

# Psychometric Properties of the Sexual Excitation/Sexual Inhibition Inventory for Women in a German Sample

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**Abstract** The Sexual Excitation Sexual/Inhibition Inventory for Women (SESII-W) is a self-report questionnaire for assessing propensities of sexual excitation (SE) and sexual inhibition (SI) in women. According to the dual control model of sexual response, these two factors differ between individuals and influence the occurrence of sexual arousal in given situations. Extreme levels of SE and SI are postulated to be associated with sexual problems or risky sexual behaviors. Psychometric evaluation of the original scale yielded two higher order and eight lower order factors as well as satisfactory to good construct validity and reliability. The present study was designed to assess the psychometric properties of a German version of the SESII-W utilizing a large convenience sample of 2206 women. Confirmatory factor analysis showed a satisfactory overall model fit, with support for the five lower order factors of SE (Arousability, Sexual Power Dynamics, Smell, Partner Characteristics, Setting) and the three lower order factors of SI (Relationship Importance, Arousal Contingency, and Concerns about Sexual Function). Additionally, the scale demonstrated good convergent and discriminant validity, internal consistency, and test–retest-reliability. The German SESII-W is a sufficiently reliable and valid measure for assessing SE and SI in women. Hence, its use can be recommended for future research in Germany that investigates women’s sexual behaviors and experiences.

**Keywords** Sexual arousal · Sexual excitation · Sexual inhibition · Dual control model

## Introduction

The Dual Control Model (DCM) of sexual response offers a theoretical framework to systematically research human sexuality and to explain individual differences in sexual behaviors, interests, and problems. According to this model, an individual’s sexual motivation is based on two relatively independent capacities, sexual excitation (SE) and sexual inhibition (SI), that vary from person to person. Assuming a normal distribution of the two propensities, most levels of SE and SI are expected to lead to relatively functional and adaptive sexual behaviors. Extreme levels of SE and SI, however, are associated with increased risks for problematic sexual behaviors (Bancroft, 1999; Bancroft & Janssen, 2000; Bancroft, 2009). More specifically, it has been proposed that high levels of SI, particularly in association with low levels of SE, are associated with increased vulnerability for sexual dysfunctions (Bancroft & Janssen, 2000). Additionally, high SE and low SI increase the likelihood of out-of-control sexual behaviors, like excessive use of pornography, and risky sexual behaviors, such as unprotected intercourse (e.g., with multiple partners) (Bancroft et al., 2003).

## Validation of the Sexual Inhibition/Sexual Excitation Scales

To allow systematic testing of the DCM, several questionnaires have been developed and validated. The first questionnaire created to assess these two factors was the Sexual Inhibition/Sexual Excitation Scales (SIS/SES) (Janssen, Vorst, Finn, & Bancroft, 2002a). This 45-item self-report instrument measures the propensities for SE and SI in men, using an “if–then” item-

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format, and asking if sexual arousal would occur, be prevented, or be reduced under certain circumstances, thereby assessing typical sexual response patterns of the participants. The SIS/SES has a three-dimensional factor structure with one Sexual Excitation Scale (SES) and two Sexual Inhibition Scales (SIS1 and SIS2). The SES consists of 20 items, which describe stimuli or situations that are potentially sexually arousing, like seeing an attractive person or watching a pornographic video. SIS1 comprises 14 items assessing inhibition due to the threat of performance failure. The items describe situations in which distracting thoughts or pressure to perform lead to the loss of an erection or reduced arousal. SIS2 consists of 11 items and describes inhibition due to the anticipation of negative consequences of sexual behaviors. The items include statements about loss of arousal or erection due to the fear of unintended pregnancy, sexually transmitted diseases or the risk of being caught during sexual activity. Psychometric properties of the SIS/SES are satisfactory to good (Janssen, Vorst, Finn, & Bancroft, 2002a). Psychophysiological experiments, using penile plethysmography and subjective ratings of sexual arousal, assessed the relationship between these scales and actual genital response in a laboratory setting. Higher SES scores were associated with greater genital and subjective arousal to all sexual stimuli used in the study. In addition, men with low SIS2 showed greater genital response to a threatening sexual video. These results were interpreted as a validation of the SES and SIS2 scales (Janssen et al., 2002b).

A modified version of the SIS/SES was used to investigate the assumptions of the DCM in a female population and to assess gender differences in SE and SI (Carpenter, Janssen, Graham, Vorst, & Wicherts, 2008). Psychometric properties of the SIS/SES for men and women were good and the factor structure of the female participants mostly resembled the factor structure in men. Compared with men, women scored higher on SI and lower on SE. This was expected and in line with parental investment theory, which postulates that efficient mechanisms to inhibit sexual arousal might be especially beneficial for women due to the greater costs associated with pregnancy (Bjorklund & Kipp, 1996). These results were supported by the first representative survey that assessed the propensities of SE and SI in a general population in Flanders, Belgium. Using a short version of the SIS/SES, both factors showed a close to normal distribution and, additionally, the proposed gender differences were replicated (Pinxten & Lievens, 2014).

### Validation of the Sexual Excitation/Sexual Inhibition Inventory for Women

Despite the promising validity of the SIS/SES for men and women, it remained unclear whether the questionnaire sufficiently reflected aspects that are particularly relevant for sexual arousal or response in women. Therefore, Graham, Sanders, Milhausen, and McBride (2004) used a focus group approach to obtain information on factors relevant to women's sexual arousal. In these groups,

women of different ages, socioeconomic status, sexual orientation, and ethnicity discussed which cognitions, emotions, or situational factors increased or diminished their sexual arousal. The themes identified based on a content analysis of these discussions were used to inform the development of a questionnaire. A total of 115 items were generated and subsequently answered by a sample of 655 women. Item reduction procedures led to a 36-item questionnaire, with two higher-order and eight lower-order factors of SE and SI (Graham, Sanders, & Milhausen, 2006). Correlations between SE, SI, and other relevant constructs, like sexual sensation seeking and a more general behavioral activation and inhibition, were moderate and in the expected directions. In a heterosexual sub-sample ( $n = 540$ ) from Graham et al. (2006), SE and SI were also both predictive of current and lifetime sexual problems of low sexual interest or arousal difficulties (Sanders, Graham, & Milhausen, 2008). In a validation study of the Dutch version of the SESII-W, women with sexual problems showed lower levels of SE and greater levels of SI compared to women without sexual dysfunctions (Bloemendaal & Laan, 2015). In an American sample of 310 female university students, both factors were related to sexual risk taking (Turchik, Garske, Probst, & Irvin, 2010).

A modified version of the SESII-W questionnaire was developed for use in men and women (SESII-W/M) (Milhausen, Graham, Sanders, Yarber, & Maitland, 2010). Utilizing this version, a subscale of the SE factor, Arousability, was associated with a greater number of sexual partners and sex under the influence of drugs or alcohol in a sample of young African American women (Wood et al., 2013). In addition, two lower-order factors of the SESII-W/M, Arousability and Relationship Importance, were associated with sexual compulsivity in a sample of 1301 married men and women (Muise, Milhausen, Cole, & Graham, 2013). To date, only one study has used psychophysiological paradigms to validate the SESII-W. In a conditioning experiment using a vaginal photoplethysmograph and genital vibrostimulation, scores of the SESII-W were predictive of the magnitude of conditioned subjective affect, but not of the genital response to arousing stimuli (Both, Brauer, & Laan, 2011). Taken together, there is considerable evidence that the original version of the SESII-W is a useful tool in investigating female sexuality and its problematic aspects.

### The Present Study

The aim of the present study was to validate a German version of the SESII-W. Therefore, we first translated and then evaluated the psychometric properties of the German SESII-W. We expected that the factor structure would resemble the original version and that reliability measures would be comparable. Furthermore, we hypothesized moderate correlations between the scales of the SESII-W and questionnaires that measure other related constructs, like general behavioral activation and inhibition or sexual sensation seeking. Both factors of the SESII-W were expected to be able to predict sexual functioning in women. Based on previous

literature (e.g., Carpenter et al., 2008; Graham et al., 2006), we also assumed a close to normal distribution of SE and SI.

## Method

### Participants

Eligibility criteria included being female, 18 years or older, and able to read German. For the present study, 2206 women with an average age of 31 years ( $M = 30.65$ ,  $SD = 9.91$ ) were included in the data analysis. Table 1 shows a summary of the sample characteristics.

Participants for the online survey were recruited through multiple channels to increase sample diversity. On the first page of the survey, visitors were informed about the sensitive content of the study and the possibility of withdrawing from the study at any time without negative consequences. Women were recruited via postings in online discussion boards for women in general, forums for homosexual or bisexual women, or in boards for relationship or sexual topics, as well as through announcements on the university homepage and flyers at gynecological practices. The study website, which included a short description of the study content as well as information about anonymity and voluntariness, had 5200 visitors between July and November 2013. In total, 2987 individuals started the survey by clicking the participation button and 2446 participants proceeded to page three and thereby answered the first questions about sexuality. The median completion time was 23 min. We excluded 83 participants prior to data analysis because they reported being younger than 18 years, being male, or admitted that they had not answered the questions truthfully.

A total of 200 women were contacted twice in order to assess the test–retest-reliability of the German SESII-W. Of the women contacted, 64.5 % ( $n = 129$ ) completed the second survey, in a median completion time of 6 min. Mean duration between first and second participation was 56 days ( $M = 55.52$ ,  $SD = 10.82$ ). The retest sample did not differ from the original sample regarding age,  $t(2142) = -1.23$ , partnership status,  $\chi^2(5, N = 2144) = 1.92$ , number of children,  $\chi^2(6, N = 2116) = 9.30$ , education,  $\chi^2(6, N = 1896) = 2.70$ , or occupation,  $\chi^2(7, N = 1896) = 13.10$ ,  $p = .070$ . The samples did differ regarding sexual orientation,  $\chi^2(3, N = 2092) = 15.72$ ,  $p < .001$ , with more homosexual women participating at baseline than at follow-up.

### Measures

#### *Sexual Excitation and Sexual Inhibition*

SE and SI were assessed with a German version of the SESII-W (Graham et al., 2006), a self-report questionnaire that measures proneness for SE and SI in women with 36 items, answered on a scale from 1 (strongly disagree) to 4 (strongly agree). Three

independent experts translated the original version into German. Differences between the translations were discussed and resolved in a focus group with the experts and the first author. A native speaker translated the German version back into English with no substantial deviations.

The SESII-W has two higher-order factors, SE and SI, which include five and three lower-order factors, respectively: The Arousal factor (SE-Arousal; 9 items) describes how easily one becomes sexually aroused (e.g., fantasizing about sex can quickly get me sexually excited); Partner Characteristics (SE-Partner; 4 items) measures how certain aspects of a potential sexual partner, like intelligence, influence one's sexual excitement. Sexual Power Dynamics (SE-Power; 4 items) has four items assessing how aspects of dominance during sex increase or diminish sexual arousal. The subscale Smell (SE-Smell; 2 items) assesses the effect of scents on arousal and the Setting (SE-Setting; 4 items) scale includes different aspects of the sexual situation, such as being overheard by others, and their influence on sexual arousal. The Concerns about Sexual Function factor (SI-Concerns; 4 items) measures how concerns about being a good lover or worrying about arousal during sexual activity influence sexual arousal. The Relationship Importance factor (SI-Relationship; 6 items) includes different aspects of the relationship with a sexual partner (e.g., mutual trust or commitment with other sexual partners) and their influence on arousal. Lastly, the Arousal Contingency factor (SI-Contingency; 3 items) assesses how important it is for a women's arousal that every aspect of the sexual situation is "just right" and how easily she can be "turned off" once arousal is initiated. The eight lower-order factors explained about 42 % of the variance in the original study. Internal consistency of these factors was acceptable, with values between  $\alpha = .63$  for SI-Concerns and  $\alpha = .80$  for SE-Arousal. Test–retest reliability for the lower-order factors was between  $r = .51$  for SI-Contingency and  $r = .86$  for SE-Setting. Test–retest correlation for the two higher-order factors was good, with  $r = .81$  and  $.82$  for SE and SI, respectively (Graham et al., 2006). A Dutch version of the SESII-W was validated in a sample of 445 women, which also showed sufficient to good construct validity, internal consistency, and test–retest validity (Bloemendaal & Laan, 2015).

#### *Sexual Functioning*

Sexual functioning was assessed with the Female Sexual Function Index (FSFI) developed by Rosen et al. (2000), a self-report questionnaire that measures female sexual functioning over the last 4 weeks in six domains (desire, arousal, lubrication, orgasm, satisfaction, and pain) across 19 items, on a scale ranging from 1 (almost never or never) to 5 (almost always or always). Some items offer the additional response option 0 (no sexual activity) (Wiegel, Meston, & Rosen, 2005). The validation of the German version of the FSFI yielded good psychometric properties (Berner, Kriston, Zahradnik, Härter, & Rohde, 2004). Although the FSFI has recently been criticized as measure of general sexual

**Table 1** Sample characteristics and sociodemographic variables

|  | Sample T1      |               | Sample T2      |               |
|--|----------------|---------------|----------------|---------------|
| Age (in years) <i>M (SD)</i>                 |                | 30.65 (9.91)  |                | 31.72 (11.12) |
|  | n <sup>a</sup> | % of N = 2206 | n <sup>a</sup> | % of N = 129  |
| Partnership status                           |                |               |                |               |
| Exclusive relationship or marriage           | 1422           | 64.2          | 89             | 69.0          |
| Non-exclusive relationship                   | 118            | 5.3           | 7              | 5.4           |
| Single with sexual contacts in the last year | 421            | 19.0          | 18             | 14.0          |
| No sexual contacts in the last year          | 233            | 10.5          | 13             | 10.1          |
| Partnership duration                         |                |               |                |               |
| <6 months                                    | 178            | 8.0           | 8              | 6.2           |
| 6 months to 2 years                          | 393            | 17.8          | 26             | 20.2          |
| 2 to 5 years                                 | 439            | 19.8          | 28             | 21.7          |
| >5 years                                     | 572            | 25.8          | 37             | 28.7          |
| Number of children                           |                |               |                |               |
| No children                                  | 1782           | 80.5          | 98             | 76.0          |
| One child                                    | 172            | 7.8           | 15             | 11.6          |
| More than one child                          | 230            | 10.4          | 16             | 12.4          |
| Sexual orientation                           |                |               |                |               |
| Heterosexual                                 | 1586           | 71.6          | 106            | 82.2          |
| Homosexual                                   | 296            | 13.4          | 3              | 2.3           |
| Bisexual                                     | 279            | 12.6          | 18             | 14.0          |
| Other  | 46             | 2.1           | 2              | 1.6           |
| Education                                    |                |               |                |               |
| Primary school                               | 231            | 10.4          | 13             | 10.1          |
| Secondary school                             | 787            | 35.5          | 48             | 37.2          |
| College degree                               | 929            | 42.0          | 67             | 52.0          |
| Occupation                                   |                |               |                |               |
| Full-time occupation                         | 753            | 34.0          | 53             | 41.1          |
| Part-time occupation                         | 270            | 12.2          | 17             | 13.2          |
| Student                                      | 770            | 34.8          | 48             | 37.2          |
| Other  | 173            | 7.8           | 11             | 8.5           |

T1 baseline sample, T2 retest sample

<sup>a</sup> Numbers vary due to missing data

functioning in women (Forbes, Baillie, & Schniering, 2014), it is still the most widely used measure to assess female sexual function. Previous studies have suggested that lower total scores of sexual functioning are associated with higher SI, especially with higher levels of SI-Contingency and SI-Concerns, whereas a positive correlation between the FSFI's arousal subscale and SE-Arousability support the convergent validity of the SESII-W (Bloemendaal & Laan, 2015).

#### *Behavioral Inhibition and Activation*

Propensities for behavioral inhibition and activation were assessed with the Behavioural Inhibition Scale/Behavioural Activation Scale (BIS/BAS) developed by Carver and White (1994). The BIS/BAS questionnaire is a 24-item self-report measure that

assesses each of the two factors with 12 items, ranging from 0 (strongly disagree) to 3 (strongly agree). The BIS/BAS consists of a different number of factors underlying the two systems. While behavioral inhibition can be measured with one subscale (BIS), behavioral activation consists of three subscales: Reward Responsiveness (BA-Reward), Drive (BA-Drive), and Fun Seeking (BA-Fun). The higher an individual scores on the behavioral inhibition scale, the more sensitive the person is deemed to be towards punishment, non-reward, and novelty. Propensity for behavioral activation is associated with signals of reward, non-punishment, and escape from punishment. The BIS/BAS was translated and validated in German with acceptable psychometric properties (Strobel, Beauducel, Debener, & Brocke, 2001). In the present study, the BIS/BAS was used to evaluate the construct validity of the German SESII-W. Moderate positive correlations

between behavioral inhibition and SI and between behavioral activation and SE were expected.

### *Sexual Sensation Seeking*

Proneness for sexual sensation seeking was assessed with the Sexual Sensation Seeking Scale (SSSS; Kalichman et al., 1994), a self-report questionnaire that measures the tendency to pursue sexual risky or novel situations. The SSSS consists of 11 items, rated on a 4-point Likert-type scale from “not at all like me” to “very much like me”. The higher the total score, the higher the endorsement of sexual sensation seeking traits, indicating sexual risk taking and unsafe sexual behaviors, like unprotected sexual intercourse. The German translation of the SSSS (Hammelstein, 2005) showed satisfactory internal consistency ( $\alpha = .73$ ) and content validity (e.g., correlations with unprotected sexual intercourse). Although this scale has mostly been used in male samples, there is some evidence that the construct of sexual sensation seeking may also be relevant for women (Graham et al., 2006). Thus, positive correlations between SSSS and subscales of SE were expected.

### *Social Desirability*

Social desirability was assessed with a short version of the Balanced Inventory of Desirable Responding (BIDR), developed by Paulhus and Reid (1991). The 12-item short version measures the two factors of self-deceptive positivity and impression management with six items each. Construct validity and reliability of a German version with 20 items was satisfactory (Musch, Brockhaus, & Bröder, 2002). In the present study, internal consistency was acceptable, with  $\alpha = .70$  for impression management and  $\alpha = .69$  for self-deception.

### *Sociodemographic Variables*

The questionnaire also included several questions about age, sexual orientation, current partnership status, number of children, body mass index, educational level, and employment status.

### **Procedure**

Participants received no financial compensation. To increase motivation to participate, women were offered online anonymous feedback regarding their sexual functioning directly after the completion of the survey. On the survey’s last page a total score of sexual functioning based on a participant’s responses to the FSFI (Rosen et al., 2000) was presented. In the event that a participant felt the need to talk about a potential sexual problem, additional information was provided about the interpretation of the score with the advice to contact a gynecologist. To obtain data about test–retest-reliability of the German SESII-W, a random sample of 200 women, who agreed to be contacted

for further study purposes, was drawn from the original study and contacted again via email. A reminder email was sent 2 weeks after the first invitation. The Ethics Committee of the Faculty of Psychology of the Ruhr-Universität Bochum approved the study.

### **Data Analyses**

Data were analyzed using SPSS version 21.0 (IBM, 2012) and lavaan package (Rosseel, 2012) of the program R (R Development Core Team, 2010).

A confirmatory factor analysis with eight factors was conducted to compare the factor structure of the German SESII-W with its original version. A diagonally weighted least squares procedure was applied, as it provides more accurate parameter estimation for ordinal data than the standard maximum likelihood procedure (Múndrilá, 2010). To test the proposed model, different fit indices were calculated: The comparative fit index (CFI) and non-normed fitted index (NNFI) compare the hypothesized model’s Chi square with that resulting from the independence model. For an acceptable fit, CFI and NNFI values above .90 are recommended; a good model fit requires values above .95 (Hu & Bentler, 1998).

Root Mean Square Error of Approximation (RMSEA) measures the difference between the reproduced covariance matrix and the population covariance matrix, with values less than .06 reflecting a small approximation error, indicating a good model fit, values between .08 and .10 a mediocre fit and values above 0.10 a poor model fit (MacCallum, Browne, & Sugawara, 1996). Additionally, the SRMR (standardized root mean square) is another index reflecting the overall model fit, with values between .05 and .08 indicating an acceptable, and values below .05, a good model fit (Hu & Bentler, 1998).

As these indices cannot substitute for a careful examination of the variables included in the model, means, *SDs*, and a correlations matrix were also analyzed (McDonald & Ho, 2002). Modification indices were inspected to identify non-fitting items. Pearson correlation coefficients were calculated to assess construct validity and test–retest reliability and Spearman rank coefficients were used for non-normal distributions. Internal consistency was assessed with Cronbach’s alpha and one-way analyses of variance (ANOVA) allowed different subgroup comparisons.

## **Results**

### **Confirmatory Factor Analysis**

Table 2 shows the original English and German items with their standardized factor loadings of the SESII-W. An acceptable to good overall fit for the proposed model, including all 36 items and eight lower order factors, could be verified through different fit indices,  $\chi^2(566, N = 2206) = 4238.33, p < .001, CFI = .90, RMSEA = .05, SRMR = .06$ . Factor loadings ranged between



.12 and .90 with an average of .49. Despite the satisfactory model fit, inspection of factor loadings and modification indices revealed that several items did not function as intended. Firstly, Item 30 (“Certain hormonal changes definitely increase my sexual arousal”) loaded only modestly on the related SE-Arousability factor or any other factor of the proposed model. This problem has already been reported in the English and Dutch validation studies (Bloemendaal & Laan, 2015; Graham et al., 2006), in which it was assumed that the perception and influence of hormonal changes on sexual arousal might reflect an additional facet of SE. Item 28 (“Dominating my partner is arousing to me”) did not load substantially on the proposed SE-Power factor or any other factor. Item 28 was the only item directly addressing sexual dominance initiated by the participant, while the other items of the factor focus on feeling overpowered or being confronted with a forceful partner. Additionally, two items loaded on different factors than expected. Item 12 (“Eye contact with someone I find sexually attractive really turns me on”) was more strongly associated with the SE-Arousability factor than the originally suggested SE-Partner factor. The SE-Arousability factor describes stimuli or situations that can evoke sexual arousal or desire. Eye contact can likely be interpreted as such a stimulus and to a lesser extent as a certain characteristic of a potential partner. Item 14 (“If I think that I am being used sexually it completely turns me off”) showed greater association to the SE-Power factor than the originally proposed SI-Relationship factor. These items were not re-categorized because overall model-fit were not significantly improved when these items were removed. Finally, Item 16 (“It is easier for me to become aroused with someone who has ‘relationship potential’”) was inspected, because it had been problematic in validation studies of the English (Graham et al., 2006) and Dutch (Bloemendaal & Laan, 2015) versions of the questionnaire. This item loaded moderately (.35) on the expected factor SI-Relationship and showed no sizeable associations with other factors. Therefore, Item 16 was also included in the final factor structure of the German scale.

Subsequently, the two higher-order factors were added. The addition of SE and SI led to a reduced model fit,  $\chi^2(551, N = 2206) = 5458.29, p < .001, CFI = .85, RMSEA = .06, SRMR = .07$ . Negative correlations between the higher-order factors were moderate,  $\rho = -.27, p < .001$ .

Table 3 shows the correlations between the eight lower-order factors. All subscales were moderately intercorrelated with the other lower-order scales of the corresponding higher-order factor. Correlations had small to medium effect sizes. Negative correlations between the three lower-order factors of SI and SE-Arousability, SE-Power and SE-Setting were found. SE-Partner and SE-Smell correlated only minimally with lower-order factors of SI.

### Construct Validity

Table 4 shows correlations for the higher- and lower-order factors of SE and SI and other distal and proximal variables.

The Kolmogorov–Smirnov-test indicated that the distribution of SE ( $M = 2.77, SD = .35$ ) was not significantly different from a normal distribution,  $D = .02, p = .077$ , but SI ( $M = 2.56, SD = .49$ ) was non-normally distributed,  $D = .04, p < .001$ . Figure 1 shows the distribution of these factors.

### Sexual Functioning

The total FSFI score (Rosen et al., 2000) correlated negatively with SI and all its lower-order factors. Effects were small to medium. These findings support our hypothesis that SI is related to sexual problems in women. Small positive correlations between the FSFI and SE and its subscales were found. Additionally, the FSFI Arousal subscale correlated positively with SE-Arousability,  $\rho = .25, p < .001$ , and negatively with SI-Contingency,  $\rho = -.43, p < .001$ , which also supports construct validity of the SESII-W.

### Behavioral Activation and Behavioral Inhibition

As predicted, BIS correlated positively with all SI subscales with small to medium effect sizes. BIS also correlated negatively with the higher-order factor of SE and three of its subscales, but the effects were minimal to small. BA-Fun correlated positively with all subscales of SE and negatively with SI (see Table 4). The two other subscales (BA-Reward and BA-Drive) showed positive correlations with SE and only negligible correlations with SI. As hypothesized, SI correlated only moderately positively with behavioral inhibition. Associations between SE and behavioral activation were also positive, but with even smaller effect sizes. These findings support the contention that SE and SI measure constructs that are distinct from general activation or inhibition proneness.

### Sexual Sensation Seeking

As predicted, positive correlations between sexual sensation seeking and all facets of SE were found. Effect sizes were mostly medium to large and the coefficients ranged from  $\rho = .22 (p < .001)$  for SE-Smell to  $\rho = .54 (p < .001)$  for the higher order factor of SE. Sexual sensation seeking correlated negatively with SI with small to medium effect sizes. These results suggest convergent and discriminant validity as associations were shown in the expected directions, but they did not account for more than 30 % of shared variance. Therefore, SE and SI seem to be constructs relatively independent of sexual sensation seeking.

### Social Desirability

Impression management correlated negatively with SE, indicating greater levels of socially desirable responding in women with lower SE. Results for the SI scales were mixed. SI-Concerns

**Table 2** German and English items and standardized factor loadings of the SESII-W

| Sexual Excitation       |  |
|-------------------------|--|
| Arousability            |  |
| 0.64                    | Wenn ich an jemanden denke, den ich sexuell attraktiv finde, werde ich leicht sexuell erregt<br>When I think about someone I find sexually attractive, I easily become sexually aroused. (24)                          |
| 0.57                    | Manchmal fühle ich mich von jemandem so sehr angezogen, dass ich nicht verhindern kann, sexuell erregt zu werden.<br>Sometimes I am so attracted to someone, I cannot stop myself from becoming sexually aroused. (32) |
| 0.56                    | Über Sex zu fantasieren, kann meine sexuelle Erregung schnell wecken<br>Fantasizing about sex can quickly get me sexually excited. (20)  |
| 0.49                    | Den nackten Körper eines attraktiven Partners zu sehen, macht mich ziemlich an<br>Seeing an attractive partner's naked body really turns me on. (15)   |
| 0.47                    | Wenn ich jemanden sehe, der/die sexy gekleidet ist, werde ich leicht sexuell erregt<br>If I see someone dressed in a sexy way, I easily become sexually aroused. (26)  |
| 0.46                    | Es macht mich sehr an, wenn mich jemand sexuell wirklich begehrt<br>I get very turned on when someone wants me sexually. (19)  |
| 0.43                    | Einem Partner körperlich nahe zu sein, ist schon genug, um mich anzutönen.<br>Just being physically close with a partner is enough to turn me on. (17)   |
| 0.41                    | Mit einem neuen Partner bin ich leicht erregbar<br>With a new partner, I am easily aroused. (25)   |
| 0.12                    | Bestimmte hormonelle Schwankungen erhöhen eindeutig meine sexuelle Erregung<br>Certain hormonal changes definitely increase my sexual arousal. (30)  |
| Partner Characteristics |  |
| 0.64                    | Blickkontakt mit einer sexuell anziehenden Person macht mich richtig an<br>Eye contact with someone I find sexually attractive really turns me on. (12)  |
| 0.58                    | Einen Partner zu beobachten, wie er/sie sein Talent unter Beweis stellt, kann mich sexuell sehr erregen.<br>Seeing a partner doing something that shows his/her talent can make me very sexually aroused. (10)         |
| 0.39                    | Wenn jemand etwas Intelligentes tut, macht mich das an<br>Someone doing something that shows he/she is intelligent turns me on. (5)  |
| 0.32                    | Wenn ich sehe, dass ein Partner gut mit anderen Menschen auskommt, werde ich leichter sexuell erregt.<br>If I see a partner interacting well with others, I am more easily sexually aroused. (8)                       |
| Sexual Power Dynamics   |  |
| 0.60                    | Es erregt mich, wenn mein Partner beim Sex „schmutzige Wörter“ verwendet.<br>It turns me on if my partner "talks dirty" to me during sex. (2)  |
| 0.54                    | Wenn ein Partner beim Sex energisch vorgeht, reduziert das meine Erregung<br>If a partner is forceful during sex, it reduces my arousal. (27*)   |
| 0.45                    | Mich in einer sexuellen Situation von einem vertrauten Partner überwältigt zu fühlen, erhöht meine Erregung.<br>Feeling overpowered in a sexual situation by someone I trust increases my arousal. (6)                 |
| 0.20                    | Es erregt mich, einen Partner beim Sex zu dominieren<br>Dominating my partner is arousing to me. (28)  |
| Smell                   |  |
| 0.90                    | Häufig erregt es mich sehr, wie eine Person riecht<br>Often just how someone smells can be a turn on. (23)   |
| 0.80                    | Bestimmte Düfte erregen mich sehr<br>Particular scents are very arousing to me. (22)   |
| Setting                 |  |
| 0.71                    | Ich finde es schwieriger, sexuell erregt zu werden, wenn andere Menschen in der Nähe sind<br>I find it harder to get sexually aroused if other people are nearby. (7*)   |
| 0.55                    | Es tönt mich an, wenn ich denke, dass ich beim Sex erwischt werden könnte.<br>I get really turned on if I think I may get caught while having sex. (13)  |
| 0.53                    | In einer anderen Umgebung als üblich Sex zu haben, tönt mich richtig an<br>Having sex in a different setting than usual is a real turn-on for me. (3)  |

**Table 2** continued

|                                       |  |
|---------------------------------------|--|
| 0.40                                  | Wenn man uns beim Sex sehen oder hören könnte, bin ich schwerer erregbar<br>If it is possible someone might see or hear us having sex, it is more difficult for me to get aroused. (4*)  |
| <b>Sexual Inhibition</b>              |  |
| <b>Concerns about Sexual Function</b> |  |
| 0.74                                  | Manchmal bin ich beim Sex so schüchtern oder befangen, dass ich nicht richtig erregt werde.<br>Sometimes I feel so “shy” or self-conscious during sex that I cannot become fully aroused. (29)                                 |
| 0.66                                  | Wenn ich mich Sorge, dass es zu lange dauern könnte, bis ich erregt bin, kann das meine Erregung beeinträchtigen.<br>If I am worried about taking too long to become aroused, this can interfere with my arousal. (31)         |
| 0.54                                  | Wenn ich darüber nachdenke, ob ich einen Orgasmus bekommen werde, ist es für mich schwieriger erregt zu werden.<br>If I think about whether I will have an orgasm, it is much harder for me to become aroused. (18)            |
| 0.49                                  | Wenn ich mich Sorge, eine gute Liebhaberin zu sein, ist es unwahrscheinlicher, dass ich erregt werde.<br>If I am concerned about being a good lover, I am less likely to become aroused. (9)                                   |
| <b>Arousal Contingency</b>            |  |
| 0.83                                  | Es ist für mich schwierig, erregt zu werden, wenn nicht “alles richtig” ist<br>Unless things are “just right” it is difficult for me to become sexually aroused. (36)  |
| 0.76                                  | Es ist schwierig für mich, sexuell erregt zu bleiben<br>It is difficult for me to stay sexually aroused. (34)  |
| 0.72                                  | Wenn ich sexuell erregt bin, kann mich jede Kleinigkeit wieder abtörmern<br>When I am sexually aroused, the slightest thing can turn me off. (35)  |
| <b>Relationship Importance</b>        |  |
| 0.7                                   | Ich muss einem Partner wirklich vertrauen, um voll und ganz erregt zu werden<br>I really need to trust a partner to become fully aroused. (33)   |
| 0.63                                  | Wenn ich mir unsicher bin, was ein Partner mir gegenüber empfindet, ist es für mich schwieriger, erregt zu werden.<br>If I am uncertain about how a partner feels about me, it is harder for me to get aroused. (21)           |
| 0.57                                  | Es wäre schwierig für mich, beim Sex erregt zu werden, wenn ich weiß, dass die Person auch mit jemand anderem zusammen ist<br>It would be hard for me to become aroused with someone who is involved with another person. (11) |
| 0.52                                  | Wenn ich denke, dass ein Partner mich emotional verletzen könnte, trete ich beim Sex auf die Bremse.<br>If I think a partner might hurt me emotionally, I put the brakes on sexually. (1)                                      |
| 0.51                                  | Wenn ich mich beim Sex benutzt fühle, törmert mich das total ab<br>If I think that I am being used sexually it completely turns me off. (14)   |
| 0.35                                  | Bei einem Partner, der auch für eine feste Partnerschaft in Frage kommt, bin ich leichter erregbar.<br>It is easier for me to become aroused with someone who has “relationship potential”. (16)                               |

\* Reverse coding

**Table 3** Spearman’s rank correlation coefficients between the lower order factors of SESII-W

|                                | Arousability | Partner Characteristics | Sexual Power Dynamics | Smell    | Setting  | Concerns about Sexual Function | Arousal Contingency | Relationship Importance |
|--------------------------------|--------------|-------------------------|-----------------------|----------|----------|--------------------------------|---------------------|-------------------------|
| Arousability                   | 1            |                         |                       |          |          |                                |                     |                         |
| Partner Characteristics        | 0.36***      | 1                       |                       |          |          |                                |                     |                         |
| Sexual Power Dynamics          | 0.34***      | 0.22***                 | 1                     |          |          |                                |                     |                         |
| Smell                          | 0.38***      | 0.27***                 | 0.20***               | 1        |          |                                |                     |                         |
| Setting                        | 0.27***      | 0.12***                 | 0.31***               | 0.15***  | 1        |                                |                     |                         |
| Concerns about Sexual Function | -0.09***     | 0.04*                   | -0.15***              | -0.05*   | -0.22*** | 1                              |                     |                         |
| Arousal Contingency            | -0.23***     | -0.07**                 | -0.26***              | -0.12*** | -0.30*** | 0.51***                        | 1                   |                         |
| Relationship Importance        | -0.10***     | 0.02                    | -0.26***              | 0.02     | -0.32*** | 0.32***                        | 0.32***             | 1                       |

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

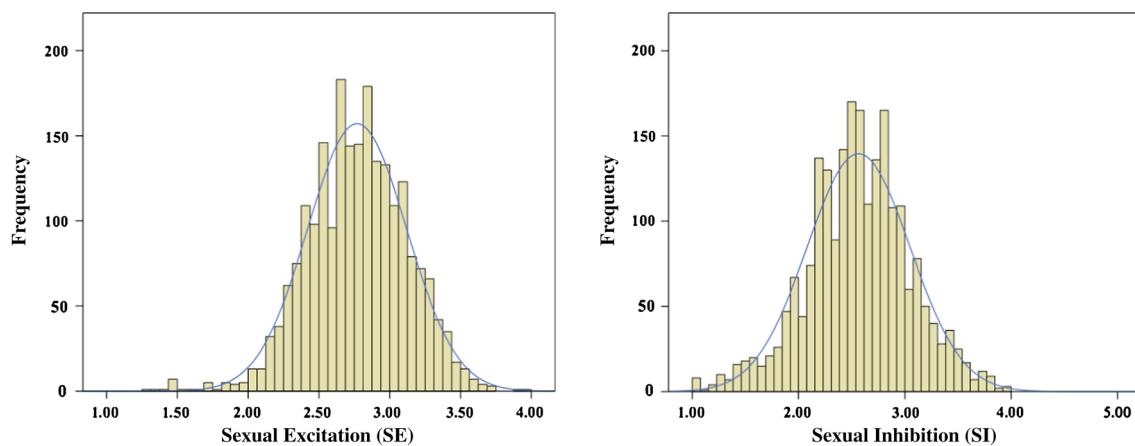


**Table 4** Spearman's rank correlation coefficients between the SESII-W factors and other constructs

| Factors                        | FSFI    | SSSS    | BIS     | BA-Drive | BA-Reward | BA-Fun  | IM      | SDP     |
|--------------------------------|---------|---------|---------|----------|-----------|---------|---------|---------|
| Sexual Excitation              | .28***  | .54***  | -.10*** | .17***   | .25***    | .31***  | -.16*** | .06*    |
| Arousability                   | .26***  | .45***  | -.01    | .14***   | .24***    | .27***  | -.17*** | -.02    |
| Partner Characteristics        | .08***  | .25***  | -.05*   | .12***   | .22***    | .17***  | -.07**  | .03     |
| Sexual Power Dynamics          | .27***  | .49***  | -.08**  | .08***   | .14***    | .22***  | -.14*** | .05*    |
| Smell                          | .12***  | .22***  | -.01    | .11***   | .18***    | .15***  | -.07**  | .00     |
| Setting                        | .23***  | .42***  | -.18*** | .10***   | .07**     | .24***  | -.11*** | .11***  |
| Sexual Inhibition              | -.43*** | -.35*** | .34***  | -.04     | .01       | -.18*** | .04*    | -.33*** |
| Concerns about Sexual Function | -.37*** | -.16*** | .32***  | -.07**   | .01       | -.12*** | -.06**  | -.36*** |
| Arousal Contingency            | -.43*** | -.25*** | .24***  | -.06**   | -.05*     | -.15*** | .01     | -.27*** |
| Relationship Importance        | -.16*** | -.42*** | .22***  | .05*     | .07**     | -.17*** | .15***  | -.14*** |

FSFI Female Sexual Function Index, SSSS Sexual Sensation Seeking Scale, BIS Behavioural Inhibition Scale, BA behavioural activation, IM impression management, SDP self-deceptive positivity

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

**Fig. 1** Distributions of the two higher order factors of Sexual Excitation and Sexual Inhibition

was associated negatively, and SI-Relationship positively, with impression management. Self-deceptive positivity was negatively correlated with SI. Associations between self-deception and SE were mixed, with only one subscale (SE-Power) positively associated with self-deception. These results suggest that different aspects of socially desirable responding might influence SE and SI.

#### Sociodemographic Variables

There were small, but significant negative correlations between age and both SE,  $\rho = -.10$ ,  $p < .001$ , and SI,  $\rho = -.07$ ,  $p = .001$ . While three lower order factors (SE-Arousability, SE-Partner, and SI-Contingency) were not correlated with age, the other five factors showed significant negative age-associations (from  $\rho = -.06$ ,  $p = .006$  to  $\rho = -.12$ ,  $p < .001$ ). Body mass index correlated negatively with SI,  $\rho = -.06$ ,  $p = .007$ , but was not significantly associated with SE,  $\rho = -.04$ ,  $p = .104$ . There were significant differences in SE,  $F(2, 2056) = 15.45$ ,  $p < .001$ , and SI,  $F(2,$

2056) = 10.89,  $p < .001$ , depending on partnership status, even when controlled for by age. Post-hoc analyses showed the highest levels of SE for women who reported having had sex during the past year, but who were not in an exclusive relationship. Women in an exclusive relationship had medium levels of SE and women who reported no sexual activity in the last year had the lowest SE levels. SI levels were lowest for women who had sex but no current partnership, compared to women in a committed relationship and women who were not sexually active. When controlled for by age, neither educational level nor employment status was related to SE or SI.

#### Reliability

Table 5 shows descriptive values and reliability measures for the SESII-W. Overall internal consistency proved satisfactory ( $\alpha = .73$ ) and the two higher-order factors showed good internal consistency ( $\alpha = .80$  for SE and  $\alpha = .82$  for SI). Two of the lower-order factors of SE showed poor internal consistency:

**Table 5** Description and reliability of the higher and lower order factors of Sexual Excitation and Sexual Inhibition

| Factor (number of items)           | <i>M</i> | <i>SD</i> | Cronbach's alpha | Retest-reliability |
|------------------------------------|----------|-----------|------------------|--------------------|
| Sexual Excitation (23)             | 2.77     | 0.35      | 0.80             | .82*               |
| Arousability (9)                   | 3.03     | 0.39      | 0.71             | .66*               |
| Partner Characteristics (4)        | 2.81     | 0.49      | 0.58             | .70*               |
| Sexual Power Dynamics (4)          | 2.70     | 0.51      | 0.46             | .77*               |
| Smell (2)                          | 2.94     | 0.74      | 0.84             | .75*               |
| Setting (4)                        | 2.36     | 0.57      | 0.63             | .74*               |
| Sexual Inhibition (12)             | 2.56     | 0.49      | 0.82             | .83*               |
| Concerns about Sexual Function (4) | 2.58     | 0.62      | 0.71             | .75*               |
| Arousal Contingency (3)            | 2.20     | 0.67      | 0.82             | .75*               |
| Relationship Importance (5)        | 2.91     | 0.56      | 0.72             | .83*               |

\*  $p < .001$

SE-Power ( $\alpha = .46$ ) and SE-Partner ( $\alpha = .58$ ). The internal consistency of the lower-order factors of SI proved to be satisfactory to good. Test–retest reliability was good for the two higher-order factors of SE ( $r = .82$ ) and SI ( $r = .83$ ). Eight of the nine lower-order factors reached at least satisfactory levels of test–retest reliability ( $r > .70$ ). Only the SE-Arousability factor showed lower test–retest reliability ( $r = .66$ ).

## Discussion

The primary objective of the current study was to validate, in a large convenience sample, a German translation of the SESII-W that measures proneness for SE and SI in women. The German version of the SESII-W proved sufficiently reliable and valid to assess these two propensities and can therefore be recommended for application in future studies. The present study included the largest convenience sample that has been used in the validation of a questionnaire based on the DCM of sexual response. The use of multiple recruitment strategies (e.g., flyer, university homepage, discussion boards) increased generalizability and external validity. Dropout rates were comparable to other online studies (Hoerger, 2010), as 83.8 % of the individuals who started answering questions about their sexuality completed the whole survey.

### Factor Structure, Construct Validity, and Reliability of the German SESII-W

The factor structure of the original SESII-W was replicated with an acceptable overall model fit. Two items (Items 12 and 14) loaded on other factors than predicted. This is not altogether surprising, as the lower-order factors of SE are intercorrelated and have substantial conceptual overlap. Inspection of factor loadings suggests, for example, that the arousing effect of eye contact with an attractive person might be more strongly associated with general arousability than with a specific partner

characteristic. The feeling of being used, which can be described as feeling manipulated, not fully respected as a person, or reduced to a sexual object, was associated with SE-Power rather than the proposed SI-Relationship factor. This finding is particularly interesting, as Item 28, the only item addressing the arousing effect of dominating a partner, did not load on the proposed factor SE-Power. In the present study, SE-Power seems to resemble SE when being confronted with a forceful, overwhelming or dominating partner as well as with the feeling of being used or manipulated sexually. Being the more dominating sexual partner might represent an additional aspect of SE that is not sufficiently represented in the current version of the questionnaire. In addition, the effects of dominance or submission on sexual arousal might be two-, rather than one-dimensional. Some women might prefer being submissive or dominant, while others might enjoy neither or both.

There is growing evidence that Item 30, which describes the influence of hormonal changes on arousal, does not work well either. Bloemendaal and Laan (2015) suggested that the influence of bodily or hormonal changes on sexual arousal might be an additional component of SE that is not sufficiently represented in the SESII-W. Further research on the effects of perception and appraisal of body changes on sexual arousal is needed to test this possibility and to exclude methodological grounds for the incompatibility, such as the wording or translation of the item.

The addition of the two higher-order factors to the CFA resulted in a moderate reduction of the overall model fit, which has also been reported in other studies using similar questionnaires to assess the DCM (Carpenter et al., 2008; Milhausen et al., 2010). The existence of two latent variables was supported by positive correlations between the five subscales of SE and the three subscales of SI. The negative correlations between SE and SI that were found in our study were substantially smaller than in the Dutch validation study of the SESII-W (Bloemendaal & Laan, 2015). The present study thus suggests that although SE and SI might be moderately interdependent, they do not seem to

be simply extremes of one continuous variable, but rather two dimensions.

Correlations between the SESII-W and other relevant constructs revealed good convergent and discriminant validity. SE and SI both correlated with the FSFI, BIS/BAS, and the SSSS in the expected directions. Compared with the findings of Bloemendaal and Laan (2015), we found a differential pattern of correlations between these questionnaires and SE/SI. On the one hand, there were greater associations between SI and inhibition-related constructs or sexual problems and on the other hand, greater correlations between SE and activation-related constructs; SE was more strongly associated with sexual sensation seeking and different aspects of behavioral activation than SI. This supports the idea of a two-dimensional model of sexual response.

Propensity for SE and age were negatively correlated. This finding can be interpreted as a natural decline in sexual arousability, which has also been found in other studies using the SESII-W to assess SE in women (Graham et al., 2006). Rather surprisingly, we also found a negative correlation between age and SI. Previous studies have reported inconsistent results, with either no associations (Graham et al., 2006) or a curvilinear or positive relationship (Pinxten & Lievens, 2014) between age and SI. It is possible that there might be different aspects of SI that are more likely to be age dependent than others. The SI-Contingency factor, which has previously been described as an “inhibitory tone” that has to be overcome for arousal to occur, showed no age-related correlations in our sample, while SI-Concerns was lower in older women. Longitudinal research is needed to distinguish age from cohort effects and further representative surveys using the SESII-W might clarify the levels of SI in a broader range of age groups.

Although the normality assumption could not be statistically confirmed for SI, both higher order factors showed a close to normal distribution comparable to previous studies using the English and Dutch versions of the SESII-W (Bloemendaal & Laan, 2015; Graham et al., 2006). This finding supports the DCM assumption that levels of SE and SI vary substantially between individuals.

In general, internal consistency and test–retest reliability of the higher-order factors were good and comparable to the English and Dutch versions of the inventory. Two of the lower-order factors (SE-Power and SE-Partner) showed poor internal consistency. This was in part caused by Items 28 and 12 that were, as already discussed, more strongly related to other factors.

### Limitations and Future Research

Several methodological limitations challenge the internal and external validity of the present study. Firstly, our convenience sample was very selective, with mostly highly educated, relatively young women. While online surveys are easy to administer, convenient for participants (Evans & Mathur, 2005), and might

provide more honest answers to sensitive, personal questions (Gunter, Nicholas, Huntington, & Williams, 2002), online recruitment excludes women who do not regularly use the Internet. Additionally, a volunteer bias in sexuality-related research has been reported, with participants in sexuality studies being more sexually experienced, reporting less traditional attitudes towards sex, and higher levels of sexual sensation seeking (Wiederman, 1999) than those who do not participate. To allow for subgroup comparisons, we specially recruited women with homosexual and bisexual orientation for our study. This resulted in a relatively high percentage of non-heterosexual women (26.0 %), compared to the general population, in which between 0.5 to 2.0 % of the adult population report either a homosexual or bisexual orientation (Bostwick, Boyd, Hughes, & McCabe, 2010; Chandra, 2011). These limitations reduce the generalizability of our findings.

The cross-sectional design of the study did not allow causal interpretation of the results. Longitudinal assessment is necessary to evaluate the direction of the relationship between SE, SI, and, for example, sexual functioning. Whether SI is a risk factor for sexual dysfunction or whether the perception of sexual difficulties actually leads to stronger SI in women has not been established. The same is true for the associations between sexual sensation seeking and SE.

Representative population studies are needed to further increase generalizability and to allow comparisons between various populations. Such studies could also clarify the mixed results regarding the normality assumptions and the age-dependency of SE and SI. Finally, the present study suggests that the existing SESII-W questionnaire might not fully cover some aspects of SE and inhibition (e.g., effects of bodily/hormonal changes on arousal).

Few studies have investigated sexual dominance and its effect on sexual arousal in women. Another important aspect of future research should concern the investigation of the DCM in women in laboratory settings. Further investigation of the relevance of SE and SI for the occurrence of actual genital or subjective response to sexual stimuli is needed to ensure clinical relevance and increase content validity of the use of the DCM to understand female sexual response.

**Conflict of interest** None.

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