



## Effects of social anxiety and depressive symptoms on the frequency and quality of sexual activity: A daily process approach

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### ABSTRACT

Diminished positive experiences and events might be part of the phenomenology of social anxiety; however, much of this research is cross-sectional by design, limiting our understanding of the everyday lives of socially anxious people. Sexuality is a primary source of positive experiences. We theorized that people with elevated social anxiety would have relatively less satisfying sexual experiences compared to those who were not anxious. For 21 days, 150 college students described their daily sexual episodes. Social anxiety was negatively related to the pleasure and feelings of connectedness experienced when sexually intimate. The relationship between social anxiety and the amount of sexual contact differed between men and women—it was negative for women and negligible for men. Being in a close, intimate relationship enhanced the feelings of connectedness during sexual episodes for only individuals low in social anxiety. Depressive symptoms were negatively related to the amount of sexual contact, and the pleasure and feelings of connectedness experienced when sexually intimate. Controlling for depressive symptoms did not meaningfully change the social anxiety effects on daily sexuality. Our findings suggest that fulfilling sexual activity is often compromised by social anxiety.

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Traditionally, diminished positive experiences have been considered to be part of the structure of depression, but not anxiety (Brown, Chorpita, & Barlow, 1998; Clark & Watson, 1991). Nevertheless, a meta-analysis of 30 studies found negative relationships between social anxiety and positive experiences that could not be explained by depression (Kashdan, 2007). Why should social anxiety be inversely related to positive events and experiences? At any given moment, people have limited available self-regulatory resources, including attention, stamina, willpower and other executive functions. With over-exertion, these resources can be depleted, leaving little to no regulatory capacity for subsequent challenges (Muraven & Baumeister, 2000). People with high social anxiety exert substantial time and effort to conceal anxious feelings and avoid social situations. To minimize the probability of being scrutinized during social interactions, people with high social anxiety engage in “safety behaviors” such as talking very little, nodding excessively, and deflecting attention by asking questions. Regular, intense efforts to control anxiety and public impressions

put socially anxious people in “prevention mode”, where the avoidance of threat and failure take precedence over responding to potential rewards (Clark & Wells, 1995; Kashdan, 2007; Rapee & Heimberg, 1997). Devoting limited self-regulatory resources to manage anxiety “steals” time and effort from being receptive to environmental reward cues and pursuing other everyday strivings (Hayes, Luoma, Bond, Masuda, & Lillis, 2006; Kashdan, Breen, & Julian, 2010). Thus, the self-regulatory orientation linked to social anxiety appears to interfere with the psychological benefits of positive social experiences like enjoyment, laughter, inspiration, and intimacy.

### Social anxiety and romantic relationships

By nature, social anxiety is an emotionally vulnerable experience contextually linked to interpersonal interactions and relationships. Yet, only scant attention has been given to the romantic lives of people with high social anxiety. People with high social anxiety have been shown to be less likely to be in romantic relationships (e.g., Lampe, Slade, Issakidis, & Andrews, 2003; Schneier et al., 1994). Of the subgroup of people with high social anxiety in romantic relationships, there is evidence to suggest dysfunction. People with high social anxiety reported less perceived intimacy

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and social support (e.g., Cuming & Rapee, 2010; Sparrevoth & Rapee, 2009; Wenzel, 2002), and greater avoidance of conflict, disclosure, and intense emotions (Davila & Beck, 2002; Kashdan, Volkmann, Breen, & Han, 2007).

Each of these studies relied on single occasion, global questionnaires, asking participants to report on their general behaviors and relationship attitudes across time and context. Only two published studies used a process-oriented methodology. In an observational study of how 13 people with high social anxiety communicated with their romantic partners, researchers found that these people reported infrequent positive behaviors during various conversation topics and frequent extreme negative behaviors when discussing a contentious topic compared with 14 “nonanxious” people and their romantic partners (Wenzel, Graff-Dolezal, Macho, & Brendle, 2005). In another observational study, 22 women with high social anxiety and their romantic partners (compared with 23 “nonanxious” people and their romantic partners) discussed how they each coped with the most difficult event in their lives, respectively (Beck, Davila, Farrow, & Grant, 2006). The researchers found no differences in the quality of social support provided and received by women with high social anxiety compared to “nonanxious” women.

### Social anxiety and sexual behavior

To understand social anxiety and romantic relationships, there is value in studying the most intimate form of positive social experience: sex.<sup>1</sup> The importance of this life domain is underscored by its presence in everyday thought, conversation, and even commerce. From what we know, people with high social anxiety report a range of sexual problems, including greater performance anxiety, greater difficulty getting aroused (lubrication for women, erections for men), more frequent premature ejaculation, fewer sexual partners, and less discussion of sexual issues with romantic partners (Bodinger et al., 2002; Figueira, Possidente, Marques, & Hayes, 2001; Fontenelle et al., 2007; Leary & Dobbins, 1983).

To our knowledge, all published studies on social anxiety and sexuality have used global sexual history questionnaires. In addition, individual difference variables, such as the type and quality of romantic partners, might influence within-person associations between social anxiety and sexual activity. A few existing studies provide indirect evidence for considering these contextual, moderating variables.

### Relational factors and sexuality

Engaging in sexual activity with a romantic relationship partner (compared with new or occasional partners) has been shown to alter the quality of sexual experiences. In 2009, researchers collected data from a nationally representative sample of 3990 adults (ages 18–59) in the United States via mailed household surveys (Herbenick et al., 2010). When contacted, participants were asked about their most recent sexual experience with another person. For men, having sexual relations within a romantic relationship context, compared with a non-relationship partner, was associated with greater arousal and pleasure, and a higher probability of orgasm; these findings remained even after accounting for age and health status. In contrast, during their last sexual episode, women experienced greater arousal difficulties and a lower probability of having an orgasm within a romantic relationship context compared with non-relationship partners, and a similar level of

pleasure across different types of partners; these findings remained even after accounting for age and health status. Findings concerning women should be interpreted cautiously as most of their sexual partners outside of romantic relationships were classified as friends as opposed to new people.

These data suggest that the nature of sexual partners influence the frequency and quality of sexual experience. Thus, the type and quality of sexual partners might moderate any existing relationships between social anxiety and the frequency and quality of sexual activity in daily life.

### Gender, social anxiety, and sexuality

Gender has been found to influence the effects of social anxiety on the quality of romantic relationships in cross-sectional survey studies. Compared to women with low social anxiety, women with high social anxiety reported less support, less disclosures about emotions and personal information, and greater conflict in their romantic relationships (Cuming & Rapee, 2010); for men, social anxiety did not influence any of these relationship quality outcomes. As for observable behavior when communicating with romantic partners in a laboratory setting, healthy supportive responses by partners only served to increase the distress of women with high (but not low) social anxiety (Beck et al., 2006); there were no men in the study to allow for gender comparisons. The seemingly unusual response by women with high social anxiety fits with recent research on fear responses to overtly positive events (e.g., Weeks, 2010; Weeks, Heimberg, Rodebaugh, & Norton, 2008). Specifically, individuals with high social anxiety often fear being evaluated favorably and publicly by other people because of concerns that they cannot meet the new, higher standards set for them. Instead of responding with positive experiences, individuals with high social anxiety feel conspicuous and seek to withdraw or disqualify the positive event to reduce unwanted, unmanageable negative reactions. Within this conceptual framework, women with higher social anxiety might fail to respond positively to overtly healthy sexual experiences and in turn, might reduce the frequency of sexual experiences to avoid any evaluation from sexual partners (positive or negative).

When comparing men and women on psychological variables, few differences tend to be of a large enough magnitude to be meaningful (Hyde, 2005). Sexuality is an exception. Stark gender differences have been reported in rates of masturbation and attitudes about casual sex (e.g., Baumeister, 2000; Oliver & Hyde, 1993; Petersen & Hyde, 2010). When asked to describe the advantages of romantic relationships, women viewed intimacy, companionship, and exclusivity as more important benefits than men; men were more likely to consider sexual gratification as a primary benefit (Sedikides, Oliver, & Campbell, 1994). Taken together, these results suggest that men place higher value on sexual gratification in romantic relationships, while women regard the fulfillment of their needs for commitment, intimacy, and affiliation as more important.

In heterosexual relationships, there is asymmetry in sexual access with women often serving as gatekeepers (Baumeister & Vohs, 2004). Supportive research suggests that men show a greater willingness to engage in casual sex whereas women show a preference toward reserving sexual intercourse for committed partners (e.g., Clark & Hatfield, 1989; Mathes & Kozak, 2008; Oliver & Hyde, 1993). Although all human beings desire sex, the asymmetrical status of men and women in sexual interactions alters mating strategies and perceived costs and benefits. Men show greater motivation to obtain sexual gratification and are more apt to extract immediate pleasures compared with women (e.g., Meston & Buss, 2007; Regan & Dreyer, 1999). Women are more

<sup>1</sup> At the same time, in situations involving coercion and assault, sex can become a profoundly traumatic event.

concerned about their self-worth, self-respect, self-confidence and the quality of their sexual decision-making (Buss, 2003).

Dispositional concerns about being evaluated and devalued by others, a defining feature of social anxiety (Leary, 1999, 2004), might amplify women's concerns about giving romantic partners sexual access. Biases toward viewing rejection as highly probable and costly (Hofmann, 2007) may extend to how women with high social anxiety form opinions of themselves and react during sexual activity. Women with high social anxiety are expected to derive less pleasure, decreased feelings of belonging, and fewer orgasms during sexual episodes compared with women with low socially anxiety. In fact, Bodinger et al. (2002) found that in response to a sexual history questionnaire, compared to a healthy comparison group, women (but not men) with social anxiety disorder reported less desire for sex and loss of desire during intercourse. This fits with recent theorizing on how social anxiety leads to fear responses and the disqualification of overtly positive social events (e.g., Kashdan & Weeks, 2010).

One strategy to cope with the fear of positive evaluation and concerns about being indebted following positive partner behavior is to avoid or withdraw from sexual activity. Prior research has shown that women with high social anxiety exhibit adverse responses to positive behavior by romantic partners (Beck et al., 2006). Bodinger et al. (2002) found that on responses to a sexual history questionnaire, compared to a healthy comparison group, women with social anxiety disorder reported less frequent vaginal sex. Leary and Dobbins (1983) found that on responses to a sexual history questionnaire, compared to women with low social anxiety, women with high social anxiety reported less frequent vaginal and oral sex over the past month (no differences were found between men with high and low social anxiety). These findings serve as a useful starting point. Based on this small body of research, women with high compared with low social anxiety might report less frequent sexual activity in daily life. Increased sexual activity, for men, has been shown to be a useful strategy to enhance their perceived social status (Buss, 2003; Meston & Buss, 2007). Consequently, men with high social anxiety might show more frequent sexual activity compared with men with low social anxiety. However, a recent review concluded that men's sexual desires and behavior were relatively unaffected by sociocultural factors (Baumeister, 2000) and thus, liable to be less affected by social anxiety symptoms.

#### Addressing limitations in the literature with the current study

Besides the over-reliance on global questionnaires in prior studies of social anxiety and sexuality, another limitation is the questionable strategy of providing participants with response options that fail to correspond to any particular time frame (e.g., "often" and "average"). Retrospective reports that ask people to abstract their behavior over lengthy or arbitrary intervals often lead to erroneous recall. In studies using historical questionnaires and daily diary methodologies, historical questionnaires led to over-estimations of sexual activity (55% of the time) more often than underestimations (25% of the time) (Coxon, 1999; also see, Jaccard, McDonald, Wan, Dittus, & Quinlan, 2002). For this reason, when participants are given adequate training and response burden is limited, daily process approaches appear to be superior in terms of the accuracy of self-reported sexual behavior (Schroder, Carey, & Vanable, 2003).

To address dynamic interpersonal processes that are relevant to social anxiety, researchers need to study people across time and multiple contexts. Unlike single occasion assessments, daily diary approaches provide opportunities to move beyond between-person analyses to examine within-person variability in sexual

experiences and behavior and individual differences such as trait social anxiety that moderate these within-person relationships (Affleck, Zautra, Tennen, & Armeli, 1999).

#### Current study questions and hypotheses

This is the first study to examine the influence of individual differences in social anxiety on the frequency and quality of sexual activity in daily life. Unlike prior studies, we studied people within a meaningful context as opposed to examining associations between social anxiety and free-floating positive emotions or mood during the day (Kashdan, 2007).

By measuring people's sexual activity everyday for three weeks, we were able to test several between-person hypotheses. Based on prior work, we hypothesized that individuals with greater social anxiety would report less frequent sexual activity. As for the quality of sexual activity, we hypothesized that individuals with greater social anxiety would experience less pleasure and satisfaction of their need to belong (i.e., feeling connected to their partner). When participants were sexually active, we hypothesized that individuals with high social anxiety would experience less explicit sexual activity (defined as oral, vaginal, and anal sex as opposed to simply passionate kissing). We addressed the construct specificity of social anxiety via additional analyses controlling for depressive symptoms. Besides the strong co-occurrence with social anxiety, depressive symptoms show conceptual and empirical ties to attenuated positive experiences and interpersonal dysfunction (e.g., Joiner & Coyne, 1999; Rottenberg, 2005). Thus, we tested whether social anxiety was related to the frequency and quality of daily sexual activity, and whether these findings were also attributable to elevated depressive symptoms.

By collecting information about the type and quality of sex partners, we were also able to test additional hypotheses about contextual factors that might moderate the effects of social anxiety on within-person sexual behavior. For instance, on an exploratory basis, we examined whether the effects of social anxiety on the quality of sexual activity would be more pronounced when sex occurs with stable (as opposed to occasional or new) partners—when concerns about relational devaluation might be particularly harmful to the self (Leary, 2004). We also explored whether being in a close, intimate relationship moderates the effects of social anxiety on daily sexual behavior. That is, being in a close relationship might buffer the adverse impact of social anxiety on the frequency and quality of sexual activity.

Finally, a review of prior literature showed that gender is relevant to both social anxiety and sexuality. Building on cross-sectional survey studies and experimental studies limited to samples of women, we examined gender as a potential moderator of social anxiety on sexual behavior. We hypothesized that women with high social anxiety would report less frequent and lower quality sexual experiences compared with women with low social anxiety, and that for men, social anxiety would be less relevant to sexual behavior.

#### Method

##### Participants

Initially, 186 participants (40 men, 133 women, and 13 with missing data) began the study. Of these 186, 36 did not provide trait-level data on the constructs being investigated and were eliminated from all analyses. It should be noted that participants who were not included in the primary analyses did not differ from those who were included in terms of the number of days they provided data ( $p > .20$ ), their frequency of sexual episodes, or their

reactions to the episodes they experienced (all  $ps > .50$ ). The remaining 150 participants (116 women, mean age 23.4 years) provided an average of 24.8 days of valid data ( $SD = 4.8$ ), with a minimum of at least 10 daily reports. Only four participants provided fewer than 20 valid reports. A valid end-of-day report was defined as a report completed prior to 11:00 am the next day. Three participants provided more than 35 days of data, and reports past the 35th day were eliminated from the analyses.

### Procedure

Participants were recruited via flyers and online advertisements for a study on “personality and risk-prone behavior.” They attended a meeting (1.5 h) during which the purpose of the study was explained and instructions were given about how to use the website to provide daily reports. Participants were told to complete their daily reports at the end of each day (before going to sleep) for 21 days. We informed participants that we wanted data on at least two weekends, when there tends to be more leisure time for sexual activity. Due to missing data on weekends (e.g., participants going on planned vacations), several participants continued completing daily reports beyond three weeks. They were given handouts with definitions of the survey items, including what was and was not a sexual episode. Researchers emphasized the importance of compliance and explained that each entry included both date and time. Participants received emails each week reminding them to provide data as instructed. Throughout the study, participants were reminded that their responses were confidential and stored in a way that could not be readily traced to individuals. Each participant was assigned a random identification number that was used to organize the data.

### Questionnaires

At the initial session, participants answered a series of demographic questions and completed the Social Interaction Anxiety Scale (SIAS; Mattick & Clark, 1998), measuring tendencies to fear and avoid social interactions due to concerns about being negatively evaluated. They also completed the Beck Depression Inventory-II (BDI; Beck, Steer, & Brown, 1996). Participants who were in romantic relationships completed the Inclusion of Other in the Self Scale (IOS; Aron, Aron, & Smollan, 1992), a single-item measure of relationship closeness.

Participants select one of seven pairs of circles with increasing degrees of overlap, ranging from no contact (1) to almost complete overlap (7) that best represents their level of closeness with their romantic partner. This single-item has excellent construct validity, converging with longer, time-intensive measures of relationship quality such as the subjective closeness inventory ( $r = .77$ ; Aron, Melinat, Aron, Vallone, & Bator, 1997).

### Daily measures

Each day, participants described the physically intimate encounters they had. When physical intimacy was reported, participants indicated which of the following acts occurred (passionate kissing, vaginal sex, oral sex, and/or anal sex) and whether they had an orgasm. Participants indicated how much pleasure they experienced (1 = none to 9 = very), and how close and connected they felt to their partner during sexual activity with a modified 7-point IOS (from 1 to 7) (Aron et al., 1992). They also indicated if the person with whom they had sexual relations was a new, occasional, or stable partner.

At the end of each day, immediately prior to sleeping, participants logged onto a secure website and described up to three

episodes of physical intimacy. We realize sex can occur spontaneously late into the night, therefore, the next day, participants were asked in their end-of-day survey if they had any sexual episodes the prior night after logging off. Doing so allowed us to capture up to three late night sexual escapades (after logging off but prior to breakfast). Thus, the protocol allowed participants to report on six sexual encounters per day. This limit of six did not lead to the exclusion of any events.

## Results

### Trait-level analyses

The distribution of social anxiety scores (SIAS) was similar to that found in previous studies ( $M = 20.8$ ,  $SD = 12.1$ ). Scores of at least one standard deviation above the mean on the SIAS in our sample (32.9) corresponded to scores used to distinguish people with impairing social anxiety ( $M = 34$ ; Brown et al., 1997). The distribution of BDI scores reflects a large proportion of individuals with mild to moderate depressive symptoms ( $M = 11.14$ ,  $SD = 8.0$ ). The distribution of scores for relationship closeness (with the IOS) was similar to that found in prior studies ( $M = 5.4$ ,  $SD = 1.3$ ). In our final sample, 66% reported being in a romantic relationship. Social anxiety and depressive symptoms were not significantly related to whether participants were in a romantic relationship or were sexually active during the study (all  $ps > .18$ ). SIAS, BDI, and IOS scores were standardized prior to analysis.

### Analyses of diary data: overview

To take full advantage of our data we conducted two sets of multilevel analyses using the program HLM (Raudenbush, Bryk, Cheong, & Congdon, 2000). In the first set of analyses we examined the frequency with which people reported a sexual episode. For these analyses all participants who provided valid data were included. These analyses included people who reported intimate episodes and those who did not. The second set of analyses examined sexual episodes per se and included only data from people who reported at least one sexual episode during the course of the study. For a discussion of a rationale for such an analytic strategy, see Nezlek (2003).

### Frequency of sexual contact

The first set of analyses consisted of a two-level model with 3721 days (level 1) treated as nested within 150 persons (level 2). The prime dependent measure was dichotomous: Did a participant have a sexual episode on a day or not?<sup>2</sup> These data were analyzed with a series of non-linear (Bernoulli) multilevel models that are sometimes referred to as multilevel logistical regression. To provide a context for understanding the analyses testing our hypotheses, we first conducted “unconditional models”, in which there are no predictors at any level of an analysis. Such models provide the basic descriptive statistics for a multilevel analysis. The unconditional model used for analyzing frequency of sexual contact is presented below:

<sup>2</sup> At the end of the day, participants were asked if they had any sexual episodes the prior night after logging off. This allowed us to capture up to three late night sexual escapades (after logging off but prior to breakfast). We organized our dataset with physical intimacy episodes nested within participants. For the constructs and research questions of interest, we failed to find statistically significant differences for physical intimacy episodes reported prior to the end of the day compared with late night sexual escapades.

Level 1 (within person) :  $\text{Prob}(y_{ij} = 1 | \beta_{0j}) = \phi_{ij}$

Level 2 (between person) :  $\beta_{0j} = \gamma_{00} + u_{0j}$

In this model, there were  $i$  days nested within  $j$  persons. The analyses estimated a log-odds for each person ( $\beta_{0j}$ ) that was converted to a probability. On average, participants reported experiencing a sexual episode of some kind on 13.8% of days. These analyses estimate two types of coefficients: a unit-specific and a population average (Nezlek, 2011). We used unit-specific estimates instead of population averages, but it should be noted that the two sets of coefficients provided very similar results.

Individual differences in the frequency of sexual contact were examined by adding terms to the level 2 model presented above. Conceptually, these analyses estimated the percent of days that a sexual episode occurred for each participant and then estimated individual differences in these percentages. Following the recommendations of multilevel modelers to use forward-stepping algorithms (e.g., Nezlek, 2011), we examined relationships between frequency of contact and social anxiety and depression and romantic relationship closeness (IOS) in separate analyses. We also included (using a forward-stepping procedure) a contrast-coded variable representing participant gender (1 = female, -1 = male, entered uncentered) and a term representing the interaction of gender and anxiety, of gender and depression, or of romantic relationship closeness as a moderator of any of these variables, as appropriate. All terms were entered uncentered. As an example of this, the full level 2 model for depressive symptoms is presented below:

$$\beta_{0j} = \gamma_{00} + \gamma_{01}(\text{Gender}) + \gamma_{02}(\text{BDI}) + \gamma_{03}(\text{Gender} \times \text{BDI}) + u_{0j}$$

These analyses resulted in a negative relationship between BDI scores and frequency of sexual contact ( $\gamma_{02} = -.30$ ,  $t = 2.69$ ,  $p < .01$ ). To illustrate this relationship, we estimated sexual contact for individuals who were  $\pm 1$  SD on the BDI. On average, those high on the BDI had sexual contact on 10% of days, whereas those low on the BDI had contact on 19% of days. There was no main effect for gender ( $t < 1$ ), and no Gender  $\times$  BDI interaction ( $t < 1$ ).

When social anxiety was included as the level 2 predictor, there was a significant Gender  $\times$  Social Anxiety interaction on frequency of sexual contact ( $\gamma_{03} = -.30$ ,  $t = 2.17$ ,  $p < .05$ ) but no main effect for social anxiety ( $p > .25$ ) or gender. To estimate simple slopes, we calculated predicted values for men and women who were  $\pm 1$  SD on the SIAS. For women, greater social anxiety was associated with less frequent sexual contact (low, 20% vs. high, 9% of days), whereas for men, the difference was reversed and much smaller (low, 13% vs. high, 17%).

When SIAS scores were included with BDI scores at level 2, the coefficient for the BDI remained significant ( $\gamma_{02} = -.25$ ,  $t = 2.02$ ,  $p < .05$ ), whereas the coefficient for social anxiety approached, but did not reach conventional significance levels ( $\gamma_{01} = -.22$ ,  $t = 1.74$ ,  $p < .10$ ). Note that in this last model, the gender term and the Gender  $\times$  Depression interaction were dropped because they were not significant in the initial analysis. When BDI scores were added to the final model for social anxiety (which included all three coefficients), the Gender  $\times$  Social Anxiety interaction was unchanged ( $\gamma_{03} = -.29$ , with virtually the same predicted values), and the coefficient for the BDI was close to significant ( $\gamma_{04} = -.23$ ,  $t = 1.90$ ,  $p = .06$ ).

Analyses that included romantic relationship closeness as a predictor were limited to participants who reported that they were in a relationship ( $n = 99$ ). The first analysis, which included only romantic relationship closeness at level 2 found that scores were positively related to how often participants had an intimate

episode ( $\gamma_{01} = .29$ ,  $t = 2.56$ ,  $p = .01$ ). On average, participants who were +1 SD on romantic relationship closeness had an intimate episode on 25% of days, whereas participants who were low on romantic relationship closeness (-1 SD) had an intimate episode on 15% of days. When romantic relationship closeness scores were combined with social anxiety and depression scores, the results that were reported above were largely unchanged. The relationship between frequency of sexual episodes and BDI scores remained significant as did the Gender  $\times$  Social Anxiety interaction. Moreover, romantic relationship closeness failed to moderate the effects of both social anxiety and depression ( $t_s < 1$ ).

Taken together, these results suggest that symptoms of depression were negatively related to frequency of sexual contact after controlling for individual differences in social anxiety. The results also suggest that relationships between social anxiety and amount of sexual contact differed between men and women – it was negative for women and negligible for men (even after controlling for individual differences in depressive symptoms).

#### Quality of sexual contact

The next set of analyses examined the sexual episodes, operationalized to include kissing and non-kissing sexual relations. By necessity, these analyses included only individuals who reported at least one sexual episode. In these analyses, 756 episodes were treated as nested within 120 participants (92 women). The average number of episodes per participant was 6.30 ( $SD = 5.38$ ), and 55% of participants reported five or more.

Some of the measures of episodes were dichotomous: was there explicit sexual activity (vaginal, oral, and/or anal sex), did the participant experience an orgasm, and was the episode with a stable partner? The dichotomous measures were analyzed with models similar to those used to analyze frequency of contact. Two measures of episodes, pleasure and feelings of connectedness, were continuous, and they were analyzed with a level 1 model based upon that presented below. The level 2 models were the same as those used in the previous analyses.

Level 1 (within person) :  $y_{ij} = \beta_{0j} + r_{ij}$

Descriptively, 57% of sexual episodes involved vaginal, oral, and/or anal sex, 93% were with a stable partner, and 58% involved the participant experiencing an orgasm. The mean pleasure reported was 5.85 (within-person variance = 0.90, between-person = 0.83), and the mean feelings of connectedness to sexual partner was 5.44 (within-person variance = 0.88, between-person = 1.25).

Next, we examined relationships between depression and each episode-level measure and between social anxiety and each measure. Similar to the analyses of frequency of contact, separate analyses were done for BDI and SIAS scores, and these analyses used a forward-stepping algorithm to add main effects for gender and Gender  $\times$  Depression or Gender  $\times$  Social Anxiety interactions.

Adding BDI at level 2, the analyses revealed a negative, main effect relationship between BDI scores and how pleasurable an episode was rated ( $\gamma_{02} = -.18$ ,  $t = 1.99$ ,  $p < .05$ ) that was not moderated by participant gender ( $p > .15$ ). The estimated mean pleasure for participants who were high on the BDI (+1 SD) was 5.67, whereas for those low on the BDI (-1 SD) it was 6.03. The analyses also found a negative relationship between BDI scores and feeling of connectedness ( $\gamma_{01} = -.27$ ,  $t = 1.92$ ,  $p = .06$ ), although this relationship was moderated by participant gender (interaction term:  $\gamma_{03} = -.28$ ,  $t = 1.98$ ,  $p < .05$ ). Predicted scores indicated that there was a negative relationship between BDI scores and connectedness for women (low BDI = 5.84, high BDI = 5.00),

whereas there was a weak positive relationship between BDI scores and connectedness for men (low BDI = 5.20, high BDI = 5.55).

Adding SIAS at level 2 revealed a similar negative relationship between SIAS scores and how pleasurable an episode was rated ( $\gamma_{02} = -.34, t = 3.31, p < .01$ ), a relationship that was not moderated by participant gender ( $t < 1$ ). The estimated mean pleasure for participants who were high on the SIAS (+1 SD) was 5.58, whereas for those low on the SIAS it was 6.26. The analyses also found a negative relationship between SIAS scores and feeling of connectedness ( $\gamma_{01} = -.30, t = 2.25, p < .05$ ), a relationship that was not moderated by participant gender ( $t < 1$ ). The estimated mean connectedness rating for participants who were high on the SIAS was 5.31, whereas for those low on the SIAS it was 5.91.

When both BDI and SIAS scores were included in the analysis of pleasure, the coefficient representing the relationship between pleasure and BDI scores became nonsignificant ( $t < 1$ ), whereas the relationship between pleasure and SIAS scores remained significant ( $\gamma_{01} = -.31, t = 2.60, p < .01$ ). When both BDI and SIAS scores were included in the analyses of feelings of connectedness (analyses that included participant gender and the Gender  $\times$  Depression interaction), the coefficient representing the relationship between connectedness and SIAS became marginally significant ( $\gamma_{01} = -.23, t = 1.64, p = .10$ ), whereas the interaction between BDI scores and participant gender remained significant ( $\gamma_{01} = -.33, t = 2.18, p < .05$ ).

In addition to BDI and SIAS scores, we also examined relationships between measures of sexual episodes and the quality of romantic relationships (at level 2). The pleasure experienced during sexual episodes was positively related to romantic relationship closeness ( $\gamma_{01} = .39, t = 3.82, p < .01$ ), and romantic relationship closeness was positively related to how connected participants felt to their partners during sexual episodes ( $\gamma_{01} = .61, t = 5.21, p < .01$ ). Neither of these relationships was moderated by participant gender ( $t < 1$ ).

We also examined romantic relationship closeness as a moderator of both BDI and SIAS scores on pleasure and connectedness. When controlling for individual differences in romantic relationship closeness, the Gender  $\times$  Depression interaction on connectedness during sexual episodes was largely unchanged. The  $p$ -value of the interaction term was diminished slightly ( $p = .08$ ), but the pattern remained the same. In contrast, the Romantic Relationship Closeness  $\times$  Social Anxiety interaction was significant in predicting connectedness during sexual episodes ( $\gamma_{01} = .24, t = 2.12, p < .05$ ). Estimated values for participants  $\pm 1$  SD on each scale indicated that SIAS scores were unrelated to connectedness for participants who were low in IOS (means: low SIAS = 4.90, high SIAS = 5.05), whereas a negative relationship emerged between SIAS and connectedness for those high in IOS (low SIAS = 6.52, high SIAS = 6.04).

Analyses of relational factors (i.e., romantic relationship closeness, stable partner, explicit sex) as potential moderators of social anxiety and depression effects failed to reach statistical significance. Moreover, none of these variables predicted whether or not a person reached orgasm during a sexual episode.

Taken together, the results suggest that both depression and social anxiety were negatively related to pleasure and feelings of connectedness during sexual episodes. For both of these indices of the quality of sexual contact, social anxiety effects were relatively unaffected after controlling for depressive symptoms. Neither depression nor social anxiety showed associations with the probability of orgasm during sexual episodes. The results also suggest that men and women differ in how they respond to depressive and social anxiety symptoms. Women with greater depressive symptoms report less feelings of connectedness to partners during sexual episodes whereas men with greater depressive symptoms

report more feelings of connectedness. Finally, the quality of a romantic relationship served as a moderator of social anxiety effects on connectedness. Specifically, being in a close, intimate relationship enhanced the feelings of connectedness experienced by individuals low, but not high, in social anxiety.

## Discussion

Despite advances in understanding the adverse effects of social anxiety on positive events and experiences, few studies addressed how these mechanisms operate in daily life (for exceptions see Kashdan & Collins, 2010; Kashdan, Julian, Merritt, & Uswatte, 2006; Kashdan & Steger, 2006; Vittengl & Holt, 1998). Using a 21-day monitoring approach, we examined the association between social anxiety and sexual activity, as well as potential moderating effects of gender and the contextual features of physically intimate relationships. Results suggest that social anxiety is an important consideration when exploring daily sexuality. Socially anxious people rated their sexual episodes as less pleasurable and reported feeling less connected to their partners compared to people that reported low social anxiety. Several social anxiety effects were not straight-forward with gender and romantic relationship closeness moderating the frequency and quality of sexual activity. For instance, women with greater social anxiety reported less sexual contact whereas men with greater social anxiety were no less likely to be sexually active on a given day. These findings and our approach to studying day-to-day sexual experiences offers novel insights to a small scientific literature based on global sexual history questionnaires within cross-sectional designs (Bodinger et al., 2002; Figueira et al., 2001; Fontenelle et al., 2007; Leary & Dobbins, 1983).

Given the high co-occurrence and conceptual overlap among social anxiety and depression, we examined the construct specificity of social anxiety's influence on daily sexuality. Our findings suggest that depression remains an important factor for understanding sexual activity. Depressive symptoms were related to less frequent day-to-day sexual contact and less pleasure and feelings of connectedness to partners during sexual episodes. Except for pleasure during sexual episodes, these depressive symptom findings remained significant even after controlling for the influence of social anxiety. Prior research using daily diary methods has shown that depression is negatively related to general goal-oriented behavior and to the ability to extract rewards when actively engaged with the outside world (Hopko & Mullane, 2008). Our findings, focusing on sexuality, lend support to the extant literature. However, similar to the small body of work on social anxiety and sexual behavior, studies examining the relationship between depressive symptomatology and sexual behavior have relied heavily on global questionnaires (e.g., Cyranowski et al., 2004; Laurent & Simons, 2009). Thus, the present study provides a methodological advancement for the study of the shared and unique influences of both social anxiety and depression on the frequency and quality of sexual activity. Fitting with recent evidence of an inverse relationships between social anxiety and positive experiences (Kashdan, 2007), the lack of reward responsiveness to sexual activity remained even after removing shared variance with depressive symptoms.

Prior research is mixed as to whether socially anxious people are less likely to be in romantic relationships (Bodinger et al., 2002; Schneier et al., 1994). In this study, social anxiety failed to predict the likelihood of romantic relationships or sexual inactivity, however, social anxiety did predict the quality of romantic relationships. This was the first study to examine the moderating influence of relational factors on the frequency and quality of sexual activity in people varying in social anxiety. People with greater

social anxiety reported a lower frequency of physical intimacy regardless of whether they viewed their partners as someone they felt close and connected to or distant from. When shifting to the quality of daily sexual contact, being in a close, intimate relationship appeared insufficient to remedy the less pleasurable, less intimate sexual episodes of people with greater social anxiety. Specifically, individuals with greater social anxiety in close, intimate relationships reported feelings of connectedness to partners during sex that were in a similar range as low socially anxious people in unsatisfying romantic relationships. Our results suggest that socially anxious people have less satisfying sex lives compared to non-socially anxious people, even when they have access to partners with whom they feel close.

Extending prior research on gender differences in sexual behavior (Oliver & Hyde, 1993; Petersen & Hyde, 2010) and social anxiety (Turk et al., 1998), we found that social anxiety operated differently in men and women. As women reported greater social anxiety, there was a substantial decrease in the likelihood of physical intimacy. In contrast, as men reported greater social anxiety, their likelihood of sex increased, even after controlling for depressive symptoms. Likewise, women who reported greater depressive symptoms showed lower feelings of connectedness to their partners during sexual activity; men who reported greater depressive symptoms showed greater feelings of connectedness to their partners during sexual activity. Prior cross-sectional studies have shown that as social anxiety increases, women show less frequent, less satisfying sexual activity, whereas for men, social anxiety fails to significantly predict these outcomes (Bodinger et al., 2002; Leary & Dobbins, 1983). The explanation for the different function of emotional disturbances on sexual activity among men and women may hinge on gender roles in sexual interactions.

The social exchange theory of sex suggests that a sexual encounter often results in a net gain for men in terms of sexual gratification and prestige, but a loss for women in terms of less scarce sexual access (Baumeister & Tice, 2000; Sedikides et al., 1994). Women tend to be the gatekeepers of sexual activity (Baumeister & Vohs, 2004), however, greater social anxiety might lead women to avoid intimacy and intense emotional experiences (Beck et al., 2006; Cuming & Rapee, 2010). As women refrain from sharing themselves with romantic partners, perhaps to avoid relational devaluation (Leary, 2004), there is reason to expect this to be particularly pronounced in the sphere of granting a person sexual access to their body. With men showing a greater motivation for sexual activity for immediate, physical gratification (Sedikides et al., 1994), greater social anxiety and other emotional disturbances are unlikely to inhibit their sexual desire or reward responsiveness. Unfortunately, we did not measure who initiated sexual activity each day or sexual motives and thus, future studies are needed to formally test these potential mechanisms of action.

Gender differences in self-regulation might also contribute to the moderating effect of gender. Men are more likely to seek out pleasurable activities to divert attention from negative mood (Thayer, Newman, & McClain, 1994). Thus, men with high social anxiety may be more likely to increase sexual activity as a regulation strategy to distract from anxious feelings; women might rely on less successful emotion regulation strategies such as rumination (Nolen-Hoeksema & Jackson, 2001), that tends to prolong negative mood and decrease the quality of relationships (Nolen-Hoeksema & Davis, 1999). We hope these speculative ideas inspire studies specifically designed to address the potential causal connections among social anxiety, gender, and sexuality.

Our findings provide additional evidence for the notion that social anxiety is linked to diminished positive functioning (Kashdan, 2007). A benefit of the current study is that positive

experiences were studied in the meaningful context of sexual relationships—with robust associations with quality of life. This finding departs from prior research that separated positive experiences from their context—such as positive emotions over the past day (e.g., Kashdan & Steger, 2006) or trait positive affect (e.g., Brown et al., 1998). To understand the sex lives of socially anxious people, we need to observe ongoing events and reactions over time; this is one of the first studies to move beyond one-time questionnaires and interviews.

Our understanding of social anxiety and sexuality is just beginning. There are several mechanisms that might underlie the relationship between social anxiety and the reduced frequency and fulfillment of sexual intimacy. Based on current theoretical models, unrealistic impression management concerns, excessive self-focused attention, and the unwillingness to be in contact with intense emotions and bodily sensations (where sexual arousal might be construed as anxiety), might impact the probability and quality of sexual experiences (Hayes et al., 2006; Rapee & Heimberg, 1997). Reactions to sexual experiences may also be an important contributing factor in the maintenance of social anxiety. If socially anxious people are unable to satisfy their need to belong within the intimate embrace of a sexual partner, they may have even more difficulty feeling accepted and valued during everyday ambiguous social interactions. Feeling devalued in the aftermath of a sexual episode might result in amplified expectations of negative evaluation and allocation of attention to social threats and personality flaws, which then may increase socially anxious feelings (Leary, 2004; Rapee & Heimberg, 1997). When these tendencies become fixtures in people's behavioral repertoire, they may persist even during sexual encounters with stable romantic partners (Hayes et al., 2006). Unfulfilling sex might place an additional burden on the already taxing self-regulatory strategies undertaken by socially anxious people to avoid the possibility of evaluation and rejection. Future research can examine the temporal sequence of how negative (and positive) sexual experiences affect psychological well-being and performance in subsequent activities (such as work performance the next day).

Additional work needs to expand into sex-specific constructs, including motives, expectancies, and the degree to which socially anxious people feel comfortable expressing their unique sexual desires (e.g., Smith, Nezelek, Webster, & Paddock, 2007). Prior work suggests that socially anxious people engage in less self-disclosure when meeting new people or communicating with romantic partners (e.g., Sparrevohn & Rapee, 2009). Thus, we might expect a gap between desired and actualized sexuality. For example, 42 percent of men in treatment for social anxiety disorder reported having paid for sex, and 21 percent reported having no sexual experiences except those requiring payment (Bodinger et al., 2002). Another promising direction is to move away from the notion that socially anxious people are a homogenous group. Research suggests that at least 20% of people with social anxiety problems tend to be approach oriented, impulsive, and risk-prone, including evidence of high-risk sexual behavior as a strategy to manage anxieties and insecurities (Kashdan & McKnight, 2010).

There are several limitations to our findings. We have a restricted student sample that may not generalize to other age groups. Despite our use of a daily diary method, our data are still based on self-reports; thus, we cannot be certain if participants omitted or exaggerated relevant information. Social anxiety may affect self-disclosure in a way that influenced our results. The influence, however, is pertinent to our collective interest in how social anxiety affects a person's social life. To minimize historical distortions of reports, we offered intensive training at the beginning of the study and regular compliance reminders. Also, using daily diary methods with time-and-date stamped responses maximizes ecological

validity and is less susceptible to characteristic memory and response biases associated with traditional approaches (Affleck et al., 1999).

Some readers might be concerned about the number of men in this study. There were 34 in trait-level analyses and in the analyses of frequency of sexual contact, and 28 in the analyses of physical intimacy episode-level data. The statistical power of a research design is less about relative sample numbers than it is about absolute numbers. Unfortunately, power within a multilevel context is not well-understood. Multilevel modeling analyses, however, are more powerful than corresponding ordinary least square analyses (e.g., Nezlek, 2001). For example, scores for individual participants in our study were based upon numerous observations and this was taken into account as part of the estimation algorithms—this increases our ability to detect the presence or absence of main and interaction effects involving gender and other variables.

The strength of these findings rests on the balance of personal well-being and relationship functioning. People with social anxiety might respond differently – compared to non-socially anxious people – to contextually dependent situations such as sexual intimacy because they spend precious resources managing their own internal problems rather than enjoying otherwise positive events. Sexual activity is just another positive event that we can examine to help us better understand how social anxiety affects all aspects of well-being.

In summary, the present research explored people's daily sex lives with a particular focus on how social anxiety, depressive symptoms, the quality of relationships, and gender offer insight into potential positive experiences. Both social anxiety and depressive symptoms were relevant to the frequency and quality of sexual contact with partners, with several effects being moderated by gender and closeness within a romantic relationship. Our findings provide additional support for the relevance of attenuated positive experiences to social anxiety, even after controlling for depressive symptoms. This study shows that careful consideration of people's sexual functioning in the context of their naturalistic environment and existing romantic relationships offers insight into ways that social anxiety interferes with a well-lived life.

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