



# A Brief Psychoeducational Sexual Mindfulness Intervention to Bolster Sexual Well-Being

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## Abstract

**Objectives** Cognitive distractions during sex are among the most common mechanisms underlying problems with sexual well-being (e.g., sexual dissatisfaction, low sexual desire). Traditional interventions that include both psychoeducation and mindfulness training are effective for improving sexual dysfunction. It remains unclear if psychoeducation about the benefits of sexual mindfulness for sexuality would also be effective, and if such an intervention would benefit nonclinical samples. We tested whether a 3.5-min online psychoeducational intervention about the benefits of sexual mindfulness and five strategies to have more mindful sex could bolster sexual well-being in two community samples.

**Methods** Participants in study 1 ( $N=179$ ) and study 2 ( $N=239$ ) completed sexual well-being and sexual mindfulness measures at three time points over a 2-week period. In both studies, the participants were randomly assigned to either a control “no information” condition or an experimental “psychoeducation intervention” condition where they viewed a 3.5-min video on the benefits of sexual mindfulness.

**Results** Across both studies, those in the experimental intervention reported significantly greater sexual satisfaction ( $\eta_p^2 = .02-.07$ ) and sexual mindfulness ( $\eta_p^2 = .02-.05$ ) and in study 2 greater sexual desire ( $\eta_p^2 = .02-.03$ ). Facets of sexual mindfulness mediated changes in sexual satisfaction as a function of experimental condition ( $Bs = .32-.56$ ).

**Conclusions** A small amount of psychoeducation—3.5 min—facilitates small improvements in sexual well-being and sexual mindfulness. Our data supports the effectiveness of a novel, cost-effective, easily disseminated psychoeducation-based intervention about mindfulness for promoting sexual well-being in community samples.

**Keywords** Sexual Satisfaction · Sexual Desire · Sexual Mindfulness · Psychoeducation · Online

Sexual well-being includes cognitive-affective indicators of sexual wellness, including positive factors (e.g., sexual satisfaction, sexual desire), as well as negative factors (e.g., sexual distress) (Lorimer et al., 2019; Martin & Woodgate, 2020). Sexual well-being is vital to relationship satisfaction, yet sexual well-being often declines across the course of romantic relationships (for a review see Impett et al., 2014). Indeed, significant proportions of individuals in long-term relationships report that they are sexually dissatisfied (e.g., Smith et al., 2011), are experiencing waning or discrepant sexual desire (reviewed in Mark, 2015), or have worries and concerns about their sex life (e.g., Fischer & Træen, 2022)

that do not meet criteria for a diagnosis of sexual dysfunction. These problems with sexual well-being are not inconsequential, with poor sexual well-being being associated with relationship dissatisfaction and even dissolution (Balsam et al., 2017; Sprecher & Cate, 2004). Given the prevalence of problems with sexual well-being in nonclinical samples and the importance of sex for relationships, it is perhaps not surprising that most previous research has focused on identifying risk factors associated with declines in sexual well-being (Impett et al., 2013) rather than positive processes that might bolster sexual well-being.

The Cognitive Distraction Model (CDM; Barlow, 1986) is an empirically supported framework proposed to explain the onset and persistence of problems with sexual response and sexual function (e.g., arousal, orgasm, desire, pain). Specifically, the model positions attention toward bothersome thoughts (i.e., distraction) as a core mechanism underlying sexual problems, such that distraction precludes or interferes

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with the sexual response (Barlow, 1986; de Jong, 2009). Cross-sectional studies of nonclinical and clinical samples find that higher levels of cognitive distraction during sex, including distracting thoughts about performance and appearance, are associated with lower sexual satisfaction, lower desire, and higher sexual distress (Newcombe & Weaver, 2016; Tavares et al., 2020).

Experimental research further elucidates the roles of attention and distraction for sexual well-being. First, there is strong evidence that sexual arousal can be modified through manipulation of attentional focus. For example, under specific demand conditions to either produce or inhibit sexual arousal, participants are successfully able to manipulate their arousal either by directing attention toward (e.g., through fantasy) or away from (e.g., through concentrating on non-sexual thoughts) sexual cues (Beck & Baldwin, 1994; Laan et al., 1993). Other studies have induced distraction directly via the use of secondary tasks (e.g., dichotic listening, body image self-consciousness induction). These studies find that sexual response is inhibited under conditions of cognitive distraction (reviewed in Kane et al., 2019). Sexual arousal can also be enhanced or bolstered under other experimental manipulations. For example, studies that use instructions to attend to bodily sensations and/or pleasurable sensations have demonstrated that these conditions result in greater arousal and stronger concordance (i.e., coherence between physiological and self-reported arousal) in people with and without sexual difficulties (Meston, 2006; Seal & Meston, 2007).

Given theoretical models such as the CDM and empirical evidence situating distraction as a key mechanism underlying sexual problems, general or trait mindfulness—nonjudgmental awareness and acceptance of the present moment—has garnered research attention as an intervention for sexual dysfunction (Banbury et al., 2021; Jaderek & Lew-Starowicz, 2019; Stephenson, 2017; Stephenson & Kerth, 2017). Most research has examined trait mindfulness finding that individuals who are low in trait mindfulness tend to also report lower sexual satisfaction and desire, and higher distress, as well as lower relationship satisfaction (Newcombe & Weaver, 2016). More recently, researchers have investigated sexual mindfulness—awareness and nonjudgment during sexual activity specifically—and sexual well-being (Leavitt et al., 2019, 2021a, b, c; Smedley et al., 2021). Sexual mindfulness is linked with higher sexual well-being over and above trait levels of general mindfulness, further establishing the importance of both types of mindfulness for overcoming distractions common to sexual interactions (Leavitt et al., 2019).

Evidence from meta-analyses supports the efficacy of mindfulness-based interventions for improving sexual satisfaction and sexual desire, and reducing sexual distress (all moderate effect sizes), among people with sexual

dysfunction (Banbury et al., 2021; Stephenson & Kerth, 2017). Notably, there is some variability in reported effect size, which might be expected given differences in treatment modality and length, though differences in effect sizes have not been examined directly (Stephenson & Kerth, 2017). The hypothesized mechanisms through which mindfulness exerts its effects on sexual well-being are through increasing focus on positive rewarding cues and reducing focus on distracting nonsexual cues (Stephenson, 2017). Existing interventions for sexual dysfunction are typically delivered across traditional in-person group-based formats over 3+ sessions (e.g., Brotto & Basson, 2014; Brotto et al., 2015, 2021, 2008a, b) or via an exclusively online platform (Brotto et al., 2022; Hucker & McCabe, 2014, 2015). The length and structure of these interventions are warranted given the severity of sexual problems experienced in clinical samples. Common to these interventions is psychoeducation about sexuality and mindfulness, nonsexual mindfulness exercises practiced in session and in-between sessions (e.g., mindfulness of breath, mindful eating), and eventually mindfulness exercises during sexual activity (e.g., tuning into genital sensations).

Other studies have examined the benefits of sexual mindfulness interventions for sexual and relational well-being. One recent qualitative study of 5 couples tested the feasibility of a two-session structured sexual mindfulness intervention (Leavitt et al., 2021c). Participants reported improvement in both relationship and sexual well-being. Qualitative thematic analyses revealed several potential mechanisms, including slowing down, paying attention to their own sexual experience and/or feelings, and communicating their thoughts and feelings openly with their partner. A longitudinal study of couples (Leavitt et al., 2021a) directly compared a sexual mindfulness intervention ( $n = 83$  couples) to a mindfulness-only intervention ( $n = 66$  couples). While both interventions improved sexual mindfulness, sexual satisfaction, and relationship satisfaction at 6-month follow-up (all moderate to large effect sizes), only those in the sexual mindfulness intervention group experienced significantly greater improvement in sexual awareness—a subtype of sexual mindfulness—at follow-up.

To our knowledge, only two studies have examined the impacts of brief laboratory-based mindfulness interventions on sexual response in nonclinical samples of women (Velten et al., 2018, 2020). In both studies, the authors examined the immediate effects of different types of 5- to 6-min exercises (e.g., modified body scan versus a visualization exercise, a sexual-sensations task versus a stream-of-thoughts task) on genital and self-reported sexual response. Across both studies, those in the mindfulness body-scan condition reported greater subjective arousal when watching sexual films, supporting the efficacy of brief mindfulness interventions for improving sexual response. Taken together, evidence from cross-sectional, experimental, and intervention-based studies

supports that general and sexual mindfulness is linked with greater arousal, sexual function, desire, satisfaction, and lower sexual distress. Evidence from experimental studies provides initial support that relatively brief (i.e., 5 to 6 min) mindfulness interventions are effective for producing meaningful change in sexual response within a single session (Velten et al., 2018, 2020).

Psychoeducation typically involves the passive delivery of information about disorders and their treatment via brochures or videos or with therapist guidance (Donker et al., 2009). Meta-analytic evidence from other areas of mental health (e.g., depression, anxiety) finds that passive psychoeducational interventions produce small, but significant, effects on outcomes (Donker et al., 2009), including preventing the onset of problems among nonclinical community samples (Rigabert et al., 2020). A significant component of traditional sex therapy involves psychoeducation about sex, including information about the role of cognitive distraction interfering with sexual response (Hall & Binik, 2020). Previous psychoeducation-based mindfulness interventions and feasibility studies (Zippa et al., 2020) also included mindfulness exercises and practice within and between the sessions (e.g., Brotto et al., 2008a, b; Brotto et al., 2008a, b), making it difficult to disentangle whether the effects are attributable to psychoeducation, the mindfulness meditation exercises, or both. To date, there is little research examining the benefits of psychoeducation alone for bolstering sexual well-being, especially among people without sexual dysfunction.

Two recent studies with nonclinical samples have experimentally manipulated factors known to be associated with greater sexual well-being using psychoeducation only. The first manipulated sexual goals (i.e., engaging in sex for positive outcomes, such as intimacy; Muise et al., 2017) and the second manipulated relational self-expansion (i.e., engaging in novel activities with one's partner; Muise et al., 2019). In both studies, psychoeducational information about the benefits of sexual goals or relational self-expansion was provided to participants with specific examples of how to incorporate these strategies into one's life. Those in the experimental condition were then instructed to try the strategies over the next several days. On follow-up, individuals in the experimental conditions reported higher sexual desire and sexual satisfaction, as well as higher relationship satisfaction (all small to moderate effects) compared to their own baseline and compared to those in the control condition (Muise et al., 2017, 2019). Thus, there is preliminary evidence to support the efficacy of brief psychoeducation-only-based interventions for bolstering sexual well-being in the short term among people without sexual dysfunction.

We sought to develop and test whether a brief online psychoeducational mindfulness intervention relative to a control condition could be effective for bolstering sexual well-being

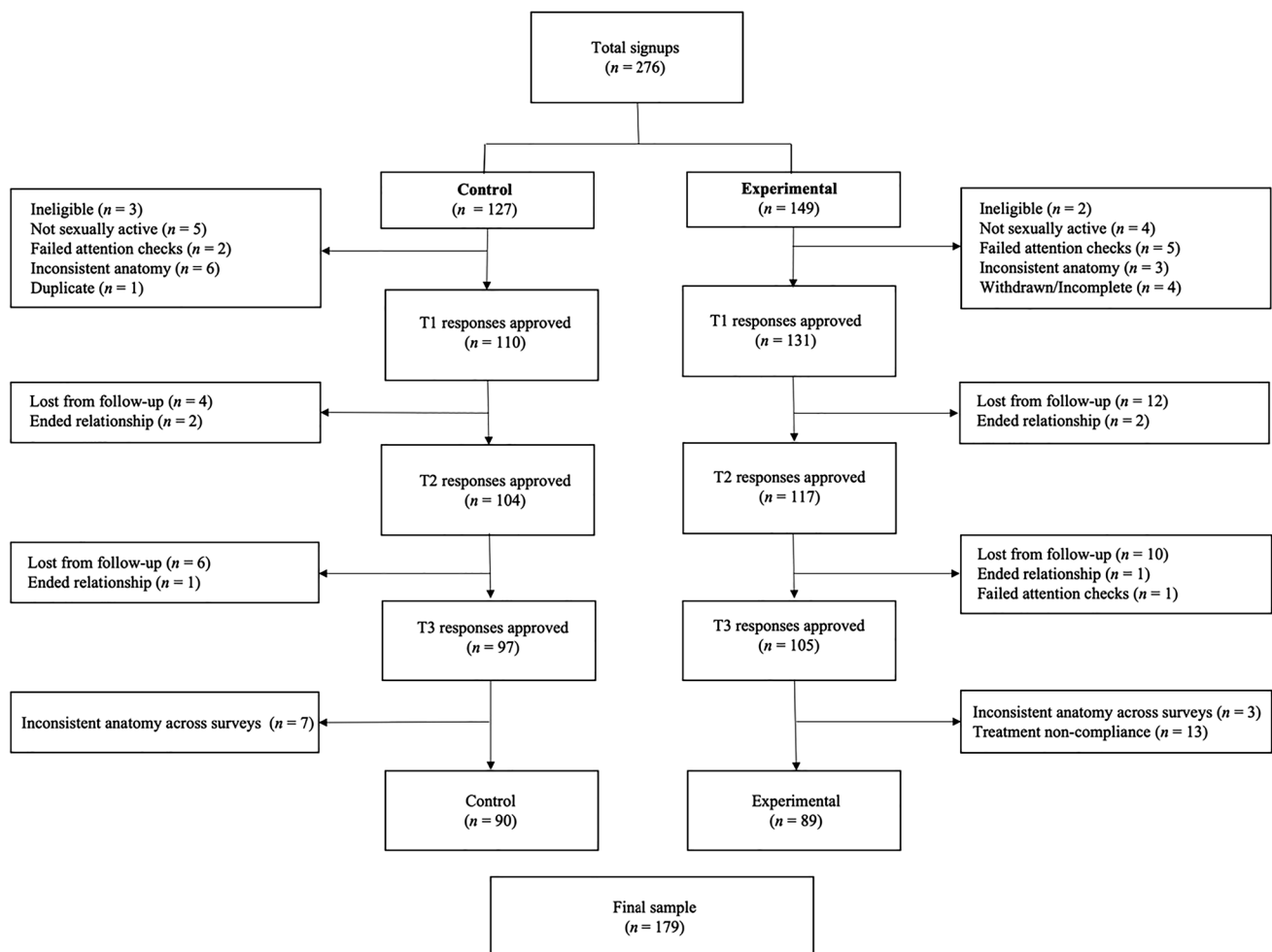
among individuals without sexual problems over a 2-week period. We hypothesized that those in the experimental condition would report greater sexual and relational well-being, and sexual mindfulness 1 and 2 weeks later (relative to their baseline levels). Given the brevity of the intervention and relatively short follow-up (i.e., 2 weeks), we expected that any effects observed would be small in size. In study 2, we aimed to replicate the effects observed in study 1 and extend the findings by examining if we could “boost” the benefits of the intervention by increasing the intensity of the intervention. Finally, in an exploratory analysis using data from both studies, we examined whether facets of sexual mindfulness mediated associations between condition and sexual well-being.

## Study 1

### Participants

We recruited 276 participants (135 women, 134 men) through Prolific, an online crowd-sourcing platform. Participants were eligible for the study if they were at least 18 years of age and in a committed relationship of at least 3 months. The study was advertised only to people who met these criteria using Prolific's built-in screening options, and eligibility was later confirmed based on participant responses to the baseline survey. We oversampled participants in the experimental condition ( $n = 30$ ) to account for expected attrition, which was indeed higher in the experimental condition ( $n = 22$ ) than in the control condition ( $n = 10$ ). To be included in the follow-up time points, participants needed to report being sexually active in the past 4 weeks, as well as remain in their committed relationship. Of 276 participants who initially signed up, 241 completed and were approved after baseline (T1), 221 were approved after the second survey (T2), and 202 were approved after the third survey. After final data quality checks (i.e., failed 2/3 attention checks, inconsistent responding across similar items), 179 participants (89 experimental and 90 control) were retained for analyses (see Fig. 1 for a summary of the participant flow).

Participants ( $N = 179$ ; 87 women, 92 men) were on average 28.67 years old ( $SD = 9.02$ , range = 18 to 61 years) and had an average relationship length of 66.01 months ( $SD = 65.71$ , range 3 to 377 months). Most participants (79.9%) identified as heterosexual and a minority identified as bisexual (12.3%), asexual (2.2%), gay (2.2%), pansexual (2.2%), and queer (1.1%). Most participants (95.5%) were in mixed-gender/sex relationships, while 4.5% were in a same-gender/sex relationship. Participants reported their relationship status as dating (41.3%), living together (not common-law; 22.3%), married (29.1%), engaged (5.6%), common-law (1.1%), or something else not listed (0.6%).



**Fig. 1** Participant flow through all timepoints in study 1. *Note:* Treatment non-compliance included participants who self-reported that they did not view the video or brochure at all and those who self-reported that they did not attempt any mindfulness strategies during the study period

Most participants identified as White (72.1%) and a minority identified as Hispanic/Latino/Latina (10.1%), South Asian (3.4%), African American/Black (2.8%), Asian American/Asian (2.2%), biracial/multiracial (1.7%), East Asian (1.1%), Southeast Asian (1.1%), Middle Eastern/Central Asian (0.6%), Indigenous/Native American/Alaska Native (0.6%), or something else not listed (4.5%).

## Procedure

Following pre-screening, Qualtrics automatically randomized participants to either the control condition or the experimental condition within the first survey. Embedded data within Qualtrics ensured that all participants remained randomized to the same condition throughout the study. All participants completed the same measures to assess their sociodemographics, sexual well-being, and sexual mindfulness. Participants in the experimental condition then viewed a 3.5-min animated video designed for the purpose of the

study that described the benefits of mindfulness for sexual well-being based on recent empirical research (Brotto et al., 2008a, b; Brotto et al., 2008a, b; Leavitt et al., 2021a, b, c; Stephenson, 2017). Embedded survey timers were used to prevent participants from advancing in the survey without viewing the video. Participants in the experimental condition were then encouraged to apply what they had learned over the next week and indicate which strategies they intended to try (e.g., “Focusing on your breath and/or physical sensations”). As a comprehension check, participants answered questions about the content of the video, as well as provided feedback about the content. Participants in the control condition did not receive any psychoeducational information and just completed the online survey measures, similar to a wait-list control design. At the end of the survey, participants in both conditions were informed that they would be invited to complete a second survey in 7 days and that they had 48 h to submit survey 2. Administration of the time 2 survey was identical to that of the time 1 survey. As a booster for those

in the experimental condition, participants received a summative brochure containing the same information from the psychoeducational video. Participants in the experimental condition also answered questions about the brochure, provided feedback, and indicated whether they had engaged in any of the strategies over the past 7 days. The time 3 survey was sent 7 days after responses for survey 2 were received, and participants had 48 h to submit their response to be eligible for final compensation. To minimize attrition, participants in both conditions received email reminder notifications 3 days prior to the delivery of the next survey. Participants were compensated £2.50 per survey for a total of £7.50.

## Measures

**Eligibility Screener** To confirm eligibility, we asked participants to report their age, the length of their relationship (i.e., greater than or less than 3 months), and whether they were sexually active, defined as engaging in any type of sexual activity with their partner in the last month. Participants who reported being under 18 years of age or as having a relationship of less than 3 months were branched out of the survey and asked to cancel their signup. Per Prolific’s screening rules, participants who were not sexually active were permitted to complete the baseline survey, as we could not pre-screen for this requirement using Prolific’s built-in eligibility criteria. Participants who were not sexually active with a partner in the last month but reported solo sexual activity within the last week were retained, while participants with no reported sexual activity of any kind were compensated for the baseline survey and removed from follow-up.

**Sociodemographics** All participants responded to sociodemographic questions. At T2 and T3, participants were asked to confirm that their relationship had not ended since the previous survey.

**Sexual Satisfaction** Sexual satisfaction during the past 7 days was assessed using the well-validated Global Measure of Sexual Satisfaction (GMSEX; Lawrance & Byers, 1995). The GMSEX includes five bipolar items (e.g., *Bad to Good*) rated on a 7-point scale, for a total score range of 5 to 35. Higher scores indicate higher sexual satisfaction. The GMSEX has demonstrated high reliability and validity (Lawrance & Byers, 1995) and had strong internal consistency (T1–T3:  $\alpha = 0.95–0.96$ ) and scale reliability (T1–T3: McDonald’s  $\omega = 0.96–0.97$ ) in the current sample.

**Sexual Desire** Sexual desire was measured using three items from the well-validated Sexual Desire Inventory (SDI-2; Spector et al., 1996), which asks participants to respond thinking about the last month or past 7 days (for T2 and

T3). Two items assessed desire to have sexual activity with a partner, and one item assessed desire to engage in solitary sexual activity (Spector et al., 1996). Items are rated on an 8-point scale, with higher scores indicating higher sexual desire.

**Sexual Distress** Sexual distress during the past 7 days was assessed using the validated Female Sexual Distress Scale – Short Form (SDS; Santos-Iglesias et al., 2020). The five items were rated using a 5-point scale (0 to 4), for a total score range of 0 to 20. Higher scores indicate greater sexual distress. The SDS has demonstrated excellent reliability and discriminant validity (Santos-Iglesias et al., 2020) and good internal consistency (T1–T3:  $\alpha = 0.89–0.91$ ) and scale reliability (T1–T3:  $\omega = 0.91–0.93$ ) in the current sample.

**Couple Satisfaction** Relationship satisfaction was measured using the four-item version of the Couples Satisfaction Index (CSI; Funk & Rogge, 2007). Three items are measured on a 6-point scale (0 to 5), and one item is measured on a 7-point (0 to 6) scale. Total scores range from 0 to 21, and scores below 13.5 indicate relationship dissatisfaction (Funk & Rogge, 2007). The CSI demonstrates good reliability and strong convergent validity. Internal consistency (T1–T3:  $\alpha = 0.90–0.93$ ) and scale reliability (T1–T3:  $\omega = 0.92–0.93$ ) were strong in the current sample.

**Attention to Sexual Cues** Attention to positive and negative sexual cues during sexual activity was assessed using an adapted measure on feelings and cognitions (Birnbaum et al., 2006) used in previous studies (Rosen et al., 2018). Examples of the twelve items include “I focused on the physical pleasure I felt during sexual activity” (positive) and “During sexual activity, I concentrated on thoughts that I’m not ‘good’ enough in bed” (negative). Items are rated on a 7-point (1 to 7) scale such that higher scores indicate greater attention to positive and negative sexual cues, respectively. Both subscales demonstrate good reliability (Rosen et al., 2018). Internal consistencies were adequate for the positive subscale (T1–T3:  $\alpha = 0.78–0.83$ ) and negative subscale (T1–T3:  $\alpha = 0.84–0.87$ ) across the samples. Scale reliabilities for the positive (T1–T3:  $\omega = 0.83–0.87$ ) and negative (T1–T3:  $\omega = 0.90–0.91$ ) subscales were good in the current sample. Only participants who reported *partnered* sexual activity within the last week received this measure.

**Sexual Mindfulness** Sexual mindfulness was assessed using the Sexual Mindfulness Measure (SMM; Leavitt et al., 2019). The seven-item measure assesses mindfulness within a sexual context or during sexual experiences (e.g., “I paid attention to how sex affects my thoughts and behaviours”; Leavitt et al., 2019) rated on a 5-point scale (1 to 5). Two subscale scores were calculated related to sexual awareness

and sexual nonjudgment. Subscale scores range from 1 to 5, with higher mean scores reflecting greater sexual mindfulness. Internal consistency for the sexual awareness subscale was adequate and similar to the validation study (T1–T3:  $\alpha = 0.69–0.76$ ), as was the internal consistency for the nonjudgment subscale (T1–T3:  $\alpha = 0.81–0.87$ ). Scale reliabilities for the sexual awareness (T1–T3:  $\omega = 0.72–0.77$ ) and nonjudgment (T1–T3:  $\omega = 0.83–0.87$ ) subscales were adequate in the current sample. Only participants who reported sexual activity (solo or partnered) in the previous week received the SMM.

**Sexual Consciousness** Sexual consciousness was assessed using the Sexual Awareness Questionnaire (SCS; Snell et al., 1991). This six-item subscale assesses the tendency to be aware of internal aspects of one’s sexuality, such as sexual desires, motivations, and thoughts (e.g., “I’m very aware of my sexual motivations”; Snell et al., 1991) rated on a 5-point (0 to 4) scale. Higher scores indicate greater introspection on one’s sexuality (Snell et al., 1991). Total scores range from 0 to 4 with higher mean scores indicating greater sexual consciousness. Internal consistency (T1–T3:  $\alpha = 0.86–0.88$ ) and scale reliability (T1–T3:  $\omega = 0.90–0.92$ ) were good in the current sample.

**Psychoeducational Video and Brochure** The psychoeducational video was created for the purpose of the study based on recent empirical research on the benefits of mindfulness for sexual well-being. The psychoeducational content was informed by previous psychoeducational interventions for low desire delivered in person (Brotto, 2015). Specifically, the video included information about the cognitive distraction model as it applies to sexuality, benefits of sexual mindfulness, and strategies to be more mindful during sex. The included strategies were informed by the qualitative data from a 2-session couples’ sexual mindfulness intervention (Leavitt et al., 2021a, b, c). In line with recent evidence from other brief online mindfulness-based interventions for depression that used 5-min psychoeducational videos (Beshai et al., 2020), we developed a similarly brief psychoeducational video about sexual mindfulness. The video was created using Moovly, an online video editing program. The brochure was designed using Canva, an online graphic design platform. There was no new content presented in the brochure; instead, the brochure was intended to remind participants of key information from the video. Both the video and summative brochure are available on the Open Science Framework (OSF; <https://osf.io/cymrb/>).

**Manipulation Checks** Participants in the experimental condition responded to comprehension and feedback questions following the presentation of the video (T1) and brochure (T2). To gauge overall comprehension and attention,

participants were asked to identify the main takeaway of the video and brochure (i.e., “Being more mindful during sex can lead to improvements in sexual well-being”). At T3, participants were asked to confirm whether they viewed the video and/or brochure, how often they referred to the materials provided throughout the study, and which (if any) of the suggested strategies they tried. Thirteen participants indicated they did not view the video or brochure at all during study 1 and/or did not try any strategies and thus were classified as treatment non-compliant and removed from data analysis.

## Data Analyses

Our dependent variables (sexual satisfaction, sexual desire, sexual distress, and relationship satisfaction) were significantly correlated to varying degrees ( $r = -0.48$  to  $0.45$ ,  $ps < 0.001$ ), as were the attention to positive and negative sexual cues ( $r = -0.37$ ,  $p < 0.001$ ) and the sexual mindfulness variables ( $r = 0.24$  to  $0.52$ ,  $ps < 0.002$ ). Given these correlations, our dependent variables were examined together in various multivariate analyses of covariance (MANCOVAs). MANCOVAs were used to examine if those in the experimental condition experienced improvements in their sexual well-being over the 2-week study period relative to those in the control condition. To isolate the effects of our experimental condition on sexual and relational well-being, participants’ baseline outcomes were entered as covariates to control for baseline levels of sexual and relational well-being, with condition (experimental, control) as the independent variable and outcomes at T2 as the dependent variables. The same procedure was used to examine effects of the booster session (T2 to T3) and across the study period (T1 to T3). We first report in text the multivariate effects for all dependent variables as a set and, if significant, the specific univariate effects. We include all significant univariate effects regardless of the multivariate significance in the tables. To investigate potential mechanisms of change in sexual well-being, we also examined whether the experimental intervention was effective at improving attention and mindfulness variables (i.e., attention to positive and negative sexual cues, sexual awareness, sexual nonjudgment, and sexual consciousness).

## Results

The final sample included 90 (43 women and 47 men) control and 89 (44 women and 45 men) experimental participants. Chi-square and one-way analysis of variance (ANOVA) revealed no significant group differences in gender,  $X^2(1, N = 179) = 0.05$ ,  $p = 0.82$ ; age,  $F(1, 177) = 1.42$ ,

$p=0.24$ ,  $\eta^2=0.008$ ; or relationship length,  $F(1, 177)=1.65$ ,  $p=0.20$ ,  $\eta^2=0.009$  between the two conditions.

### The Effect of the Psychoeducational Video on Sexual Well-Being and Sexual Mindfulness

We first examined the effects of the psychoeducational video by examining sexual well-being and mindfulness outcomes at T2 controlling for baseline levels at T1. The multivariate effect on the combined set of sexual and relational well-being dependent variables was significant, Wilks'  $\Lambda=0.93$ ,  $F(5, 167)=2.60$ ,  $p=0.03$ ,  $\eta_p^2=0.07$ , indicating an overall difference in sexual and relational well-being variables between conditions. Univariate effects revealed a significant effect of condition on participants' reports of their sexual satisfaction,  $F(1, 171)=4.50$ ,  $p=0.04$ ,  $\eta_p^2=0.03$ . Specifically, participants in the experimental condition reported higher sexual satisfaction at T2 after controlling for their satisfaction at T1 (see Table 1 for marginal  $M$  and  $SE$ ). There were no effects of condition on dyadic desire,  $F(1, 171)=3.76$ ,  $p=0.05$ ,  $\eta_p^2=0.02$ ; solitary desire,  $F(1, 171)=0.39$ ,  $p=0.53$ ,  $\eta_p^2=0.002$ ; sexual distress,  $F(1, 171)=3.41$ ,  $p=0.07$ ,  $\eta_p^2=0.02$ ; or relationship satisfaction,  $F(1, 171)=0.39$ ,  $p=0.53$ ,  $\eta_p^2=0.002$ . The multivariate effect on the combined set of attention to sexual cues dependent variables was significant, Wilks'  $\Lambda=0.93$ ,  $F(2, 134)=5.21$ ,  $p=0.007$ ,  $\eta_p^2=0.07$ , indicating an overall difference in attention to positive and negative sexual cues between conditions. There was a significant effect of condition on attention to positive and negative sexual cues, such that those in the experimental condition reported greater attention to positive sexual cues,  $F(1,$

$135)=6.03$ ,  $p=0.02$ ,  $\eta_p^2=0.04$ , and less attention to negative sexual cues,  $F(1, 135)=6.86$ ,  $p=0.01$ ,  $\eta_p^2=0.05$  at T2. The multivariate effect on the combined set of sexual mindfulness variables was not significant, Wilks'  $\Lambda=0.99$ ,  $F(3, 158)=0.70$ ,  $p=0.55$ ,  $\eta_p^2=0.01$ .

### The Effect of the Psychoeducational Brochure “Booster” on Sexual Well-Being and Sexual Mindfulness

We also examined whether we could extend the effects of the psychoeducational intervention by providing participants in the experimental condition with a summative brochure. Here, we examine the effects of the brochure on sexual well-being and mindfulness outcomes at T3 controlling for levels at T2 (see Table 2). That is, we were specifically interested in examining change or a boost in sexual, relational, and sexual mindfulness outcomes that occurred between T2 and T3. The multivariate effect on the combined sexual and relational well-being variables, Wilks'  $\Lambda=0.95$ ,  $F(5, 168)=1.71$ ,  $p=0.14$ ,  $\eta_p^2=0.05$ ; attention to sexual cues variables, Wilks'  $\Lambda=1.00$ ,  $F(2, 131)=0.04$ ,  $p=0.96$ ,  $\eta_p^2=0.001$ ; and sexual mindfulness variables, Wilks'  $\Lambda=0.97$ ,  $F(3, 158)=1.68$ ,  $p=0.17$ ,  $\eta_p^2=0.03$ , was not significant, indicating that there was no overall “booster” effect of the intervention from T2 to T3 on our outcome variables. Table 2 shows two significant univariate effects. Participants in the experimental condition reported significantly greater sexual satisfaction ( $\eta_p^2=0.05$ ) and sexual consciousness ( $\eta_p^2=0.02$ ) at T3 controlling for levels at T2.

**Table 1** Marginal means comparisons across conditions on sexual, relational, and mindfulness outcomes at T2, controlling for outcomes at T1 for study 1 and study 2

Variables	Study 1		Study 2	
	Control <i>M</i> ( <i>SE</i> ) ( <i>n</i> =90)	Experimental <i>M</i> ( <i>SE</i> ) ( <i>n</i> =88)	Control <i>M</i> ( <i>SE</i> ) ( <i>n</i> =128)	Experimental <i>M</i> ( <i>SE</i> ) ( <i>n</i> =110)
Sexual satisfaction	28.01 (0.56)	29.71 (0.57)*	27.19 (0.49)	29.42 (0.53)**
Dyadic desire	11.53 (0.31)	12.39 (0.31)	11.62 (0.26)	12.44 (0.28)*
Solitary desire	3.69 (0.20)	3.51 (0.20)	3.90 (0.18)	4.03 (0.20)
Sexual distress	4.21(0.27)	3.48 (0.28)	4.33 (0.29)	4.24 (0.31)
Relationship satisfaction	16.88 (0.22)	16.69 (0.22)	15.99 (0.20)	16.51 (0.22)
	( <i>n</i> =62)	( <i>n</i> =77)	( <i>n</i> =93)	( <i>n</i> =89)
Positive sexual cues	5.59 (0.08)	5.85 (0.07)*	5.61 (0.07)	5.86 (0.07)*
Negative sexual cues	2.19 (0.10)	1.84 (0.09)*	2.17 (0.10)	2.08 (0.10)
	( <i>n</i> =83)	( <i>n</i> =82)	( <i>n</i> =113)	( <i>n</i> =106)
Sexual awareness	3.72 (0.05)	3.77 (0.05)	3.64 (0.05)	3.87 (0.05)**
Sexual nonjudgment	3.89 (0.08)	3.96 (0.08)	3.82 (0.07)	3.90 (0.07)
Sexual consciousness	2.93 (0.05)	3.03 (0.05)	2.98 (0.05)	3.01 (0.05)

\* $p \leq 0.05$ ; \*\* $p < 0.01$ .

**Table 2** Marginal means comparisons across conditions on sexual, relational, and mindfulness outcomes at T3, controlling for outcomes at T2 for study 1 and study 2

Variables	Study 1		Study 2	
	Control <i>M (SE)</i> ( <i>n</i> = 90)	Experimental <i>M (SE)</i> ( <i>n</i> = 89)	Control <i>M (SE)</i> ( <i>n</i> = 129)	Experimental <i>M (SE)</i> ( <i>n</i> = 110)
Sexual satisfaction	28.18 (0.49)	30.21 (0.49)*	28.24 (0.44)	28.87 (0.48)
Dyadic desire	12.03 (0.30)	12.22 (0.30)	12.00 (0.26)	12.29 (0.28)
Solitary desire	3.72 (0.21)	3.74 (0.21)	3.71 (0.18)	4.01 (0.19)
Sexual distress	3.75 (0.27)	3.60 (0.27)	4.33 (0.24)	3.60 (0.26)*
Relationship satisfaction	16.98 (0.21)	17.11 (0.21)	16.38 (0.18)	16.43 (0.20)
	( <i>n</i> = 58)	( <i>n</i> = 78)	( <i>n</i> = 83)	( <i>n</i> = 86)
Positive sexual cues	5.82 (0.08)	5.84 (0.07)	5.77 (0.07)	5.79 (0.07)
Negative sexual cues	1.82 (0.09)	1.83 (0.08)	1.99 (0.08)	1.99 (0.08)
	( <i>n</i> = 78)	( <i>n</i> = 87)	( <i>n</i> = 112)	( <i>n</i> = 107)
Sexual awareness	3.80 (0.06)	3.90 (0.06)	3.78 (0.05)	3.87 (0.05)
Sexual nonjudgment	4.01 (0.08)	4.13 (0.08)	3.95 (0.07)	3.87 (0.07)
Sexual consciousness	3.08 (0.05)	3.21 (0.04)*	3.05 (0.05)	3.20 (0.05)*

\* $p \leq 0.05$ ; \*\* $p < 0.01$ .

### The Overall Effect of the Psychoeducational Information on Sexual Well-Being and Sexual Mindfulness

Finally, to test the cumulative effects of the intervention (i.e., video and brochure), we ran the same analyses with outcomes at T3 as dependent variables controlling for scores at T1 (see Table 3). Doing so enabled an examination of the overall effects of the intervention on our outcomes across the 2-week study period. The multivariate effect on the combined set of sexual and relational well-being dependent variables was significant, Wilks'  $\Lambda = 0.92$ ,  $F(5, 167) = 2.83$ ,  $p = 0.02$ ,  $\eta_p^2 = 0.08$ , indicating an overall

difference in sexual and relational well-being variables between conditions. There was a significant effect of condition on overall sexual satisfaction,  $F(1, 171) = 12.50$ ,  $p < 0.001$ ,  $\eta_p^2 = 0.07$ . No effects were observed for dyadic desire,  $F(1, 171) = 1.94$ ,  $p = 0.17$ ,  $\eta_p^2 = 0.01$ ; solitary desire,  $F(1, 171) = 0.10$ ,  $p = 0.75$ ,  $\eta_p^2 = 0.001$ ; sexual distress,  $F(1, 171) = 2.84$ ,  $p = 0.09$ ,  $\eta_p^2 = 0.02$ ; or relationship satisfaction,  $F(1, 171) = 0.09$ ,  $p = 0.76$ ,  $\eta_p^2 = 0.001$ . The multivariate effect on the combined set of attention to sexual cues dependent variables was not significant, Wilks'  $\Lambda = 0.96$ ,  $F(2, 129) = 2.84$ ,  $p = 0.06$ ,  $\eta_p^2 = 0.04$ , though the univariate effect of condition on attention to positive sexual cues was significant ( $\eta_p^2 = 0.03$ ). The multivariate effect on the

**Table 3** Marginal means comparisons across conditions on sexual, relational, and mindfulness outcomes at T3, controlling for outcomes at T1 for study 1 and study 2

Variables	Study 1		Study 2	
	Control <i>M (SE)</i> ( <i>n</i> = 90)	Experimental <i>M (SE)</i> ( <i>n</i> = 88)	Control <i>M (SE)</i> ( <i>n</i> = 128)	Experimental <i>M (SE)</i> ( <i>n</i> = 110)
Sexual satisfaction	27.85 (0.52)	30.50 (0.53)**	27.74 (0.49)	29.48 (0.53)*
Dyadic desire	11.79 (0.33)	12.44 (0.33)	11.66 (0.28)	12.73 (0.30)*
Solitary desire	3.68 (0.21)	3.78 (0.21)	3.63 (0.18)	4.14 (0.19)
Sexual distress	4.03 (0.28)	3.35 (0.29)	4.31 (0.28)	3.58 (0.30)
Relationship satisfaction	17.02 (0.24)	17.13 (0.24)	16.19 (0.22)	16.67 (0.24)
	( <i>n</i> = 59)	( <i>n</i> = 75)	( <i>n</i> = 84)	( <i>n</i> = 85)
Positive sexual cues	5.76 (0.09)	6.00 (0.08)*	5.68 (0.08)	5.89 (0.08)
Negative sexual cues	1.88 (0.09)	1.68 (0.08)	2.11 (0.11)	2.01 (0.10)
	( <i>n</i> = 77)	( <i>n</i> = 83)	( <i>n</i> = 115)	( <i>n</i> = 106)
Sexual awareness	3.78 (0.07)	3.94 (0.06)	3.70 (0.06)	3.96 (0.06)**
Sexual nonjudgment	3.98 (0.08)	4.17 (0.07)	3.87 (0.08)	3.90 (0.08)
Sexual consciousness	3.04 (0.06)	3.25 (0.05)**	3.00 (0.05)	3.22 (0.05)**

\* $p \leq 0.05$ ; \*\* $p < 0.01$ .



combined set of sexual mindfulness variables was significant, Wilks'  $\Lambda = 0.95$ ,  $F(3, 153) = 2.95$ ,  $p = 0.03$ ,  $\eta_p^2 = 0.06$ . Specifically, there was a significant effect of condition on sexual consciousness,  $F(1, 155) = 7.03$ ,  $p = 0.009$ ,  $\eta_p^2 = 0.04$ . The effects of condition on sexual awareness,  $F(1, 155) = 3.09$ ,  $p = 0.08$ ,  $\eta_p^2 = 0.02$ , and sexual nonjudgment,  $F(1, 155) = 3.17$ ,  $p = 0.08$ ,  $\eta_p^2 = 0.02$ , were not significant but were in the expected direction.

### Feedback on the Psychoeducational Intervention

To assess the feasibility and acceptability of the brief intervention, three bipolar questions capturing comprehension, learning, and previous experience were administered. Each of these were rated on 5-point scales (e.g., “*not at all understandable*” to “*completely understandable*”). Participants reported strong comprehension of the information for the video ( $M = 4.97$ ,  $SD = 0.18$ ) and the brochure ( $M = 4.73$ ,  $SD = 0.52$ ). Most participants agreed that they learned new information from the video ( $M = 3.38$ ,  $SD = 1.17$ ; from “*strongly disagree*” to “*strongly agree*”). Most participants reported having some prior experience with the suggested strategies ( $M = 3.03$ ,  $SD = 1.11$ ; “*no experience*” to “*a lot of experience*”). In addition to watching the video during the survey, over half of the participants reported that they downloaded the video (59.6%). Most participants reported that they only viewed the video once from T1 to T3 (60.7%), while over one third (38.2%) viewed the video multiple times throughout the study period. Similarly, most participants reported viewing the brochure once from T2 to T3 (65.1%) with a third (33.7%) referring to the brochure multiple times. The most common attempted strategies to increase their ability to be more mindful during sex were “*slowing down/extending sexual activity*” (36.9%), “*turning off electronic devices during sex*” (36.9%), and “*focusing on your breath and/or physical sensations*” (31.3%). On average, participants rated that they found the strategies very helpful ( $M = 4.14$ ,  $SD = 0.83$ ; on a scale from 0 to 5).

### Study 2

Given the promising findings from study 1, specifically the robust effects for the intervention leading to improvements in sexual satisfaction, attention to positive sexual cues, and sexual consciousness, the aim of study 2 was to replicate these findings in an independent sample. In study 2, we wanted to extend the findings from study 1 by examining whether a dose effect could be observed by showing the video at two time points in the study. Based on participant feedback from study 1 that the video was more useful than the brochure and that one third of the sample reported

watching the video more than once, we decided to show the video once at T1 and once at T2.

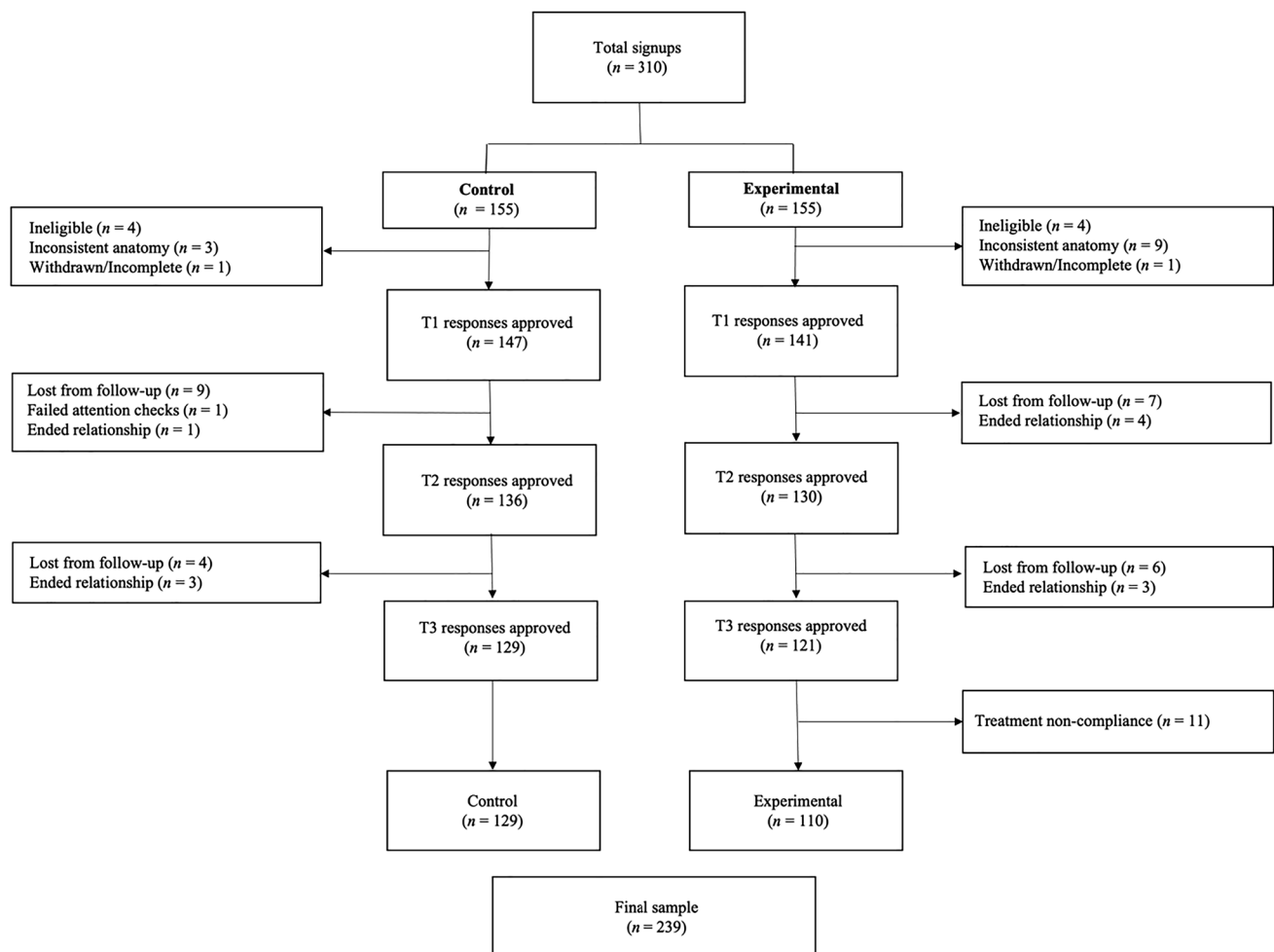
### Participants

We conducted an a priori power analysis in G\*Power (Faul et al., 2007) using the small effect size ( $\eta_p^2 = 0.04$ ) obtained in study 1, with 80% power and standard alpha = 0.05. This revealed a sample size of 199 participants was necessary to test our hypotheses. Given the attrition observed in study 1, we oversampled and aimed to recruit a sample of 250 participants in study 2. We used the same recruitment method (i.e., Prolific), eligibility criteria, and screening as study 1. Of 310 participants who initially signed up, 288 were approved after T1, 266 were approved at T2, and 250 were approved at T3. After final data quality checks, 239 participants (110 experimental and 129 control) were retained for analyses (see Fig. 2 for a summary of the participant flow).

Participants in the final sample ( $N = 239$ ; 119 women, 111 men, 8 non-binary, 1 self-identified) were on average 25.49 years old ( $SD = 7.50$ , range = 18 to 65) and had an average relationship length of 51.08 months ( $SD = 62.19$ , range = 5 to 487 months). Participants identified as heterosexual (73.2%) and a minority identified as bisexual (15.9%), pansexual (4.2%), asexual (2.1%), lesbian (2.1%), gay (0.8%), queer (0.4%), or something else not listed (1.3%). Participants (94.1%) were in mixed-gender/sex relationships, while 5.9% were in a same-gender/sex relationship. Participants reported their relationship status as dating (59.8%), living together (not common-law; 21.3%), married (11.3%), engaged (5.4%), or something else not listed (2.1%). Most of our sample identified as White (54.0%), and a minority identified as Hispanic/Latino/Latina (30.5%), African American/Black (9.2%), biracial/multiracial (2.1%), Middle Eastern/Central Asian (0.4%), South Asian (0.4%), East Asian (0.4%), or something else not listed (2.9%).

### Procedure

All administration procedures for study 2 were identical to those for Study 1, except for a modification to the experimental booster at T2. At T2, participants completed the survey measures and then viewed the 3.5-min psychoeducational video for a second time. The summative brochure was delivered to participants in a reminder email 3 days before the delivery of the T3 survey. An administrative inconsistency occurred for some participants in the delivery of the T2 and T3 surveys. All participants received their surveys 7 and 14 days from the first survey regardless of when they completed the surveys. Because participants had 48 h to submit the T2 and T3 surveys, it was possible that some participants completed the T2 survey 9 days after completing T1 and then received the T3 survey 5 days later. Investigation of our



**Fig. 2** Participant flow through all timepoints in study 2. *Note:* Treatment non-compliance included participants who self-reported that they did not view the video or brochure at all and those who self-reported that they did not attempt any mindfulness strategies during the study period

own data revealed that this was the case for 5 participants at T2 and 4 participants at T3. All other participants completed their surveys 7 days apart. Five (4.1%) participants who indicated they did not view the video at all and six (4.9%) who reported they did not try any suggested mindfulness strategies were removed from data analysis. A minority of (18.7%) participants reported that they did not view the brochure; however, they were retained for analysis because they all indicated that they watched the video. Participants were compensated £3.75 for the first survey and £2.50 for the other two surveys for a total of £8.75.

## Measures

**Eligibility Screener and Sociodemographics** To confirm eligibility, we asked participants to report their age, the length of their relationship (i.e., greater than or less than 3 months), and whether they were sexually active, identical to study 1. All participants responded to sociodemographic questions

at T1. At T2 and T3, participants were asked to confirm that their relationship had not ended since the previous survey.

**Sexual Satisfaction** Sexual satisfaction during the past 7 days was assessed using the well-validated GMSEX (Lawrance & Byers, 1995). The GMSEX had strong internal consistency (T1–T3:  $\alpha = 0.94$ – $0.96$ ) and scale reliability (T1–T3:  $\omega = 0.96$ – $0.98$ ).

**Sexual Desire** Sexual desire was measured using three items from the well-validated SDI-2 (Spector et al., 1996), which asks participants to respond thinking about the last month or past 7 days (for T2 and T3).

**Sexual Distress** Sexual distress during the past 7 days was assessed using the validated SDS – Short Form (Santos-Iglesias et al., 2020). The SDS has good internal consistency (T1–T3:  $\alpha = 0.85$ – $0.91$ ) and scale reliability (T1–T3:  $\omega = 0.88$ – $0.92$ ).

**Couple Satisfaction** Relationship satisfaction was measured using the four-item version of the CSI (Funk & Rogge, 2007). The CSI demonstrates strong internal consistency (T1–T3:  $\alpha = 0.93$ – $0.96$ ) and scale reliability (T1–T3:  $\omega = 0.95$ – $0.96$ ).

**Attention to Sexual Cues** Attention to positive and negative sexual cues during sexual activity were assessed using an adapted measure on feelings and cognitions (Birnbaum et al., 2006). There was adequate internal consistency for the positive subscale (T1–T3:  $\alpha = 0.74$ – $0.78$ ) and negative subscale (T1–T3:  $\alpha = 0.86$ – $0.87$ ). There was good scale reliability for the positive (T1–T3:  $\omega = 0.82$ – $0.86$ ) and negative subscales (T1–T3:  $\omega = 0.90$ – $0.91$ ).

**Sexual Mindfulness** Sexual mindfulness was assessed using the SMM (Leavitt et al., 2019). Internal consistencies and scale reliabilities for the sexual awareness subscale (T1–T3:  $\alpha = 0.67$ – $0.76$ , T1–T3:  $\omega = 0.69$ – $0.79$ ) and the nonjudgment subscale (T1–T3:  $\alpha = 0.81$ – $0.83$ , T1–T3:  $\omega = 0.82$ – $0.85$ ) were adequate.

**Sexual Consciousness** Sexual consciousness was assessed using the Sexual Awareness Questionnaire (Snell et al., 1991). Internal consistency (T1–T3:  $\alpha = 0.88$ – $0.90$ ) and scale reliability (T1–T3:  $\omega = 0.92$ – $0.93$ ) were good.

**Psychoeducational Video and Brochure** The psychoeducational video and brochure were identical to those described in study 1.

**Manipulation Checks** The manipulation checks from study 1 were used in study 2 to assess comprehension of the intervention. Eleven participants indicated they did not view the video or brochure at all during study 1 and/or did not try any strategies and thus were classified as treatment non-compliant and removed from data analysis.

## Data Analyses

To replicate the effects observed in study 1, MANCOVAs were used to examine if those in the experimental condition experienced improvements in their sexual well-being and sexual mindfulness over the 2-week study period relative to those in the control condition.

## Results

The final sample included 239 participants, 129 (61 women, 64 men, 4 non-binary) in the control condition and 110 (58 women, 47 men, 4 non-binary, 1 self-identified) in the experimental condition. One-way analysis of variance

(ANOVA) revealed no significant group differences in age,  $F(1, 237) = 0.03$ ,  $p = 0.86$ ,  $\eta^2 = 0.00$ , or relationship length,  $F(1, 236) = 1.22$ ,  $p = 0.27$ ,  $\eta^2 = 0.005$ , between conditions. Because of the small number of non-binary and other self-identified individuals, Fisher's exact test rather than the chi-square used in study 1 was used to examine group differences as a function of gender identity. Fisher's exact test revealed no significant group differences in gender ( $p = 0.56$ ) between the two conditions.

## The Effect of the Psychoeducational Video on Sexual Well-Being and Sexual Mindfulness

To examine the effects of the psychoeducational video, we ran identical analyses from study 1 for sexual well-being and mindfulness outcomes at T2 controlling for outcomes at T1 (Table 1). The multivariate effect on the combined set of sexual and relational well-being dependent variables was significant, Wilks'  $\Lambda = 0.95$ ,  $F(5, 227) = 2.48$ ,  $p = 0.03$ ,  $\eta_p^2 = 0.05$ . Univariate effects indicated that there was a significant effect of condition on overall sexual satisfaction,  $F(1, 231) = 9.43$ ,  $p = 0.002$ ,  $\eta_p^2 = 0.04$ , and dyadic sexual desire,  $F(1, 231) = 4.53$ ,  $p = 0.03$ ,  $\eta_p^2 = 0.02$ , such that participants in the experimental condition reported greater sexual satisfaction and dyadic sexual desire at T2. There were no effects of condition on solitary sexual desire,  $F(1, 231) = 0.23$ ,  $p = 0.63$ ,  $\eta_p^2 = 0.001$ ; sexual distress,  $F(1, 231) = 0.05$ ,  $p = 0.83$ ,  $\eta_p^2 = 0.00$ ; or relationship satisfaction,  $F(1, 231) = 3.04$ ,  $p = 0.08$ ,  $\eta_p^2 = 0.01$  at T2. The multivariate effect on the combined set of attention to sexual cues dependent variables was not significant, Wilks'  $\Lambda = 0.97$ ,  $F(2, 177) = 2.99$ ,  $p = 0.05$ ,  $\eta_p^2 = 0.03$ , though the univariate effect of condition on attention to positive sexual cues was significant ( $\eta_p^2 = 0.03$ ). The multivariate effect on the combined set of sexual mindfulness variables was significant, Wilks'  $\Lambda = 0.95$ ,  $F(3, 212) = 3.93$ ,  $p = 0.01$ ,  $\eta_p^2 = 0.05$ . Univariate effects revealed that sexual awareness,  $F(1, 214) = 9.80$ ,  $p = 0.002$ ,  $\eta_p^2 = 0.04$ , but not sexual nonjudgment,  $F(1, 214) = 0.68$ ,  $p = 0.41$ ,  $\eta_p^2 = 0.003$ , or sexual consciousness,  $F(1, 214) = 0.23$ ,  $p = 0.64$ ,  $\eta_p^2 = 0.001$ , was higher in the experimental group at T2 relative to the control group.

## The Effect of the Psychoeducational Video and Brochure “Booster” on Sexual Well-Being and Sexual Mindfulness

We wanted to examine the effects of the “booster” (i.e., video and summative brochure delivered at T2) on sexual and mindfulness outcomes at T3 controlling for outcomes at T2 as covariates (Table 2). The multivariate effect on the combined set of sexual and relational well-being variables, Wilks'  $\Lambda = 0.97$ ,  $F(5, 228) = 1.31$ ,  $p = 0.26$ ,  $\eta_p^2 = 0.03$ ; the

combined set of attention to sexual cues variables, Wilks'  $\Lambda = 1.00$ ,  $F(2, 164) = 0.01$ ,  $p = 0.99$ ,  $\eta_p^2 = 0.00$ ; and the combined set of sexual mindfulness variables, Wilks'  $\Lambda = 0.98$ ,  $F(3, 212) = 1.75$ ,  $p = 0.16$ ,  $\eta_p^2 = 0.02$ , were not significant, indicating that there was no overall “booster” effect of the intervention from T2 to T3 on our outcome variables. Significant univariate effects for sexual distress ( $\eta_p^2 = 0.02$ ) and sexual consciousness ( $\eta_p^2 = 0.02$ ) are in Table 2.

### The Cumulative Effect of the Psychoeducational Video and Brochure on Sexual Well-Being and Sexual Mindfulness Overall

To determine the effects of the intervention overall, we ran analyses for sexual well-being and mindfulness outcomes at T3 controlling for outcomes at T1 as covariates (Table 3). The multivariate effect on the combined set of sexual and relational well-being dependent variables was significant, Wilks'  $\Lambda = 0.95$ ,  $F(5, 227) = 2.40$ ,  $p = 0.04$ ,  $\eta_p^2 = 0.05$ . There was a significant effect of condition on sexual satisfaction,  $F(1, 231) = 5.65$ ,  $p = 0.02$ ,  $\eta_p^2 = 0.02$ , and dyadic sexual desire,  $F(1, 231) = 6.78$ ,  $p = 0.01$ ,  $\eta_p^2 = 0.03$ . The effect of condition on solitary sexual desire,  $F(1, 231) = 3.74$ ,  $p = 0.05$ ,  $\eta_p^2 = 0.02$ , and sexual distress was not significant,  $F(1, 231) = 3.07$ ,  $p = 0.08$ ,  $\eta_p^2 = 0.01$ , but was in the expected direction such that experimental participants reported higher desire and lower sexual distress compared to control participants. There was no effect of condition on relationship satisfaction,  $F(1, 231) = 2.12$ ,  $p = 0.15$ ,  $\eta_p^2 = 0.01$ . The multivariate effect on the combined set of attention to sexual cues dependent variables was not significant, Wilks'  $\Lambda = 0.98$ ,  $F(2, 164) = 1.78$ ,  $p = 0.17$ ,  $\eta_p^2 = 0.02$ . The multivariate effect on the combined set of sexual mindfulness variables was significant, Wilks'  $\Lambda = 0.94$ ,  $F(3, 214) = 4.46$ ,  $p = 0.005$ ,  $\eta_p^2 = 0.06$ . Univariate effects indicated that there was a significant effect of condition on sexual awareness,  $F(1, 216) = 9.57$ ,  $p = 0.002$ ,  $\eta_p^2 = 0.04$ , and sexual consciousness,  $F(1, 216) = 8.93$ ,  $p = 0.003$ ,  $\eta_p^2 = 0.04$ , with higher sexual awareness and sexual consciousness for those in the experimental condition. There was no effect of condition on sexual nonjudgment,  $F(1, 216) = 0.09$ ,  $p = 0.77$ ,  $\eta_p^2 = 0.00$ .

### Feedback on the Psychoeducational Intervention

Participants reported strong comprehension of the video ( $M = 4.81$ ,  $SD = 0.48$ ), that they learned new information ( $M = 3.17$ ,  $SD = 1.15$ ), and that they had some prior experience with the strategies ( $M = 3.06$ ,  $SD = 1.14$ ). When asked how often they referenced the video, many participants (45.5%) indicated they only viewed the video while completing the surveys, while half (53.6%) referred to the video at least once outside of the surveys (54.5% of participants reported that they downloaded the video). Most participants

(79.1%) viewed the brochure only once in the 3 days leading up to the final survey, few (8.2%) viewed the brochure multiple times, and several (12.7%) did not view the brochure at all. On average, participants rated the strategies as very helpful ( $M = 4.12$ ,  $SD = 0.82$ ). The most common attempted strategies were “turning off electronic devices during sex” (32.2%), “slowing down/extending sexual activity” (31.4%), and “exploring new positions, toys, locations, etc.” (30.1%).

### Sexual Mindfulness as a Mediator of Changes in Sexual Satisfaction as a Function of Experimental Condition?

One-way analysis of variance (ANOVA) revealed that there were no significant differences between participants in study 1 and study 2 on the dependent variable sexual satisfaction at T3,  $F(1, 416) = 1.01$ ,  $p = 0.32$ ,  $\eta^2 = 0.002$ . There were also no significant differences between participants in study 1 and study 2 in any of the mediators, sexual awareness at T2,  $F(1, 396) = 0.007$ ,  $p = 0.93$ ,  $\eta^2 = 0.00$ ; attention to positive sexual cues at T2,  $F(1, 348) = 0.001$ ,  $p = 0.98$ ,  $\eta^2 = 0.00$ ; or sexual consciousness at T2,  $F(1, 416) = 0.03$ ,  $p = 0.87$ ,  $\eta^2 = 0.00$ . Thus, we combined the data across studies for the mediation analyses.

We conducted three separate simple mediation analyses using PROCESS macro version 4.0 and SPSS version 28.0 which is suitable for testing longitudinal mediation (model 4; Hayes, 2012) to investigate whether sexual awareness, attention to positive sexual cues, and sexual consciousness at T2 mediated the overall change in sexual well-being observed at T3 as a function of condition using data from both studies. The proposed mediation model was as follows: condition (experimental vs. control) was the independent variable ( $X$ ), mindfulness variables at T2 were the mediating variable(s) ( $M$ ), and sexual satisfaction at T3 was the dependent variable ( $Y$ ). Three separate mediation models were used based on the recommendation of Hayes (2012) that significantly correlated mediators are not entered into the same model. These mediators were chosen because they showed significant changes from T1 to T3. Sexual satisfaction was chosen as the outcome variable at T3 because it showed a robust change over the course of the study, from T1 to T3.

Table 4 presents unstandardized regression coefficients, standard errors, and confidence intervals derived from simple mediation analyses. Results indicate that condition (experimental vs. control) was indirectly related to sexual satisfaction through all three mediators—sexual awareness, attention to positive sexual cues, and sexual consciousness. Specifically, in Table 4, those in the experimental condition reported higher sexual awareness at T2 relative to those in the control condition ( $a = 0.24$ ,  $p < 0.001$ ), and in turn, higher sexual awareness at T2 was related to higher sexual

**Table 4** Indirect effects of condition on sexual satisfaction via sexual awareness, attention to positive sexual cues, and sexual consciousness

	<i>B</i>	<i>SE</i>	95% CI for <i>B</i>		<i>N</i>
			Lower	Upper	
Condition—sexual awareness—sexual satisfaction					
<i>ab</i> path (indirect effect)	0.55*	0.21	0.20	1.01	398
<i>a</i> path	0.24	0.07	0.11	0.37	
<i>b</i> path	2.32	0.45	1.45	3.20	
<i>c</i> path	2.56	0.60	1.37	3.75	
<i>c'</i> path	2.01	0.60	0.84	3.18	
Condition—positive sexual cues—sexual satisfaction					
<i>ab</i> path (indirect effect)	0.56*	0.21	0.15	0.99	350
<i>a</i> path	0.25	0.09	0.07	0.43	
<i>b</i> path	2.23	0.32	1.61	2.86	
<i>c</i> path	2.23	0.57	1.10	3.36	
<i>c'</i> path	1.67	0.54	0.60	2.75	
Condition—sexual consciousness—sexual satisfaction					
<i>ab</i> path (indirect effect)	0.32*	0.18	0.006	0.70	418
<i>a</i> path	0.15	0.07	0.002	0.29	
<i>b</i> path	2.16	0.40	1.36	2.95	
<i>c</i> path	3.16	0.63	1.91	4.40	
<i>c'</i> path	2.84	0.62	1.63	4.05	

\*Represents a significant indirect effect (i.e., confidence interval does not include zero). Indirect effects represent the effect of condition (*X*) on sexual satisfaction (*Y*) through the mediating variable. *B*s represent the unstandardized regression coefficients of each path. Standard errors (*SE*) and the lower and upper bounds for the 95% confidence interval (CI) reflect 10,000 resampled bootstrap confidence intervals.

satisfaction at T3 ( $b = 2.32, p < 0.001$ ). The indirect effect of condition (experimental vs. control) on sexual satisfaction via sexual awareness was also significant ( $ab = 0.55$ , CI [0.20, 1.01]). This pattern held for the other two mediators (i.e., attention to positive sexual cues, sexual consciousness) whereby the 95% confidence intervals calculated based on 10,000 bootstrap samples did not contain zero, which can be interpreted as a mediation effect (i.e., a significant indirect effect). Since the indirect effects were all significant ( $p < 0.01$ ), but the direct effects remained significant in all three mediation models—we consider our findings to be a partial mediation. In other words, each of the mediators (i.e., sexual mindfulness, attention to positive sexual cues, and sexual consciousness) explains part of the association between condition and sexual satisfaction, but condition (experimental vs. control) still predicts differences in sexual satisfaction even when taking into account the role of the mediators.

## Discussion

We demonstrated that a brief psychoeducational intervention about the benefits of sexual mindfulness was effective for bolstering sexual well-being. Across both studies, we saw the most robust effects for improvements in sexual

satisfaction and sexual consciousness. In study 2, we sought to test whether the observed benefits could be enhanced by increasing the intensity of the intervention. As a result, in study 2, we saw additional effects for improvements in dyadic sexual desire and sexual awareness, for those in the experimental relative to the control condition. While the observed effects in both studies were small in magnitude, they were comparable to the size of the intervention (i.e., 3.5 min of psychoeducation). Given these promising findings, we then examined mechanisms through which the intervention exerts its benefits on sexual well-being. Longitudinal mediation analyses revealed that differences in sexual satisfaction as a function of condition could be partially explained by differences between the conditions in sexual awareness, attention to positive sexual cues, and sexual consciousness at time 2. Taken together, this research suggests that a brief psychoeducation-based intervention about how to have more mindful sex is effective for improving sexual well-being and sexual mindfulness over a 2-week period.

The current findings add to the literature on mindfulness and sexuality by providing experimental evidence to support previously observed cross-sectional associations (Leavitt et al., 2019, 2021a, b, c; Newcombe & Weaver, 2016; Smedley et al., 2021) and experimental manipulations (Velten et al., 2018, 2020). Specifically, receiving only 3.5 min of evidence-based psychoeducation about sexual mindfulness,

as well as strategies to implement, led to small but significant increases in sexual satisfaction in both studies. Improvements in sexual desire were less consistent across time in study 1, though in study 2, the effects for dyadic desire were quite robust. Inconsistent with prior research sampling clinical populations (Brotto & Basson, 2014; Brotto et al., 2015, 2022, 2021, 2008a, b), there were no consistent effects for reductions in sexual distress. Investigation of our data revealed very low levels of sexual distress in our samples. As such, it is likely that participants had little room to improve in terms of their sexual distress. Overall, these data provide initial support for the therapeutic benefits of psychoeducation about sexual mindfulness in a sample of people who were already relatively high in sexual well-being. Given the importance of maintaining a high-quality sexual relationship for overall relationship quality and well-being (Impett et al., 2014), psychoeducation may serve as a possible prophylaxis for sexual well-being problems (e.g., decreases in sexual satisfaction) commonly experienced by people in long-term relationships.

Contrary to previous research examining links between mindfulness and relationship satisfaction (Leavitt et al., 2019, 2021b, Smedley et al., 2021), we did not observe any benefit of the intervention for relationship satisfaction. Though inconsistent with our hypothesis based on cross-sectional studies, other more intensive intervention studies have not always observed benefits for relationship satisfaction (e.g., Brotto & Basson, 2014; Brotto et al., 2008a, b) or have only observed benefits for relationship satisfaction when the mindfulness intervention specifically targeted relationships (Leavitt et al., 2021a). Given that our intervention focused on sexual mindfulness rather than relational factors (e.g., conflict), it is perhaps not surprising that we did not observe benefits to relationship satisfaction. It is also possible that the brevity of the intervention and relatively short study period may have also precluded observation of any changes to relationship satisfaction given that these changes may take longer to develop.

Additional evidence supporting the preliminary effectiveness of our intervention comes from the sexual mindfulness results. Indeed, we observed improvements in sexual awareness and sexual consciousness for those in the experimental condition, as well as some effects for increasing attention to positive sexual cues. We did not observe consistent effects for reducing attention to negative sexual cues or effects for improving sexual nonjudgment, possibly due to the specific strategies specified in the intervention, the brevity of the intervention, or both. The intervention specified paying attention to thoughts, feelings, and sensations without judging them as good or bad; however, there were no specific strategies mentioned for how to practice nonjudgment. Instead, and consistent with previous research, the strategies focused on tuning into positive aspects of

the sexual experience (e.g., pleasurable sensations) (Brotto et al., 2008a, b; Leavitt et al., 2021a, b, c; Velten et al., 2018, 2020), rather than turning away from negative aspects (e.g., partner disinterest) or practicing nonjudgment during sex. This may be why we saw improvements in sexual awareness and sexual consciousness in particular. It is possible that the intervention may simply have not been sensitive enough to specifically target attention to negative sexual cues or sexual nonjudgment or needed to include more information about how to practice nonjudgment in order to elicit improvements for these aspects of sexual mindfulness. It is also possible that longer interventions that include mindfulness meditation practice may be necessary to produce change in nonjudgment given that many aspects of sexuality are associated with negative judgment (e.g., shame and guilt) which may be more resistant to change.

Consistent with predictions from the CDM, facets of sexual mindfulness partially explained group differences in sexual satisfaction resulting from the intervention. Thus, in addition to demonstrating that psychoeducation is effective for improving sexual well-being and sexual mindfulness, our results support sexual mindfulness as a mechanism through which change in sexual satisfaction occurs. This further illustrates the importance of attention and cognitive processes for sexual satisfaction, in addition to established effects for sexual response and sexual dysfunction (Stephenson, 2017). Given that a direct effect of condition on sexual satisfaction remained, it also points to other unexamined factors (e.g., enhanced communication, increased intimacy) that may have also changed because of the intervention contributing to improvements in sexual satisfaction (e.g., Malloy, 2022).

Though previous mindfulness-based psychoeducation studies have demonstrated benefits for sexual function and aspects of sexual well-being, they typically achieve these benefits through multiple sessions and the inclusion of mindfulness exercises (Brotto et al., 2008a, b). The one exception is the findings from a feasibility study that delivered a single module derived from an 8-session intervention program (Zippan et al., 2020). Data from 16 women supported that the single 90-min module with three homework exercises was effective for improving sexual desire and sexual satisfaction and reducing sexual distress over a 1-week period. The current study is a novel contribution because we demonstrated small benefits to sexual well-being with an even briefer intervention that only included psychoeducation about sexual mindfulness without the inclusion of general mindfulness meditations. That is, our results provide a direct test of the benefits of psychoeducation only, for bolstering sexual well-being and sexual mindfulness in a nonclinical sample. Feedback data revealed that the intervention was acceptable and appropriate to participants, with high levels of adoption. Thus, taken together, the data support the use of

a brief online video to disseminate evidence-based information about how to have more mindful sex as highly feasible for widespread dissemination. Indeed, in line with stepped care approaches for mental health more generally (Bower & Gilbody, 2005), and relationships specifically (Busby et al., 2015; Markman et al., 2022), there is a need for brief psychoeducation programs to help individuals manage common challenges to their sexual relationships before these reach clinically significant levels of difficulty. Additional benefits of brief online interventions include easy access, cost-effectiveness, and being less intensive than traditional interventions, all of which may facilitate their uptake (Donker et al., 2009; Rigabert et al., 2020).

A key implication and future direction of the current findings is to extend the intervention to individuals and couples who are experiencing declines in sexual satisfaction and desire—two commonly reported problems in community samples (Mark, 2015; Smith et al., 2011). Though it is well established that general mindfulness-based interventions delivered over multiple sessions result in moderate to large improvements in sexual function among individuals with sexual dysfunction—clinically significant and distressing sexual difficulties (reviewed in Banbury et al., 2021; Stephenson & Kerth, 2017)—it remains unclear if sexual mindfulness interventions might benefit individuals at risk for sexual problems but who do not meet diagnostic criteria for sexual dysfunction. Our promising findings point to the possibility that psychoeducation about sexual mindfulness might be effective for improving the sex lives of people who are experiencing subclinical sexual well-being problems or as an add-on for relationship education interventions that typically do not focus on sexual issues.

### Limitations and Future Directions

Though we replicated our effects in two separate samples demonstrating the robustness of our findings, future research could build on a few limitations to our work. While our research design mirrored that of a randomized wait-list control intervention, we did not include an active control condition. One possibility would be to include a control sexual video condition, where the video included sexual facts but no information about the benefits of mindfulness for sexuality. The inclusion of such a condition would provide an even more robust test of our hypotheses and rule out the alternate explanation that the effects were the result of performance demand. Of note, performance demand is probably not sufficient to explain all our effects given that the video mentioned the benefits of mindfulness for relationship satisfaction and sexual distress, but we did not observe effects for these outcomes. Future research could include a control condition to further isolate the

effects of psychoeducation for bolstering sexual well-being, as well as sampling over a longer period to examine the time course of these effects.

Sex is inherently interpersonal, yet we sampled individuals in relationships rather than couples. Our video depicted a character engaging in sexual activity with a partner and some of the suggested strategies involved a partner (e.g., describe what you are feeling out loud). Sampling couples would account for this interpersonal context and the interdependence of many aspects of sexual well-being. Such a study would enable an examination of whether psychoeducation delivered to both members of a couple has an additive benefit for both partners' sexual well-being. That is, when both members of the couple employ mindful sex strategies, does this benefit their own and their partners' sexual well-being? There is some dyadic research supporting this hypothesis, finding that even when only one member of the couple participated in a mindfulness-based stress reduction program, both partners reported benefits to their relationship satisfaction (Khaddouma et al., 2017).

A final limitation has to do with the measures used in the study. Common method bias may have influenced our findings given that we assessed multiple related constructs within the same survey (Podsakoff et al., 2012). Indeed, it is possible that responses to one scale may have inadvertently influenced how participants responded to a related or unrelated measure contributing to spurious correlations. We also omitted a measure of general mindfulness. Though previous research has established that sexual mindfulness predicts sexual and relational well-being over and above trait mindfulness (Leavitt et al., 2019), it would have been ideal to also include a measure of general mindfulness. Given that our intervention intended to target sexual rather than general mindfulness, the inclusion of such a measure would have enabled us to examine whether our intervention led to improvements only in sexual mindfulness or in both types of mindfulness. Additionally, we also could have examined whether general mindfulness moderated the treatment effects, such that we might expect even stronger effects among people higher in trait mindfulness.

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**Author Contribution** SJD: designed the study, oversaw data collection and analyses, and drafted the initial manuscript; GEJ: collaborated with the design of the study, led the data collection for study 1, ran data analyses, drafted methods and results, and edited the final manuscript; SYG: led the data collection for study 2, ran data analyses, drafted results, and edited the final manuscript. All authors approved the final version of the manuscript.

**Data Availability** All data and study materials are available on the Open Science Framework (<https://osf.io/cymrb/>).

## Declarations

**Ethics Approval** All procedures for studies 1 and 2 were approved by the Behavioural Research Ethics Board at the University of British Columbia.

**Informed Consent Statement.**

Informed consent was obtained from all participants.

**Conflict of Interest** The authors declare no competing interests.

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