

## **The Dual Control Model: Current Status and Future Directions**

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DUAL CONTROL MODEL

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(abstract)

*The Dual Control Model proposes that sexual responses involve an interaction between sexual excitatory and sexual inhibitory processes. The model further postulates that individuals vary in their propensity for both sexual excitation and sexual inhibition, and that such variations help us to understand much of the variability in human sexuality. The development of psychometrically validated instruments for measuring such propensities for men (SIS/SES) and for women (SESII-W) is described. These measures show close to normal variability in both men and women, supporting the concept that “normal” levels of inhibition proneness are adaptive. The relevance of the model to sexual development, sexual desire, the effects of ageing, sexual identity, and the relationship between mood and sexuality are discussed and the available evidence reviewed. Particular attention is paid to gender differences and similarities in propensities for sexual excitation and inhibition. Research findings related to sexual problems<sub>2</sub> and high- risk sexual behavior, and the relevance of this model to clinical management of such problems<sub>2</sub> are also summarized. Lastly, ideas for future use and further development of the Dual Control Model are considered.*

In a special issue of *The Journal of Sex Research*, Weis (1998) pointed out that the majority of sex research appeared to be atheoretical, and that although various theoretical models of relevance existed in the literature, they were seldom used. Fifty years earlier, Kinsey, although not explicitly theoretical in his sex research, had recognized the phylogenetic mammalian origins of much of human sexuality. The guiding theme in both his earlier entomological research and his sex research was individual variability, and, for the latter, he developed an exceptionally long and detailed interview to document this variability (Kinsey, Pomeroy, & Martin, 1948; Kinsey, Pomeroy, Martin, & Gebhard, 1953). More recently, Kinsey Institute researchers introduced a theoretical model of sexual response, the Dual Control Model (Bancroft & Janssen, 2000), based on the interaction of sexual excitation and inhibition in the brain. With this model, we aim to conceptualize individual variability in sexual responsiveness in ways that can be systematically measured in men and women, thus allowing the formulation and testing of a range of hypotheses relevant to human sexual behavior. Although the Dual Control Model has cross-species relevance, the focus of this paper is on the human; in particular, we present the development of measures to assess individual variability in propensities for sexual excitation and sexual inhibition, and the use of such measures in research over the past 8 years. (For a recent review of the underlying mechanisms, see Bancroft, 2009). We conclude with some suggestions for further development.

The Dual Control Model is an example of “a conceptual nervous system,” a phrase introduced by Hebb (1949) to describe a theoretical model of brain function that accounts for observed behavior and precedes a conclusive neurophysiological explanation. Gray’s (1987) model of Behavioral Activation and Behavioral Inhibition, which led to a rich body of research on relevant brain mechanisms in the rat, is another good example and of considerable relevance

to our Dual Control Model of sexual response. Theoretical models of this kind have two principal purposes. First, they provide a conceptual framework that helps organize thinking about the complexities of human behavior, the underlying psychological and neurophysiological mechanisms, and the way in which those mechanisms interact with social and cultural factors. Secondly, they allow formulation of testable hypotheses. In these ways such models may prove to have heuristic value and are likely either to be modified as a result of their use or abandoned for new and better models. The crucial point is that they are models rather than precise descriptions of reality.

It is generally accepted that most brain functions involve both excitatory and inhibitory processes. To understand how this dual process leads to specific behaviors relevant to sexuality, it is useful to distinguish between these processes at a systems level. Bancroft (1999) reviewed the available neurophysiological evidence for the existence of such systems in the area of sexual functioning and behavior. In animal research more attention has been paid to the excitatory system, reflecting the fact that it involves relatively discrete anatomic structures and pathways that can be studied by lesion experiments, whereas inhibition results from more diffuse and less easily manipulated structures and mechanisms. In research involving humans, particularly in psychophysiological studies of information processing and sexual arousal, attention has also focused on the excitation process and the various ways that excitation may be impaired (e.g., by distraction). However, for various reasons reviewed by Bancroft (1999), it has become apparent that, in addition to excitation, active mechanisms of central inhibition also needed to be considered, leading to our Dual Control concept (Janssen & Bancroft, 1996). Subsequently, with the use of functional brain imaging in studying sexual arousal, strong evidence of inhibitory

brain mechanisms relevant to sexual response has emerged (reviewed by Stoléro & Mouras, 2007). This evidence will be considered further later in this article.

A key characteristic of our Dual Control Model is its focus on individual variability. We make three basic assumptions:

1. Neurobiological inhibition of sexual response is an adaptive pattern relevant across species, which reduces the likelihood of sexual response and recognizes the distracting effects of sexual arousal occurring in situations when sexual activity would be disadvantageous or dangerous, or would distract the individual from dealing appropriately with other demands of the situation.
2. Individuals vary in their propensity for both sexual excitation and sexual inhibition. Whereas for the majority, these propensities are adaptive and nonproblematic, individuals with an unusually high propensity for excitation and/or low propensity for inhibition are more likely to engage in high-risk or otherwise problematic sexual behavior. Conversely, individuals with a low propensity for sexual excitation and/or high propensity for sexual inhibition are more likely to experience problems with impairment of sexual response (i.e., sexual dysfunctions).
3. Although sexual arousal typically occurs in interactions between two or more individuals, and the context and cultural meanings or scripts attributed to these interactions are important sources of stimuli, both excitatory and inhibitory, the effects of such stimuli are mediated by psychological and neurophysiological characteristics of the individuals involved, influenced by both genetic factors and early learning.

### **The Concept of Sexual Inhibition**

The focus on inhibitory mechanisms per se, and in particular on the concept that these mechanisms are in most cases adaptive, opens up substantial new opportunities for understanding “normal” sexuality, individual variability, and problematic sexuality; it also has considerable relevance to the clinical assessment and management of sexual problems, as well as interventions to reduce high-risk sexual behaviors. Whereas the function of sexual excitation is relatively apparent, the function of inhibition, with its possible underlying mechanisms, warrants further consideration. The following five adaptive functions of inhibition of sexual response have been postulated for the male (Bancroft, 1999):

1. when sexual activity in a specific situation is potentially dangerous or disadvantageous (this would include not only physical threats but also the threat of negative emotional/interpersonal consequences);
2. when a nonsexual challenge occurs and suppression of otherwise distracting response patterns, including sexual, is necessary for focusing on the appropriate coping response;
3. when excessive involvement in the pursuit of sexual pleasure distracts from other important adaptive functions;
4. when social or environmental pressures result in suppression of reproductive behavior and reduction of population density;
5. when the consequences of continued excessive sexual behavior includes, in the male, reduction of fertility due to excessive ejaculation.

These five functions have cross-species relevance. However, the fourth function, although of potential importance in humans, is less clearly relevant to humans. There is no evidence that either reproductive behavior or fertility is reduced in conditions of overcrowding or poverty.

Bjorklund and Kipp (1996) made a convincing case for inhibitory mechanisms being more crucial and hence better developed in females. Of the above five male functions, the first three are likely to be relevant to females. The first is of particular importance because of the risks of pregnancy in disadvantageous circumstances. The fourth, as with males, is relevant as a negative impact of social or environmental pressures, though not apparently relevant to human females. The fifth function may also not be relevant to human females. A further function, the inhibition of female sexual responsiveness to restrict sexual activity to the fertile phase of the reproductive cycle, occurs across most species, but not with most primate or human females. Gender differences, particularly in the human, may reflect socio-cultural as well as biopsychological factors. Thus, if females have more enhanced sexual inhibitory mechanisms than males, they may be more susceptible to sociocultural suppression of their sexuality (Bancroft, 2009).

Given this range of potential functions, it is not surprising that evidence of more than one type of inhibition is emerging. Recent investigators of functional brain imaging in response to sexual stimulation have revealed a number of different relevant mechanisms. This is a new area of research, as yet limited and predominantly focused on the response to visual erotic stimuli. The conclusions at this stage should be considered preliminary and of less certain relevance to overt sexual behavior. However, on the basis of this evidence, Redouté, Stoléru, Pugeat, Costes,

Lavenne, Le Bars, et al. (2005) postulated three components of sexual inhibition, along with their neurological origin:

1. Inhibitory processes operating in the resting state and imposed by the temporal lobes are evident in brain imaging by predictable areas of deactivation in the temporal lobes that precede or accompany sexual response.
2. Processes that limit the development of sexual excitation once it has been initiated, particularly in terms of its active expression, are mediated, they suggest, by the caudate nucleus and the putamen.
3. Cognitive processes relevant to problems of low sexual desire, which involve devaluation of potential sexual partners, result from a lack of deactivation of the medial orbito-frontal cortex.

The first component can be conceptualized as inhibitory tone that needs to be lowered for sexual response or arousal to occur. What is not yet clear is whether this temporal lobe based inhibitory tone relates to what has been called inhibitory tone in the periphery (Bancroft & Janssen, 2000). In the male, for example, tonic constriction of the smooth muscles of the erectile tissues needs to be reduced to allow erection to occur. It is also unclear what relevance this form of peripheral inhibitory tone has to the sexual response of women. Although it is less likely to be involved in vaginal response, a uniquely female function involving increased vaginal blood flow to enhance vaginal lubrication, it may be important for clitoral response, which is homologous to penile tumescence (a comparison considered more closely in Bancroft, 2009).

The second component may be relevant to reactive inhibition, and reflects what some women have described as “putting the brakes on” in situations when becoming sexually aroused could be disadvantageous or risky (Graham, Sanders, Milhausen, & McBride, 2004). It is



noteworthy that this particular pattern was observed in brain imaging studies involving men, when sexual arousal occurred in a laboratory context, resulting in some restraint in its expression (Redouté et al., 2005).

The third component is interesting given its focus on devaluation of potential sexual partners. This response does not fit with conventional concepts of reactive inhibition to a sexual threat; it may prove to be an example of how the advance in knowledge of brain activity based on brain imaging studies requires reconceptualization (and possible revision of models) of how the brain works.

The lack of sexual responsiveness that affects some people when they are stressed may reflect increased inhibitory tone, but it may also involve an impairment of excitation. This lack of responsiveness may also apply to the postejaculatory refractory state in the male, the mechanisms of which are not well understood. The limited evidence of the neurophysiological basis of “sexual satiation” in the rat suggests a complex pattern (reviewed in Bancroft, 1999).

Overall, it is important to keep in mind that our theoretical model of inhibition, even allowing for a distinction between inhibitory tone and reactive inhibition, is probably an oversimplification.

### **Development of Measures of the Propensities for Sexual Excitation and Sexual Inhibition**

Having formulated our theoretical model, the next requirement was to develop instruments for measuring the postulated individual variability in propensities for sexual excitation and sexual inhibition. This process has been carried out in two stages, as we first developed a questionnaire for men and then one for women.

*The Sexual Inhibition/Sexual Excitation Scales (SIS/SES; Janssen, Vorst, Finn, & Bancroft, 2002a)*

The method of developing the men's questionnaire involved formulating a range of sexual stimuli and situations, some potentially exciting without any obvious threat involved, others threatening (i.e., involving risk, danger, or likelihood of some negative consequence) as well as potentially sexually exciting. The items were written in an "if-then" format, with ratings on a 4-point scale (1, *strongly agree* to 4, *strongly disagree*). For items relevant to excitation, the "if" statement described a potential sexual stimulus or situation (e.g., visual, tactile, imaginary, social) and the "then" statement, the occurrence of a sexual response. The majority of the inhibition items were written to reflect situations in which existing sexual arousal is lost due to the introduction of some intrapersonal or interpersonal threat (e.g., negative consequences of having sex, performance-related concerns, norms and values, and physical and psychological harm). Instructions included asking participants to respond based on how they would "most likely" respond in a particular situation. Feedback on the initial questionnaire was obtained from both laypersons and sex researchers.

The first version of this measure had 73 items. Factor analysis of the results from a sample of 408 male undergraduate psychology students (mean age 22.8 years) identified 10 factors, involving 45 items. Further factor analysis of the 10 subscale scores identified a single excitation factor (SES) and two sexual inhibition factors which, based on the items involved, were called Inhibition Due to Threat of Performance Failure (SIS1) and Inhibition Due to Threat of Performance Consequences (SIS2; see Appendix A). Confirmatory factor analysis of data from two further samples of men, one consisting of undergraduate psychology students ( $N = 459$ ; mean age 20.9 years), and the other, a random sample of university employees and men from the local community ( $N = 313$ ; mean age 46.2 years) was carried out. This showed the 10-factor model to be best, but only marginally better than the nested 3-in-10 model. Therefore, further

research focused on the 3-factor structure. Correlations between the SES and the two SIS scores were low and nonsignificant, indicating that the excitation and inhibition factors were relatively independent. A significant but low correlation (+.28) between SIS1 and SIS2 showed only modest overlap between these two factors.

The SIS/SES questionnaire has now been used in a number of large convenience samples, some of which will be reported later in this review. To date only one study has used the questionnaire in a representative sample (Varjonen, Santtila, Hoglund, Jern, Johansson, Wager, et al., 2007). From a large population-based twin sample, 1,289 male 33-43-year-old Finnish twins were recruited (a 36% response rate). The findings relevant to genetic effects are considered later. The authors randomly split the twin sample in two and conducted exploratory and confirmatory analyses in each subsample. A three-factor structure, comparable to the original one, was reported, though there were some differences in the factor structure and in the extent to which specific items loaded on the factors. Out of the original 45 items, 7 items were dropped because of low factor loadings ( $< .35$ ) in one of the two subsamples (one SES item and one SIS2 item), complex loadings (two SIS1 items and one SIS2 item), or a skewed response distribution (two SIS1 items). In addition, one item was excluded from the study due to a technical error. The confirmatory factor analysis showed that the best fitting model included SIS1, SIS2, and SES; the first two as main factors and the last as consisting of three subfactors. The majority of model-fit criteria were met for this factor structure.

In the original psychometric validation of these scales, reasonable test-retest reliability was demonstrated (SES: +.76, SIS1: +.67, SIS2: +.74; Janssen et al., 2002a). To assess to what extent our questionnaire assessed distinctly sexual rather than general inhibition/excitation tendencies, scores were correlated with the Behavioral Inhibition and Behavioral Activation

Scales (BIS/BAS; Carver & White, 1994). The three subscales of BAS all correlated with SES (+.31 to +.22); BIS correlated with SIS2 (+.22), and unexpectedly, BIS correlated positively with SES (+.21). Modest correlations were found between SIS1 and SIS2 and the Harm Avoidance Scale from the Minnesota Personality Scale (+.22 and +.28, respectively; Tellegen & Waller, 1994) and SES and neuroticism (-.22; Eysenck & Eysenck, 1975). In a later dataset, involving 880 heterosexual men, the trait measure of anxiety on the State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch & Lushene, 1970), correlated with SIS1 and weakly with SIS2 (+.25 and +.11 respectively; Janssen, 2008).

Somewhat higher correlations were found with established measures of sexuality (Janssen, Vorst, Finn, & Bancroft, 2002a). The Sexual Opinion Survey (SOS; Fisher, Byrne, White, & Kelley, 1988), which assesses erotophilia/erotophobia, correlated +.45 with SES and -.29 with SIS2. The Sociosexual Orientation Inventory (SOI; Simpson & Gangestad, 1991), a measure of propensity for uncommitted or casual sex, correlated +.21 with SES and -.31 with SIS2. In another study (Gaither & Sellborn, 2003), the Sexual Sensation Seeking Scale (SSSS; Kalichman & Rompa, 1995) correlated +.55 with SES and -.32 with SIS2.

In summary, the SIS/SES showed moderate correlations with other sexuality-related scales. However, most of these other scales measure a mixture of attitudes and behaviors. The SOS includes a few questions about sexual response, but only in relation to excitation, not inhibition. The SIS/SES, in contrast, specifically focuses on situations that might excite or inhibit sexual response.

It is noteworthy that the above significant correlations with other sexuality measures involved SES and SIS2; no significant correlations occurred between any of the above sexuality measures and SIS1. This raises the question of what SIS1 is measuring. In our original

formulation, we (Janssen et al., 2002a) postulated that SIS1 measured inhibition due to a threat of performance failure, which can be likened to the widely used but understudied concept of performance anxiety. Its correlation with trait anxiety (STAI) is possibly relevant. An alternative interpretation is that SIS1 measures inhibitory tone (Bancroft & Janssen, 2000). Individuals with high inhibitory tone may well be more likely to anticipate and to experience impaired sexual response as a result. This conceptual distinction needs further appraisal and is considered in more detail later in this article. It would be of particular interest to compare high and low SIS1 individuals in brain imaging studies of response to sexual stimuli.

The SIS/SES was adapted for women and used in a study of 2,045 undergraduate students (1,067 women and 978 men) to examine the psychometric properties of women's scores (Carpenter, Janssen, Graham, Vorst, & Wicherts, 2008). Whereas women scored higher on sexual inhibition and lower on sexual excitation compared to men—as predicted, both women and men showed substantial variability in sexual inhibition and excitation scores. Tests of factorial invariance, using multigroup confirmatory factor analysis, showed that the structure of individual differences in SIS/SES scores was the same for men and women, although all models tested fit men's data slightly better than women's. Regarding internal validity, convergent/discriminant validity, and test-retest validity, the findings in women were broadly similar to those for men, with some interesting differences. In women, SIS/SES scores showed stronger associations with other sexuality-related measures (e.g., SOS, SOI) but weaker associations with general behavioral approach/avoidance measures (e.g., BIS/BAS) than in men. Women's scores on SIS2 (Inhibition due to threat of performance consequences) also appeared less reliable than men's (test-retest;  $r = +.41$  for women and  $+.60$  after the removal of outliers, versus  $+.74$  for men). Additional exploratory factor analyses, conducted separately for men and

women, revealed factor solutions that strongly resembled one another, as well as the original higher-level factor structure, suggesting that the basic dimensions present in the SIS/SES are stable and similar in women and men. However, there were several item-level differences between the solutions for men and women. For example, the theme accounting for the most variability in women's SES scores described arousal in response to reading sexual passages in books. This item did not figure in the men's solution. These findings thus point to the importance of exploring further possible gender differences in what constitutes potential stimuli, or triggers, for sexual excitation and inhibition.

In a recent study of 705 women (Janssen, 2008) using the female version of the SIS/SES, STAI was significantly correlated with SIS1 ( $+ .22$ ;  $p < .001$ ), as it was in males, but not with SES or SIS2.

To further examine gender similarities and differences, an additional series of confirmatory factor analyses was conducted to identify SIS/SES items that represented the three-factor structure equally well for women and men (Carpenter, Janssen, Graham, Vorst, & Wicherts, 2006). Using a process of elimination, the analyses identified a subset of 14 SIS/SES items that have similar psychometric properties for men and women. Correlations between the original and short-form versions of the three scales were identical for men and women (SES:  $r = +.90$ ; SIS1:  $r = +.80$ ; SIS2:  $r = +.80$ ), and scores on the two forms exhibited similar test-retest reliability and convergent/discriminant validity as had previously been found. As with the original full-length version, thematic differences were apparent in items that had been dropped to create the short version of the SIS/SES. Inhibition items that were eliminated assessed concerns about pregnancy, pain, and pleasing a partner sexually. Most SES items represented on the shorter measure described arousal stemming from social interactions (e.g., "when an attractive

person flirts with me, I easily become sexually aroused”), whereas items reflecting less relational activities (such as arousal in response to fantasy or sexually explicit materials) were dropped. Thus, these analyses, like the ones involving the full-length questionnaire, suggest that some SIS/SES themes are relevant to both men and women, but also that some arousal themes may be less shared or less held in common.

*The Sexual Excitation/Sexual Inhibition Inventory for Women (SESII-W; Graham, Sanders, & Milhausen, 2006)*

Despite the acceptable psychometric properties of the female version of the SIS/SES, we were unsure whether this questionnaire, originally developed for use with men, was equally suited for use with women. As discussed previously, inhibitory mechanisms may be more crucial for females (Bjorklund & Kipp, 1996) and may be elicited by different situations in women than in men; moreover, some themes relevant to women’s sexual arousal processes (e.g., reputation, body image) appeared to be underrepresented on the SIS/SES. It is also conceivable that different inhibitory mechanisms may be involved in female-specific inhibitory responses. These concerns led to the development of a separate instrument, The Sexual Excitation/Sexual Inhibition Inventory for Women (SESII-W; Graham et al., 2006). The process of developing this questionnaire differed in potentially important ways from that used for the SIS/SES.

The starting point was a series of nine focus groups involving women of different age, ethnicity, and sexual orientation (Graham et al., 2004), designed to explore the concepts of sexual excitation and inhibition in women. The ultimate goal was to use the qualitative data to inform the development of a questionnaire to assess a woman’s tendency to respond with sexual excitation/inhibition. A broad range of themes emerged in the focus groups. Notably, many of the themes related to inhibition of sexual arousal reflected the influence of relational and

sociocultural factors, which are not well represented in the SIS/SES. For example, many women mentioned that feeling “used” or criticized by partners inhibited their arousal. In contrast, the SIS2 factor (Inhibition Due to Threat of Performance Failure) largely focuses on *external* threats such as unwanted pregnancy and being seen or heard having sex, rather than threats related to the relationship/partner.

These qualitative data were used by Graham et al. (2006) to guide the development of the SESII-W questionnaire. They endeavored to write items that closely mapped onto all of the themes and subcategories in the coding scheme from their focus group study. Items were rated on a 4-point Likert rating scale, from *strongly disagree* to *strongly agree*. The resulting 115-item questionnaire was used in a sample of 655 women (mean age of 33.9 years), 226 of whom were recruited from a random sample of university students and staff, and 429 through e-mail and paper flyers. Factor analysis resulted in eight factors based on 36 items, and two higher-order factors, a Sexual Excitation (SE) and Sexual Inhibition (SI) factor. Five of the eight lower-order factors loaded on the SE factor. They were labeled Arousability (9 items), Sexual Power Dynamics (4 items), Smell (2 items), Partner Characteristics (4 items), and Setting (4 items). Three lower-order factors loaded on the SI factor. They were labeled Relationship Importance (6 items), Arousal Contingency (3 items), and Concerns About Sexual Function (4 items; see Appendix B). The Arousal Contingency factor is proving to be of particular importance in relation to sexual functioning, as discussed later. This factor reflects the potential for sexual response to be easily inhibited or disrupted (e.g., “unless things are just right it is difficult for me to become sexually aroused”; “when I am sexually aroused, the slightest thing can turn me off”).

Satisfactory test-retest reliability was demonstrated (SE: +.81, SI: +.82), as was good evidence of convergent and discriminant validity, similar to that found with the SIS/SES. With



the BIS/BAS, scores on the higher-order SE factor correlated +.41 with BAS, and the higher-order SI factor correlated +.30 with BIS. The SOS (Fisher et al., 1988) correlated +.53 with SE and -.41 with SI, and the SSS (Kalichman & Rompa, 1995) correlated +.58 with SE and -.39 with SI.

In a study by Bradford (2008), trait anxiety (STAI; Spielberger et al., 1970) was not significantly correlated with either the SE (-.18) or SI (+.16) higher-order factors. However, the correlation between trait anxiety and the Arousal Contingency factor was significant (+.38). The total score from the Female Sexual Function Index (FSFI; Rosen et al., 2000) correlated +.46 with SE and -.40 with SI. It is noteworthy that the main contributions to these correlations came from the Desire and Arousal subscales of the FSFI, and the Arousal Contingency factor of the SESII-W.

The SESII-W has been modified for completion by men as well as women (Milhausen, Sanders, Graham, Yarber, & Maitland, 2008). A randomly selected college student sample of 328 males (mean age 22.4 years) and 440 females (mean age 21.4 years) completed this modified version (Sexual Excitation/Sexual Inhibition Scale for Women and Men (SESII-W/M)). Exploratory factor analysis identified an eight-factor solution comprised of 34 items. Confirmatory factor analysis (CFA) was conducted to provide a thorough statistical test of the model. Two factors were comprised of only two items each, an insufficient number to appropriately identify a factor. Therefore, these four items were removed from the CFA, and the structure of the remaining 30 items, which loaded on six factors, was tested. Fit of the six-factor model was good. As a next step, gender invariance was tested and found to be acceptable. Specifically, the factor loadings and the relationships between the factors were not different for men and women, suggesting that the six-factor solution works well for both genders.

These results suggest that the SESII-W/M reliably measures factors that inhibit and enhance sexual arousal in both men and women. The factor scales had alpha levels between .66 and .80, with an average of .76.

The SESII-W/M differs to some degree from the original SESII-W. Given that male as well as female responses were included in the factor analyses, this result is not surprising. Five of the six factors were very similar to the original SESII-W structure: Arousability, Partner Characteristics, Setting, Relationship Importance, and Concerns About Sexual Function. The final factor, labeled Dyadic Elements of the Sexual Interaction (partner variables during sexual interaction which can inhibit sexual arousal), has no direct parallel on the SESII-W.

### **The Relevance of The Dual Control Model to “Normal” Sexuality**

#### *Individual Variability*

Consistent evidence across several studies indicates that scores on the SIS/SES are close (Carpenter et al., 2008) to normally distributed. Examples of such distributions in men and women are shown in Figure 1

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The distributions for women’s scores on the higher-order SE and SI factors of the SESII-W (Graham et al., 2006) are provided in Figure 2. Here again, close to normal distributions were found. Such distributions lend support to the idea that variation in excitation and inhibition proneness is normal, and that the midpart of the range represents adaptive levels of inhibition. Although, as shown in Figure 1, the distributions of SES, SIS1, and SIS2 scores in men and

women overlap considerably, significant gender differences appear in average scores for all three variables.

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### *Sexual Desire and Frequency of Sexual Activity*

The concept of *\*sexual desire* is challenging, particularly the distinction between sexual desire and sexual arousal. There is evidence that both men and women may have problems distinguishing between arousal and desire (Beck, Bozman, & Qualtrough, 1991; Graham et al., 2004; Janssen, McBride, Yarber, Hill, & Butler, 2008). Some researchers have suggested that sexual “desire” may reflect early arousal processes (Everaerd, Laan, Both, & van der Velde, 2000). It has also been proposed (Bancroft, 2009) that these two constructs be seen as “windows” into the complexity of sexual arousal, one focusing on the incentive motivation component (desire or appetite), the other on the arousal component (excitement). Appetite for sex varies from strong to weak across individuals, across genders, and also across time within the same individual. On average, men report stronger sexual desire than women (for a review, see Baumeister, Catanese, & Vohs, 2001.), whereas women tend to vary more on this measure.

As both the male (SIS/SES) and female (SESII-W) measures focus on arousability or its absence, they are likely to be highly relevant to sexual desire. In support of this notion, Prause, Janssen, and Hetrick (2007), in a study of 36 women and 33 men, conducted a factor analysis with SES and the two scales from the Sexual Desire Inventory (Dyadic and Solitary; Spector, Carey, & Steinberg, 1996) and found one latent factor explaining 67% of the variance. All three scales were strongly correlated with this factor (SDI/Dyadic: +.85; SDI/Solitary: +.78; SES:

+ .82). However, SIS1 and SIS2 were not used in this study, leaving open the possibility that excitation and inhibition interact in determining sexual desire. The concept of inhibited sexual desire has been widespread in the clinical literature, but little attention has been paid to the distinction between inhibition versus lack of excitation in explaining such conditions.

We are now beginning to gather relevant evidence. In an unpublished study, Janssen (2005) asked 774 men, "During the past 4 weeks, how often did you think about sex with interest or desire? This includes times of being just interested, daydreaming, and fantasizing, as well as times you wanted to have sex." In a multiple regression, with SIS/SES scores and age as independent variables, SES was the strongest positive predictor of this measure of sexual thoughts ( $p < .001$ ). SIS1 was negatively predictive, but was only just significant ( $p = .03$ ). The same question was asked of the women in Graham, Crosby, et al.'s initial validation study (2006), though the results were not presented in that article. For a subsample of 540 heterosexual women (see also Sanders, Graham, & Milhausen, 2008b, described later) the reported frequencies of sexual thoughts were *not once* (0.7%), *less than once a month* (4.3%), *about once a month* (5.0%), *2-3 times per month* (12.7%), *at least once a week* (22.0%), *several times a week* (28.0%), and *at least once a day* (27.2%). Multiple regression was used to predict this measure of sexual interest based on the SESII-W variables of age, self-ratings of health and the importance of sex, and whether the woman was married, in a sexual relationship, employed full-time, had completed college, and had children in the household (adjusted  $R^2 = .43$ ). The strongest predictor was Arousalability, the principal subfactor in the SE scale (standardized  $\beta$  coefficient = .33). Arousal Contingency, an important subscale in the SI scale, negatively predicted frequency of thinking about sex ( $\beta$  coefficient = -.11). The other significant predictors

were higher ratings of the importance of sex ( ~~$\beta$~~  $\beta$  = .29), not being married ( $\beta$  = .19), being in a sexual relationship ( ~~$\beta$~~  $\beta$  = .10), and age ( ~~$\beta$~~  $\beta$  = -.11).

In a large convenience sample of 6,458 men and 7,938 women (Winters, Christoff, & Gorzalka, 2008), the Sexual Desire Inventory (SDI; Spector et al., 1996) was completed together with the SIS/SES (using the female version for the women), although only SES and SIS2 were used. In men, SES was strongly correlated with the Dyadic (+.52) and Solitary (+.34) scores of the SDI. SIS2 was negatively correlated with the Dyadic scores (-.23) and, more weakly, with the Solitary subscale (-.09), though all these correlations were significant. In women, the picture was broadly similar: SES correlated with the Dyadic, (+.60) and Solitary (+.42) subscales. SIS2 showed the same correlation as for men with the Dyadic (-.23), and a somewhat stronger correlation with the Solitary subscale (-.18).

Recently, interest has been growing in *asexuality*, a construct which, although still poorly defined, has most often been used to indicate an individual's lack of interest in or desire for sex. Prause and Graham (2007) recruited 41 self-identified "asexuals," some from a website dedicated to asexuality, and some from the Kinsey Institute's website, and compared them to a "nonasexual" comparison group of 1,105 men and women. Both groups completed a range of online questionnaires, including the Sexual Desire Inventory (SDI), with its measures of both dyadic and solitary sexual desire, the Sexual Inhibition/Sexual Excitation Scales (SIS/SES; Janssen et al., 2002a), and the Sexual Arousalability Inventory (SAI; Hoon, Hoon, & Wincze, 1976). The asexuals experienced significantly lower "dyadic" sexual desire (i.e., desire for sex with a partner), lower sexual arousalability (SAI), and lower propensity for sexual excitation (SES), but they did not differ significantly from the nonasexuals in their propensity for sexual inhibition (SIS1 and SIS2) or their desire to masturbate.

Results on the SDI reflect the need to distinguish between sexual activity involving one's partner and masturbation on one's own. In the initial SIS/SES validation study (Janssen et al., 2002a), there was inconsistent evidence of an association between SIS1 and SIS2 and frequency of sexual activity with a partner but a clear association between SES and frequency of masturbation. This finding reflects that the factors influencing partner interaction are more complex than those influencing masturbation. The relationship between masturbation frequency and SESII-W subscales was examined for the subsample of heterosexual women from the initial validation study of the SESII-W (Sanders, Graham, & Milhausen, 2008a). Masturbation frequency in this sample was *never* (19.5%), *less than once a month* (24.5%), *1-3 times per month* (29.4%), *once a week* (13.8%), *2-3 times per week* (9.7%), and *4 times per week or more* (3.2%). Multiple regression was used to predict this frequency with the following predictors: age, self-ratings of health and the importance of sex, and whether or not the woman was married, in a sexual relationship, employed full-time, had completed college, and had children in the household. Although only 16% of the variance was accounted for, the Arousalability (standardized  $\beta = .20$ ) and Setting ( $\beta = .13$ ) subscales of SE were both significant positive predictors, and Relationship Importance ( $\beta = -.09$ ), an SI subscale, was a significant negative predictor.

The relative importance of excitation and inhibition to sexual desire will be considered later in this review in connection with problems of low sexual desire.

#### *Sexual Development and the Effects of Ageing*

Because individuals vary in their propensity for both excitation and inhibition, it is important to understand the origins of such variability. At this stage, we have very little understanding of the emergence of sexual excitability and even less of sexual inhibition during

normal development. Whereas puberty, with its associated changes in brain structure and function and in hormonal status, are obviously crucial factors, evidence of variability exists also in prepubertal children, some starting to masturbate and to experience orgasm before the onset of puberty (see Bancroft, 2009 for review). Interestingly, a much more variable age of masturbatory onset has been found in girls, whereas age of onset in boys is predictably closer to onset of puberty (Bancroft, Herbenick, & Reynolds, 2003). ~~That~~ There is some evidence that -boys are capable of experiencing repeated orgasms before they start ejaculating (Kinsey et al., 1948). This raises the possibility that puberty is not only responsible for an increase in sexual arousability but also for the development of the postejaculatory refractory period.

To date, the one published male twin study in which SIS/SES has been measured (Varjonen et al., 2007) suggested modest heritability for both SIS1 and SIS2, but similarities between twins for SES seemed more attributable to shared environment. It would be interesting to have comparable data for women. Other approaches to understanding this aspect of sexual development have not yet been explored, most obviously the measurement of SIS/SES and SESII-W in young adults together with a fairly detailed history of their childhood sexual experiences, positive and negative, and their family environment in relation to sex. For example, do adults with high SES (especially when combined with low SIS2) report more positive sexual experiences, less restriction of sexual curiosity, and earlier onset of masturbation and other sexual experiences during childhood?

This question leads to a more general one: What happens to sexual excitation and inhibition tendencies with age? Using a cross-sectional approach, in one of our older samples of men (mean 43.0 years; range 25-70), Janssen et al. (2002a) found that age correlated negatively with SES (-.24) and positively with SIS1 (+.34), but not with SIS2. With the SESII-W, in a

sample of 655 women with a mean age of 33.8 years (range 18-81), age correlated negatively with SE (-.29) but not with SI (Graham, Sanders, et al., 2006). The negative correlation between sexual excitation and age is not surprising and may in part reflect an age-related decrease in sexual arousability. The positive relationship between SIS1 and age found in men is less easily explained. Of possible relevance is the in vitro finding by Christ et al. (1992) that smooth muscle in the erectile tissues becomes more responsive to peripheral inhibitory (noradrenergic) stimulation with increasing age. This finding could indicate an age-related increase in peripheral inhibitory tone. This change will be considered further in the section on erectile problems.

#### *Relevance of the Dual Control Model to Sexual Identity*

Two convenience samples of gay ( $N = 1,196$ ) and heterosexual ( $N = 1,558$ ) men, recruited mainly from the Internet, were compared for their SIS/SES scores (Bancroft, Carnes, Janssen & Long, 2005). The two groups were similar in age (gay: mean age = 34.8; straight: mean age = 34.5) and differed mainly as to the proportions in exclusive relationships, a difference expected even in representative samples. Nevertheless, we should be cautious in drawing conclusions from these data. The gay men scored significantly higher on SES (58.4 vs. 55.9;  $p < .001$ ) and on SIS1 (29.7 vs. 28.0;  $p < .001$ ) but were very similar for SIS2 (27.4 vs. 27.5). These two groups are compared further in the section on sexual problems. In a large, Internet-based survey of heterosexual, homosexual, and bisexual men, Lippa (2007) found that heterosexual men reported higher sexual drive than gay and bisexual men, but SES was not measured.

In a subsample of 545 women from the initial SESII-W validation study, 82.6% identified as heterosexual, 9% as lesbian, and 8.4% as bisexual (Sanders, Graham, & Milhausen,



2008<sup>b,c</sup>). The bisexual women scored significantly higher on the higher-order Excitation factor (SE) than both the heterosexual and lesbian women ( $p < 0.001$ ), who did not significantly differ from each other. The heterosexual women had significantly higher sexual inhibition scores than both the lesbian and the bisexual women ( $p < 0.001$ ). In Lippa's (2007) study, bisexual women reported higher sexual desire than heterosexual and lesbian women, a finding that was consistent across cultures. These two studies support the idea that bisexual women may be distinct from both heterosexual and lesbian women in their higher propensity for sexual arousal. In this respect, bisexual women are not simply midway between heterosexual and lesbian women.

#### *Mood and Sexuality*

The conventional view has been that negative mood states (e.g., depression or anxiety) are typically associated with decreases in sexual interest or responsiveness. However, recent research at the Kinsey Institute has shown that a significant minority of men and women report an increase in sexual interest or response when depressed or anxious. Whereas this paradoxical relationship is not necessarily problematic, it does seem relevant to measures of "out of control" sexual behavior and to sexual risk taking, as discussed later. To what extent can this aspect of individual variability be explained by the Dual Control Model?

To approach an answer to this question, a simple instrument, The Mood and Sexuality Questionnaire (MSQ), was devised by Bancroft, Janssen, Strong, Vukadinovic, and Long (2003). It first asks whether the individual has experienced enough (a) depression or (b) anxiety to recognize a predictable pattern associating this mood with sexuality. Those who indicated they had not done so were classified as "excluders," either for depression (37% of heterosexual men and 36.5% of heterosexual women) or anxiety (20% of heterosexual men and 15% of heterosexual women). The nonexcluders completed two bi-polar scales for depression (MS1 for

sexual interest and MS2 for sexual response; for example, “when you have felt depressed what typically happens to your sexual interest?”) and two for anxiety (MS3 for sexual interest and MS4 for sexual response), with responses on a 1-9 scale (5 = *no change*, 1 = *markedly decreased*, and 9 = *markedly increased*). This questionnaire has now been completed by large samples of heterosexual men (Bancroft, Janssen, Strong, Vukadinovic, & Long, 2003), self-identified gay men (Bancroft, Janssen, Strong, & Vukadinovic, 2003) and heterosexual women (Lykins, Janssen, & Graham, 2006). Taking scores of 7 to 9 on these scales as an indication of increased sexual interest and/or response in a particular negative mood state, increased sexual interest when depressed was reported by 9% of heterosexual men, 16% of gay men, and 9.5% of heterosexual women. The proportions reporting increased sexual interest when anxious were 21%, 24%, and 23%, respectively. Comparisons of these three samples are limited by age differences, and in the sample of heterosexual men, these patterns were negatively correlated with age (i.e., were reported by fewer older men). For this reason, Lykins et al. (2006) directly compared their sample of heterosexual college women with an age-matched group of heterosexual college men. Whereas both groups showed considerable individual variability in scores on all scales, men scored significantly higher on all but one of the scales (MS4, sexual response when anxious).

Interestingly, no negative correlations were found between MSQ scores and age in gay men. This awaits explanation, but may reflect different developmental histories of gay and straight men, particularly in terms of the relationship between sexuality and negative mood (Bancroft, Janssen, Strong, & Vukadinovic, 2003).

In terms of the possible relationship between excitation and inhibition proneness and this paradoxical mood/sexuality pattern, SIS2 negatively predicted MSQ scores in both heterosexual

and gay men, SIS1 was negatively predictive in the heterosexual but not the gay men and SES positively predictive, although only weakly, in the gay men. Overall, more variance was accounted for in the heterosexual (19%) than in the gay men (4%).

In the sample of college women (Lykins et al., 2006), multivariate analysis was only significant for the anxiety questions (MS3 and MS4), and SES was most strongly predictive of these two scales. Age was negatively predictive but only for MS4 (anxiety and sexual response). Only 3% of the variance in the MSQ scores of these women was accounted for.

In the two male studies (Bancroft, Janssen, Strong, & Vukadinovic, 2003; Bancroft, Janssen, Strong, & Vukadinovic, & Long), subsamples of 43 heterosexual and 42 gay men were interviewed and asked to describe how they experienced the impact of mood on their sexuality. Overall, the impact of depression was more variable and complex than that of anxiety. Those engaging in sexual activity when depressed described it as serving a variety of functions (e.g., establishing intimacy or self-validation) or more simply as a mood regulator. The patterns for anxiety and stress seemed, by comparison, straightforward and more consistent. The term *\*stress* was used to describe feeling under pressure, overwhelmed, anxious, or worried about what needs to be done. For some, ~~the~~ increase in sexual interest or behavior appeared to be principally a matter of benefiting, at least transiently, from the arousal-reducing and calming effect of the postorgasmic state.

What is the relative importance of excitation and inhibition in accounting for these unusual mood and sexuality patterns? ~~With depression, two~~ Depression seems to be associated with two mechanisms ~~processes relevant to sexuality seem to be involved~~: a reduction in excitation proneness, or arousability, and/or an increase in inhibition. Reduced arousability can be seen as a manifestation of the metabolic changes that can accompany depression, particularly

endogenous depressive illness, although the precise mechanisms are not yet well understood (Bancroft, 1999). Paradoxical patterns of increased sexual interest of behavior thus may be more likely in those who have high SES. The second mechanism, involving es- elicitation of sexual inhibition as part of the depressive process, and our limited evidence is consistent with would point at there being less likelihood of such an increase in individuals with low SIS1 and SIS2 scores. The paradoxical pattern then becomes even more likely in those who also have high SES. The failure to show the effect of SIS1 and SIS2 in women may be due to the use of the SIS/SES questionnaire which, as discussed earlier, may not be the most appropriate measure of inhibition in women. Studies using the more recent SESII-W are needed to examine further the relationship between inhibition and mood and sexuality.

An additional mechanism of possible importance to consideration of anxiety is “excitation transfer” (Zillman, 1983), whereby the central and peripheral activation associated with anxiety might augment arousal responses to sexual stimuli. Low inhibition proneness may allow excitation transfer without the counteracting effect of inhibition.

#### *Psychophysiological and Experimental Studies*

A psychophysiological study was carried out in men as part of the validation of the SIS/SES questionnaire (Janssen, Vorst, Finn, & Bancroft 2002b). Selecting participants on the basis of their SIS/SES scores (i.e., high and low scores on each of the three scales) allowed comparison of psychophysiological response patterns to nonthreatening and threatening sexual stimuli. As hypothesized, the high SES group showed generally higher erectile response to the nonthreatening stimuli than did the low SES group. Also as predicted, the low SIS2 group showed higher genital response to the threatening sexual stimuli than the high SIS2 group, although the two groups did not differ in their ratings of subjective sexual arousal or affective

response (including their startle response, which can be described as an implicit measure of affective state). Manipulation of performance demand and the use of distraction were added in an attempt to discriminate between high and low SIS1 participants, but this maneuver was not successful, partly because the performance demand manipulation did not work as intended. This study and other related psychophysiological studies are examined more closely by Janssen and Bancroft (2007).

One aspect of the field of sexual psychophysiology has become especially apparent as a result of our attempts to apply the Dual Control Model. It is unusual for any trait measure relevant to sexuality to be used to select samples. The SIS/SES and the SESII-W could prove valuable in this respect, with sampling allowing comparison of individuals with high versus low scores on a specific scale.

### **Problematic Sexual Response and Behavior**

The Dual Control Model postulates that individuals who have low propensity for sexual excitation and/or a high propensity for sexual inhibition are more likely to experience problems of impaired sexual response or reduced sexual interest. The model also predicts that individuals who have high propensity for sexual excitation and/or a low propensity for sexual inhibition are more likely to engage in “problematic sexuality,” such as out of control or high-risk sexual behavior.

#### *Impaired Male Sexual Response*

*Erectile problems.* So far most of the evidence is from a number of nonclinical samples.

The following questions have been asked in each study:

1. In your sexual activities with a sexual partner, have you *ever* had difficulties in obtaining or keeping an erection?

2. In the *past 3 months*, have you experienced any difficulty in obtaining or maintaining a full erection during sexual activity?

Answers for each question were *never, occasionally, less than half the time, most of the time*.

In a sample of heterosexual men (Bancroft & Janssen, 2001), multiple regression analysis showed SIS1 to be strongly and positively predictive of erectile problems, both *ever* and *in the past 3 months*. Age was also positively predictive for *ever* and *in the past 3 months*. SES was negatively predictive only *in the last 3 months* and SIS2 positively predictive only for *ever*.

Evidence is much more limited concerning the relevance of SIS/SES to men presenting with erectile problems at sexual problem clinics. Bancroft, Herbenick, et al. (2005) reported results from 146 such men (mean age = 46.7), who were compared to an age-matched nonclinical sample of 446 men. The clinic attenders were very similar in their SES and SIS1 scores to the 13 men in the nonclinical sample who reported having erectile problems *most of the time*.

Next, the relationship between SIS/SES scores, clinical history, and other aspects of the erectile dysfunction (ED) was explored in the clinic group. Men with ED who had normal waking erections or better erections during masturbation than during sexual activity with partners (both suggestive of a psychogenic basis) showed significantly higher SES, but not higher SIS1. Those men with a medical problem that could have contributed to their ED showed significantly lower SES. They also showed higher SIS1, but this difference was not significant. A proportion of the clinic ED group was assessed by their clinician for performance anxiety. SES was significantly lower in those with marked performance anxiety, but SIS1 was not significantly different. The SIS2, ~~since it has had~~ -featured more in the theorizing about sexual risk taking than about sexual problems, ~~offered had~~ Hence there were -no preconceptions of expected results.

Interestingly, men with ED who reported “fear of rejection” by their partners or whose partners expressed hostility (not related to the ED) had significantly higher SIS2 scores.

At first sight, this preliminary clinical evidence points to SES as possibly more diagnostically informative than SIS1. However, we should not jump to that conclusion. The higher SES scores in those men with ED who reported normal erections on waking or during masturbation are consistent with their having physiologically normal erectile capacity reduced during sexual interaction with a partner. This consistency indicates a psychogenic basis to the problem. Conversely, the lower SES in the group with medical conditions is consistent with an impaired capacity for erectile response. Such impairment may involve peripheral mechanisms, as, for example, in cases with vascular disease. However, it may also involve central mechanisms, as for example, in endogenous depression or with central autonomic dysregulation caused by diabetes, both of which are typically associated with an impairment of nocturnal penile tumescence, a condition consistent with reduction of central excitatory tone (Bancroft, 2009).

What can we learn from the observed association between performance anxiety, a concept widely used in the clinical literature though underresearched, and low SES but not high SIS1? Our original descriptor for SIS1 was “inhibition due to the threat of performance failure,” which overlaps with performance anxiety. Conventional thinking holds that, at least in some individuals, worrying about whether they are going to respond sexually, makes response less likely. Our data are consistent with this line of thought: some (if not most)-men who have “organic” impairment of their erectile response ~~by will also worry~~ worrying about that their response, which may possibly ~~makeing~~ it worse. In such cases the effect of the worry or anxiety

may be mediated not by direct inhibition but rather by distraction. Inhibition of sexual response, on the other hand, may not necessarily be associated with anxiety or worry.

Let us reconsider the components of the SIS1 scale and compare these with the SESII-W questionnaire. The SESII-W presents a noteworthy distinction between the Arousal Contingency and Concerns About Sexual Function lower-order factors: the first suggests a vulnerability of sexual response such that if conditions aren't just right, sexual arousal will not occur or will be reduced; the second is much more performance anxiety oriented. SIS1, in comparison, is made up of 3 of the 10 factors that were originally identified in the exploratory factor analysis (see earlier). The first, with 8 items, conveys the need for active stimulation to both elicit and maintain sexual arousal, with an impression of vulnerability of response comparable to the female Arousal Contingency factor. The other two factors, each with 3 items, are more comparable to Concerns About Sexual Function from the SESII-W. As discussed earlier, we have reconsidered the SIS1 scale as possibly reflecting the level of inhibitory tone, a concept different from that of performance anxiety. Given the lack of clear association between SIS1 and etiologically relevant variables in our clinical study, future research should explore the 10 factor-structure to see whether it allows more clinically relevant distinctions. Inhibitory tone may, in fact, be more relevant to the Arousal Contingency concept. The inhibitory mechanisms postulated by Redouté et al. (2005), based on brain imaging studies, include deactivation of inhibitory tone from the temporal lobe before sexual arousal can occur. The experience of individuals whose level of inhibitory tone is high to start with, or who for some reason are less likely to reduce it sufficiently, could well be as described in the Arousal Contingency factor of the SESII-W or the 8 item subfactor of the SIS1 scale.



These clinical findings raise a further basic issue, the state/trait distinction. Our theoretical model postulates that those individuals with a low propensity for sexual excitation (low sexual excitation) and high propensity for sexual inhibition (SIS1 in particular) are more likely to develop sexual dysfunction, and in men, ED in particular. This pairing is thus conceptualized as a vulnerability trait. However, once ED becomes established—from whatever cause—what happens to the individual's SIS/SES scores? As yet the questionnaire allows no way of distinguishing between a man whose low sexual excitation rendered him vulnerable to ED and who developed ED as a consequence, and a man whose SES scores decreased because ED became established.

A similar issue arises with the SIS scales, compounded by the evidence considered earlier that the responsiveness of the erectile smooth muscle to inhibitory signals is increased in older men and in men with diabetes. Here, however, it could well be that men with high SIS1 to begin with are most likely to be affected by these peripheral mechanisms. Furthermore, established ED may show a less predictable impact on SIS1 ~~may show a less predictable impact of established ED than on SES will.~~

Our limited findings with SIS2 warrant further study. They may indicate that men with high SIS2 are more likely to react with ED to fears of rejection or partner hostility. However, other possible explanations for these findings cannot yet be excluded.

Support for the assumption that SIS1 is a measure of vulnerability to ED rather than clinical manifestation of ED is provided by the findings from our *nonclinical* samples described previously. In the study comparing gay and straight men mentioned earlier, gay men reported significantly more erectile problems than straight men for both “ever” and “the past 3 months,” though this difference was mainly for “occasional” problems (Bancroft, Carnes, et al., 2005).

The gay men scored higher on SIS1, even when ~~the scoring was controlled~~ controlling for erectile problems or ~~excluded~~ excluding those with any ED in the past 3 months.

*Premature ejaculation.* In nonclinical studies we have asked one simple question about speed of ejaculation: “In your sexual activities with a sexual partner, have you ever had a problem in ejaculating (i.e., ‘coming’) too quickly?” and offered the following responses: *never*, *occasionally*, *less than half the time*, *most of the time*. No consistent association was found between a tendency to rapid ejaculation, according to that one question, and scores on the SIS/SES in nonclinical samples. In the clinical sample (Bancroft, Herbenick, et al., 2005), only 15 men presented with premature ejaculation as their only problem and they did not differ from the nonclinical control group on SIS/SES.

*Low sexual desire.* Earlier in this review, we reported associations between SIS/SES and levels of sexual interest in nonclinical samples, but in these studies, no attempt was made to identify those for whom low sexual interest was a problem. In the clinical study (Bancroft, Herbenick, et al., 2005), only two men presented with low sexual desire, both with notably high SIS1 and low SES scores.

#### *Impaired Female Sexual Response*

To date, the relationship between SESII-W and sexual problems in women has been examined in only one published study, it involved a nonclinical sample. Using a subset of the data from the initial SESII-W validation sample, Sanders et al. (2008b) explored predictors of ~~reports-reported~~ of sexual problems in 540 heterosexual women (mean age = 33.7). One general question asked, “To what degree, if any, would you say you experience sexual problems?” There were six possible responses, ranging from *not at all* to *very strongly*. There were also three questions about specific problems with (i) becoming or staying sexually aroused, (ii) difficulty in

reaching orgasm/climax, and (iii) low sexual interest”~~”;~~~~that is~~ i.e., “Have there been any times in your life when (i, ii or iii) was a problem for you?” Response options were *never, less than half the time, about half the time, more than half the time, and all the time*. The strongest predictor of reporting problems, both generally and for each of the three specific types, was the inhibition factor, Arousal Contingency. Another inhibition factor, Concerns About Sexual Function, was a significant predictor of both the general question and two of the specific problems, arousal difficulty and, most strongly, orgasm difficulty. Concerns About Sexual Function contains four items, each of which conveys an aspect of performance anxiety. In contrast, Arousal Contingency, as the name of this factor implies, is a more complex construct, although the three items all relate to easily disrupted or prevented arousal and, as discussed in relation to male erectile dysfunction, may reflect high inhibitory tone. The strong association of Arousal Contingency with sexual problems makes it important to explore the underlying mechanisms more closely. It may be informative to compare women high and low on this factor with brain imaging as they react to sexual stimuli. It would also be valuable to obtain qualitative data from women who score high on Arousal Contingency. As yet we have no relevant evidence from clinical studies of women with sexual problems.

#### *The Clinical Management of Impaired Sexual Response*

With the advent of effective pharmacological methods for treating sexual problems in men, the need to integrate these with psychological treatment arises (Rosen, 2007). Although its heuristic value has yet to be demonstrated, the Dual Control Model provides a framework for conceptualizing sexual problems, which fits well with the integrated treatment approach. Fundamental to its usefulness is the concept of inhibition of sexual response as an adaptive mechanism. The model requires that clinical assessment ~~to~~ differentiate s between inhibition

which is adaptive (or at least an understandable or appropriate reaction to the current circumstances) and that which reflects vulnerability (e.g., high propensity for sexual inhibition). A “three windows” approach has been proposed for this assessment (Bancroft, Loftus, & Long, 2003). Through the first window, the individual’s current circumstances are considered. To what extent could these circumstances account for an “adaptive” inhibition of sexual response or interest? In particular, are there relevant relationship problems or other sources of current stress? Through the second window, the individual’s sexual history is assessed. For example, is there evidence of a recurring or chronic tendency to over-react with inhibited sexuality to certain circumstances? The third window reveals evidence of physical, pharmacological (e.g., side effects of medication), or hormonal factors that could be interfering with the sexual response system. Explanatory factors observed through the second or third windows may warrant the term *sexual dysfunction*.

A further important aspect of this approach is that the program of sex therapy based on Masters and Johnson (1970), which focuses on the couple rather than the individual, involves early behavioral assignments (“sensate focus”) that may not only induce positive change in the sexual relationship but also provide substantial input to the assessment process. Thus, the early stages of the treatment program leading up to genital stimulation may in some cases not only reveal that “adaptive inhibition to current circumstances” is relevant, but also initiate the necessary therapeutic process. In such cases, this identification of the problem indicates that the continuation of sex therapy is appropriate and sufficient. In other cases, not only may the assessment process reveal evidence of less adaptive mechanisms, but the lack of change from the early stages may indicate that an additional pharmacological method should be added to the treatment program. (This approach is described in greater detail in Bancroft, 2006.)

From this perspective, adaptive patterns of inhibition (i.e., identified through the first window) should respond to the behavioral program alone; if the reason for the inhibitory reaction is identified and an appropriate method of dealing with it is developed, inhibition can be expected to lessen, and the affected individual's normal pattern of sexual responsiveness may return. For those with vulnerability (seen through the second window, and possibly reflected in high SIS1, SIS2, or SI scores), a behavioral program may be helpful but not sufficient, possibly calling for an integrated approach, a longer-term psychotherapy, or a couple therapy approach. Unfortunately, little in the way of "inhibition-reducing" medication is available as yet. Phentolamine may be an exception, as it combines peripheral alpha-1 adrenergic with central alpha-2 adrenergic blockade. ~~The~~ In men the alpha-1 blockade should reduce the noradrenergically mediated contraction of penile smooth muscle and hence facilitate erectile response; the alpha-2 blockade, which in the brain reduces re-uptake of noradrenaline (NA) and hence increases NA-induced central arousability, should enhance sexual arousal. We have suggested the use of phentolamine in men with evidence of high inhibition (Bancroft & Janssen, 2001), but this treatment has not yet been adequately evaluated. Some evidence of effective oral phentolamine therapy in the treatment of ED has been reported (Goldstein, Carson, Rosen, & Islam, 2001), but researchers made no attempt to select cases in any way relevant to the above rationale. So far there is very limited evidence of the effects of oral phentolamine in women (Rosen, Phillips, Gendrano, & Ferguson, 1999).

Medication to enhance the excitatory mechanisms (e.g., dopamine agonists for central effects, phosphodiesterase inhibitors for peripheral effects) rather than reduce inhibition may be most likely to help those individuals where causal mechanisms identified through the third

window are involved. However, they may also prove valuable in some cases where inhibitory mechanisms are involved (i.e., as seen through the second window).

So far, only one treatment study has included measurement of sexual inhibition and ~~used~~ excitation propensities as ~~a~~-possible predictors. In a small, prospective pilot study of pharmacotherapy (sildenafil) in men with mild-to-moderate erectile problems (Rosen et al., 2006), in which partners were also assessed, a broad range of psychological and interpersonal variables were tested as predictors of treatment efficacy and satisfaction. Sildenafil treatment was associated with significant improvements in erectile function, in addition to improvements in orgasmic function, sexual desire, intercourse satisfaction, and overall sexual satisfaction. In this study, sexual excitation and inhibition, measured using the SIS/SES, were not significant predictors of treatment efficacy; however, the relevance of these variables may have been obscured due to the small number of men completing the study (34 out of 69) and the potential impact of other variables (e.g., partner relationship). This study also illustrates the difficulty of involving both partners in pharmacological treatment evaluation.

Obviously, further carefully controlled clinical studies with appropriate assessment of the underlying problem (including measurement of sexual inhibition and excitation) will be needed to validate this approach, including its implications for choosing couple-based rather than individual treatment programs.

The relevance of the Dual Control Model to problematic sexual behavior will be considered under two headings: “out of control” sexual behavior and high-risk sexual behavior.

#### *“Out of Control” Sexual Behavior*

This alternative term is used for what is usually called sexual addiction or sexual compulsivity, or the experience of a lack of control over one’s sexual behavior to the extent that

it interferes with one's life, undermines one's sexual relationship, or has legal, social or financial consequences. Most often, the *out of control* behavior is solitary (e.g., masturbation or use of the Internet for pornography), but in some cases, other people are involved. Such behaviors likely involve a range of etiological mechanisms and, in a small proportion, the behavior may have obsessive-compulsive characteristics. ~~but The the~~ concept of low inhibition and high excitation could well be relevant ~~to others in many cases with this range of characteristics~~. So far sexual excitation and inhibition have been measured only in one small study of self-defined male "sex addicts" ( $N = 31$ ; Bancroft & Vukadinovic, 2004), using the SIS/SES questionnaire. In comparison with an age-matched control group, men in the *out of control* group had significantly higher SES scores, but did not differ in SIS1 or SIS2 scores. However, when divided into the "compulsive masturbators" (two thirds of the sample) and those whose behavior involved other people (the remaining third), the latter group had significantly lower SIS2 scores than the masturbators and participants in the control group.

Interestingly, Bancroft and Vukadinoic (2004) found a strong association between paradoxical patterns of sexuality and mood, considered earlier, and sexual acting out. For both masturbators and nonmasturbators, acting out was more likely to occur in states of depression and anxiety. It is noteworthy that such individuals often seem to be helped by serotonin selective re-uptake inhibitors (SSRIs; Kafka, 2007). Benefits for these individuals could result from improved mood, but SSRIs may also enhance inhibition of sexual response. The roles of inhibition and excitation need to be explored in larger samples, which ~~allow identify comparison of~~ different patterns of out of control sexuality. ~~The larger sample~~ This may show that the Dual Control Model is helpful in understanding a substantial proportion of ~~them~~ these patterns.

To date we have no evidence on out of control sexual behavior and its relationship to sexual excitation and inhibition in women.

### *High-Risk Sexual Behavior*

A number of risks or negative consequences are associated with sexual activity, but the two that have received the most attention are sexually transmitted infections and unwanted pregnancy. Adaptive management of such risks requires careful selection of one's sexual partners and the use of contraception or barrier methods to reduce the likelihood of pregnancy and transmission of infection.

In spite of the massive attention paid to reducing high-risk sexual behavior because of the HIV/AIDS pandemic, only recently has this attention focused on the impact of sexual arousal on risk management. Part of the reason for this oversight became apparent during a workshop on "The Role of Theory in Sex Research" organized by The Kinsey Institute in a session on "individual differences in sexual risk taking," during which the Dual Control Model was presented (Bancroft, 2000). In addition to disagreeing with the claim that personality traits are not relevant to the explanation of processes that involve interactions between two people (e.g., Diaz, 2000), the view was also expressed that it is "politically incorrect" to study individual differences and risky sexual behavior, because this would "blame" the individual and limit and challenge prevailing approaches to intervention and prevention (e.g., "one cannot change personality"; Gagnon, 2000). Consistent with a more recent shift in HIV/AIDS research to consideration of individual differences, we have carried out several studies on the relationship between sexual excitation, sexual inhibition proneness, and sexual risk taking.

In a study of 879 heterosexual men (mean age 25.2 years; Bancroft et al., 2004), risk assessment included the following three questions: "With how many different partners have you



had sex (sexual intercourse) (i) in the *past year*?; (ii) during the past *three* years with whom no condom was used?; (iii) *on one and only one occasion in your life time* ('one night stands')?." These questions were taken from a modification of the Socio-Sexual Orientation Inventory by Seal and Agostinelli (1994). Controlling for age, SIS2 was a significant negative predictor of number of partners in the past 3 years with whom no condoms were used, and also of the lifetime number of one-night stands. SES, however, was not a significant predictor.

In a parallel study of gay men ( $N = 589$ ; mean age 35.7 years), a more detailed assessment of sexual risk was undertaken (Bancroft, Janssen, Strong, Carnes, et al., 2003), with a close assessment of the previous 6 months, plus an assessment of long-term risk. Recent risk assessment covered two aspects of specific sexual activity, unprotected anal intercourse (UAI) and unprotected oral sex, and two aspects of sexual contact, casual sex and cruising (i.e., searching for casual sex partners). In addition, the same three questions as used in the study of heterosexual men described above were combined to give a long-term risk score. As predicted, SIS2 was significantly lower in those reporting higher frequencies of UAI and unprotected oral sex in the past 6 months, but was not predictive of the two aspects of sexual contact. SES, however, was predictive of the number of casual partners, as was SIS1 in a positive direction. Cruising was not associated with SES, SIS1, or SIS2 scores, although cruising was more frequent, and number of casual partners higher, in those reporting increased sexual interest with negative mood. Long-term risk was significantly associated with low SIS2 and high SES, but also with high SIS1.

Thus, in men, a high propensity for sexual excitation (SES) predicted the number of casual partners, whereas a low propensity for sexual inhibition (SIS2) in sexually risky situations was associated with high-risk sexual activity, in particular UAI, during these sexual encounters.

The *positive* associations found among SIS1, number of casual sex partners, and long-term risk, however, were not predicted. ~~That is,~~ we had not expected SIS1 to show associations in the opposite direction to SIS2, two variables that are typically positively correlated ( $r = .28$  in this study). A possible explanation is that at least some men with high SIS1 are not only more likely to experience erectile problems but, as a result, are more reluctant to use condoms or to use them consistently. In contrast, other men with high SIS1 may avoid sexual interactions because of anticipation of erectile failure. A significant difference was found between the highest and lowest long-term risk categories, with the highest reporting more erectile problems in the past, but no clear ordinal relationship across intermediate categories. Because of emerging evidence that condoms are used ~~inappropriately-inconsistently~~ or not at all by men with erectile problems because of the potential for aggravating the erectile problem, this issue is now receiving more attention (e.g., Graham, Crosby, Yarber, Sanders, McBride, Milhausen, et al., 2006).

We have, as yet, limited data relevant to sexual risk taking in women. Carpenter et al. (2008) found significant correlations between women's scores on the Sociosexual Orientation Inventory (SOI; Simpson & Gangestad, 1991), a measure of the propensity for casual sex, and SES (+.38) and SIS2 (-.47). These correlations were higher than those reported in men (SES: +.21, SIS2: -.32). Also, in the original validation study of the SESII-W (Graham et al., 2006), the relationship between SE and SI and the propensity for casual sex, the number of lifetime sexual partners, and condom use during the previous year was examined among 540 heterosexual women (mean age 33.7 years). Using multiple regression and controlling for age, SE and Arousability, a lower-level excitation factor, were significant positive predictors, and Relationship Importance, an inhibition factor, a significant negative predictor of the propensity for casual sex. In a similar way, and controlling for age, number of lifetime partners was

predicted positively by SE, and negatively by relationship importance (Graham, Sanders, Milhausen, & McBride, 2005). Frequency of condom use was not predicted by any of the SE or SI factors but, consistent with previous evidence (Anderson, Wilson, Doll, Jones, & Barker, 1999), was predicted by age and relationship status, with condom use less common in older individuals and those in “exclusive” relationships.

In a study of college students (302 male and 311 female), Turchik and Garske (2008) developed a new comprehensive 23 item measure of sexual risk taking, the Sexual Risk Survey (SRS). It has five factors: Sexual Risk Taking With Uncommitted Partners, Risky Sex Acts, Impulsive Sexual Behaviors, Intent to Engage in Risky Sexual Behaviors, and Risky Anal Sex Acts. Male participants completed the SES and SIS2 scales from the SIS/SES (but not the SIS1). SES correlated significantly with the men’s Total SRS score (+.22), and with each of the factor scores except Impulsive Sexual Behavior. SIS2 correlated significantly with the Total SRS (-.31) and each of the five factors in the men. The women completed the SESII-W, and correlations between the higher order SE and SI factors and SRS scores were presented. SE correlated significantly with the Total SRS score (+.31) and with each of the five lower-level factor scores. SI correlated significantly and negatively with the Total SRS score (-.20) and with three of the lower-level factor scores: sexual risk taking with uncommitted partners (-.21), risky sex acts (-.18), and intent to engage in risky sexual behaviors (-.15). Thus this study provides further support for the relevance of high sexual excitation and low sexual inhibition proneness to sexual risk taking in men and women.

### Summary

The principal findings reviewed in this paper are summarized as follows:

1. Measures of propensity for sexual excitation and inhibition have been developed separately for men (SIS/SES) and women (SESII-W), although each has been adapted for use by both genders.
2. Both measures include lower and higher factor~~s~~ solutions (with 10 and 6, and 8 and 2 factors, respectively).
3. Both measures show large variability in both men and women, with distributions close to normal.
4. Men on average score higher on excitation and lower on inhibition than women.
5. Gay men, on average, score higher on excitation (SES) and SIS1, and lower on SIS2 than straight men.
6. Bisexual women, on average, score higher on excitation than lesbian and straight women.
7. Excitation lessens with age for men (SES) and women (SE). Inhibition is not age-related in women (SI), but, in men, one of the two inhibition scales (SIS1) is age related.
8. Sexual Excitation is related to overall sexual responsiveness (including laboratory studies), sexual desire, out of control sexual behavior, and number of sexual partners (lifetime/casual). Although excitation is also related to sexual risk taking, particularly in women, in men, sexual inhibition is a stronger negative predictor.
9. Men who report erection problems score higher on SIS1. No association with premature ejaculation has been found.
10. Women with sexual problems score higher on the Arousal Contingency and, to a lesser extent, the concerns about sexual function subscales of SESII-W.

11. The relation between negative mood and sexuality is best predicted by inhibition scores in men, but by excitation scores in women.

~~12.~~In addition, the Dual Control Model provides a useful framework for conceptualizing sexual problems when using an integrated treatment approach.

### **The Future**

Research using the Dual Control Model has made a promising start. A major tenet of the model is that it conceptualizes sexual excitation and sexual inhibition as separate systems, in contrast to the more traditional tendency to see them as two ends of a single dimension. The model provides rich opportunities for formulating and testing hypotheses relevant to many aspects of human sexuality.

We need to allow for development of the basic neurophysiological model as we gather further evidence, particularly through brain imaging. ~~Too~~Also, although our measures of sexual excitation and inhibition propensities were validated in a conventional psychometric manner, the selection of items or situations may be further improved. We have started to experiment with modifications of the questionnaires, retaining the main structure to provide continuity while exploring the impact of adding new and different items. ~~Also~~In addition, we are currently collecting data using both the SIS/SES questionnaire and the SESII-W in both men and women, data that should shed additional light on the issue of gender differences and similarities in sexual excitation and inhibition. In particular, it will allow us to assess the correlations between items in the different questionnaires and enable a clearer overall picture of what the two measures cover. This process should help researchers who want to use the Dual Control Model but ~~are~~ uncertain about which questionnaire to use.

One new idea stems not only from our research but also from the recent brain imaging literature: There may be a number of different inhibitory patterns, some involving information processing of either a conscious or “automatic” nature, others based on high inhibitory tone which needs to be reduced if sexual arousal is to occur. Such varied patterns may show gender differences, have different determinants, vary in the type of sexual context in which they are relevant, and require appropriate questions to rate them. They may also vary in the extent to which they are learned or genetically determined.

In contrast, so far, we see few reasons to assume different neurophysiological patterns of sexual excitation, but we should keep an open mind on that issue. These considerations may be particularly relevant to the determinants of sexual excitation in subgroups of men and women (e.g., those in long-term relationships). In learning more about how men and women experience sexual desire, we may need to distinguish among different types of arousal, including the motivational state of “wanting to be desired,” which may be particularly important for some women (Graham et al, 2004; Brotto, Heiman, & Tolman, in press), as well as for some men (Janssen et al., ~~2007~~2008). Because questions incorporated into our sexual excitation scales may be relevant to inhibitory as well as excitatory mechanisms in the brain, we maintain caution in equating our measures of variability with the neurophysiological mechanisms postulated by the Dual Control Model.

Evidence from the application of this model to sexual dysfunction has been the most inconsistent, although that evidence, particularly from clinical contexts, is as yet very limited and largely restricted to men. ~~An~~One obvious challenge, ~~in when~~ dealing with those who present clinically with established sexual problems, ~~is the issue to distinguish between a~~ more long-lasting response propensity (e.g., preceding clinical problems) ~~or, alternatively, and~~ the possible

effects of sexual problems on current levels of sexual excitation and inhibition. This distinction is of particular importance in assessing the extent to which an individual's low sexual excitation and high sexual inhibition propensities constitute a vulnerable trait, or ~~are~~ rather are manifestations of established sexual dysfunctions (i.e., a state). In some circumstances, we may be able to use our measures to predict those who are most likely to develop a problem in a particular impending context (e.g., those most likely to experience sexual side effects of medications or oral contraceptives). Prediction of the changes associated with ageing would be possible in longitudinal studies (e.g., MMAS; Araujo, Mohr, & McKinlay, 2004). For instance, are men with higher SIS1 in middle age more likely to develop erectile dysfunction as they get older? Are women with higher SE in middle age less likely to develop sexual problems?

So far, the Dual Control Model and, in particular, the questionnaires developed to assess individual variability have focused on sexual arousal rather than orgasm. The lack of association between SIS/SES and premature ejaculation highlights the fact that the questions in the SIS/SES and the SESII-W do not cover the ease or speed of reaching orgasm. In women, there is some suggestion that sexual inhibition is associated with difficulty experiencing orgasm (Sanders et al., ~~2007~~2008b), evidence that would fit our basic inhibitory model. However, this study involved a nonclinical sample of women; future research should involve clinical samples of women. As yet there is not enough evidence to assess the role of sexual inhibition in delayed or absent ejaculation in men. The nine men with delayed ejaculation and without erectile difficulties in our clinical study (Bancroft, Herbenick, et al., 2005) did not have obviously raised SIS1. Premature ejaculation, furthermore, was associated neither with low SIS1 nor with high SES. More evidence from men presenting at clinics with premature ejaculation is needed. The neurophysiological mechanisms involved in seminal emission, the uncertain relation between

seminal emission and orgasm, and the variable relationship between seminal emission and degree of sexual arousal in men with premature ejaculation may indicate that inhibition of seminal emission involves different mechanisms or pathways than inhibition of sexual arousal or even orgasm (reviewed in Bancroft, 2009).

Much of the research using the Dual Control Model has found gender differences in scores on sexual excitation and inhibition propensities. However, as Carpenter et al. (2008) observed, within-gender variability on all three SIS/SES factors is much greater than the average differences between women and men. A recent focus group study in men (Janssen et al., 2007), using similar methodology to that of the Graham et al. (2004) study, found many similarities to women in the factors that men deemed important to their sexual arousal. For example, the majority of men reported that feeling “emotionally connected” to their partner enhanced their sexual arousal. Future research should continue to explore gender similarities, as well as differences, in this area.

Overall, we can conclude that the Dual Control Model offers much for future sex research, as long as we continue to see it as a model, rather than a description of reality, and look for ways of improving the model and the methods we use to investigate it. ~~As long as we continue to see it as a model, rather than a description of reality, the Dual Control Model offers much for future sex research as we continue to look for ways to improve the model itself as well as the methods used to investigate it.~~

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## APPENDIX A

### SIS/SES Scales\*

*Instruction:* “In this questionnaire you will find statements about how you might react to various sexual situations, activities, or behaviors. Obviously, how you react will often depend on the circumstances, but we are interested in what would be the most likely reaction for you. Please read each statement carefully and decide how you would be most likely to react. Then circle the number that corresponds with your answer. Please try to respond to every statement. Sometimes you may feel that none of the responses seems completely accurate. Sometimes you may read a statement which you feel is ‘not applicable’. In these cases, please circle a response which you would choose if it were applicable to you. In many statements you will find words describing reactions such as ‘sexually aroused’, or sometimes just ‘aroused’. With these words we mean to describe ‘feelings of sexual excitement’, feeling ‘sexually stimulated’, ‘horny’, ‘hot’, or turned on’. Don’t think too long before answering, please give your first reaction. Try to not skip any questions. Try to be as honest as possible.”

*Note:* 1) Asterisks indicate items that are part of the SIS/SES short form. 2) When different item versions are used for men and women, both versions are given (male/female).

#### Sexual Excitation (SES)

##### Lower-Level Factor

- |    |   |
|----|---|
| 1* | When I think of a very attractive person, I easily become sexually aroused. |
| 1  | When a sexually attractive stranger looks me straight in the eye, I become  |

aroused/When a sexually attractive stranger makes eye-contact with me, I become aroused.

1 When I see an attractive person, I start fantasizing about having sex with him/her.

1\* When I talk to someone on the telephone who has a sexy voice, I become sexually aroused.

1 When I have a quiet candlelight dinner with someone I find sexually attractive, I get aroused.

1\* When an attractive person flirts with me, I easily become sexually aroused.

1 When I see someone I find attractive dressed in a sexy way, I easily become sexually aroused.

1 When I think someone sexually attractive wants to have sex with me, I quickly become sexually aroused.

1\* When a sexually attractive stranger accidentally touches me, I easily become aroused.

2\* When I see others engaged in sexual activities, I feel like having sex myself.

2 If I am with a group of people watching an X-rated film, I quickly become sexually aroused.

2 If I am on my own watching a sexual scene in a film, I quickly become sexually aroused.

2 When I look at erotic pictures, I easily become sexually aroused.

3 When I feel sexually aroused, I usually have an erection/I usually have a genital response (e.g., vaginal lubrication, being wet).

- 3\* When I start fantasizing about sex, I quickly become sexually aroused.
- 3 Just thinking about a sexual encounter I have had is enough to turn me on sexually.
- 3 When I feel interested in sex, I usually get an erection/I usually have a genital response (e.g., vaginal lubrication, being wet).
- 4 When I am taking a shower or a bath, I easily become sexually aroused.
- 4 When I wear something I feel attractive in, I am likely to become sexually aroused.
- 4 Sometimes I become sexually aroused just by lying in the sun/Sometimes just lying in the sun sexually arouses me.

#### Sexual Inhibition - 1 (SIS1)

##### Lower-Level Factor

- 1 I need my penis to be touched to maintain an erection/ I need my clitoris to be stimulated to continue feeling aroused.
- 1 When I am having sex, I have to focus on my own sexual feelings in order to keep my erection/stay aroused.
- 1 Putting on a condom can cause me to lose my erection/Using condoms or other safe-sex products can cause me to lose my arousal.
- 1 It is difficult to become sexually aroused unless I fantasize about a very arousing situation.
- 1\* Once I have an erection, I want to start intercourse right away before I lose my

erection/Once I am sexually aroused, I want to start intercourse right away before I lose my arousal.

- 1\* When I have a distracting thought, I easily lose my erection/my arousal.
- 1 I often rely on fantasies to help me maintain an erection/my sexual arousal.
- 1\* I cannot get aroused unless I focus exclusively on sexual stimulation.
- 2 If I am concerned about pleasing my partner sexually, I easily lose my erection/ If I am concerned about pleasing my partner sexually, it interferes with my arousal.
- 2 During sex, pleasing my partner sexually makes me more aroused. [Reversed item scoring]
- 2 When I notice that my partner is sexually aroused, my own arousal becomes stronger. [Reversed item scoring]
- 3 If I think that I might not get an erection, then I am less likely to get one/If I am worried about being too dry, I am less likely to get lubricated.
- 3\* If I am distracted by hearing music, television, or a conversation, I am unlikely to stay aroused.
- 3 If I feel that I'm expected to respond sexually, I have difficulty getting aroused.

#### Sexual Inhibition - 2 (SIS2)

##### Lower-Level Factor

- 1\* If I am masturbating on my own and I realize that someone is likely to come into the room at any moment, I will lose my erection/my sexual arousal.
- 1 If I can be heard by others while having sex, I am unlikely to stay sexually

aroused.

- 1\*      If I am having sex in a secluded, outdoor place and I think that someone is nearby, I am not likely to get very aroused.
- 1\*      If I can be seen by others while having sex, I am unlikely to stay sexually aroused.
- 2\*      If I realize there is a risk of catching a sexually transmitted disease, I am unlikely to stay sexually aroused.
- 2        If there is a risk of unwanted pregnancy, I am unlikely to get sexually aroused.
- 2        If my new sexual partner does not want to use a condom, I am unlikely to stay aroused/If my new sexual partner does not want to use a condom/safe-sex product, I am unlikely to stay aroused.
- 3        If having sex will cause my partner pain, I am unlikely to stay sexually aroused.
- 3        If I discovered that someone I find sexually attractive is too young, I would have difficulty getting sexually aroused with him/her.
- 3        If I feel that I am being rushed, I am unlikely to get very aroused.
- 3        If I think that having sex will cause me pain, I will lose my erection/my arousal.

\* Researchers interested in using the SIS/SES should contact Erick Janssen, PhD.

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APPENDIX B

The Sexual Excitation/Sexual Inhibition Inventory for Women (SESII-W)\*

Instructions

This questionnaire asks about things that might affect your sexual arousal. Other ways that we refer to sexual arousal are feeling “turned on”, “sexually excited”, and “being in a sexual mood”. Women described their sexual arousal in many different ways. These can include genital changes (being “wet”, tingling sensations, feelings of warmth, etc.), as well as non-genital sensations (increased heart rate, temperature changes, skin sensitivity, etc.) or feelings (anticipation, heightened sense of awareness, feeling “sexy” or “sexual”, etc.).

We are interested in what would be the most *typical* reaction for you now. You may read a statement that you feel does not apply to you, or may have applied to you in the past but doesn’t now. In such cases please indicate how you think you *would* respond, if you were currently in that situation. Some of the questions sound very similar but are in fact different. Please read each statement carefully and then circle the letter to indicate your answer.

Don’t think too long before answering. Please give your first reaction to each question.

Items and Factor Loadings

Sexual Excitation Factors

### *Arousability*

- .639 When I think about someone I find sexually attractive, I easily become sexually aroused.
- .597 Fantasizing about sex can quickly get me sexually excited.
- .587 Certain hormonal changes definitely increase my sexual arousal.
- .549 Sometimes I am so attracted to someone, I cannot stop myself from becoming sexually aroused.
- .507 I get very turned on when someone wants me sexually.
- .437 When I see someone dressed in a sexy way, I easily become sexually aroused.
- .417 Just being physically close with a partner is enough to turn me on.
- .331 Seeing an attractive partner's naked body really turns me on.
- .328 With a new partner, I am easily aroused.

### *Sexual Power Dynamics*

- .597 Feeling overpowered in a sexual situation by someone I trust increases my arousal.
- .546 It turns me on if my partner "talks dirty" to me during sex.
- .529 If a partner is forceful during sex, it reduces my arousal.
- .430 Dominating my partner is arousing to me.

### *Smell*

- .864 Often just how someone smells can be a turn on.
- .685 Particular scents are very arousing to me.

### *Partner Characteristics*

- .661 Seeing a partner doing something that shows his/her talent can make me very sexually aroused.
- .557 If I see a partner interacting well with others, I am more easily sexually aroused.



.511 Someone doing something that shows he/she is intelligent turns me on.

.358 Eye contact with someone I find sexually attractive really turns me on.

*Setting (Unusual or Unconcealed)*

.774 Having sex in a different setting than usual is a real turn on for me.

-.565 I find it harder to get sexually aroused if other people are nearby.

.552 I get really turned on if I think I may get caught while having sex.

-.316 If it is possible someone might see or hear us having sex, it is more difficult for me to get aroused.

**Sexual Inhibition Factors**

*Relationship Importance*

.608 I really need to trust a partner to become fully aroused.

.571 If I think that I am being used sexually it completely turns me off.

.539 It is easier for me to become aroused with someone who has “relationship potential.

.536 It would be hard for me to become sexually aroused with someone who is involved with another person.

.536 If I am uncertain about how a partner feels about me, it is harder for me to get aroused

.464 If I think a partner might hurt me emotionally, I put the brakes on sexually.

*Arousal Contingency*

.714 Unless things are “just right” it is difficult for me to become sexually aroused.

.683 When I am sexually aroused, the slightest thing can turn me off.

.513 It is difficult for me to stay sexually aroused.

*Concerns About Sexual Function*

- .637 If I am worried about taking too long to become aroused, this can interfere with my arousal.
- .593 If I think about whether I will have an orgasm, it is much harder for me to become aroused.
- .505 Sometimes I feel so “shy” or self-conscious during sex that I cannot become fully aroused.
- .397 If I am concerned about being a good lover, I am less likely to become aroused.

\* Researchers interested in using the SESII-W should contact Cynthia Graham, PhD.

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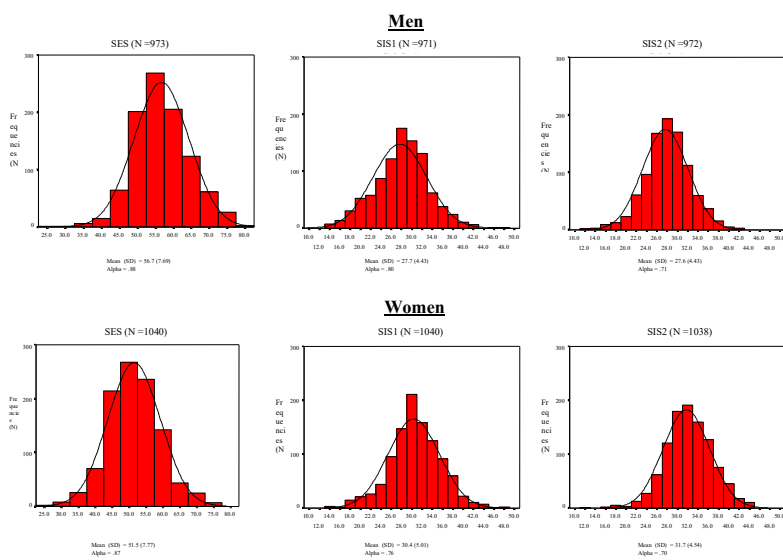


Figure 1. Distributions of SES, SIS1, and SIS2 in men and women (Carpenter et al., 2008)

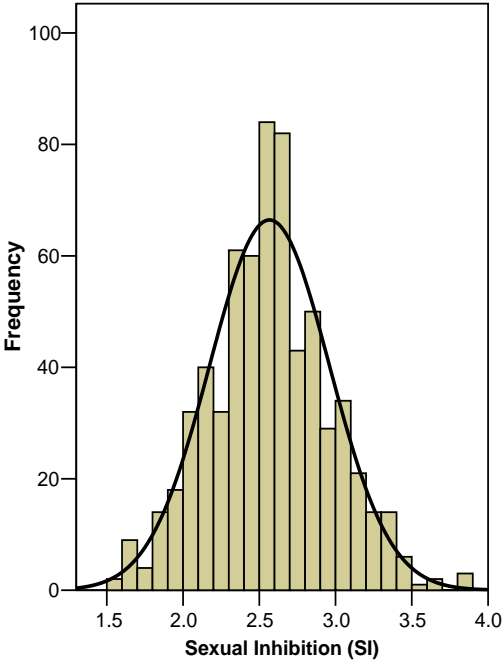


Figure 2. Distributions of SE and SI in women. (Graham et al., 2006)