = 0.85$ for *sexual anxiety and discomfort*, $\alpha = 0.78$ for *sexual private self-consciousness*, and $\alpha = 0.78$ for *sexual public self-consciousness*. Internal consistency differed only slightly across genders. For *sexual anxiety and discomfort*, Cronbach’s α (♂) = 0.76, whereas α (♀) = 0.86. For *sexual private self-consciousness*, α (♂) = 0.78, and α (♀) = 0.78. For *sexual public self-consciousness*, α (♂) = 0.82, whereas α (♀) = 0.77. Four items contributed to two factors and were subsequently used to calculate the respective subscale scores. As to its construct validity, subscale scores on the sexual self-consciousness scale were tested against the hypoactive sexual desire subscale of the questionnaire for screening sexual dysfunctions (Vroege, 2003; Vroege, Zeijlemaker, & Scheers, 1998). In males, sexual private self-consciousness correlated negatively with problems of hypoactive desire ($r = -0.37$; $p < 0.01$), suggesting that increased sexual private self-consciousness decreased male desire problems. In females, sexual anxiety and discomfort correlated positively with hypoactive sexual desire ($r = 0.53$; $p < 0.001$), indicating that sexual anxiety and discomfort was higher in women with hypoactive sexual desire problems.

2.3.3.3. Questionnaire for the screening of sexual dysfunction. A 10-item version of the Vragenlijst voor het Signaleren van Seksuele Disfuncties (Questionnaire for screening Sexual Dysfunctions (QSD); Vroege et al., 1998) was employed to validate diagnostic classification. It contains five questions concerning masturbatory sexual activity and five questions concerning sexual interaction with partner. With respect to each sexual situation, three questions were asked regarding erectile functioning (problems with not achieving erection at all, with attaining full penile rigidity, and with maintenance of rigidity). Two questions were asked regarding premature ejaculation (problems with ejaculating faster than one desired and with ejaculating almost immediately upon onset of sexual stimulation). For every problem aspect, both estimated frequency and level of associated distress were reported using 5-point Likert scales. Anchor points used were ‘almost never’ and ‘always’ for frequency and ‘no trouble’ and ‘very much trouble’ for associated distress.

2.4. Procedure

The subjects were tested individually. Upon arrival at the laboratory, the research assistant carefully explained the experimental procedure with sufficient detail to enable an informed decision of the participant. The experimental room and the measurement device were shown. Placement of the mechanical strain gauge was explained, including the midshaft positioning

with the gauge part at the dorsal side of the penis. An informed consent text was read and signed. The experimental room measured 3×2 m and was furnished with a comfortable recliner chair, a TV set, an intercom set, two loudspeakers over which prerecorded instructions were delivered, and the necessary measurement equipment. It was dimly lit during the entire session. The assistant left the room and subsequent contact was conducted over an intercom to assure privacy. The participant removed his clothing as far as necessary and was seated in the recliner chair. The participant positioned the penile gauge himself for maximum privacy and was asked to cover his lower body with a textile cover that he could find next to his chair. The assistant explained the use of the rotating dial to indicate subjective sexual arousal. Then the experimental procedure began. The first 5 min were considered an adaptation period. During this period, quiet music was played. During the next 60 s a penile circumference baseline was established. After baseline measurement, two stimuli of 5 min duration were presented. Between stimulus presentations, a rest period allowed the participant's arousal to return to baseline. The duration of the rest period was at least 2 min but it was prolonged when necessary until baseline arousal level was reestablished. Following the resting period after the first stimulus presentation, a second 60 s prestimulus baseline measurement was performed.

2.5. *Experimental conditions*

2.5.1. *Performance demand*

Performance demand was induced by giving a prerecorded instruction via intercom to participants at the beginning of the stimulus presentations. It was modeled after [Panayiotou and Vrana \(1998\)](#) to suggest that a high level of genital arousal under these circumstances is commonly expected. The verbal instructions participants received were: "I will be checking on the level of erection that you attain to evaluate your performance. We would like you to know that most men get at least a 60% erection in response to the films you are about to see." In the non-performance demand condition, no instruction regarding the expected level of erection was given.

2.5.2. *Self-focus*

Self-focus was induced before the start of an erotic film segment by switching on a red light on a TV camera in the experimental room. The research assistant who entered the experimenting room after having announced his entry over the intercom did this in such a way that the participant was very well able to witness this act. The camera was placed at a distance of approximately 200-cm from the participant's seat. The camera was in a stationary position about 80 cm from the right side of the TV screen through which the erotic stimuli were presented. The lens of the camera was then turned towards the participant in a conspicuous manner, pointing at the participant's face and upper body. Additionally, the research assistant verbally gave the following instruction: "the instrument measuring your erection is very sensitive. Therefore it is necessary that you sit as still as possible. We are going to be observing you from the next room using this camera in order to make sure that you don't engage in excessive movements during the experiment" (see [Panayiotou & Vrana, 1998](#)). When the self-focus condition preceded the non-self-focus condition, the latter was induced by switching off the red light on the TV camera, turning the lens away from the participant, and the verbal statement of

the assistant, that the camera had been switched off because further checking on excessive movements was no longer required. If the non-self-focus condition preceded the self-focus condition, the camera position was left unchanged, pointing away from the participant, with the red light off, and no reference to it was made by verbal instruction. The presenting order of self-focus and non-self-focus, and the order of the erotic film segments was counterbalanced in both groups of participants.

2.5.3. *Stimulus materials*

Sexual stimuli were two selected parts of erotic color films with sound lasting 5 min, presented on a color TV monitor with a diagonal screen width of 60 cm placed at a distance of approximately 200 cm (visual angle of 17°). Although the actors in both films were different, the films were selected to be comparable in erotic intensity, depicting explicit heterosexual acts of foreplay, fellatio, cunnilingus, and intercourse.

2.6. *Data reduction and analysis*

The data were sampled by an IBM-AT computer for offline analysis. Physiological recordings were stored after conversion from mV to millimeter circumference change, based on the individual post-session calibration data. Data were averaged to provide one measurement for every epoch of 10 s duration. The difference between prestimulus baseline circumference and circumference during erotic stimulus presentation provided a measure of genital reactivity. Epochs were used from the time window of 60 s through 300 s after the start of stimulus presentation. The first 60 s were not included in the analysis to skip the initial phase of response deployment that is reported to even entail a decrease in penile circumference in spite of a total increase in penile volume (Janssen et al., 2000). Subjective data were also averaged for every 10 s epoch. All epochs from stimulus onset through the entire 5 min stimulus period were included for the calculation of subjective response, because substantial delay in the deployment of the subjective response cannot be assumed from the literature. Prior to analysis, data from the rotating dial for the indication of participants' subjective sexual arousal were examined for continuity, dimensionality and normality within clinical status groups (sexually functional vs. dysfunctional men) and conditions of performance demand vs. non-demand. Distributions were all found to be unimodal, and skewness and kurtosis were within acceptable ranges.

Data were analyzed with the use of univariate statistics and the SPSS MANOVA program (Norušis, 1994). Wilks' criterion was employed. Also multilevel analyses were performed, with the repeated measures at level one, and persons at level two (with the use of MLwiN version 1.10.0007; Rasbash et al., 2001). For estimating the effects, the RIGLS-algorithm was employed. Before performing these analyses, the data sets were screened for missing data, multivariate outliers, and other assumptions for multivariate analysis with SPSS FREQUENCIES, MULTIPLE LINEAR REGRESSION, and SCATTERPLOT. Multivariate outliers were deleted when their Mahalanobis distance proved greater than the critical value at $\alpha = 0.001$ after performance of multiple linear regression (Tabachnick & Fidell, 1996). No threats to the assumptions for multivariate analysis were found.

In analyses including scores on the sexual self-consciousness questionnaire, total N was reduced to 47 with the deletion of two cases with missing values.

3. Results

3.1. Subject characteristics

As a result of the loss of data of three participants, due to computer failure, data of 23 sexually dysfunctional men and 26 sexually functional men were available for analysis. One sexually functional participant wanted to end his participation after viewing the first erotic video because he found it repulsive, and was replaced with another applicant. Demographic characteristics are shown in Table 1. Sexually dysfunctional men were found to be older than functional men ($t(47) = 2.60$; $p < 0.05$). To adjust the data for age effects, this was entered as a covariate in subsequent analyses. Other demographic group characteristics were not significantly different. Several sexually functional participants had participated in previous research projects for reasons of curiosity, or for the monetary rewards that participation brought in. Several of them had also been serving as demonstration patients in skills training programs for medical and psychology students. All subjects had seen erotic videos before. QSD data were reduced by performing principal component factor analysis with varimax rotation on the pool of frequency ratings and ratings of problem associated distress. Six orthogonal factors with eigenvalues >1 were extracted, together explaining 88.2% of the total variance. Factor scores were saved as variables. The factors concerning erectile functioning were found to significantly differentiate between functional and dysfunctional participants, thus confirming diagnostic allocation based on sexual history taking (QSD-ED Rigidity: $t(24) = 1.95$, $p = 0.06$; QSD-ED with partner: $t(24) = 5.49$, $p < 0.001$; QSD-ED Distress: $t(28) = 2.41$, $p < 0.05$). Factors representing problems with premature ejaculation were found not to differentiate between functional and dysfunctional participants (QSD-PE masturbation: $t(23) = 0.61$, $p > 0.05$; QSD-PE during masturbation and sexual interaction with partner: $t(24) = 1.04$, $p > 0.05$; QSD-PE during sexual interaction with partner: $t(26) = 1.73$, $p > 0.05$).

3.2. Randomization test

Randomized groups of participants allocated to either performance demand manipulation or non-demand were examined for baseline differences regarding demographic features and baseline sexual arousal data. No differences in demographics were observed. Sexual functioning scores with regard to experienced distress with erectile problems during masturbation (QSD-ED distress) proved to differentiate between performance demand and non-demand groups ($t(47) = 2.54$, $p < 0.05$). Participants in the non-demand condition had higher distress scores on this factor (mean (M) \pm standard error of the mean (S.E.): 8.5 ± 1.5) than participants in the performance demand condition (M \pm S.E.: 3.6 ± 1.5). Strain gauge baseline data for demand vs. non-demand groups were found not to differ. To adjust the data for the QSD-ED distress imbalance, the scores on this variable were entered as a covariate in subsequent analyses.

3.3. Between-group differences in dispositional self-consciousness

Because subscales of the employed dispositional measures were found to be significantly inter-correlated in prior work (Hendriks, 1997), a one-way MANOVA was performed with six depen-

Table 1
Demographic and psychological characteristics of sexually functional and sexually dysfunctional males

Characteristic	Sexually functional	Sexually dysfunctional
<i>N</i>	26	23
Age		
M	47.9 ^a	55.7 ^a
SD	11.4	9.1
Education (years)		
M	14.5	12.9
SD	5.1	5.2
Marital status (%)		
Married	35	48
Widower	0	4
Separated/divorced	27	39
Single	31	9
Steady partner	8	0
Currently cohabitating (%)	54	52
Currently has paid job (%)	65	57
Self-Consciousness Scale (SCS)		
<i>Private self-consciousness</i>		
M	20.4	22.5
SD	8.3	5.9
<i>Public self-consciousness</i>		
M	15	16.0
SD	5.3	5.3
<i>Social anxiety</i>		
M	8.8	10.2
SD	5.0	6.5
Self-Consciousness Scale in Sexual Situations (SCS-SS)		
<i>Anxiety/discomfort in sexual situations</i>		
M	5.8 ^b	12.1 ^b
SD	5.0	6.1
<i>Sexual private self-consciousness</i>		
M	12.2 ^a	15.5 ^a
SD	5.8	4.5
<i>Sexual public self-consciousness</i>		
M	7.7 ^b	13.0 ^b
SD	5.0	5.3
Questionnaire for screening sexual dysfunctions (QSD)		
Problem with penile rigidity	−0.29 ^a	0.34 ^a
Erectile problem with partner	−0.59 ^b	0.70 ^b
Distress with erectile problem in masturbation	−0.31 ^a	0.37 ^a
Almost immediate ejaculation in masturbation	−0.08	0.09
Premature ejaculation with masturbation and partner	−0.13	0.15
Premature ejaculation with partner	−0.22	0.26

Note: Unless indicated by superscripts, comparisons are non-significant.

^a Univariate differences between sexually functional and sexually dysfunctional males were significant (p two-tailed < 0.05).

^b Univariate differences between sexually functional and sexually dysfunctional males were significant (p two-tailed < 0.001).

dent variables: scores on the three subscales of the Self-Consciousness Scale and on the three subscales of the sexual self-consciousness scale. Independent variable was clinical status (sexually functional or dysfunctional). Total N was 47, with 25 functional males and 22 dysfunctional males. The combined dependent variables were significantly different for clinical status, $F(6, 40) = 3.50$, $p < 0.01$. The association between clinical status and scores on the combined dependent variables (subscales of the self-consciousness scale and sexual self-consciousness scale) was of medium strength ($\eta^2 = 0.34$). In subsequent univariate analyses, the groups did not differ with respect to subscale scores on the self-consciousness scale (private self-consciousness: $F(1, 45) = 0.98$, $p > 0.05$; public self-consciousness: $F(1, 45) = 0.42$, $p > 0.05$; social anxiety: $F(1, 45) = 0.68$, $p > 0.05$). Significant differences were found on all three subscales of the sexual self-consciousness scale. Compared with functional participants, the dysfunctional participants had higher sexual private self-consciousness scores in sexual situations ($F(1, 45) = 4.68$, $p < 0.05$), higher sex related anxiety scores ($F(1, 45) = 15.08$, $p < 0.001$), and higher scores on the sexual public self-consciousness subscale ($F(1, 45) = 12.55$, $p < 0.001$). However, after Bonferroni correction, only scores on the latter two subscales remained significantly different.

3.4. Concordance of genital and subjective arousal data

The matrix of bivariate correlations of mean physiological and mean subjective data revealed strong associations between, on the one hand, genital response under different experimental conditions in both groups of participants ($r = 0.51$; $r = 0.52$; both $p < 0.05$), and, on the other, between subjective response under these conditions (ranging from $r = 0.66$ to $r = 0.85$; all $p < 0.001$). Correlations between genital and subjective responses, however, ranged from $r = -0.27$ to $r = 0.34$ but concordance was significant only in the non-self-focus condition when both groups were combined ($r = 0.30$, $p < 0.05$). Separate statistical analyses of the results for genital recordings and subjective sexual arousal were therefore considered appropriate.

3.5. Order effects

To evaluate a possible order effect of the two erotic stimulus presentations, a check was performed on genital and subjective data by means of multilevel analysis with group (functional vs. dysfunctional), performance demand (non-demand vs. demand), self-consciousness, and order of stimulus presentation as between-subjects variables and self-focus (non-self-focus vs. self-focus) as within-subjects factor, while adjustment was made for age and QSD-ED Distress as covariates, and the linear and quadratic form of the covariate time (epoch-number at each presentation). A mixed-effects model was used, with a random intercept and random slope effects, i.e. self-focus and the linear and quadratic form of the covariate time. Dependent variables were genital and subjective scores. No main effect of presentation order or interaction effects with presentation order was found with respect to genital physiological reactivity. A significant presentation order \times clinical status \times self-focus interaction effect was found on subjective arousal (Wald test: $z = 2.88$, $p < 0.01$). For the elaboration of this, see the results of testing hypothesis 6.

The choice for including the fixed and random effects of the linear and quadratic form of time is made on the basis of the following considerations. “The compound symmetry model is a very

restrictive model, and often an unlikely one. For example, if measurements are ordered in time, the correlation often is larger between nearby measurements than between measurements that are far apart. (...) There are various ways in which the assumption of compound symmetry (which states that the covariance matrix has constant variances and also constant covariances (...)) can be relaxed. In the hierarchical linear model framework, the simplest way is to include one or more random slopes in the model. This makes sense if there is some meaningful dimension, such as time, underlying the measurement occasions.” (Snijders & Bosker, 1999, p. 171); “Extensions to more than one random slope are obvious; e.g., a second random slope could be given to the squared value $(t - t_0)^2$. In this way, one can perform a *polynomial trend analysis* to improve the fit of the random part. This means that one fits random slopes for a number of powers of $(t - t_0)$ to obtain a model that has a good fit to the data and where unexplained differences between individuals are represented as random individual-dependent regressions of Y on $(t - t_0)$, $(t - t_0)^2$, $(t - t_0)^3$, etc.” (Snijders & Bosker, 1999, p. 172). “Further, if we assume that there are real differences across individuals in the polynomial coefficient, this variation should be distinguished from the sampling variation.” (Manor & Kark, 1996).

The fixed and random effects of the linear and quadratic form of the covariate time were significant, while those of the cubic form were not. The hereinafter shown Fig. 1 seems to be consistent with that with regard to the fixed parts.

4. Genital responding

To test the first hypothesis, multilevel analysis was performed with performance demand (non-demand vs. demand) as between-subjects factor and self-focus (non-self-focus vs. self-focus) as within-subjects factor, while adjustment was made for age and QSD-ED Distress as covariates. A mixed-effect model was used, with a random intercept and random slope effects for all within main effects, i.e. self-focus and the linear and quadratic form of the covariate time (epoch-number at each presentation). Dependent variable was penile circumference change score at each epoch during erotic stimulus presentation. A significant main effect of performance demand was found ($z = 2.32$; $p < 0.05$). Self-focus was found not to influence genital responding ($z = 0.44$; $p > 0.05$). This confirmed hypothesis 1 for the effect of performance demand, which was found to impede genital sexual responding, and for the effect of self-focus which was found not to affect genital responding.

Hypothesis 2 was disconfirmed. The performance demand \times self-focus interaction effect was not significant ($z = 0.79$; $p > 0.05$).

Hypothesis 3 predicted the interaction effect of performance demand and self-focus to be confined to sexually dysfunctional men. To test it, multilevel analysis was performed with performance demand (non-demand vs. demand) and clinical status (sexually functional vs. sexually dysfunctional) as between-subjects factors and self-focus (non-self-focus vs. self-focus) as within-subjects factor, while adjustment was made for age, QSD-ED Distress, and the linear and quadratic form of time as covariates. Dependent variable was penile circumference change score at each epoch during erotic stimulus presentation. No main effect or two-way or three-way interaction effects of clinical status were found with performance demand or self-focus, disconfirming the hypothesis. As shown in Fig. 1 for illustratory purposes, both sexually functional and

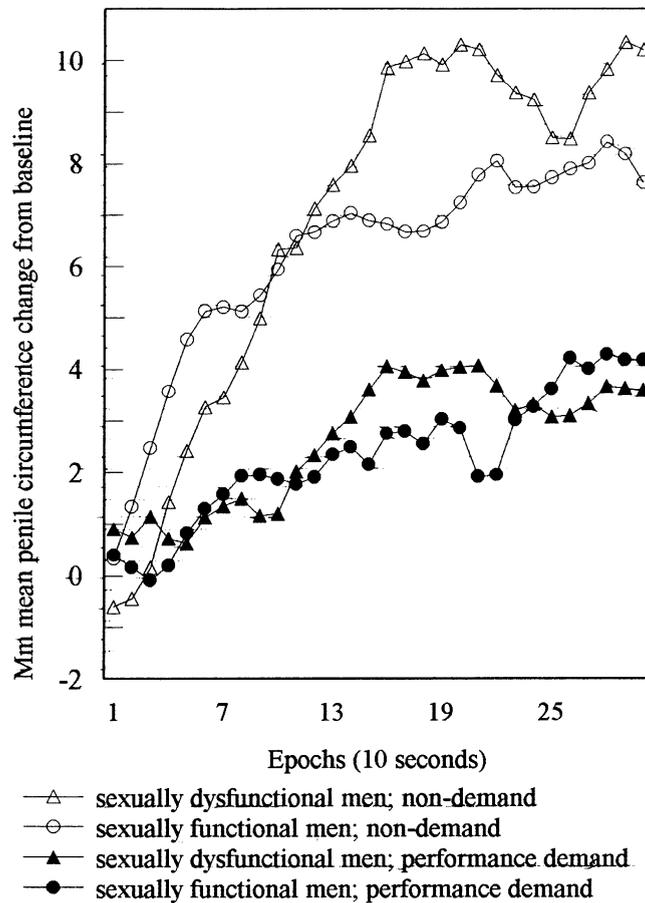


Fig. 1. Effect of performance demand on genital arousal.

dysfunctional participants responded with lower genital sexual arousal in the performance demand condition.

Hypothesis 4 predicted interaction effects of performance demand on one hand and dispositional self-consciousness aspects on the other. Such an interaction was also predicted of experimentally induced self-focus on one hand and dispositional self-consciousness aspects on the other hand. To test it, several multilevel analyses were performed with performance demand (non-demand vs. demand) and dispositional self-consciousness aspects as between-subjects factors and self-focus (non-self-focus vs. self-focus) as within-subjects factor, while adjustment was made for age, QSD-ED Distress, and the linear and quadratic form of time as covariates. Dependent variable was penile circumference change score at each epoch during erotic stimulus presentation.

The interactions of performance demand and dispositional self-consciousness aspects were not significant. A private self-consciousness \times self-focus interaction effect was found ($z = 2.20$; $p < 0.05$). Participants who were low on private self-consciousness showed increased genital

responding during self-focus, compared to non-self-focus. In contrast, participants who were high on private self-consciousness showed decreased genital responding during self-focus, compared to non-self-focus. The same holds for the public self-consciousness \times self-focus interaction ($z = 2.18$; $p < 0.05$), and the social anxiety \times self-focus interaction ($z = 2.06$; $p < 0.05$). In addition, a significant sexual private self-consciousness \times self-focus interaction effect was found ($z = 2.36$; $p < 0.05$). Participants who were low on sexual private self-consciousness showed increased genital responding during self-focus, compared to non-self-focus. In contrast, participants who were high on sexual private self-consciousness showed decreased genital responding during self-focus, compared to non-self-focus. A marginally significant sexual anxiety and discomfort \times self-focus interaction effect on the genital response appeared ($z = 1.84$; $p = 0.066$), with effects in the same direction as those of previously reported interactions. To check whether the interaction was restricted to either of the investigated groups, the multilevel analyses were repeated with the between-subjects factor of clinical status (sexually functional vs. dysfunctional) added. The interaction effects of self-focus and self-consciousness aspects appeared not to be qualified by clinical status. Together, these findings can be interpreted to mean that participants' trait scores on several self-consciousness subscales qualify the effect of the self-focus manipulation (self-focus vs. non-self-focus) on the genital response during erotic video presentation. In any of the interactions, higher scores on the respective trait were found to diminish the genital response when self-focused attention was induced. Self-focus induction instead augmented the genital response when the participants scored low on the respective trait measure. The interaction effect was not found to be qualified by clinical status, even though the analysis of the participants' scores on the sexual public self-consciousness and sex related anxiety subscales revealed significant differences, with functional males having relatively low, and dysfunctional males having relatively high scores. For illustrative purposes only, Fig. 2 shows the sexual private self-consciousness \times self-focus interaction effect on mean genital response, with self-consciousness dichotomized by median split of subscale scores.

4.1. Subjective responding

The observed self-focus \times clinical status \times presentation order interaction effects on subjective sexual arousal necessitated the inclusion of presentation order as a factor in hypothesis testing.

Hypothesis 5 predicted that subjective sexual arousal would not be affected by induction of performance demand. Multilevel analysis was performed with performance demand (non-demand vs. performance demand), and presentation order (self-focus $>$ non-self-focus vs. non-self-focus $>$ self-focus) as between-subjects factors, and self-focus (non-self-focus vs. self-focus) as within-subjects factor, while adjustment was made for age, QSD-ED Distress, and the linear and quadratic form of time as covariates. Dependent variable was subjective arousal at each epoch during erotic stimulus presentation. No main effect of performance demand was found. Hypothesis 6 predicted that subjective sexual arousal would be differentially affected by induction of self-focus in sexually functional (enhanced subjective arousal) and in sexually dysfunctional participants (unaffected). Multilevel analysis was performed with clinical status (sexually functional vs. dysfunctional) and presentation order (self-focus $>$ non-self-focus vs. non-self-focus $>$ self-focus) as between-subjects factors, and self-focus (non-self-focus vs. self-focus) as within-subjects factor, while adjustment was made for age, QSD-ED Distress, and the



Fig. 2. Interaction effect of self-focus and sexual private self-consciousness on male genital arousal.

linear and quadratic form of time as covariates. Dependent variable was subjective arousal scores at each epoch during erotic stimulus presentation. No main effect of self-focus was found. No first-order interaction effect of self-focus and clinical status was found. A significant self-focus \times clinical status \times presentation order interaction effect was found ($z = 2.88, p < 0.01$). In sexually functional men, self-focus induction was found to evoke higher subjective sexual arousal than non-self-focus, irrespective of presentation order. In dysfunctional participants, the level of subjective sexual arousal was found to be equal during both erotic video presentations under, respectively, self-focus and non-self-focus, but to be different dependent upon whether self-focus or non-self-focus was induced during the first presentation. Compared with non-self-focus, induction of self-focus during the first presentation produced lower subjective sexual arousal in sexually dysfunctional men. This suggests a carry-over effect in dysfunctional men from a previously induced self-focused or non-self-focused state to later situations. We wished to explore whether or not the interaction of self-focus and dispositional self-consciousness aspects that were found to affect genital arousal, would also affect subjective arousal. Multilevel analyses were performed with private self-consciousness, public self-consciousness, social anxiety, sexual private self-consciousness, and presentation order (self-focus $>$ non-self-focus vs. non-self-focus $>$ self-focus) as between-subjects factors, and self-focus (non-self-focus vs. self-focus) as within-subjects factor, while adjustment was made for age, QSD-ED Distress, and the linear and quadratic form of time as covariates. Dependent variable was subjective arousal at each epoch during erotic stimulus presentation. No main or interaction effects were found.

5. Discussion

In this study, performance demand was found to inhibit genital sexual responding. Self-focus was not found to independently moderate genital responding. In participants with low scores on different aspects of self-consciousness, experimentally induced self-focus increased the genital response. Furthermore, in men with high scores on self-consciousness dimensions, induction of self-focus decreased genital responding. Contrary to our expectations, no interaction effect on genital arousal was found of performance demand and self-focused attention. The before-mentioned effects were found both in men with erectile disorder and in sexually functional volunteers.

Our findings with regard to performance demand effects in sexually dysfunctional men are in line with earlier studies that found genital sexual arousal to be impeded by such demand (Abrahamson et al., 1989; Heiman & Rowland, 1983). Former work using the same manipulation as employed in the present study also showed an impeding effect of performance demand in functional volunteers (Farkas et al., 1979). However, previous studies which used other methodologies than the present study to manipulate performance demand (Abrahamson et al., 1989; Beck et al., 1983; Heiman & Rowland, 1983) evidenced an enhancing effect of performance demand in sexually functional men. These contrasting findings might be explained by methodological differences. The inhibitory effect of performance demand that equally affected functional and dysfunctional males in our study may have resulted from a more powerful performance demand manipulation in the present study than the comparison task used by Abrahamson et al. (1989). Lower demand levels might serve to distinguish subtle differences between functional and dysfunctional men, while stronger demands may override these differences and obstruct arousal in both groups.

In the present study, no main effect of clinical status was apparent, with the exception of the interaction of self-focus and presentation sequence of the two self-focus/non-self-focus trials. Sexually functional men showed consistent higher levels of subjective arousal in response to self-focus induction, whereas the effect of self-focus in dysfunctional men was qualified by presentation order. The absence of differential findings between sexually functional and dysfunctional participants might call the appropriateness of our sampling methods into question. However, QSD subscale scores from our sample were found to replicate the allocation to groups by demonstrating significant differences between functional and dysfunctional participants on subscales measuring erectile difficulties. Moreover, other psychophysiological studies of male sexual arousal have also evidenced an absence of differential genital responding under specific laboratory conditions (Abrahamson et al., 1985; Janssen, Everaerd, van Lunsen & Oerlemans, 1994).

The interaction of self-focus with self-consciousness dimensions provokes interest. Self-consciousness may be seen as the dispositional counterpart of the attentional focus on the self that we induced experimentally in our study. This stable way of reacting to sexual situations was found to differentiate between functional and dysfunctional participants, with dysfunctional males showing higher levels of sex related anxiety and public self-consciousness in sexual situations (cf. Heiman & Rowland, 1983). General dispositional self-consciousness was not found to differentiate between males with erectile dysfunction and functional controls. This finding replicated earlier work (Fichten, Libman, Takefman, & Brender, 1988; Quadland, 1980). Several self-consciousness dimensions were shown to moderate the effect of a self-focused state on geni-

tal reactivity (cf. Beck & Barlow, 1986). Self-focus tended to increase the genital response in men scoring low on self-consciousness traits. Men scoring high on self-consciousness, both in general (public, private, and social anxiety) and specifically in a sexual context (sexual private self-conscious), in contrast, displayed lower genital responses when self-focus was instigated. Although our data do not allow such direct inference, these findings might speculatively be explained by postulating a curvilinear association of self-focused attention and genital arousal, with an inverted U-shape. Dispositional self-consciousness and momentarily induced self-focused attention might act cumulatively. We can postulate a model in which an optimal level of self-focused attention is necessary to provide adequate levels of feedback of the genital and other autonomic reactions of the individual's body to the erotic stimulation. Low propensity to direct one's attention to the self, combined with absence of environmental pressure to do so, might cumulatively result in too little attention for self-information to support sexual arousal. In contrast, too much self-focused attention could interfere with genital arousal by consuming too much of the attentional capacity needed to process external or imaginary sexual stimuli (Abrahamson et al., 1989; Geer & Fuhr, 1976; Janssen, 1995). We can also speculate that, compared with sexually functional males, men with erectile disorder exhibit a stronger overall tendency to focus their attention on information from the self in situations which they appraise as being sexual, considering their higher average score on the sex related anxiety and the sexual public self-consciousness subscale. Their attention may become increasingly focused on self-information when they, for instance, imagine themselves as being observed and judged by their partner (sexual public self-consciousness), or when they feel embarrassed and uncomfortable, and have difficulties in letting themselves go (sexual anxiety and discomfort). Processing of sexual stimuli may then be impeded, to the detriment of their erectile response. This same effect has been found in our study to show up as well in sexually functional men with elevated sexual self-consciousness levels.

We might hypothesize that performance demand and self-focused attention constitute complementary or overlapping constructs. When sexual performance demand is created, the individual may also be expected to start directing attention towards his bodily state in order to compare his own response level against the perceived performance criterion. The present findings, however, do not support the idea of such concurrency, in view of the absence of an interaction effect of performance demand and self-focus, and the presence of the interaction effects of self-focus and dispositional self-consciousness, whereas such interactions were not found of dispositional self-consciousness aspects and performance demand.

No independent effects of performance demand, self-focus, dispositional self-consciousness, or of clinical status could be demonstrated on subjective arousal in reaction to visual erotic stimulation. However, a significant interaction was found of self-focus, clinical status and presentation order of self-focus and non-self-focus. Compared with non-self-focus, self-focus was found to enhance subjective sexual arousal in sexually functional participants, independent of presentation order. In dysfunctional men, during the first presentation, self-focus evoked lower subjective sexual arousal than non-self-focus. Both levels of arousal were maintained into the second presentation, when attentional focus changed. The findings concerning subjective sexual arousal are generally in line with earlier work (Beck & Barlow, 1986; Farkas et al., 1979; Heiman & Rowland, 1983) that found lower levels of subjective arousal in dysfunctional males compared with functional males. Why would the combination of self-focus and the presentation

order of self-focus and non-self-focus bring about this differential response pattern in sexually functional and dysfunctional men? In line with the Sbrocco and Barlow (1996) model of limited self-regulatory abilities of sexually dysfunctional men, we might speculate that subjective arousal in sexually dysfunctional men is sensitive to a carry-over effect of attentional set. When self-focus is induced during the first erotic video presentation, switching off the camera which is pointed towards them, may not stop them from attending to self-related information. However, more research is needed to clarify the nature of this interaction.

The relatively low power of our study may have obscured the presence of hypothesized effects. The generalizability of the effects of performance demand and the interaction of self-focus induction and dispositional self-consciousness may be limited as a result of our sampling methods, excluding men with predominantly organic erectile disorder and with psychogenic erectile disorder with comorbid premature ejaculation.

Future research into the role of self-focus, self-consciousness, and performance demand should control for attentional effects, by assessing the amount of attention paid to the visual erotic stimulus during normal and self-focused states, as well as during performance demand and non-demand. In view of the strong association of self-focus and performance demand with (social) anxiety, new investigations should also control for levels of state and trait anxiety of participants. The ability of the Sexual Self-Consciousness Scale to discriminate between sexually functional and dysfunctional men warrants further efforts to validate this instrument with regard to its psychometric strengths and liabilities. Further testing of the Sexual Self-Consciousness Scale in larger and in non-sexological populations is necessary, concerning both validity and reliability aspects.

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