

A Randomized Trial Comparing Group Mindfulness-Based Cognitive Therapy With Group Supportive Sex Education and Therapy for the Treatment of Female Sexual Interest/Arousal Disorder

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Objective: Sexual interest/arousal disorder (SIAD) is the most prevalent sexual dysfunction in women. Our goal was to compare (a) group mindfulness-based cognitive therapy (MBCT) plus sex education with (b) group supportive sex education and therapy (STEP) for women with SIAD. **Method:** Eight-session treatments were delivered weekly and participants completed the measures of sexual desire and arousal, sexual distress, relationship satisfaction, rumination, and global impressions of change, at baseline, immediately posttreatment, and at 6- and 12-month posttreatment. Of 148 women who consented, 70 were randomized to MBCT (mean age 39.3 ± 13.2 years) and 78 were randomized to STEP (mean age 37.9 ± 12.2 years). **Results:** Sexual desire and arousal significantly improved at each time point relative to baseline, with large effect sizes ($d = -1.29$ to -1.60), and similarly for MBCT and STEP. Sexual distress also improved at each time point with large effect sizes ($d = 0.83$ – 1.17), and more so for MBCT relative to STEP. Relationship satisfaction significantly improved ($d = -0.17$ to -0.20), and rumination about sex improved significantly in both arms, with medium effect sizes ($d = 0.42$ – 0.69), with both outcomes responding more to MBCT. About half the participants across both treatments reported moderate or great improvements in global indicators of desire and overall sexuality. **Conclusions:** Results support the efficacy of both group MBCT and group supportive sex education for improving symptoms of SIAD with 12-month retention of improvements.

What is the public health significance of this article?

This study suggests that both mindfulness-based group therapy and supportive sex education are effective in improving the symptoms of sexual interest/arousal disorder in women, with greater improvements for mindfulness-based group therapy for sexual distress. Treatment effects from both therapies were strong to very strong and were maintained 12 months after treatment. Women reported a very high level of overall satisfaction with both treatments.

Keywords: sexual interest/arousal disorder, sexual desire, mindfulness-based cognitive therapy, sex education

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A lack of interest in sexual activity that creates personal distress and negatively impacts relationship satisfaction is the most common sexual concern in women (Mitchell et al., 2013). The disorder is officially classified in the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5; American Psychiatric Association, 2013) as Female Sexual Interest/Arousal Disorder (SIAD). SIAD is based on polythetic criteria whereby women must endorse at least three of six of the following criteria to receive a diagnosis, with symptoms lasting at least 6 months (American Psychiatric Association, 2013): lack of interest (or no interest) in sexual activity; reduced or absent erotic thoughts or fantasies; reduced level of

initiating sex and/or responding to a partner's sexual advances; reduced pleasure during sexual activity; lack of responsive sexual desire (or desire that emerges with or after sexual arousal); and reduced genital and nongenital sexual sensations (i.e., arousal). The use of polythetic criteria means that a diagnosis of SIAD may involve different symptom expressions (Brotto et al., 2015).

There have been many large, representative studies focusing on the prevalence of low desire in women. The third National Survey of Sexual Attitudes and Lifestyles (NATSAL-3) assessed 6,777 British women (who had a sexual partner in the last year) and found that 34.2% of women across ages endorsed low desire (defined as a 3-month period or more where the individual lacked interest in having sex; Mitchell et al., 2013). Across the age cohorts, the highest prevalence was among women in the 55- to 64-year-old category, and age was negatively associated with sexual desire. Between 15% and 35% of women across the age categories reported having a discrepant (lower) level of sexual interest compared to their partners (Mitchell et al., 2013). In a study of Canadian middle-aged women, the rates of low desire were similar to those in the NATSAL-3 study (Quinn-Nilas et al., 2018), and those with health conditions and poor overall health were more likely to report low desire in both studies.

The Incentive Motivation model of sexual response describes how biological, psychological, and contextual factors interact to elicit sexual interest and arousal (see Laan & Both, 2008, for a review). It posits that sexual desire results from an interplay between a sensitive sexual response system and effective stimuli that activate this system (Toates, 2009). From this perspective, sexual motivation does not exist as a fixed level within the individual; rather, it is dependent on context, including relationship satisfaction. Women begin sexual encounters for any variety of sexual or nonsexual reasons (Basson, 2002a, 2002b) and the awareness of feelings of desire may be absent and are not prerequisite for entering a sexual situation. When a woman experiences sexual arousal and excitement during a sexual encounter, "responsive sexual desire" may occur—a desire for the sexual activity to continue for now more sexual reasons. Attention to sexual stimuli is a critical aspect of the Incentive Motivation model, as attention to sexual cues has been associated with sexual desire (Prause et al., 2008).

Psychological factors can disrupt sexual response, including sexual desire, according to the Incentive Motivation model. Cognitive distraction during sexual activity, which draws attention away from erotic cues, can negatively affect women's sexual esteem, sexual satisfaction, and sexual response (Dove & Wiederman, 2000). Such cognitive interference can trigger negative affect that can interfere with sexual arousal or pleasure (Masters & Johnson, 1970) and therefore block sexual desire from emerging. Behavioral avoidance is a natural consequence, which further exacerbates anxiety about sexual performance (Barlow, 1986). Compared to women without sexual difficulties, those with low sexual desire hold stronger negative beliefs about the influence of age and body image on sexuality, and this makes them more vulnerable to the activation of negative self-schemas (specifically those of incompetence) when confronted with a potential sexual situation (Nobre & Pinto-Gouveia, 2006). These self-critical schemas then trigger negative automatic thoughts, which prevent one from focusing on sexual stimuli and elicit negative affect, which further impairs sexual response. For some, such negative thoughts about sex, and one's perceived personal failures with sexual desire, can be ruminative in nature, and rumination about sex is a strong predictor of sex-related distress (Pascoal et al., 2020).

From an Incentive Motivation model perspective, psychological disruptions to sexual response provide a rationale for the use of psychological treatments to improve low sexual desire in women. A meta-analysis by Frühauf et al. (2013) identified 20 psychological treatment studies that included a wait-list control group, and another 8 that included comparisons between different treatments. Most of the studies evaluated cognitive-behavioral approaches, which involved a combination of behavioral skill training to improve communication between partners, increase sexual skills, and reduce sexual and performance anxiety, as well as anxiety reduction skills, and cognitive challenging. For these treatment approaches, there is an overall large effect size (Cohen's $d = 0.91$) for the primary end point of low desire, and a moderate effect size (Cohen's $d = 0.51$) for sexual satisfaction when treatments are compared to a wait-list control group.

Chivers and Brotto (2017) have argued that there are limitations with Cognitive Behavior Therapy (CBT) when applied to SIAD in that these skills do not directly address critical aspects of the Incentive Motivation Model, such as the woman's awareness/attention to sexual stimuli and their effect on responsive sexual desire. They postulated that mindfulness-based treatments might thus be especially suitable for treating low sexual desire as it directly cultivates mindfulness, emphasizes compassion for oneself, and may be especially useful for managing ruminative thoughts.

Mindfulness-based approaches have emerged as the third wave of CBT and aim to cultivate active awareness of the body in an accepting, nonjudgmental, and compassionate manner. For over a decade, a few small studies have evaluated mindfulness-based approaches to sexual dysfunction (Brotto & Heiman, 2007). Both three-session (Brotto, Basson, et al., 2008; Brotto, Heiman, et al., 2008) and four-session (Brotto & Basson, 2014) versions of group mindfulness have been found effective for improving sexual desire in women. More recently, an eight-session format has been developed to more closely align with mindfulness-based cognitive therapy (MBCT)—a mindfulness-based treatment developed to prevent depressive relapse (Segal, Teasdale, et al., 2002). In an uncontrolled trial of MBCT for women with SIAD, there were improvements in sexual desire, reduced sexual distress, reduced rumination, and increased overall sexual function, regardless of women's expectations about the treatment at the start of the program (Paterson et al., 2017). Because the MBCT evaluated by Paterson et al. (2017) contained elements of psychoeducation as well as the nonspecific treatment effects of being in a group with other women with SIAD, the extent to which the mindfulness exercises, per se, contributed to improvements in sexual desire and reductions in sexual distress could not be evaluated. Moreover, the long-term maintenance of these gains was not assessed.

The purpose of this study was to evaluate the efficacy of group MBCT for addressing the coprimary outcomes of sexual desire and arousal, and sex-related distress in women with SIAD. We implemented a randomized controlled trial design as per the recommendations of Pyke and Clayton (2015a) in sex research who called for the importance of control groups that contain the same nonspecific therapy elements as the experimental group. Supportive sex education was chosen as our comparison group to control for the same-sex education ingredients in the MBCT treatment, as well as the nonspecific therapeutic components such as group discussion and support. This comparison group allowed us to evaluate the extent to which mindfulness exercises, per se, effectively improved our

outcomes. Elements of supportive expressive therapy, such as encouraging open and honest expression of thoughts and emotions, receiving and offering support from group participants to one another, and learning new ways to cope (Leichsenring & Leibing, 2007), were woven into this group.

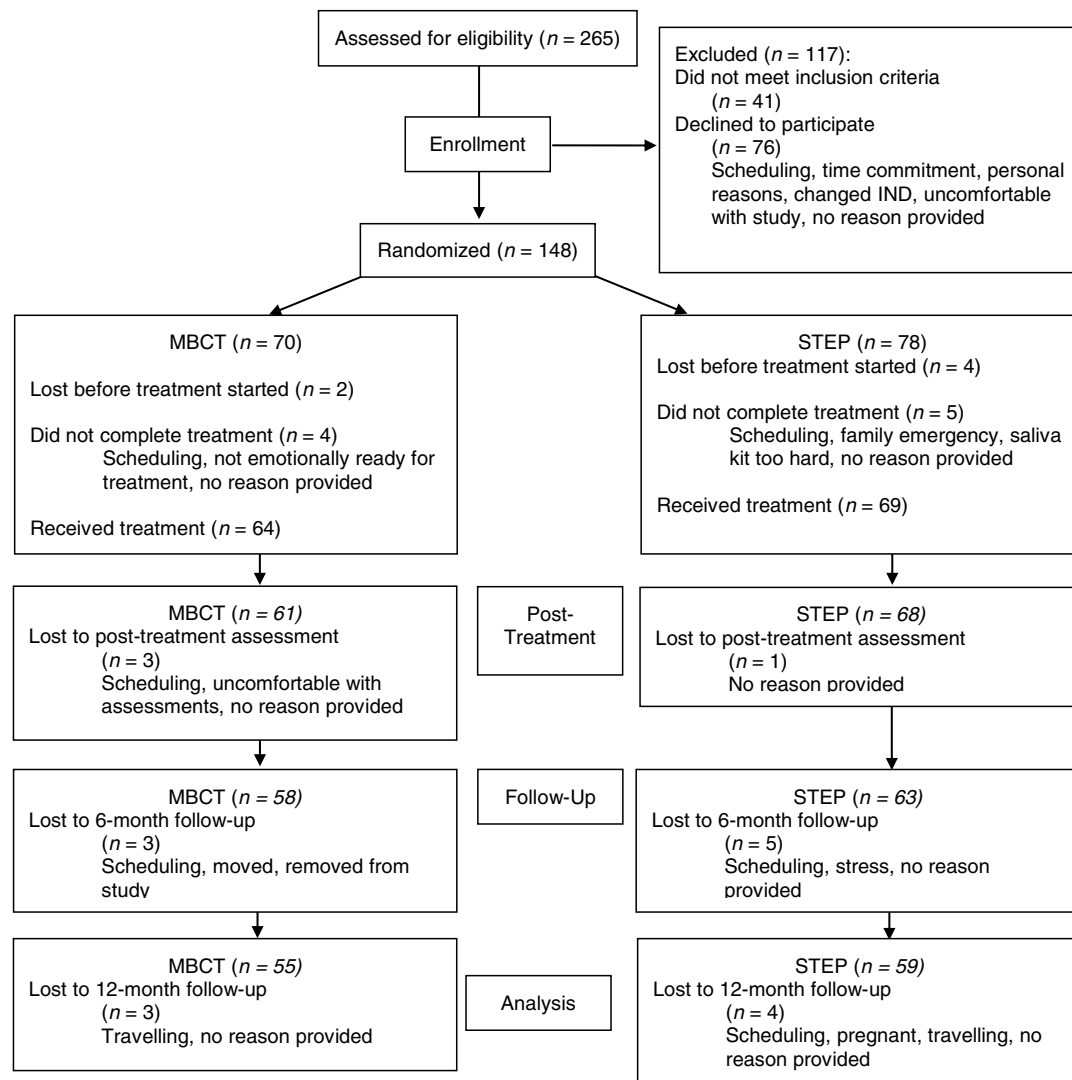
Our primary outcome was a comprehensive measure of sexual desire that also included elements of motivated sexual behavior, arousal, and receptivity, and mapped onto the SIAD polythetic criteria, which we will refer to as sexual desire and arousal. Our second coprimary end point was sex-related distress given that this is a core criterion for a SIAD diagnosis (American Psychiatric Association, 2013). Our first secondary end point was relationship satisfaction, given that it is related to the core criterion of sexual distress (Vannier & Rosen, 2017) and sexual response (Muise et al., 2013). Our next

secondary end point was rumination—a major target of treatment in MBCT for depression (Segal et al., 2012) that is significantly associated with overall quality of life, over and above the intensity of depressive symptoms (Kuehner & Bueger, 2005). A pilot study of MBCT for low desire in women found a medium effect size for improvements in ruminations about sex (Paterson et al., 2017) from pre to posttreatment, and ruminations about sex are also significantly associated with sexual distress (Pascoal et al., 2020). Finally, we measured global impression of change as an exploratory outcome.

We assessed participants again at posttreatment, 6 and 12 months after completing the intervention, allowing for the assessment of sustained improvements. We hypothesized that women's scores on sexual desire and arousal, sexual distress, relationship satisfaction, rumination, and global treatment impressions would improve

Figure 1

CONSORT Diagram for Participants in Mindfulness-Based Cognitive Therapy (MBCT) and Sex Therapy, Education, and Support Group (STEP)



Note. This flowchart is an adaptation of the flowchart offered by the CONSORT Group (Schulz et al., 2010).

significantly from pre to posttreatment in both treatment groups, and that those improvements would be maintained at the two follow-up points. We also expected that women exposed to MBCT treatment would improve more on these outcomes than women in supportive sex education and therapy (STEP) treatment.

Method

Participants

Potential participants responded to community advertisements, social media postings, and referrals from a network of sexual medicine health care providers in a major metropolitan city. Study advertisements provided overall eligibility criteria and contact information for a study coordinator. A total of 265 women expressed an interest in the study and completed a telephone screen by a trained study coordinator. Participant eligibility criteria were assessed, a thorough description of the study was provided, and those who met criteria and were interested, provided verbal consent.

Inclusion criteria were as follows: (a) a tentative diagnosis of SIAD that was assessed by asking women the six SIAD criteria plus assessing the presence of significant personal distress; (b) a duration of SIAD that was at least 6 months; (c) ability to attend eight weekly treatment sessions; (d) age 19 years or older; (e) fluent in English; and (f) a willingness to not begin any new treatments for low desire for the duration of the study until the 6-month follow-up point. Exclusion criteria were as follows: (a) a current untreated psychiatric or medical condition that would make attending group sessions difficult; (b) self-report of significant vulvo-vaginal pain that accounted for the loss of sexual desire; and (c) self-reported symptoms of significant dissociation (which would make participation in mindfulness-based therapy challenging; *Kuyken et al., 2012*). Women were eligible regardless of their relationship status.

As shown in the participant flow diagram (*Figure 1*), of the original 265 women who were assessed for eligibility, 41 did not meet the study criteria and 76 declined to participate after receiving more information about the study. Participants were a total of 148 women who provided written consent. Participants' demographic characteristics are shown in *Table 1*.

The treatment groups were similar with no statistically significant group differences on any demographic variables except that women in the STEP group were more likely to be using hormone therapy and be self-employed compared to the MBCT group (*Table 1*). These two variables were controlled for in all analyses and did not significantly impact results.

Procedure

Recruitment began in January 2015 and ended in October 2018. Women who consented to participate took part in an in-person clinical assessment of their sexual desire and arousal concerns with one of the group facilitators (an upper-level clinical or counselling psychology student, a postdoctoral fellow, or a registered psychologist). A diagnosis of SIAD was verified during this interview, and women were asked about a history of sexual assault (which was useful for group facilitators to know in advance) and assessed for fit for group treatment.

Following these in-person assessments, women were emailed a link to complete a battery of questionnaires online using Survey-Monkey, at least 1 week before treatment began. Reminder emails and/or telephone calls were sent up to three times for any participant who did not complete these baseline measures.

Participants were randomized by the study coordinator to either the MBCT or STEP group using a coin flip. The coordinator was not involved in treatment, and group facilitators were not involved in randomization or group assignment. Participants were blind to the treatment type of the group they were enrolled in until after the pretreatment assessment and corresponding questionnaires were completed. Participants were informed about which treatment type their group was 1 week before the group start date. In the event a participant needed to postpone participation to a later date, and treatment group type had already been disclosed that participant was only eligible for future groups of the same treatment type. The research team was not blind to the treatment arm participants were assigned to.

After these assessments, participants were told that both treatments consisted of daily homework exercises with the MBCT group

Table 1

Topics Covered During Each of 8 Weeks of the Mindfulness-Based Cognitive Therapy (MBCT) Group and the Sex Education (STEP) Group

Session	MBCT	STEP
1	Eating meditation; body scan; definitions of sexual desire and arousal; prevalence of sexual concerns	Definitions of sexual desire and arousal; prevalence of sexual concerns
2	Body scan; predisposing, precipitating, and perpetuating contributors to sexual concerns; circular sexual response cycle	Predisposing, precipitating, and perpetuating contributors to sexual concerns; circular sexual response cycle
3	Stretch and breath meditation; sexual beliefs; body image	Sexual beliefs; body image
4	Breath, body, sounds and thoughts meditation; self-observation; a cognitive behavioral model for understanding the relationship between thoughts and emotions and behaviors, thought biases	Self-observation; a cognitive behavioral model for understanding the relationship between thoughts and emotions and behaviors, thought biases
5	Working with difficulty meditation; 3- min breathing space; self-exploration with touch	Self-exploration with touch
6	Stretch and breath; sexual sensations awareness; using sexual tools (with erotica, vibrators, and fantasy)	Using sexual tools (with erotica, vibrators, and fantasy)
7	Working with sensations in the body; pleasurable touch; self-evaluation; review of other treatments for low desire	Self-evaluation; review of other treatments for low desire
8	Body scan; sensate focus	Sensate focus

Note. STEP = supportive sex education and therapy group.

Table 2*Baseline Characteristics of Participants in the Sex Education (STEP) and Mindfulness-Based Cognitive Therapy (MBCT) Treatment Arms*

Measure	STEP	MBCT	Total
Number of participants	78	70	148
Age (years), mean (<i>M</i>) ± <i>SD</i>	37.9 ± 12.2	39.3 ± 13.2	38.6 ± 12.6
Relationship status, <i>n</i> (%)			
Common law	22 (28.6)	20 (29.4)	42 (29.0)
Dating	11 (14.3)	9 (13.2)	20 (13.8)
Married	30 (39.0)	31 (45.6)	61 (42.1)
Single	14 (18.2)	8 (11.8)	22 (15.2)
Length of current relationship (years), mean (<i>M</i>) ± <i>SD</i>	11.9 ± 10.5	10.8 ± 10.1	11.4 ± 10.3
Satisfaction with relationship closeness, <i>n</i> (%)			
Yes	34 (45.9)	29 (43.3)	63 (44.7)
No	40 (54.1)	38 (56.7)	78 (55.3)
Ethnicity, <i>n</i> (%)			
East Asian	7 (9.1)	3 (4.3)	10 (6.8)
Euro-Canadian	60 (77.9)	57 (82.6)	117 (80.1)
Latin American	1 (1.3)	0 (0.0)	1 (0.7)
Middle Eastern	1 (1.3)	2 (2.9)	3 (2.1)
South Asian	2 (2.6)	4 (5.8)	6 (4.1)
Other	6 (7.8)	3 (4.3)	9 (6.2)
Sexual orientation, <i>n</i> (%)			
Bisexual	11 (14.1)	10 (14.5)	21 (14.3)
Heterosexual	62 (79.5)	52 (75.4)	114 (77.6)
Lesbian	3 (3.8)	4 (5.8)	7 (4.8)
Other	2 (2.6)	3 (4.3)	5 (3.4)
Education, <i>n</i> (%)			
High school	5 (6.5)	1 (1.4)	6 (4.1)
College/technical or trades	17 (22.1)	15 (21.7)	32 (21.9)
Undergraduate degree	35 (45.5)	28 (40.6)	63 (43.2)
Master's degree	15 (19.5)	23 (33.3)	38 (26.0)
Doctorate or MD	5 (6.5)	2 (2.9)	7 (4.8)
Significant medical history, ^a <i>n</i> (%)	27 (35.1)	27 (39.1)	54 (37.0)
Currently receiving hormone therapy, <i>n</i> (%)	13 (16.7)	4 (5.8)	17 (11.6)
Number of years with current sexual concerns, mean (<i>M</i>) ± <i>SD</i>	9.1 ± 7.8	8.7 ± 8.0	8.9 ± 7.9
Report a history of sexual assault, <i>n</i> (%)			
As an adult	25 (32.1)	29 (42.0)	54 (36.7)
As a child	17 (21.8)	20 (29.0)	37 (25.2)
Received past treatments for low desire, <i>n</i> (%)	19 (24.4)	11 (16.2)	30 (20.5)

Note. ^a Reported medical conditions listed from most to least endorsed: inflammatory bowel disease (e.g., Crohn's, colitis), cancer, endometriosis, hypothyroidism, asthma, benign tumor/growths (e.g., fibroids, cysts), diabetes, genital herpes, celiac disease, high blood pressure, migraines, osteoarthritis, seizures, cervical dysplasia, chronic fatigue syndrome, fibromyalgia, heart condition, kyphosis, iron deficiency, Meniere's disease, monoclonal B cell lymphocytosis, multiple sclerosis, neutropenia, osteoporosis, sciatica, significant physical injuries, typhoid fever, vestibulitis. STEP = supportive sex education and therapy group.

including daily mindfulness practices and the STEP group including weekly reading. The entire assessment was readministered 2–4 weeks after treatment, and again at 6 and 12 months after treatment completion.

A remuneration of \$25 for each questionnaire assessment point plus an additional \$30 for completion of each laboratory assessment (up to a total of four assessments) was provided. Treatment was provided free to all participants. The study was funded by an Operating Grant from the Canadian Institutes of Health Research to Lori A. Brotto. The study was approved by the University of British Columbia Clinical Research Ethics Board (H12-01659) as well as the Vancouver Coastal Health Hospital Research Ethics Board. The study and hypotheses were registered at ClinicalTrials.gov NCT01690897.

Treatments

Both treatments were delivered over eight weekly, 2.25-hr sessions, by a pool of seven clinicians who had specialized training in

group therapy (either sex education or MBCT or both), and who had expertise in the diagnosis and management of sexual dysfunctions. Facilitators for the MBCT groups also had additional training in implementing mindfulness-based treatments, such as attending a 5-day residential MBCT professional training and a monthly MBCT-based supervision and skills-development group for clinicians for at least 1 year, and each had a personal ongoing mindfulness practice. There was no specialized training for the STEP groups. Several group facilitators were authors on the MBCT and STEP treatment manuals.

Sessions took place in a large board room housed at an academic medical center. A facilitator who was delivering one treatment was not permitted to simultaneously deliver the other treatment to remain fully aligned to a particular treatment modality for the full duration of the group. For new facilitators, weekly supervision by the lead author was undertaken by having facilitators listen to all eight sessions of a previously audio-recorded group (for both arms), observing one full group, and then coleading a group with the lead author. Our team developed comprehensive treatment manuals

that included a facilitator version plus participant handouts, separately for each arm¹ and which could be used for training. If a participant missed a session, she was encouraged to let the facilitators know and schedule an individual make-up session.

Mindfulness-Based Cognitive Therapy

The MBCT intervention was pilot tested in an earlier uncontrolled trial (Paterson et al., 2017). It was based upon the 8-week MBCT for depression developed by Segal et al. (2012) and adapted for women with sexual concerns by, for example, modifying the mindfulness practices to increase the emphasis on developing and training equanimity, especially for interoceptive sensations. Specific mindfulness exercises were then introduced to practice bringing mindful attention with equanimity to erogenous parts of the body. Sensate focus was included in both the MBCT and STEP arms as it aligned with a non-goal-oriented exercise where couples touched one another and paid attention, and it was included in the STEP arm as it is often seen as an educational tool that focuses on healthy communication between partners.

One full hour of each session was spent engaging in a guided mindfulness practice plus inquiry on practice. Mindfulness practices and exercises included are outlined in Table 2. In addition to the sexuality-specific mindfulness exercises, informations about sexual response and sexual desire were provided in the second hour of each group session (Table 2). The sex education and therapy information was the same in the two treatment arms. Participants were sent Dropbox links after each session to the audio-recorded mindfulness practices and were encouraged to set aside time for practice each day and to record their observations of the practice on a daily log in addition to whether they did the practice and for how many minutes.

Group Supportive Sex Education and Therapy

The STEP intervention included all of the educational aspects of the MBCT arm but did not include any aspect of mindfulness training or practice. Given that the STEP group was also 2.25 hr in duration and did not contain any mindfulness exercises, the additional hour was used to actively solicit participant discussion and support in the educational material. Prochaska and Norcross (2013) define supportive therapy as aiming “to strengthen the patient’s coping, provide encouragement, and prevent regression.” (p. 70). The STEP group included peer supportive treatment by weaving into the facilitator-administered education core supportive therapy techniques including validation, empathy, and encouragement of the group members by one another. In the early sessions, the facilitators proactively elicited more supportive interactions, and over time, they modeled participants providing validation and support to one another.

Twenty percent of all group sessions were audio recorded to be coded and examined for treatment adherence. To establish coding accuracy, two trained research assistants, who were not involved in the treatment, coded the same five randomly selected recordings and used a modified seven-item MBCT Adherence Scale (Segal, Williams, et al., 2002) that assessed group cohesion, provision of treatment rationale, adherence to skills, home practice setting, home practice review, adherence to treatment modality, and commitment to practice. Each of the seven items was rated on a scale as follows: 0 (*no evidence for item*), 1 (*slight evidence for item*), or 2 (*definite*

evidence for item) by each coder (with a total score of 0–14). The lead author then reviewed coders’ coding and provided feedback to clarify scoring. Feedback continued until the two coders reached agreement, which took four recordings to achieve. Following this initial step of both coders reviewing the same recordings and receiving feedback, all subsequent recordings were scored by one of the two coders. A total of 18 recordings were coded for treatment adherence. Adaptations were made to this scale to allow adherence testing for 20% of the STEP sessions also.

Measures

Demographic and Clinical Characteristics

At the baseline assessment we administered a variety of demographic questions (e.g., age, ethnicity, education, sexual orientation, relationship status, and duration) and clinical questions (e.g., duration of low desire and arousal, past treatments tried, and medications) to characterize our participants and test participant equivalence in the two arms.

Sexual Desire and Arousal

Desire/arousal was a coprimary end point and was measured with the 14-item Sexual Interest/Desire Inventory (SIDI; Clayton et al., 2006), which, in addition to measuring sexual desire and interest, provides a comprehensive index of other aspects of sexuality related to desire such as arousability, responsive desire, initiation, affection, sexual thoughts, and response to erotica. Total scores range from 0 to 51, with higher scores indicating greater sexual desire and response. Moreover, the SIDI items are relevant regardless of whether participants are currently sexually active or not. The SIDI has excellent internal consistency (Cronbach’s $\alpha = 0.90$), and excellent concurrent validity, correctly identifying 94.7% of women with hypoactive sexual desire disorder using a cutoff score of 33 (Clayton et al., 2010). In this sample, Cronbach’s α at pretreatment was .82.

Sex-Related Distress

This coprimary end point was measured with the 13-item Female Sexual Distress Scale-Revised (FSDS-R; Derogatis et al., 2008). Total scores range from 0 to 52, with higher scores indicating greater distress. The FSDS-R has been found to have excellent concurrent validity, correctly identifying 92.7% of women with hypoactive sexual desire disorder using a cutoff score of 11 (Derogatis et al., 2008). Like the SIDI, the FSDS-R is valid for participants regardless of whether they are or are not currently sexually active. In this sample, Cronbach’s α at pretreatment was .93.

Relationship Assessment Scale

The Relationship Assessment Scale (RAS) was designed to assess an individual’s satisfaction with their relationship, the first secondary end point in this study (Hendrick et al., 1998). It consists of seven items, each rated on a 5-point Likert scale, and the total mean score ranges between 1 and 5 with higher scores reflecting greater satisfaction. It is suitable for use with any individuals who are in an

¹ Treatment manuals available upon request of the first author.

intimate relationship, such as married couples, cohabiting couples, engaged couples, or dating couples. The psychometric properties of the instrument are strong (Hendrick, 1988; Hendrick et al., 1998; Vaughn & Matyastik Baier, 1999). In this sample, Cronbach's α at pretreatment was .89. The RAS was only collected from women in romantic relationships.

Ruminative Reflection Questionnaire

Our second secondary outcome focused on rumination, as measured by the Ruminative Reflection Questionnaire (RRQ; Trapnell & Campbell, 1999). The original scale consists of 2 subscales, 12 items on Rumination and 12 items on Reflection, all of which were asked on a 1–5 Likert scale. *Rumination* is defined as “self-attentiveness motivated by perceived threats, losses, or injustices to the self”; *reflection* is defined as “self-attentiveness motivated by curiosity or epistemic interest in the self.” We adapted the rumination subscale of the questionnaire to reflect ruminations about sex. For example, Item 1, “My attention is often focused on aspects of myself I wish I'd stop thinking about” was adapted to “My attention is often focused on aspects of my sexuality or sex life I wish I'd stop thinking about.” The total mean score ranges from 1 to 5 and higher scores indicate more rumination. In this sample, Cronbach's α at pretreatment was .93.

Global Impression of Change

The Patient Global Impression of Change was an exploratory outcome measuring clinical significance of the improvements and was adapted from a measure developed by Hurst and Bolton (2004). It measured the extents to which one's sexual desire and overall quality of sexual life have changed following treatment; as well, this questionnaire assessed patient satisfaction toward the treatment received. Four questions were asked as follows: (a) To what extent do you believe that there has been an improvement in your sexual desire following the treatment you received in the course of this study? (b) To what extent do you believe that there has been an improvement in your sexuality, sexual relationship, or sexual response following the treatment you received over the course of this study? Answer options for these two questions ranged from complete recovery to deterioration. (c) To what extent did participating in the group contribute to this improvement in your sexuality, sexual relationship, or sexual response? and (d) Please rate on a scale from 0 to 10 your global satisfaction toward the treatment you received. Answers for these two questions ranged from 0 (*not at all*) to 10 (*completely*) for Question 3 and from 0 (*completely dissatisfied*) to 10 (*completely satisfied*) for Question 4.

Treatment Credibility

Immediately after their first treatment session, participants in both groups were asked, “To what extent do you think the treatment you will receive is logical in terms of alleviating your sexual desire concerns?” This item was rated on a 0 (*not at all logical*) to 10 (*completely logical*) scale. A second item asked, “To what extent do you expect improvement in your sexual desire as a result of this treatment?” and was rated from 0 (*no improvement*) to 10 (*complete improvement*). Treatment credibility was assessed after the first of the eight sessions so that participants had some information about

the treatment to estimate their own beliefs about how well it would work (Boot et al., 2013). A mean score of the two questions was computed and ranged from 0 to 10.

Homework Completion

Participants in both treatment arms received an online checklist at posttreatment to report the completion of exercises assigned each week of the treatment. In the MBCT group, participants were also asked to report the number of days per week and minutes per day they practiced the assigned mindfulness homework for each week of the treatment. They were also asked to report which exercises they chose to practice for weeks that gave participants options from which to choose.

Data Analysis Plan

Power Analysis

We conducted a power analysis (Faul et al., 2007) based on the findings for the coprimary end points of sexual desire and arousal, and sex-related distress from the pilot study that preceded the present study (Paterson et al., 2017). This analysis indicated we would need $n = 46$ women in each of the two groups for power = .95, $\alpha = .05$, and Cohen's $d = 0.50$.

Analysis of Primary and Secondary Outcomes

Effects of treatment were analyzed using a multilevel mixed-model analysis evaluating main effects of the within-group factor based on four measurement points (pretreatment, posttreatment, 6-month, and 12-month follow-up) and the between-group factor comparing two treatments (STEP vs. MBCT), as well as the interaction of the within- and between-subject factors (changes from pretreatment to posttreatment time points were compared between the two groups). Four models were examined, one for each primary and secondary outcome. In addition to main and interaction effects, effect sizes and confidence intervals were also calculated.

Missing Data

This study used an intent-to-treat approach, a method that is more conservative and does not compromise the comparability of groups achieved through randomization (Newell, 1992). Multilevel modeling analyses employed a full-information maximal likelihood estimation technique to deal with missing data at posttreatment and follow-up which is considered a “state of the art” method of modern missing data approaches (Schafer & Graham, 2002). In addition, a comparison of participants who dropped out of the study by the posttreatment follow-up to those who remained on found no significant differences on any baseline participant characteristic variables (Table 1).

Results

Session Attendance and Homework Completion

A total of 75.4% of women in the MBCT group and 73.2% women in the STEP group attended all eight in-person sessions, and

Table 3*Weekly Minutes of Mindfulness Practice Completed by Participants in MBCT Arm*

Weekly meditation	Minutes (<i>M</i> ± <i>SD</i>)	Minimum	Maximum
Week 1 (Body scan)	153.8 ± 66.2	40.0	280.0
Week 2 (Body scan)	156.2 ± 77.5	20.0	420.0
Week 3 (Stretch and breath)	142.9 ± 61.3	20.0	280.0
Week 4 (Sitting meditation)	138.4 ± 68.7	5.0	280.0
Week 5 (Working with difficulty)	126.7 ± 67.1	20.0	375.0
Week 6 (Walking meditation)	123.4 ± 62.9	15.0	306.0
Week 7 (Meditations of their choosing)	127.3 ± 60.9	30.0	274.0

Note. MBCT = mindfulness-based cognitive therapy group.

86.0% of women in the MBCT group and 87.5% of women in the STEP group completed six or more sessions.

There was no significant difference in the completion of sexuality-related homework exercises between groups, with the average homework completion being 81.6% for the MBCT group and 77.4% for the STEP group. Table 3 summarizes the minutes per week of mindfulness practice completed by the MBCT group participants.

Treatment Manual Adherence and Treatment Credibility

For both the 9 MBCT group sessions and the 9 STEP group sessions that were randomly selected and scored for adherence to the treatment manual by 1 of the 2 independent coders, the average adherence scores were 14, indicating that the coders saw definite evidence of adherence to the treatment manual on all 7 dimensions.

Mean treatment credibility, which was measured after the first session, was 6.80/10 (*SD* = 1.46) for the MBCT group, and 7.01/10 (*SD* = 1.24) for the STEP group, indicating a moderate to high level of credibility in the treatment. Treatment credibility was not significantly different between arms, $t(138) = -0.90$, $p > .05$, Cohen's $d = .16$.

Table 4*Primary and Secondary Outcomes by Time of Assessment and Treatment Group*

Outcome and group	Baseline <i>M</i> (<i>SD</i>)	Posttreatment <i>M</i> (<i>SD</i>)	6-month follow-up <i>M</i> (<i>SD</i>)	12-month follow-up <i>M</i> (<i>SD</i>)
Sexual desire and arousal (SIDI) ^a				
STEP	15.41 (6.66)	23.63 (9.91)	25.57 (10.77)	26.76 (11.51)
MBCT	16.99 (8.16)	27.91 (9.81)	28.08 (10.44)	29.85 (9.78)
<i>n</i> (%) ≤ 33 ^d	140 (98.6)	96 (76.8)	71 (66.4)	56 (65.7)
Sexual distress (FSDS-R) ^b				
STEP	32.22 (7.99)	25.68 (10.24)	23.87 (11.83)	21.60 (11.95)
MBCT	32.97 (11.27)	22.88 (10.73)	23.02 (11.54)	18.92 (9.63)
<i>n</i> (%) ≥ 11 ^d	139 (98.6)	115 (92)	99 (85.3)	90 (82.6)
Relationship satisfaction (RAS) ^c				
STEP	4.14 (.74)	4.03 (.89)	4.24 (.85)	4.26 (.73)
MBCT	3.87 (.80)	4.27 (.71)	4.16 (.75)	4.17 (.72)
Rumination about sex (RRQ) ^c				
STEP	3.00 (.79)	2.71 (.92)	2.81 (1.01)	2.47 (.99)
MBCT	3.08 (.96)	2.60 (.83)	2.32 (.72)	2.23 (.72)

Note. STEP = supportive sex education and therapy group; MBCT = mindfulness-based cognitive therapy group; SIDI = Sexual interest and desire inventory; FSDS-R = Female sexual distress scale-revised; RAS = relationship assessment scale; RRQ = ruminative reflection questionnaire. Possible range of scores: ^a 0 to 51. ^b 0 to 52. ^c 1 to 5. ^d Number (and percentage) of respondents who meet the clinical cutoff score for a sexual desire disorder.

Effects of Treatment on Primary Outcomes of Sexual Desire and Arousal, and Distress

Table 4 contains mean values and standard deviations for each outcome variable by treatment arm and time of assessment. Results for random coefficient analyses are reported in Table 5 along with Cohen's d s.

Analysis of sexual desire and arousal as measured by the SIDI showed an increase in desire between pretreatment (t1) and post-treatment (t2) as well as between pretreatment and 6-month (t3) and 12-month follow-up (t4), with large effect sizes ($d = -1.29$, -1.44 , and -1.60 , respectively). However, there was no significant time by group interaction (d s < 0.37) indicating that the increases in sexual desire and arousal were not significantly different in the two arms (Figure 2).

Sexual distress as measured by the FSDS-R total score showed significant improvement (scores decreased) from t1 to all three posttreatment time comparisons (large effect sizes: $d = 0.83$, 0.90 , and 1.17 , respectively). The interactions of time by group for t1–t2 and t1–t4 comparisons were significant, revealing that MBCT led to over a 3-point reduction in sexual distress compared to STEP (the FSDS-R maximum score is 52). Interaction effects were small/medium in size ($d = -0.34$ and -0.36 , respectively).

The amount of overlap between desire and arousal and distress was evaluated by correlating SIDI and FSDS-R scores at each time point. The correlation coefficients ranged from -0.44 (at t1) to -0.61 (at t3) showing the amount of shared variance ranging from 19% to 37% and thus indicating that the two variables are not redundant.

Effects of Treatment on Secondary Outcomes of Relationship Satisfaction and Rumination

Participants also reported significant improvements in relationship satisfaction, as measured by the RAS, from t1 to all three posttreatment time comparisons (small effect sizes: $d = -0.18$, -0.20 , and -0.17 , respectively). The interactions of time by group for t1–t2, t1–t3, and t1–t4 comparisons were also significant, revealing that the MBCT group improved by 0.3–0.4 points

Table 5

Time and Group Comparisons and Interaction Effects From Random Coefficient Analysis Models for the Outcome Measures at Pretreatment (t1), Posttreatment (t2), 6-Month Follow-Up (t3), and 12-Month Follow-Up (t4)

Variable	<i>b</i>	<i>SE</i>	<i>p</i>	<i>d</i>	95% CI for <i>b</i>
Model for sexual desire and arousal: SIDI					
Constant	15.543	1.093	<.001***		13.39, 17.70
Time (t1–t2)	–9.572	.827	<.001***	–1.29	–11.12, –7.95
Time (t1–t3)	–10.680	.871	<.001***	–1.44	–12.39, –8.97
Time (t1–t4)	–11.862	.885	<.001***	–1.60	–13.60, –10.12
Group	2.822	1.304	.032*	0.38	.24, 5.40
Time (t1–t2) × Group	2.785	1.653	.093	0.37	–.47, 6.04
Time (t1–t3) × Group	1.292	1.742	.459	0.17	–2.13, 4.72
Time (t1–t4) × Group	1.418	1.771	.424	0.19	–2.06, 4.90
Model for sexual distress: FSDS-R					
Constant	32.245	1.219	<.001***		29.84, 34.65
Time (t1–t2)	8.055	.802	<.001***	0.83	6.48, 9.63
Time (t1–t3)	8.736	.824	<.001***	0.90	7.12, 10.36
Time (t1–t4)	11.357	.841	<.001***	1.17	9.70, 13.01
Group	–1.408	1.524	.357	–0.15	–4.42, 1.60
Time (t1–t2) × Group	–3.285	1.604	.041*	–0.34	–6.44, –.13
Time (t1–t3) × Group	–1.784	1.647	.279	–0.18	–5.03, 1.45
Time (t1–t4) × Group	–3.464	1.682	.040*	–0.36	–6.77, –.16
Model for relationship satisfaction: RAS					
Constant	4.118	.107	<.001***		3.91, 4.33
Time (t1–t2)	–.140	.057	.015*	–0.18	–.25, –.03
Time (t1–t3)	–.155	.058	.008**	–0.20	–.27, –.04
Time (t1–t4)	–.136	.059	.022*	–0.17	–.25, –.02
Group	–.071	.137	.602	–0.09	–.34, .20
Time (t1–t2) × Group	.366	.114	.001**	0.47	.14, .59
Time (t1–t3) × Group	.280	.115	.016*	0.36	.05, .51
Time (t1–t4) × Group	.391	.118	.001**	0.50	.16, .62
Model for rumination about sex: RRQ					
Constant	3.004	.102	<.001***		2.80, 3.21
Time (t1–t2)	.365	.070	<.001***	0.42	.23, .50
Time (t1–t3)	.447	.072	<.001***	0.51	.30, .59
Time (t1–t4)	.604	.073	<.001***	0.69	.46, .75
Group	–.201	.125	.111	–0.23	–.45, .05
Time (t1–t2) × Group	–.205	.141	.147	–0.24	–.48, .07
Time (t1–t3) × Group	–.570	.145	<.001***	–0.65	–.85, –.29
Time (t1–t4) × Group	–.374	.146	.011*	–0.43	–.66, –.09

Note. SIDI = Sexual interest/desire inventory; FSDS-R = Female sexual distress scale-revised; RAS = Relationship assessment scale; RRQ = Ruminative reflection questionnaire; t1 = pretreatment; t2 = posttreatment; t3 = 6-month follow-up; t4 = 12-month follow-up; group = STEP (reference) versus MBCT; CI = confidence interval; *d* = Cohen's *d* based on the multilevel model estimates. All models had random intercepts.

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

more than STEP group on the RAS scale (the RAS ranges from 1 to 5). Interaction effects were of medium size ($d = 0.47, 0.36,$ and 0.50 , respectively).

Rumination about sex, as measured by the RRQ, significantly improved (scores decreased) for all participants from t1 to all three posttreatment time comparisons (medium effect sizes: $d = 0.42, 0.51,$ and 0.69 , respectively). As well, the interactions of time by group for t1–t3 and t1–t4 comparisons were significant revealing that the MBCT group improved by 0.4–0.6 points more than STEP group (the RRQ ranges from 1 to 5) between these points of measurement. Interaction effects were medium in size ($d = -0.65$ and -0.43 , respectively).

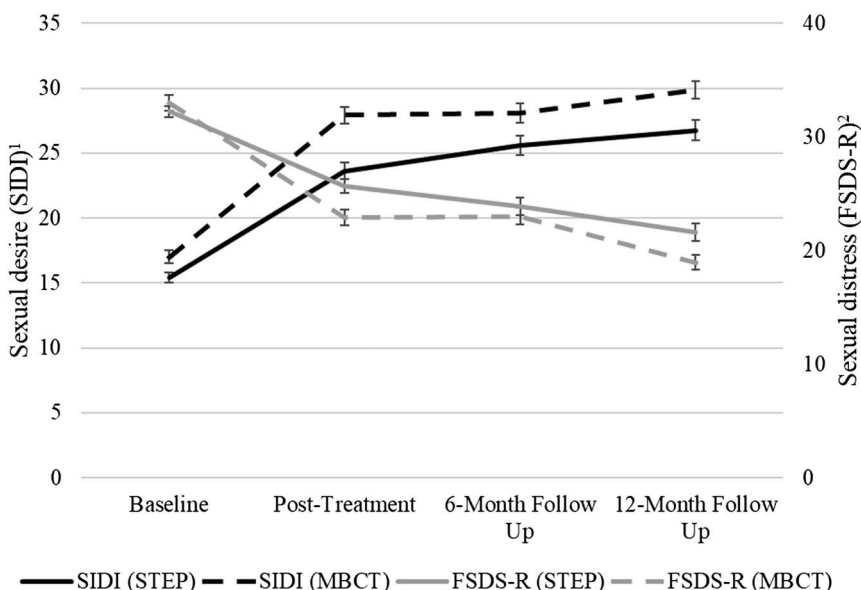
Clinical Significance: Patient Global Impression of Change

Women's ratings of global impressions of change were assessed at posttreatment, with no group differences found in treatment

satisfaction or in attribution of group participation to improvement in sexuality (Table 6). Similarly, the ratings of improvement in levels of sexual desire and improvement in sexuality showed no group differences. A total of 58.4% in the MBCT group and 44.1% in the STEP group reported moderate or great improvements in sexual desire (40.0% in MBCT and 55.9% in STEP reported small or no improvement, no one reported complete recovery and one person in MBCT reported deterioration). A total of 56.7% in the MBCT arm and 48.5% in the STEP group reported moderate or great improvement in overall sexuality (42.3% in MBCT and 51.5% in STEP reported small or no improvement, no one reported complete recovery or deterioration).

Impact of t1–t2 change in primary outcomes on the above measures was examined by regressing each clinical significance measure on t1 and t2 measures of desire and arousal (SIDI) and sexual distress (FSDS-R). Pre to posttreatment improvements in desire and arousal, and decreases in distress, respectively, predicted greater global satisfaction with treatment ($b = .032, p = .015,$ and

Figure 2
Sexual Desire and Sexual Distress by Time of Assessment and Treatment Group



Note. Possible range of scores: ¹0–51; ²0–52.

$b = -.035, p = .010$); greater improvement in overall desire and arousal symptoms ($b = .067, p < .001$, and $b = -.048, p < .001$); and greater improvement in overall sexuality, sexual relationship, or sexual response ($b = .050, p < .001$ and $b = -.044, p < .001$). Pre to posttreatment changes in desire and arousal, and distress did not predict women’s ratings of the extent to which the group contributed to improvements.

Discussion

The goals of this study were (a) to evaluate the effects of MBCT versus supportive sex education (STEP) on sexual desire and arousal and sex-related distress in women with SIAD and (b) to evaluate if the effects were maintained at 6- and 12-month follow-up. Sexual desire and arousal significantly improved at each time point relative to baseline, with large effect sizes, but with no significant difference between MBCT and STEP. Sexual distress also improved at each posttreatment time point with large effect sizes, and with significantly greater reductions for the MBCT arm relative to the STEP arm. Relationship satisfaction significantly improved at each

posttreatment time point, with small effect sizes, while rumination about sex improved significantly, with medium effect sizes, with both outcomes showing significantly greater improvements for the MBCT arm. Treatment satisfaction and overall improvements in sexuality, satisfaction, and desire were notable, with no significant differences between the two groups. About half of participants reported moderate or great improvement in sexual desire, 58.4% for the MBCT arm and 44.1% for the STEP arm. Importantly, gains were maintained at follow-up.

Impact of Treatment on Sexual Desire and Arousal

Both treatments produced significant increases in sexual desire and arousal that corresponded with large effect sizes ($d > -1.29$). By comparison, a recent review of the effect sizes of pharmaceutical trials for women with low desire revealed a mean effect size of 1.0 for flibanserin, 0.9 for bremelanotide, and 0.9 for transdermal testosterone (Pyke & Clayton, 2018). The effect sizes for SIDI scores in the present study were higher than both the effect sizes associated with sexual pharmaceuticals and those found in a pilot study of the same MBCT ($d = 0.94$; Paterson et al., 2017). Collectively, these data provide support for both our tested interventions in addressing symptoms of SIAD in women. The improvements in sexual desire and arousal did not cross the clinical threshold, however.

Improvements in desire and arousal were retained when women were reassessed 6 and 12 months after the completion of the groups, suggesting that the initial changes to women’s desire were lasting, possibly owing to women’s ongoing practicing of the acquired skills. That there were no group differences on the desire/arousal primary outcome points to the possibility of common factors. Drawing from the Incentive Motivation Model (Toates, 2009), it is possible that mindfulness training increased women’s attention to

Table 6
Global Impression of Change at Posttreatment by Treatment Group

Measure and group	M(SD)
Satisfaction ^a	
STEP	8.43 (1.27)
MBCT	8.25 (1.47)
Group contribution to improvement ^a	
STEP	7.94 (2.04)
MBCT	7.84 (1.79)

Note. Higher scores indicate more satisfaction and improvement. Possible range of scores: ^a 0–10.

sexual cues, and/or increased their interoceptive awareness of their own body sensations, as evidenced by the positive impact of mindfulness training on reaction time to noticing physiological sensations following sexual stimuli (Silverstein et al., 2011). Mindfulness likely also removed psychological barriers to sexual arousal, in part by decreasing rumination and negative affectivity (e.g., Lindsay & Creswell, 2017). Each mindfulness practice was followed by a structured inquiry (Crane et al., 2015) which combined may have led to improvements in attention that facilitated interoception, sexual arousal, and responsive sexual desire.

The STEP group may have also led to improvements in attention that directly facilitated desire and arousal. Education alone (delivered over six weekly group sessions) intended to correct women's inaccurate beliefs about sexual desire and sexual health has been found to improve sexual desire among women diagnosed with a desire disorder (Kaviani et al., 2014), and similar beneficial effects of education alone have been found in women with sexual pain (Masheb et al., 2009). Inaccurate beliefs about sexuality are common among women with low desire (Carvalho & Nobre, 2010; Nobre, 2009) and negative thoughts lead to greater difficulty paying attention to sexual stimuli, which further inhibits sexual response and blocks responsive desire (Nobre, 2009). In addition to the provision of information, participants in the STEP arm were encouraged to provide support, empathy, and validation to other group members through modeling by the facilitators, consistent with the goals of supportive expressive therapy (Leichsenring & Leibing, 2007). It is likely that this resulted in group participants feeling less isolated and less different from others due to their low desire, and relief that other women shared similar experiences (Hinchliff et al., 2009). Though these are typically described as treatment nonspecific effects, and therefore applicable to both treatment arms, it may be that these elements became an explicitly active (therapeutic) component of the STEP arm. Supportive psychotherapy has been recommended as an active comparison group in psychological treatment outcome studies for sexual dysfunction (Pyke & Clayton, 2015a) because it elicits the same nonspecific factors that structured psychological therapies elicit (Brotto, et al., 2017).

Based on the Contextual Model of why psychotherapy works (Wampold, 2015), there may have been additional nonspecific routes through which MBCT and STEP led to improved sexual desire and arousal. The initial bond of trust established between women and their facilitator in Session 1 (which was the same in both arms) may have created an alliance that participants felt supported by throughout the sessions. In addition, positive expectations may account for treatment gains, and there was no significant difference in participant expectations for improvement between the two arms.

Impact of Treatment on Sexual Distress

Both treatments showed a significant and lasting decrease in sexual distress associated with large effect sizes, and these improvements were significantly greater with MBCT. Given that the cultivation of self-compassion was explicitly woven into the various mindfulness exercises taught by the facilitators, and because evidence that self-compassion practices in adapted/modified MBCT mediate improvements in sexual distress (Brotto et al., 2020), we speculate that the training in eliciting kindness toward oneself contributed to the group differences in distress.

The effect sizes from t1 to follow-up time points across the STEP and MBCT treatments ranged from $d = 0.83$ to 1.17 , whereas effect sizes across the flibanserin trials were all less than $d = .90$, with most ranging between 0.40 and 0.70 (Pyke & Clayton, 2018). Even the 3-point mean difference between the two active treatment groups is notably larger than the largest difference across studies between active treatment and placebo on FSDS-R scores for flibanserin (Pyke & Clayton, 2018). The 12-month FSDS-R scores in the MBCT and STEP groups (18.92 and 21.6 , respectively), although still in the clinical range, are appreciably lower than the lowest scores obtained in trials of flibanserin (23.4) and bremelanotide (22.0 ; Pyke & Clayton, 2018).

Impact of Treatment on Relationship Satisfaction

A total of 85% of participants were in a relationship at the time of the study. Both treatment arms showed modest improvement in relationship satisfaction at all three follow-up time points with small effect sizes ($d = -0.17$ to -0.20), and improvements were significantly greater in the MBCT group with a medium effect size ($d = 0.36-0.50$). Most of the exercises in both arms were focused on the individual participant and not her partner, and yet participants' reports of feeling satisfied in their relationships increased. It is possible that the improvements in sexual desire/arousal and distress account for these improvements in relationship satisfaction.

Indeed, although sexual distress is related to relationship dissatisfaction in women (Vannier & Rosen, 2017), sexual functioning is associated with relationship satisfaction (Muise et al., 2013). A daily diary study found that women's self-ratings of relationship quality on 1 day predicted sexual activity the next day, and also predicted sexual desire (Dewitte & Mayer, 2018). Furthermore, women's relationship satisfaction predicted both their sexual desire and their sexual activity, leading these authors to state that there is a "... pervasiveness of women's (daily and general) satisfaction in determining the antagonists, motivators, and gains of sexual activity" (Dewitte & Mayer, 2018, p. 1683). The only couples-based exercise in our treatments was sensate focus (Weiner & Avery-Clark, 2014) and it is possible that participants continued this practice even after the group sessions were complete, though because it was introduced in the final session, facilitators did not have the opportunity to check in with participants. It has been recognized that although mindfulness is an individual practice, it may act as a moderator for the stress that arises when in conflict with a partner, and thus has the outcome of positively influencing satisfaction in a relationship (McGill et al., 2016). One implication of these findings is that mindfulness-based treatments may be recommended over general sex therapy, especially to address the negative impacts of SIAD on relationship satisfaction.

Impact of Treatment on Rumination

Rumination significantly decreased from pre to all three posttreatment time points for women in both the MBCT and STEP arms with medium effect sizes, and the effects were greater for women in the MBCT arm, as indicated by a medium-sized interaction effect. These findings mirror another randomized trial comparing mindfulness to relaxation training which found that both treatments reduced rumination, but that effects were magnified in the mindfulness group ($d = 0.30$ for relaxation; $d = 0.57$ for mindfulness; Jain et al., 2007).

Moreover, the magnitude of improvements in rumination we saw across time points ($d = 0.42\text{--}0.69$) was comparable to another study using the same measure ($d = 0.57$; Paterson et al., 2017).

Women with sexual dysfunction are particularly prone to negative cognitions (Carvalho & Nobre, 2010; Nobre, 2009) and, for some, these can have a ruminative quality. Although the associations between ruminations about sex and SIAD have not been studied, rumination does predict sex-related distress (Pascoal et al., 2020), and as such, targeting ruminations about sex is relevant in the treatment of sexual dysfunctions. The tendency to have especially negative and repetitive worries about sexuality and concerns about impact on a partner might take a toll on a woman's ability to pay attention to sexual stimuli, which further inhibits sexual response. Training in metacognition, as a result of the repeated practicing of mindfulness of thoughts, and the associated cultivation of acceptance, may have contributed to reduced rumination. In the treatment of depression, a meta-analysis of 11 studies found a moderate reduction in rumination, and these effects were likely mediated by acceptance (Perestolo-Perez et al., 2017). We are not aware of another study that has evaluated the effects of a psychological treatment on sex-related rumination; therefore, our findings should be taken as provisional and in need of replication.

Limitations and Strengths

Placebo effects, or changes in an outcome variable that are not due to the active ingredients of the intervention, are pervasive in psychological treatment outcome studies (Boot et al., 2013; Wampold & Imel, 2015) and were likely active in both treatment arms. Future studies should aim to evaluate (and perhaps manipulate) such expectations and examine their impact on improvements in sexual desire and distress.

The participants were highly educated, which limits generalizability to women of diverse socioeconomic backgrounds. All women were required to attend sessions in person, at a large metropolitan center. This would have precluded women living in rural and remote areas from attending, and thus the findings can only be generalized to women living in an urban area. Finally, 80% of the participants were White and representation from Black, Indigenous, and Persons of Color groups was minimal, also limiting generalizability.

Treatment equivalence should always be considered for this type of research. In the present study, both arms involved the same number of sessions, but the MBCT group had more homework, and the therapists for that arm received special training (not the case for the STEP arm). Because the same therapists provided treatment in the two arms, the very fact of receiving special training for only one arm only may have increased their expectations for improvement for MBCT particularly, expectations that may have been communicated directly or indirectly to the participants.

Despite these limitations, our study had numerous strengths. This is the first study to implement a randomized comparison of group MBCT to group supportive sex education for women with SIAD. Because all participants were randomized to treatment arms, they were equivalent at baseline on a number of demographic and clinical variables. In addition, we retained 77% of participants for a year and a such, provided data on the sustainable gains with these treatments. We also used a clear definition of mindfulness, and facilitators followed a structured treatment manual, in line with recommendations that have

arisen from a critical review of the mindfulness literature (Van Dam et al., 2018). Facilitators delivering the MBCT groups were well trained in MBCT and mindfulness-based stress reduction (MBSR) with personal mindfulness practices. To reduce the impact of therapist allegiance to one particular treatment, the entire pool of facilitators delivered both the MBCT and STEP treatments (but not simultaneously).

The time required to participate in the groups was significant at eight weekly sessions that were over 2 hr in duration. It should be noted that this intensive time requirement may limit the number of women able to participate, and future studies might seek online or digital adaptations to increase access.

Clinical Implications of the Findings

Because MBCT was significantly better than supportive sex education for improving sexual distress, rumination, and relationship satisfaction, our findings suggest that it might be especially recommended in cases where there is significant distress compounding the SIAD symptoms, in situations where a woman experiences high levels of rumination about her concerns, or when significant relationship discord occurs along with the low sexual desire. We recommend identifying a sexual health care provider who is trained in delivering mindfulness-based interventions, if possible. In cases where such a trained professional does not exist, we recommend that individuals consider beginning with a general mindfulness practice, as accessed through any of numerous commercially available applications.

Because group supportive sex education was as effective as MBCT for the primary SIAD symptoms, this suggests that both treatments can be recommended. It is likely that correcting misinformation about sexual desire, and providing educational information about responsive sexual desire (Basson, 2001) and incentive motivation (Toates, 2009), clarifying the effects of biased and negative thoughts, all in a supportive and validating environment with other women may be sufficient for eliciting robust and lasting improvements in sexual desire. Unfortunately, we are not aware of supportive group sex education groups outside of a research context so it may be a challenge to identify where such treatments like STEP are offered.

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