Unprotected intercourse and one-night stands:

Impact of sexual excitation, sexual inhibition, and atypical sexual arousal patterns on risky

sexual behaviors in women

Abstract

Introduction: Associations between sexual excitation, sexual inhibition, atypical sexual arousal patterns, and sexual risk behaviors have been reported in studies involving men and women. To date longitudinal studies have not evaluated the predictive value of these propensities for future sexual behaviors in women.

Aims: The aim of this study was to investigate the associations between sexual excitation, sexual inhibition, atypical sexual arousal patterns, and potentially risky sexual behaviors in women.

Methods: Overall, 2,214 women (M age = 30.65, SD = 9.91) participated in a baseline web-based survey. The one and two-year follow-up surveys included 396 and 382 participants, respectively. Correlational analyses and multiple linear regression analyses were conducted to analyze the relationships between predictor and outcome variables.

Main Outcome Measures: Number of partners, number of one-time sexual encounters, number of partners with whom no condoms were used during the twelve month periods prior to each of the three data assessment points.

Results: All of the five lower order factors of sexual excitation showed positive, and all of the three lower order factors of sexual inhibition negative, correlations with outcomes at baseline and follow-up. Atypical sexual arousal patterns, the tendency to become aroused in unusual sexual situations, and the importance of relationship factors such as trust for sexual arousal were the strongest predictors for sexual behaviors at baseline. These variables also predicted the number of sexual partners and the number of one-night stands at follow-up.

Conclusion: The findings suggest that increased sexual arousal when experiencing negative mood might be a risk factor for potentially health-threatening sexual decisions and

support the assumptions of the dual control model that sexual excitation is positively and sexual

inhibition is negatively predictive of risky sexual behavior in women.

Keywords: Sexual excitation, sexual inhibition, dual control model, sexual risk,

longitudinal

Engaging in sexual activities can be risky. Depending on the 'where, when, and with whom' of sexual encounters, negative consequences include distressing emotions, like shame or regret, unintended pregnancy, and sexually transmitted infections (STIs) [1,2]. Psychological consequences of unprotected intercourse, casual sex, or sex with multiple sexual partners are diverse. On the one hand, some women that have engaged in sex outside committed relationships do report greater levels of depressive symptoms, lower levels of psychological well-being, and have feelings of regret [3, 4, 5]; on the other hand, most women also say that they felt quite happy and content with their last casual sex encounter [6].

The dual control model of sexual response (DCM) [7] is a theoretical framework that may help to explain why some individuals choose to engage in risky sexual behavior. According to this model, two relatively independent factors – sexual excitation (SE) and sexual inhibition (SI) – influence the occurrence of sexual arousal in a given situation. High levels of SE, especially when coupled with low SI, have been linked to risky sexual behaviors or decisions [8]. The first instrument developed to assess these factors in men was the Sexual Inhibition/Sexual Excitation Scales (SIS/SES) [9, 10]. The SIS/SES was adapted for use in women [11], but it was unclear if the measure included all aspects of SE and SI that are relevant for women. Thus, the Sexual Excitation/Sexual Inhibition Inventory for Women (SESII-W) [12] was developed, informed by focus group data with women from diverse backgrounds and ages [13].

Studies on the relationship between SE, SI, and sexual risk behaviors were first conducted with men. Using the SIS/SES in a sample of 589 men who have sex with men, high inhibition of sexual response due to threat of negative consequences (SIS2) was associated with less frequent unprotected anal and oral sex, while high propensity for SE was associated with more casual sex partners [14]. In a sample of 879 heterosexual men, SIS2 was negatively

predictive of the number of sexual partners with whom no condoms were used and the number of

lifetime one-night stands. SIS2 and SE were both positively associated with the intention of

having safer sex in future sexual encounters [15]. In a study of 310 students, sexual risk taking

was assessed with the Sexual Risk Survey [16, 17], SE and SI in men and women were measured

with the SIS/SES and SESII-W, respectively, and personality with the NEO-Five-Factor

Inventory [18]. For women, but not men, greater SE and lower SI were both associated with

greater sexual risk taking. In men, but not in women, more general personality traits, like higher

extraversion or lower agreeableness, were associated with more frequent risk behaviors. Using

the SESII-W in a sample of 701 young African American women, higher levels of Arousability, a

SE factor, were associated with a greater number of sex partners, inconsistent condom use, and

sex under the influence of drugs or alcohol [19]. A version of the SESII that was modified for use

in men and women, the SESII-W/M [20], was used in a sample of 1,301 heterosexual married

adults. For both men and women, higher Arousability (SE factor) and lower Relationship

Importance (SI factor) scores were associated with greater sexual compulsivity. For men, but not

women, Inhibitory Cognitions (SI factor) were associated with greater sexual compulsivity [21].

Relationships between mood and sexual interest have been studied in samples of

homosexual and heterosexual men as well as heterosexual women. While most individuals report

decreased interest in sexual activities when anxious or depressed, some show an "atypical"

arousal pattern, with increased interest in sex when depressed or anxious [14, 22]. Women with

atypical sexual arousal patterns reported greater levels of desire for sexual activities and a greater

frequency of searching for sexual partners in bars [23]. Women that reported increased sexual

arousal related to negative, but also positive mood states, like cheerfulness, were also more likely

to regret their sexual choices afterwards [23].

Aims

The aim of the present study was to investigate the associations between SE, SI, atypical arousal patterns, and potentially risky sexual behaviors in women using cross-sectional and longitudinal datasets. We also wanted to examine the assumptions of the DCM and test whether high SE and low SI are indeed predictive of riskier sexual behaviors. Our first hypothesis was that high levels of SE, as well as low levels of SI, and increased arousal when depressed or anxious/stressed, would be associated with more sexual partners, more frequent one-night stands, and more sexual partners with whom no condoms were used at baseline. A second hypothesis was that SE, SI, and atypical arousal patterns would also predict future sexual behaviors assessed in two follow-up surveys that were conducted one and two years after the baseline assessment. Finally, we expected that past sexual behavior would be predictive of future sexual behavior i.e., that there would be a relatively high temporal stability of sexual behaviors over the assessed time period.

Methods

Participants

All German-speaking women above the age of 18 were eligible. Table 1 shows a summary of the sample characteristics.

Please insert Table 1

To increase sample diversity, participants were recruited through multiple channels e.g., online discussion boards, university homepage, and flyers. A total of 2,214 women with an average age of 31 years ($M = 30.65$, $SD = 9.91$) were included in the data analyses. The majority of women reported being in a steady relationship (64.2%) and having no children (80.5%). Most

were either attending college (34.8%) or were employed full-time (34.0%). Heterosexual

orientation was reported by 71.6%, homosexual orientation by 13.4%, and bisexual orientation

by 12.6% of women.

The survey was not initially designed as a longitudinal study and the participants received

no incentives for giving their contact information. Nevertheless, 886 women of the baseline

sample left their email addresses and gave their consent to be re-contacted. By October 2014,

396 (44.7 %) women had completed the first follow-up and by September 2015, 382 (43.1%)

women had completed the second follow-up survey.

We assessed whether the three groups of women (women that participated only at

baseline, those who completed baseline and one follow-up, and those who participated in

baseline and both follow-ups) differed on any of the sociodemographic variables. All subsamples

were comparable regarding age, partnership status, relationship duration, number of children,

and current occupation. Group differences between were found regarding sexual orientation

$\chi_2(4,2161) = 10.60$, $p = .031$, and education level, $F(2,1963) = 8.96$, $p < .001$. Post-hoc t-tests

showed that baseline-only participants had lower education levels compared to both women who

completed baseline and one follow-up, $t(1687) = -2.00$, $p = .046$, and those who completed all

three time points, $t(1742) = -3.95$, $p <.001$. The relative proportion of heterosexual and bisexual

participants did not differ across the three samples. However, the proportion of homosexual

women differed between the samples, $F(2,2211) = 3.27$, $p = .038$, with post-hoc tests indicating

that in the sample that participated at baseline and one follow up, the proportion of homosexual

women was higher compared to the baseline-only participants.

Procedure

On the first page of the survey, visitors were informed about the study content, anonymity, and voluntariness of participation. Participants gave their informed consent by clicking on the participation button at the bottom of the page. The study website had 5,200 visitors between July and November 2013. Of the 2,987 participants that started the questionnaire, 2,049 (69%) completed it. Participants received no financial compensation.

In July 2014 and July 2015, the invitations for the follow-up surveys were sent to the participants who at baseline had given their consent to be re-contacted. A reminder email was sent one week after the first invitation. The mean duration between baseline and follow-up 1 was 11.2 months ($M = 339.7$ days, $SD = 37.1$) and the duration between follow-up 1 and follow-up 2 was 11.5 months ($M = 349.5$ days, $SD = 12.29$). The Ethics Committee of the Faculty of Psychology at [details removed to preserve anonymity] approved the study.

Measures

Sexual excitation and sexual inhibition. SE and SI were measured with the Sexual Excitation/Sexual Inhibition Inventory for Women (SESII-W), a 36 item self-report questionnaire [12] answered on a scale from 1 (*strongly disagree*) to 4 (*strongly agree*). The scale consists of five lower order scales related to SE and three lower order scales related to SI. The Arousability factor describes how easily one becomes aroused by sexual fantasies or external sexual stimuli. The Partner Characteristics factor assesses how different aspects of a potential sexual partner such as intelligence can boost a woman's sexual excitement. The Sexual Power Dynamics factor assesses how aspects of dominance or submission increase or diminish sexual arousal. The Smell factor measures how arousing one perceives certain scents, and finally, the Setting (unusual, unconcealed) factor assesses how different aspects of the sexual situation, such

as being overheard by others or the danger of being caught during sexual activity, affect sexual arousal. The Concerns about Sexual Function scale measures how concerns about being a good lover or becoming sufficiently aroused inhibit sexual response and arousal. Relationship Importance includes items on how different aspects of a sexual relationship e.g., mutual trust or commitment impact sexual arousal. Lastly, the Arousal Contingency scale assesses how important it is for a woman's arousal that every aspect of the sexual situation is "just right" and how easily she can be "turned off" once arousal is initiated. A more detailed description of the procedure that led to the SESII-W has been published elsewhere [13]. Validity and reliability of the SESII-W in the original validation study was satisfactory to good [12]. The German version of the scale also exhibited good construct validity, internal consistency, and one-month test-retest validity [24]. In the present study, the questionnaire showed a high one year stability with intercorrelations of $r = .73$, $p < .001$, for the higher order SE factor, and $r = .80$, $p < .001$, for the higher order SI factor. This is in line with the assumption of the dual control model that both propensities are relatively stable individual traits [25].

Mood and atypical arousal. To assess the impact of atypical sexual arousal patterns on sexual decisions two questions of the Mood and Sexuality Questionnaire (MSQ) [23] were analyzed. Participants responded, on a 11-point Likert scale from 0 (*much less*) to 10 (*much increased*), what typically happens to their sexual arousal and interest when in an anxious/stressed or depressed mood. A score of 5 indicates that sexual arousal and interest are unchanged by the particular mood state.

Social desirability. Due to the sensitive matter of the study, we included a short version of the Balanced Inventory of Social Desirable Responding (BIDR) [26]. This 12 item self-report questionnaire measures self-deceptive enhancement (e.g., *My first impressions of people usually*

turn out to be right.) and impression management (e.g., *I never cover up my mistakes.*) on a scale from 1 (*not true*) to 7 (*very true*). Construct validity and reliability of a German version with 20 items was satisfactory [27]. In the present study, internal consistency was sufficient, with Cronbach's α = .70 for impression management and α = .69 for self-deceptive enhancement. Socially desirable responding describes the tendency to present oneself in a positive light or to have a favorably biased opinion about oneself [26]. Self-report measures of taboo topics, like sexual behaviors, are assumed to be significantly influenced by such response biases [28].

Sexual behaviors. There is no gold standard on how to assess sexual high-risk behaviors and the choice of specific behaviors and timeframe depends on the research questions. Nonetheless, the use of standardized questions is highly recommended [29]. In the present study, participants were asked about their number of sexual partners, number of one time sexual encounters ("one-night stands"), and number of sexual partners with whom no condoms were used over the last 12 months. Items were scaled on a 9-point scale (answer categories were 0, 1, 2, 3, 4, 5 to 6, 7 to 9, 10 to 15, and 15 and more) to assess the respective number of sexual encounters over the past year. Comparable items and similar response options were used in large representative surveys and previous research about sexual risk taking in men and women [2, 30, 31].

Data analyses

Data were analyzed using SPSS (Version 22). Zero-order correlations were calculated to assess the associations between predictor variables at baseline and outcome variables at baseline and follow-up 1, and follow-up 2. Group differences were analyzed with t-tests, univariate analysis of variance, or χ_2- tests. Hierarchical multiple regression analyses were conducted to examine the relationship between the predictor and outcome variables. The scales of the SESII-

W and atypical arousal patterns were entered in step 1. Partnership status, socially desirable

responding, and outcome variables at previous data assessments were entered in step 2.

Results

Descriptive analyses

Table 2 shows baseline and follow-up scores on socially desirable responding, arousal

patterns, SE, SI, and sexual risk behaviors for the complete baseline-sample and for the three

different subsamples i.e., the groups of women that participated either only at baseline, at

baseline and at one follow-up, or at all three time-points.

Please insert Table 2

Most participants reported reduced sexual interest and arousal when depressed or

stressed/anxious. Increased arousal due to depressed mood was reported by 11.7%, and increased

arousal due to anxious or stressed feelings by 19.3%, of the sample. The total SE scores were

slightly higher and the total SI scores were marginally lower compared to the SESII-W scores

reported in the original validation sample [12]. The effect sizes of these differences were

minimal to small, with Cohen's $d = 0.17$ for SE and $d = 0.02$ for SI. Participants reported on

average 2.82 ($SD = 2.20$) sexual partners and 1.51 ($SD = 1.69$) one-night stands during the past

twelve months. These numbers are comparable to those reported in other studies [32].

With the exception of one SE subscale, the three subsamples showed comparable levels

of SE, SI, and sexual arousal patterns. The only significant group difference emerged on the

Sexual Power Dynamics subscale of SE, $F(2,2211) = 4.38$, $p = .013$. Post-hoc t-tests showed that

women who participated only at baseline had lower levels on this subscale compared to those

who participated at baseline and one follow-up, $t(1934) = -2.84$, $p = .005$. Another significant

difference between the subsamples emerged regarding the impression management subscale of

the BIDR, $F(2,2041) = 3.80$, $p = .023$. Post-hoc t-tests showed that baseline-only participants had

lower levels of impression management compared to women that participated at baseline and one

follow-up, $t(1764) = 2.47$, $p = .014$. All subsamples were comparable regarding the number of

sexual partners and one-night stands. However, there was a significant difference in the number

of sexual partners with whom condomless sex had occurred, $F(2,2039) = 3.88$, $p = .021$. The

women that participated at all time points reported fewer sexual partners with whom no condoms

had been used compared to women that participated at baseline and one follow-up, $t(493) = 2.63$,

$p = .009$, or only at baseline, $t(1821) = 2.66$, $p = .008$. Effect sizes of these group differences

were minimal to small, with Cohen's d between 0.09 and 0.34.

The time-course of the sexual risk behaviors was calculated with data from the subsample

of women that participated at all three time points ($N = 278$). There were no significant

differences between baseline, follow-up 1, and follow-up 2 for the number of one-night stands,

Wilks' Lambda $= 0.99$, $F(2,261) = 1.763$, $p = .173$, and the number of partners with whom no

condoms were used, Wilks' Lambda $= .99$, $F(2,267) = .076$, $p = .471$. There was a non-

significant trend in the number of sexual partners, Wilks' Lambda $= .98$, $F(2,269) = 2.98$, p

$= .052$, with more sexual partners at baseline ($M = 2.74$, $SD = 2.13$), compared to follow-up 1 (M

$= 2.68$, $SD = 2.03$) and to follow-up 2 ($M = 2.53$, $SD = 1.84$).

Correlational analyses

Table 3 shows bivariate correlations for all predictor and outcome variables at baseline,

follow-up 1, and follow-up 2.

Please insert Table 3

Greater self-deceptive enhancement was positively correlated with all outcomes at baseline and two out of three outcomes at follow-up 1, indicating that women who tended to think positively about themselves reported more sexual risk behaviors. Impression management showed negative associations with all outcome variables at baseline, indicating that women who placed importance on what others thought about them reported fewer sexual risk behaviors.

Both atypical arousal patterns (increased arousal when anxious/stressed or depressed) were positively associated with all outcomes at baseline and with the number of sexual partners at follow-up 1.

The higher order factor of SE as well as all five SE subscales were positively associated with all outcomes at baseline, and with some of the outcome variables at follow-up 1. Additionally, Arousability, Sexual Power Dynamics, and Setting (unusual/unconcealed) showed significant positive correlations with the outcome measures at follow-up 2. The higher order factor of SI and all three SI subscales were negatively correlated with all outcome measures at baseline and follow-up 1. Across the SESII-W subscales, Relationship Importance (SI) showed the strongest, negative associations with all outcomes across the three data assessment points. Correlations between predictor and outcome variables had mostly small to medium effect sizes.

Table 4 shows the bivariate correlations between the sexual risk behaviors at baseline, follow-up 1, and follow-up 2.

<div align="center">Please insert Table 4</div>

All outcome variables showed substantial intercorrelations with small to large effect sizes, suggesting that these behaviors cover related, but not identical, aspects of sexual risk taking.

Number of sexual partners

Table 5 shows the results of the multiple regression analyses for the number of sexual partners at baseline, follow-up 1, and follow-up 2.

Please insert Table 5

Being in a steady relationship was associated with fewer sexual partners at baseline. Increased arousal when depressed was a positive predictor at baseline. Four lower order factors of SE (Arousability, Partner Characteristics, Sexual Power Dynamics, and Setting) positively predicted the number of sexual partners at baseline. Partner Characteristics and Sexual Power Dynamics were also positive predictors of the number of sexual partners at follow-up 1. Additionally, Setting (unusual/unconcealed) was the only SE subscale that significantly predicted the number of sexual partners at follow-up 1 above and beyond the number of sexual partners at baseline. Concerns about Sexual Function (SI) was a negative predictor at baseline and Relationship Importance (SI) was a negative predictor at all time-points; it was the only subscale of the SESII-W that predicted the number of sexual partners at follow-up 2. The number of sexual partners in the year prior to baseline significantly predicted the number of sexual partners in the years before follow-up 1 and follow-up 2. Overall, the complete model explained between 19% and 56% of the outcome variance. The scales of the SESII-W and the atypical arousal patterns contributed about 8% to 17% of the outcome variance.

One-night stands

Table 6 shows the results of the multiple regression analyses for the number of one-night stands at baseline, follow-up 1, and follow-up 2.

Please insert Table 6

Being in a steady partnership was predictive of fewer one-night stands at baseline and follow-up 1. Atypical arousal (depression) was predictive of more one-night stands at baseline. Arousability (SE) and Partner Characteristics (SE) were positive predictors at baseline; Setting (SE) was predictive of the number of one-night stands at follow-up 1. Relationship Importance (SI) was a negative predictor at baseline and follow-up 1. Concerns about Sexual Function and Arousal Contingency were both predictors at follow-up 1. Three subscales (Setting, Concerns about Sexual Function, and Arousal Contingency) were predictive of one-night stands at follow-up 1 above and beyond the baseline level of the outcome. None of the assessed variables was predictive of the number of one-night stands at follow-up 2. The number of one-night stands at previous data assessment points strongly predicted the number of one-night stands at later data assessments. Overall, the complete model explained between 17% and 46% of the variance in the number of one-night stands. The scales of the SESII-W and the atypical arousal patterns contributed about 4% to 14% of the outcome variance.

Number of sexual partners with whom no condoms were used

Table 7 shows the results of the multiple regression analyses for the number of partners with whom no condoms were used at baseline, follow-up 1, and follow-up 2.

Please insert Table 7

Being in a committed partnership was associated with more partners with whom no condoms were used at baseline and follow-up 1. Impression management was a negative predictor at baseline. Atypical arousal (depression) was a positive predictor at baseline. Two subscales of SE (Arousability and Setting) were predictive of the number of partners without condom use at baseline. Relationship Importance (SI) was a negative predictor at baseline and Concerns about Sexual Function (SI) was a negative predictor at follow-up 1.

Previous sexual risk behavior was once again a significant predictor for later sexual risk behavior. None of the other variables contributed significantly to the explanation of the outcome variable at follow-up 2. The complete model explained between 7% and 27% of the outcome variance. The scales of the SESII-W and the atypical arousal patterns contributed about 5% to 6% of the outcome variance.

Discussion

Identifying predictors of risk-related sexual behaviors is important because of the potentially health threatening and psychologically distressing consequences of these behaviors. The aim of this study was to evaluate the associations between SE, SI, atypical arousal patterns, and potentially risky sexual behaviors in women using both cross-sectional and longitudinal data. The SE and SI factors of the dual control model were assessed with a well-validated self-report questionnaire and three outcome measures were included to cover different facets of sexually risky behavior. The longitudinal assessment allowed for a determination of the predictive value of SE, SI, and atypical sexual arousal above and beyond past sexual behavior.

In line with the first hypothesis, high levels of SE, low levels of SI, and atypical arousal patterns were associated with more sexual partners and more frequent one-night stands at baseline. These results are in line with previous research and support the assumption of the DCM that both propensities are related to risky sexual behaviors [7, 8]. Our data partially supported the second hypothesis; six out of eight lower order factors of the SESII-W were predictive of the different future sexual risk behaviors, some even above and beyond the baseline level of the respective outcome variable. In line with our third hypothesis, past behaviors were indeed the best predictors of future behaviors [33, 34]. All outcome measures at baseline were predictive of future sexual behaviors. The correlations had medium to large effect sizes for a one-year period

and were substantially smaller for the two-year interval between baseline and follow-up 2. This

finding suggests that – at least in our sample of relatively young women – the frequency of

potentially risky sexual behaviors does change over a relatively short time period of two years.

The two lower order DCM factors that showed the strongest predictive value for the

explanation of all three sexual risk behaviors and across all data assessment points were Setting

(SE) and Relationship Importance (SI). Women that indicated that they were more easily aroused

by unconcealed or unusual sexual settings reported more sexual risk behaviors. Additionally,

women that relied on certain aspects of a partnership, like mutual trust and commitment in order

to become aroused, were less likely to engage in potentially risky sexual behaviors. This pattern

of results supports the assumptions of the DCM that both SE and SI play an important role in the

explanation of risky sexual behaviors.

Arousability (SE) and Partner Characteristics (SE) were also predictive of all three risk

behaviors, but mostly on a cross-sectional level and to a lesser extent than the two previously

mentioned factors. This finding indicates that at least for some women the likelihood of being

easily aroused by various stimuli increases the chance that they will pursue sexual encounters.

But in contrast to Wood et al. [19], who investigated the associations between sexual risk

behaviors and the Arousability subscale of the SESII-W/M, relationship, setting, and partner

related aspects of SE and SI showed stronger associations with risky sexual choices than the

more general Arousability construct.

Previous research has shown that the importance of everything being "just right" for

arousal to occur as the Arousal Contingency subscale of SI strongly predicted sexual problems in

women [35, 36, 37]. Interestingly, this subscale did not predict any of the sexual behaviors

assessed at baseline. This result, as well as the finding that being in a steady relationship was

significantly associated with fewer risky sexual behaviors, underlines the importance of

interpersonal or setting factors for the explanation of sexual decision-making. How women

perceived their overall ability to get aroused was somewhat less important for predicting the

number of sexual partners, one-night stands, or unprotected intercourse than the personal

meaning or relevance of a safe and familiar setting and a trusted relationship with a sexual

partner.

Even though Concerns about Sexual Function (SI) showed negative correlations with all

outcomes at baseline and follow-up 1, it was a positive predictor of the number of partners at

baseline. This finding illustrates the complexity of the associations between SE, SI, and sexual

risk behaviors. Taken together with all other predictors, women that had *more* sexual partners

actually reported *more* concerns regarding their sexual functioning. Thus, the unique contribution

of these lower order factors for the explanation of the number of sexual partners is somewhat

different than would be expected from the bivariate correlations. However, this finding is in line

with previous research in men that revealed that some aspects of SI e.g., sexual inhibition due to

threat of performance failure, increase the likelihood of sexual risk behaviors, while other

inhibition-related aspects, like the threat of negative consequences, are associated with fewer risk

behaviors [14].

At least one of the two atypical sexual arousal patterns—increased sexual interest or

arousal when depressed or anxious/stressed—was predictive of all outcomes at baseline. This

finding supports previous research regarding atypical arousal patterns as risk factors for

potentially dangerous sexual choices [22, 23]. Future studies should investigate how these sexual

arousal patterns relate to other—potentially dysfunctional—emotion-regulation strategies (e.g.,

impulsive eating). In some individuals (e.g., those with borderline-personality disorder) several

of these strategies might occur concurrently to atypical arousal patterns and might be different

manifestations of an underlying personality structure.

Overall, the amount of explained variance of the sexual behaviors we assessed by SE, SI,

and atypical sexual arousal patterns was small indicating that factors not assessed in this study

might be more relevant for understanding these behaviors.

We also assessed two aspects of socially desirable responding in order to control for

expectancy effects. Impression management was a negative predictor of sexual behaviors at

baseline, indicating that women that placed importance on what other people think about them

reported fewer risky sexual behaviors. These findings support previous research about the

association between social desirability and sexuality related self-reports [28].

Limitations

Our study had several methodological limitations that challenge the internal validity and

generalizability of our results. Our sample consisted of relatively young and mostly college-

educated women. Their sexual choices might not be representative of the sexual behaviors of

older women or women with a different socioeconomic background. Web-based studies have

several advantages compared to personal or telephone interviews e.g., more truthful answers to

sensitive questions [38], a good price-performance ratio, and easy administration [39]. We did,

however, not offer an alternative option for women that were not comfortable with participation

in an online survey. Potential volunteer bias, characterized by sexually more experienced

individuals participating more often in sexuality research than more traditional or conservative

individuals [40], may have affected the sample. However, our sample was comparable to those in

other sexuality-related studies regarding our predictor and outcome measures as well as other

sociodemographic variables such as age and education [12, 37]. Additionally, our different

subsamples (i.e., women participating at 1, 2, or all 3 time-points) were also similar on most

scores of SE, SI, and atypical arousal patterns as well as sociodemographic variables such as age

and partnership status, indicating that meaningful comparisons between these subsamples were

feasible. Women that participated at more than one time point reported greater levels of

impression management as well as fewer partners with whom no condoms were used and these

two variables showed a small, negative ($r = -.09$, $p < .001$) correlation. We cannot clarify if the

lower number of sexual partners without condom use among these participants was a result of

more socially desirable responding or an indicator of more sexually responsible individuals more

likely agreeing to participate. In order to control for this possible selection bias, we included

socially desirable responding as a predictor in our analyses.

Similar risk-behavior related questions to the ones that were used in our study have

already been used in several epidemiological or representative population-based studies e.g.,

NATSAL-3 [41]. The fact that we did not use a validated questionnaire for assessing a variety of

sexual behaviors related to sexual risks in women is still a shortcoming of our study because it

reduces comparability of our results to those of other studies that investigated sexual risks with

validated scales e.g., the Sexual Risk Survey [16].

Finally, the variables included in our analyses only explained a small amount of outcome

variance. It is unclear if the inclusion of more general personality traits, such as extraversion,

cultural or situational variables, like alcohol consumption, would have increased the predictive

value of our models. It is also important to bear in mind that sexual interactions require at least

two individuals. Thus, it is very likely that in addition to situational or setting factors, the

personalities, inclinations, and needs of both parties are important for occurrence of a sexual

encounter. This makes it understandable that the SE and SI proneness as well as the arousal patterns of one individual can only explain sexual behaviors to a certain extent.

Conclusion

Sexual excitation, sexual inhibition, and sexual arousal patterns are important predictors of potential risky sexual choices in women. Women that are easily aroused by unusual settings and are less reliant on certain relationship characteristics such as trust or commitment in order to become aroused reported more sexual partners, one-night stands, and unprotected intercourse. In line with the assumptions of the dual control model, some aspects of SE and SI were also predictive of future sexual behaviors above and beyond previous sexual behaviors. Our study is the first to support the assumptions of the dual control model with respect to the prediction of sexual risk behaviors using both cross-sectional and longitudinal datasets. However, the overall outcome variance explained by the investigated variables was small, leaving room for speculations about other individual, interpersonal or situational factors that influence sexual behaviors in women.

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Table 1

Sample characteristics at baseline assessment for the complete sample and the different subsamples

	Baseline sample (N = 2214)	One data point (N = 1714)	Two data points (N = 222)	Three data points (N = 278)	p value
Age M (SD)	30.65 (9.91)	30.42 (9.81)	31.06 (10.03)	31.74 (10.32)	.105
	n^a (%)	n^a (%)	n^a (%)	n^a (%)	
Partnership status					.750
Exclusive relationship or marriage	1422 (64.2)	1088 (63.5)	146 (65.8)	188 (67.6)	
Non-exclusive relationship	118 (5.3)	96 (5.6)	11 (5.0)	11 (4.0)	
Single with sexual contacts in the last year	421 (19.0)	332 (19.4)	465(20.3)	44 (15.8)	
No sexual contacts in the last year	233 (10.5)	183 (10.7)	19 (8.6)	31 (11.2)	
Partnership duration					.405
less than 6 months	178 (8.0)	136 (7.9)	22 (9.9)	20 (7.2)	
6 months to 2 years	393 (17.8)	304 (17.7)	42 (18.9)	47 (16.9)	
2 to 5 years	439 (19.8)	341 (19.9)	45 (20.3)	53 (19.1)	
more than 5 years	572 (25.8)	432 (25.2)	56 (25.2)	83 (30.2)	
Number of children					.227
No children	1782 (80.5)	1396 (82.8)	175 (79.5)	211 (76.2)	
1 child	172 (7.8)	119 (7.1)	20 (9.1)	33 (11.9)	
More than 1 child	230 (10.4)	172 (10.2)	25 (11.4)	33 (11.9)	
Sexual orientation*					.031
Heterosexual	1586 (71.6)	1221 (71.2)	159 (71.6)	206 (74.1)	
Homosexual	296 (13.4)	245 (14.3)	19 (8.6)	32 (11.5)	

Bisexual	279 (12.6)	212 (12.4)	38 (17.1)	29 (10.4)
Other	50 (2.3)	33 (1.9)	6 (2.7)	11 (4.0)
Education***				< .001
Primary school	231 (10.4)	188 (13.0)	24 (10.9)	19 (6.9)
Secondary school	787 (35.5)	612 (42.2)	79 (35.9)	96 (34.9)
College degree	929 (42.0)	652 (44.9)	117 (53.2)	160 (58.2)
Occupation				.536
Full-time occupation	753 (34.0)	560 (38.2)	92 (41.1)	101 (36.3)
Part-time occupation	270 (12.2)	194 (13.2)	32 (14.4)	44 (15.8)
Student	770 (34.8)	530 (36.2)	78 (35.1)	105 (37.8)
Other	173 (7.8)	181 (13.3)	20 (9.2)	28 (10.0)

Note. [a] Numbers vary due to missing data, * $p < .05$; *** $p < .001$.

Table 2

Descriptive values of social desirability, atypical arousal patterns, sexual excitation, sexual inhibition, and sexual risk behaviors at baseline for the complete sample and the different subsamples

	Baseline sample (N = 2214)		One data point (N = 1714)		Two data points (N = 222)		Three data points (N = 278)		p value
	M	SD	M	SD	M	SD	M	SD	
Impression Management*	22.29	7.84	23.00	6.79	23.28	6.93	22.65	6.85	.023
Self-deceptive Enhancement	22.98	6.81	22.55	7.83	21.16	8.10	21.77	7.57	.576
Atypical arousal (depression)	3.62	2.41	2.64	2.41	2.65	2.48	2.47	2.32	.555
Atypical arousal (anxiety/stress)	4.06	2.75	3.04	2.73	3.32	2.92	2.94	2.68	.259
Sexual Excitation (total)	2.77	0.35	2.76	0.36	2.80	0.31	2.78	0.35	.341
Arousability	3.02	0.40	3.02	0.43	3.06	0.36	3.06	0.40	.082
Partner Characteristics	2.81	0.49	2.81	0.50	2.82	0.49	2.84	0.46	.597
Sexual Power Dynamics*	2.70	0.51	2.68	0.51	2.78	0.47	2.72	0.55	.013
Smell	2.94	0.74	2.95	0.74	2.96	0.71	2.90	0.73	.591
Setting	2.36	0.57	2.36	0.58	2.37	0.57	2.35	0.56	.954
Sexual Inhibition (total)	2.56	0.49	2.57	0.49	2.54	0.50	2.56	0.48	.688
Concerns about Sexual Function	2.58	0.62	2.58	0.62	2.56	0.64	2.63	0.61	.394
Arousal Contingency	2.20	0.67	2.21	0.67	2.16	0.66	2.17	0.70	.396
Relationship Importance	2.91	0.56	2.92	0.56	2.90	0.57	2.89	0.60	.726
Sexual partners	1.66	1.50	1.68	1.51	1.61	1.44	1.58	1.45	.522
One-night stands	0.43	1.19	0.46	1.21	0.36	1.05	0.36	1.13	.272
Sexual partners without condom-use*	1.01	1.08	1.03	1.14	1.04	1.02	0.84	0.72	.021

Note. * $p < .05$

Table 3

Bivariate correlations between predictors at baseline and sexual risk behaviors at baseline, follow-up 1, and follow-up 2

	Sexual partners			One-night stands			Sexual partners without condoms		
	Baseline	Follow-up 1	Follow-up 2	Baseline	Follow-up 1	Follow-up 2	Baseline	Follow-up 1	Follow-up 2
Partnership status (no/yes)	-.23***	-.19***	-.14**	-.29***	-.25***	-.14**	.02	.18***	.06
Impression Management	-.10***	-.01	.06	-.08***	-.01	.05	-.09***	-.04	-.03
Self-deceptive Enhancement	.07**	.12*	.06	.05*	.07	.00	.06*	.13**	.08
Atypical arousal (depression)	.22***	.13*	.01	.19***	.09	-.01	.13***	.02	.03
Atypical arousal (anxiety/stress)	.20***	.10	.08	.19***	.05	.02	.14***	-.01	.07
Sexual Excitation (total)	.29***	.28***	.18***	.22***	.24***	.09	.16***	.08	.12*
Arousability	.22***	.15**	.12*	.17***	.12*	.03	.14***	.04	.11*
Partner Characteristics	.14***	.14**	.10	.10***	.11*	.04	.05*	-.01	.01
Sexual Power Dynamics	.22***	.24***	.17**	.15***	.19***	.10	.14***	.10*	.13*
Smell	.11***	.12*	.06	.07**	.08	-.01	.04	.02	.02
Setting (unusual/unconcealed)	.26***	.24***	.13**	.23***	.25***	.14**	.18***	.10*	.12*
Sexual Inhibition (total)	-.24**	-.26***	-.13*	-.21***	-.25***	-.04	-.18***	-.14**	-.05
Concerns about Sexual Function	-.10***	-.16**	-.04	-.10***	-.21***	.02	-.10***	-.14**	-.04
Arousal Contingency	-.18***	-.14**	-.07	-.14***	-.12*	.00	-.12***	-.06	-.01
Relationship Importance	-.31***	-.31***	-.20***	-.25***	-.26***	-.12*	-.20***	-.15**	-.06

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

Table 4

Bivariate correlations between sexual risk behaviors at baseline, follow-up 1, and follow-up 2

		Sexual partners			One-night stands			Sexual partners without condoms		
		Baseline	Follow-up 1	Follow-up 2	Baseline	Follow-up 1	Follow-up 2	Baseline	Follow-up 1	Follow-up 2
Sexual partners	Baseline	1								
	Follow-up 1	.70***	1							
	Follow-up 2	.47***	.74***	1						
One-night stands	Baseline	.75***	.56***	.25***	1					
	Follow-up 1	.56***	.77***	.45***	.63***	1				
	Follow-up 2	.33***	.50***	.71***	.33***	.49***	1			
Sexual partners without condoms	Baseline	.55***	.24***	.16**	.45***	.13*	.04	1		
	Follow-up 1	.29***	.47***	.38***	.07	.21***	.09	.42***	1	
	Follow-up 2	.18***	.33***	.36***	.07	.19**	.19***	.29***	.46***	1

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

Table 5
Prediction of the number of sexual partners at baseline, follow-up 1, and follow-up 2

| | Sexual partners Baseline | | | | Sexual partners Follow-up 1 | | | | Sexual partners Follow-up 2 | | | |
| | Step 1 | | Step 2 | | Step 1 | | Step 2 | | Step 1 | | Step 2 | |
	ß	t (Sig.)	ß	t (Sig.)	ß	t (Sig.)	ß	t (Sig.)	ß	t (Sig.)	ß	t (Sig.)
Outcome at follow-up 1											.06	1.08
Outcome at baseline							.65	16.27***			.70	12.05***
Partnership status			-.16	-7.93***			-.06	-1.60			-.04	-0.90
Impression Management			-.05	-1.96(*)			.05	1.15			.05	1.043
Self-deceptive Enhancement			.04	1.54			.05	1.11			-.00	-0.01
Atypical Arousal (depression)	.10	4.03***	.10	3.89***	.03	0.51	.00	-0.01	-.07	-0.94	-.07	-1.34
Atypical Arousal (anxiety/stress)	.04	1.50	.02	0.68	-.06	-1.03	-.06	-1.30	.02	0.27	.03	0.64
Arousability	.08	3.20*	.08	3.12**	-.02	-0.36	-.04	-0.90	.01	0.10	.00	-0.04
Partner Characteristics	.08	3.38**	.06	2.68**	.11	2.11*	.02	0.50	.06	0.93	-.01	-0.16
Sexual Power Dynamics	.05	2.11*	.06	2.48*	.11	2.09*	.06	1.54	.11	1.56	.01	0.25
Smell	.02	1.05	.02	0.77	.08	1.50	.03	0.75	.06	0.89	-.02	-0.49
Setting (unusual/unconcealed)	.11	4.61***	.10	4.44***	.13	2.27*	.09	2.13*	.02	0.23	-.01	-0.26
Concerns about Sexual Function	.07	2.89**	.07	2.87**	-.07	-1.21	-.06	-1.22	-.03	-0.38	.01	0.09
Arousal Contingency	-.01	-0.39	-.01	-0.19	.04	0.71	.05	0.95	.01	0.15	.03	0.50
Relationship Importance	-.23	-10.04***	-.21	-9.01***	-.25	-4.56***	-.05	-1.10	-.21	-3.12**	-.02	-0.43
R^2		.17		.19		.16		.52		.08		.56

Note. (*) $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 6
Prediction of the number of one-night-stands at baseline, follow-up 1, and follow-up 2

	One-night stands Baseline				One-night stands Follow-up 1				One-night stands Follow-up 2			
	Step 1		*Step 2*		*Step 1*		*Step 2*		*Step 1*		*Step 2*	
	ß	*t (Sig.)*	ß	*t (Sig.)*	ß	*t (Sig.)*	ß	*t (Sig.)*	ß	*t (Sig.)*	ß	*t (Sig.)*
Outcome at follow-up 1											.44	6.43***
Outcome at baseline							.57	13.61***			.06	0.88
Partnership status			-.24	-11.40***			-.12	-2.85**			-.08	-1.30
Impression Management			-.04	-1.56			.06	1.40			.05	0.82
Self-deceptive Enhancement			.01	0.22			.05	1.04			.01	0.14
Atypical Arousal (depression)	.08	2.85**	.07	2.63**	.03	0.41	.02	0.41	-.06	-0.80	-.04	-0.59
Atypical Arousal (anxiety/stress)	.06	2.37*	.03	1.23	-.11	-1.81(*)	-.09	-1.72(*)	-.05	-0.67	-.03	-0.49
Arousability	.06	2.36*	.06	2.25*	-.03	-0.42	-.07	-1.52	-.06	-0.74	-.08	-1.14
Partner Characteristics	.06	2.51*	.04	1.69(*)	.10	1.95(*)	.02	0.44	.03	0.37	-.05	-0.72
Sexual Power Dynamics	.00	-0.05	.01	0.49	.08	1.51	.08	1.77(*)	.10	1.35	.07	1.15
Smell	.01	0.21	-.01	-0.25	.04	0.73	.03	0.67	-.03	-0.46	-.03	-0.47
Setting (unusual/unconcealed)	.12	4.82***	.11	4.73***	.17	3.07**	.11	2.43*	.10	1.40	.04	0.64
Concerns about Sexual Function	.03	1.13	.02	0.77	-.18	-2.92**	-.14	-2.63**	-.05	-0.69	.02	0.24
Arousal Contingency	.01	0.21	.01	0.30	.09	1.42	.11	2.22*	.06	0.73	.05	0.67
Relationship Importance	-.18	-7.43***	-.15	-6.34***	-.18	-3.19**	-.08	-1.85(*)	-.10	-1.42	-.02	-0.35
R^2		.11		.17		.14		.46		.04		.27

Note. (*) $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 7
Prediction of the number of sexual partners with whom no condoms were used at baseline, follow-up 1, and follow-up 2

	Sexual partners without condom-use Baseline				Sexual partners without condom-use Follow-up 1				Sexual partners without condom-use Follow-up 2			
	Step 1		*Step 2*		*Step 1*		*Step 2*		*Step 1*		*Step 2*	
	ß	*t (Sig.)*	ß	*t (Sig.)*	ß	*t (Sig.)*	ß	*t (Sig.)*	ß	*t (Sig.)*	ß	*t (Sig.)*
Outcome at follow-up 1											.40	6.47***
Outcome at baseline							.39	8.32***			.12	2.02*
Partnership status			.06	2.70**			.16	3.40**			.06	1.04
Impression Management			-.06	-2.55*			.02	0.35			-.01	-0.21
Self-deceptive Enhancement			.04	1.73			.10	1.80(*)			.03	0.44
Atypical Arousal (depression)	.06	2.29*	.07	2.45*	.00	0.06	.00	0.01	-.02	-0.23	-.05	-0.82
Atypical Arousal (anxiety/stress)	.00	0.12	.01	0.47	-.09	-1.46	-.07	-1.27	-.01	-0.19	.07	0.99
Arousability	.07	2.61**	.06	2.36*	-.01	-0.09	-.02	-0.36	.11	1.44	.11	1.62
Partner Characteristics	.01	0.39	.01	0.49	.01	0.12	.02	0.30	-.05	-0.70	-.02	-0.38
Sexual Power Dynamics	.04	1.40	.03	1.14	.06	1.05	.05	1.00	.06	0.87	.00	-0.02
Smell	-.01	-0.54	-.01	-0.43	.00	0.08	-.01	-0.11	.03	0.37	-.01	-0.11
Setting (unusual/unconcealed)	.09	3.45**	.08	3.30**	.07	1.18	.06	1.15	.09	1.32	.10	1.55
Concerns about Sexual Function	-.01	-0.25	.00	0.02	-.15	-2.27*	-.08	-1.33	-.08	-1.01	.02	0.25
Arousal Contingency	.01	0.41	.01	0.47	.06	0.83	.04	0.67	.13	1.68(*)	.13	1.86(*)
Relationship Importance	-.13	-5.38***	-.13	-5.10***	-.11	-1.84(*)	-.10	-1.95	-.10	-1.49	-.06	-0.91
R^2		.06		.07		.05		.24		.06		.27

Note. (*) $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$.