Group mindfulness-based therapy significantly improves sexual desire in women

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ABSTRACT

At least a third of women across reproductive ages experience low sexual desire and impaired arousal. There is increasing evidence that mindfulness, defined as non-judgmental present moment awareness, may improve women's sexual functioning. The goal of this study was to test the effectiveness of mindfulness-based therapy, either immediately or after a 3-month waiting period, in women seeking treatment for low sexual desire and arousal. Women participated in four 90-min group sessions that included mindfulness meditation, cognitive therapy, and education. A total of 117 women were assigned to either the immediate treatment ($n = 68$, mean age 40.8 yrs) or delayed treatment ($n = 49$, mean age 42.2 yrs) group, in which women had two pre-treatment baseline assessments followed by treatment. A total of 95 women completed assessments through to the 6-month follow-up period. Compared to the delayed treatment control group, treatment significantly improved sexual desire, sexual arousal, lubrication, sexual satisfaction, and overall sexual functioning. Sex-related distress significantly decreased in both conditions, regardless of treatment, as did orgasmic difficulties and depressive symptoms. Increases in mindfulness and a reduction in depressive symptoms predicted improvements in sexual desire. Mindfulness-based group therapy significantly improved sexual desire and other indices of sexual response, and should be considered in the treatment of women's sexual dysfunction.

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Introduction

Despite over a decade of a costly and intense search for the "female Viagra", there are no medications approved by the Food and Drug Administration or Health Canada for treatment of women's most common type of sexual difficulty, namely low sexual desire and arousal — these two phases being indistinguishable for perhaps the majority of women (Brotto, Heiman, & Tolman, 2009; Goldhammer & McCabe, 2011). This is perhaps not surprising given the abundance of data indicating that low sexual desire is strongly influenced by a woman's relationship satisfaction (Burri, Spector, & Rahman, 2013; Dennerstein, Lehert, Burger, & Dudley, 1999; Dennerstein, Lehert, Guthrie, & Burger, 2007), mood (Dennerstein et al., 2007; Shifren, Monz, Russo, Segreti, & Johannes, 2008), self-esteem (Hartmann, Heiser, Rüffer-Hesse, & Kloth, 2002),

body image (Pujols, Meston, & Seal, 2010; Seal, Bradford, & Meston, 2009), psychiatric symptoms (Kalmbach, Ciesla, Janata, & Kingsberg, 2012; Kennedy, Dickens, Eisfeld, & Bagby, 1999), and age (Dennerstein, Dudley, & Burger, 2001), while both desire and subjective arousal are minimally impacted by genital blood flow and genital congestion (Chivers & Rosen, 2010).

According to one of the largest national probability studies focused on women's sexual function, low sexual desire is experienced by the majority (75%) of older women, 39% of women aged 45-64, and 22% of younger women (Shifren et al., 2008). Among the smaller proportion of this group who are distressed and therefore meet diagnostic criteria for Hypoactive Sexual Desire Disorder (HSDD), safe, effective treatment, ideally addressing factors known to negatively influence sexual desire, is very much needed.

In the absence of pharmacotherapy options, psychological and behavior-based methods (typically small group cognitive behavioral therapy (CBT), sex therapy or both), have been the mainstay of treatment to enhance sexual desire and response. Outcome data are sparse but recent systematic reviews and meta-analysis identified evidence of benefit in both symptom severity and sexual satisfaction for women with low desire. However, quality of method,

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outcome measures, and of reporting was variable, mostly low (Berner & Günzler, 2012; Frühauf, Gerger, Schmidt, Munder, & Barth, 2013; Günzler & Berner, 2012). Mindfulness-based therapies have become increasingly used and valued since the seminal work of Kabat-Zinn in the late 1970s and 1980s, which showed benefit to chronic stress and pain from an eight week program to learn mindfulness meditation (Kabat-Zinn, 1982). Mindfulness is an age-old practice that involves paying attention, in the present moment, and in a way that cultivates non-judgment. Mindfulness-Based Stress Reduction (MBSR) has been shown to benefit many medical, psychological, and behavioral ailments (Grossman, Niemann, Schmidt, & Walach, 2004; Merkes, 2010) as well as physiological parameters including vagal tone (a proxy for general health) (Kok et al., 2013) and epigenetic changes (Bhasin et al., 2013). Of particular relevance, Mindfulness-Based Cognitive Therapy (MBCT) (Segal, Williams, & Teasdale, 2002) has been shown to benefit current anxiety (Evans et al., 2008), depression (Sipe & Eisendrath, 2012) and prevent depression relapse (Teasdale et al., 2000). Depressive symptoms are strongly linked to HSDD, and even when women with Major Depression are excluded, compared to controls, women with HSDD have more depressed and anxious thoughts, more emotional instability, and lower self-image (Hartmann et al., 2002).

As well as benefiting mood, the attention to and acceptance of the present moment (considered the fundamental premise of mindfulness) lessens both the tendency to self-criticize and to evaluate one's sexual responsiveness, and the tendency to follow distracting thoughts. A circular model of sexual response (Basson, 2000) reflects the multiple factors underlying desire for sex. Included are the recognition and attention to sexual stimuli, the ability to manage distractions (including those pertaining to self-criticism and concerns about a possible unsatisfactory outcome), and freedom from anxiety, guilt, and shame that, collectively, may inhibit sexual arousal (Laan & Janssen, 2007). Women experiencing dysfunctional arousal and desire often deny awareness of responses to sexual stimuli (subjective excitement, sexual sensations, body heat, pelvic muscle tone, etc.), even despite measurable genital response in a laboratory setting (Laan, van Driel, & van Lunsen, 2008). Mindfulness practices can not only increase awareness of sexual responses unfolding moment by moment, but also lessen judgment that the latter are insufficiently intense or in some way sub-standard. Given that distractions are major inhibitors of women's sexual arousal (Adams, Haynes, & Brayer, 1985; Carvalho, 2010; Carvalho & Nobre, 2010; Dove & Wiederman, 2000; Salemink & van Lankveld, 2006), a mindfulness approach can encourage women that distractions — often anxious or other negative thoughts arising with arousal (Nobre & Pinto-Gouveia, 2006a, 2006b) — can be treated as "mental events"; in other words, as "products of the mind" that are not necessarily accurate or needing to be believed and pursued. Instead, the erotic stimulus can be attended to. Women's need for certain requirements, recently termed contingency factors (Sanders, Graham, & Milhausen, 2008), to be met before sexual stimuli can be attended, may lessen with mindfulness practice as acceptance of the present situation, just as it is, develops. Being generally more present through the day also allows recognition of sexual cues and triggers of desire that are typically rare for women with low desire (McCall & Meston, 2006, 2007). Continued mindfulness practice may enable women to resist dwelling on the unrewarding nature of past sexual experiences that had previously contributed to ongoing unsatisfactory sexual arousal (Basson, 2001, 2003). As self-acceptance increases, it may be that the insidious pervasive harm from low body-image (Nelson & Purdon, 2011; Wiederman, 2000) and the commonly identified negative or critical self-focused attention (van Lankveld & Bergh, 2008) may also lessen.

Recent research confirms benefit to sexual difficulties from mindfulness training (as reviewed by Brotto, 2013). This has been shown not just in relatively healthy women, but also in female survivors of gynecologic cancer (Brotto, Basson, & Luria, 2008; Brotto, Heiman, et al., 2008) and women with a history of childhood sexual abuse (Brotto, Seal, & Rellini, 2012).

To explore the mechanisms by which mindfulness may affect sexual function, Silverstein and colleagues enrolled sexually-healthy women in either a 12-week mindfulness program or an education control (Silverstein, Brown, Roth, & Britton, 2011). Women were assessed on interoceptive awareness and three categories of psychological barriers (i.e., attention, self-judgment, and clinical symptoms) that interfere with attention. Low body awareness was associated with women's levels of self-judgment and clinical symptoms, and mindfulness meditation significantly improved each of these domains. On a test of reaction time, there was evidence of improved interoceptive awareness with mindfulness training that correlated with improvements in women's clinical symptoms and self-judgment. Although this was a nonclinical group, the authors concluded that when applied to the treatment of sexual dysfunctions, mindfulness might promote a more direct access to body sensations by training attention and reducing negative self-evaluation. Recent evidence that sexual arousal can be deliberately modulated depending on the focus of attention (de Jong, 2009) further supports the utility of mindfulness in sexual functioning.

The goal of the present study was to test the effectiveness of a four-session mindfulness-based cognitive behavioral sex therapy (MBCST) administered to women seeking treatment for distressing low or absent sexual desire and/or sexual arousal. Much of the previous literature on which our treatment is based stems from applications of mindfulness to other (non-sexual) clinical populations. Grossman et al. (2004) discuss a number of human characteristics that support the usefulness of mindfulness meditation as a treatment. These include: (1) that we are often unaware of our moment-to-moment experiences; (2) that we have the capacity for developing awareness of mental content; (3) that development of this sustained attention requires practice; (4) that the development of such awareness will improve lives because it can replace unconscious reactiveness; (5) that persistent non-judgmental observations of mental content will lead to greater accuracy of perceptions; and (6) that as we gain a better awareness of our responses to stimuli, we may be able to act more effectively in the world and with a greater sense of control. Each of these concepts may be applied to the individual seeking help for sexual difficulties and therefore provide a strong rationale for the hypothesized benefits of mindfulness on sexual functioning.

Despite the apparent potential for mindfulness to enhance sexual response, we are not aware of any literature prior to 2007 (Brotto & Heiman, 2007) that specifically discussed mindfulness as a treatment for sexual dysfunction. In their description of the causes of sexual dysfunction, Masters and Johnson (1970) believed that anxiety and spectatoring played a major role for both women and men, and developed sensate focus as a core aspect of therapy. Sensate focus involved the structured and progressive touching by one partner to the other as a means of improving concentration on the sensual aspects of touch and to reduce anxiety. Although Masters and Johnson did not use the term mindfulness, in part, cultivating mindfulness. However, rather than any focus on acceptance of the present moment, during sensate focus each partner is encouraged to give on-going feedback and guidance so as to find the optimal type of stimulation.

Based on findings from a previous pilot study (Brotto, Basson, et al., 2008), our primary endpoints focused on sexual desire, since difficulties with desire represent the most common form of

sexual dysfunction in women (Shifren et al., 2008), and sex-related distress—the latter of which was considered given that it is usually distress about sexual difficulties which brings women to seek treatment. For both endpoints, we predicted significant improvements with treatment. Secondary endpoints were the Female Sexual Function Index (FSFI) subscales of arousal, lubrication, orgasm, sexual satisfaction, and overall sexual functioning, as well as a more detailed assessment of arousal, mood, and relationship adjustment. We examined changes in mood, mindfulness, and amount of homework completed as predictors of change in sexual desire given the finding that changes in clinical symptoms mediate the effects of mindfulness on reaction time (Silverstein et al., 2011).

We included a delayed treatment group to test for potential expectancy effects as women waited for treatment. The therapeutic effect of an in-person detailed assessment, validation of symptoms and their sequelae on relationships and self-image, along with explanation of the many factors involved to lessen guilt and perplexity is well recognized. Whether dysfunction as well as distress would lessen was less predictable.

Methods

Participants

Women seeking treatment for sexual desire and/or arousal concerns, whether lifelong or acquired, were eligible to participate. Inclusion criteria included being aged 19—65, fluent in English, and willing to complete all four treatment sessions as well as assessment measures which consisted of both self-report questionnaires and in-session psychophysiological sexual arousal assessments (data from the sexual arousal assessment will be the focus of a separate manuscript). Women were eligible regardless of their relationship status. A diagnosis of HSDD (clinically significant absent or reduced desire for sex and lack of sexual fantasies) and/or FSAD (clinically significant absent or reduced vaginal lubrication or swelling response) according to criteria set forth in the Diagnostic and Statistical Manual of Mental Disorders, 4th edition text revised (DSM-IV-TR) (American Psychiatric Association, 2000) must have been met. Given the comorbidity of sexual complaints, women with orgasmic difficulties were also included provided this was not the primary sexual complaint. We excluded any woman with dyspareunia (painful sex) that was not relieved by the use of a personal lubricant. Among the women who were excluded, the most common reasons were: lack of clinically significant distress associated with the reduced sexual desire and/or arousal, and scheduling difficulties.

Out of approximately 150 women who the assessing clinician deemed to be candidates for the study, 139 were found to be eligible by a trained study coordinator during a telephone screen, and 120 completed their baseline assessment, with 117 women assigned to either the immediate treatment or the delayed treatment arms. Two women dropped out after assignment to group but before treatment began, leaving 48 women in the delayed treatment arm and 67 women in the immediate treatment arm, or a total sample size of $n = 115$.

Procedure

Women seeking treatment for desire and/or arousal concerns were assessed by a clinician with expertise in sexual medicine (either a psychologist, psychiatrist, or other physician with specialization in sexual medicine) working at a major sexual medicine treatment center in a large cosmopolitan city. Women who were diagnosed with HSDD and/or FSAD, and whom the clinician deemed to be likely eligible for the study, were informed about the study and provided with a one-page information sheet and invited to contact the study's coordinator. During the subsequent telephone screen, study criteria were assessed, more detail about the study procedures provided, and a consent form with a stamped self-addressed envelope forwarded. The return of a signed consent form indicated informed consent, at which time women were assigned to participate in either the immediate or the delayed treatment group. Whenever possible, we used random assignment to treatment arm, however, in approximately 50% of cases, the clinic's requirement to provide treatment in a reasonably timely manner or participants' personal schedules precluded randomization, and participants were assigned to the next group that fit their availability. Assignment was done at the end of the telephone screen once full eligibility was established. Participants were then scheduled for their first sexual arousal assessment (i.e., laboratory-based testing of psychophysiological and subjective sexual arousal to erotica), which took place in the sexual psychophysiology laboratory of the lead author. Women were also mailed a package of questionnaires and asked to return them completed prior to their sexual arousal assessment.

For women in the immediate treatment group, these same questionnaires and in-person sexual arousal assessment were repeated two to four weeks after the completion of treatment (time 2) as well as six months later (time 3). For women in the delayed treatment group, participants repeated their pre-treatment assessments twice, next received treatment, and then completed their final two assessments as per the same schedule as women in the immediate treatment arm. The post-treatment assessment delay of two to four weeks allowed women to practice the skills learned in the final treatment session for the same duration of time that they had practiced them in earlier group sessions. All procedures were approved by both the university and the hospital research ethics boards. The study was registered with ClinicalTrials.gov.

Measures

Demographic, health, and relationship-related information were obtained through investigator-derived self-report questions.

The *Sexual Interest and Desire Inventory* (SIDI) (Clayton et al., 2006) was the primary endpoint and provides a comprehensive measure of sexual desire. The SIDI is a 14-item questionnaire that includes one non-scored item assessing intercourse frequency. Possible total scores range from 0—51, with higher scores indicating more sexual interest. The SIDI has excellent internal consistency (Cronbach's $\alpha = .90$) (Clayton et al., 2006). Item-total correlations are high for 'Receptivity', 'Initiation', 'Desire-frequency', 'Desire-satisfaction', 'Desire-distress' and 'Thoughts-positive' ($r > 0.7$), good for 'Relationship-sexual', 'Affection', 'Arousal-ease' and 'Arousal-continuation' ($r > 0.5$) but poor for the orgasm item ($r = 0.1$) (Clayton et al., 2006, Clayton, Dennerstein, et al., 2010; Clayton, Goldmeier, et al., 2010). Cronbach's alpha in the current sample was 0.812.

The *Female Sexual Distress Scale* (FSDS) (Derogatis, Rosen, Leiblum, Burnett, & Heiman, 2002) was used to measure the co-primary endpoint, sexually-related distress. The FSDS is a 12-item self-report questionnaire with scores that can range from 0 to 48, where higher scores represent higher levels of distress. The FSDS has been shown to have good discriminant validity in differentiating between sexually dysfunctional and functional women, with 88% correct classification rate, and a clinical cut-off score of 15 (Derogatis et al., 2002). The FSDS has satisfactory internal consistency (ranging from 0.86 to 0.90), excellent test—retest reliability over 4 weeks (0.91), and moderate correlations with other measures of nonsexual distress. Cronbach's alpha in the current sample ($n = 115$) was 0.917.

The *Female Sexual Function Index* (FSFI) (Rosen et al., 2000) was used to test secondary endpoints. The FSFI is a 19-item self-report questionnaire that covers six sexual domains; in this study we focused on arousal, lubrication, orgasm, and satisfaction domains, as well as the total sexual functioning score. Total scores range from 2 to 36 and higher scores represent better sexual function. The FSFI has been found to have discriminant validity in discriminating between women with and without sexual complaints (Meston, 2003; Rosen et al., 2000; Wiegel, Meston, & Rosen, 2005). Cronbach's alpha in the current sample for the total FSFI was 0.894.

We administered the *Detailed Assessment of Sexual Arousal* (DASA) (Basson & Brotto, 2003) to provide a more specific assessment of self-reported sexual arousal. Subscales included "Mental excitement", "Genital tingling/throbbing", "Genital wetness", and "Pleasant genital sensations in response to direct stimulation". Cronbach alpha for the current sample was 0.884. Previous data revealed positive effects of mindfulness on self-reported genital sensations and genital wetness using this measure (Brotto, Basson, et al., 2008).

The *Beck Depression Inventory* (BDI) (Beck & Beamesderfer, 1974) allowed us to measure the potential impact of mindfulness on mood. The BDI is a 21-item self-report questionnaire that is sensitive to treatment effects on severity of depressive symptoms. Each item is rated along a 4-point scale from 0 to 3, with higher numbers reflecting increasing depressive severity, and total BDI scores can range from 0 to 63, with scores $\geq$15 denoting probable depression. In a sample of college students, the internal consistency was excellent at 0.90, and concurrent validity was good at ($r = 0.76$) (Storch, Roberti, & Roth, 2004). Cronbach's alpha in the current sample was 0.855.

The *Dyadic Adjustment Scale* (DAS) (Spanier, 1976), considered the gold-standard in measuring relationship adjustment, was administered to track any changes in relationship satisfaction. It consists of 32 items measuring four domains, Dyadic Consensus, Dyadic Satisfaction, Dyadic Cohesion, and Affectional Expression. Total score range is from 0—151, with higher scores indicating higher levels of dyadic adjustment. Total score reliability (Cronbach's alpha) is 0.96 (Spanier, 1976), with subscales ranging from 0.94 to 0.73. Cronbach's alpha in the current sample was 0.933.

The *Five Facet Mindfulness Questionnaire* (FFMQ) (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006) was used to estimate the extent to which changes in mindfulness with treatment predicted changes in the primary endpoints. The FFMQ is a 39-item self-report questionnaire with items answered on a 5-point Likert scale ranging from 1 "never or very rarely true" to 5 "very often or always true". The five facets include: observing, describing, acting with awareness, non-judging of inner experience, and non-reactivity to inner experience. The FFMQ has been found to have adequate to good internal consistency with alphas ranging from 0.72 to 0.92 (Baer et al., 2008). Cronbach's alpha in the current sample was 0.724.

Homework compliance was rated by the group facilitators on a scale from 0 (did not complete homework/did not attend or participate in session) to 2 (notable efforts at completing homework/attending session). A rating was given for each participant at each of the four treatment sessions to provide a mean score across sessions.

Mindfulness-based cognitive behavioral sex therapy (MBCST)

We developed a four-session mindfulness-based intervention that was based upon the demonstrated efficacy of an earlier three-session intervention (Brotto, Basson, et al., 2008; Brotto, Heiman, et al., 2008). The resulting mindfulness-based cognitive behavioral sex therapy (MBCST) integrated psychoeducation about sexual response and elements of cognitive therapy together with in-session practice of mindfulness. There were four sessions in total spaced two weeks apart. Each participant was provided with a 54-page manual that contained all of the psychoeducational material along with instructions on home practices. Each session was 90 min, was led by two co-facilitators, and was comprised of four to seven women.

Session 1 provided educational information on the prevalence and known etiology of sexual desire and arousal difficulties. Mindfulness was then introduced through in-session practice of a seeing meditation (i.e., looking at a leaf or a stone, and making that object that focus of the meditation), followed by the Body Scan—a 20 min practice in which the facilitator guided participants to notice a part of her body and tune into the sensations arising in that area without any deliberate attempt to change the sensations. Following the practice, there was a group discussion in which women were encouraged to consider how such mindfulness practices might be useful for their particular difficulties with sexual desire and arousal. A review of current research on the effects of mindfulness practice on brain function followed. Homework involved daily mindfulness practice, monitoring of sexual beliefs, completing a worksheet that considered the possible contributors to her sexual desire/arousal complaints, and a body image worksheet.

Session 2 provided an opportunity for in-depth homework review, followed by education on sexual anatomy and physiology and a discussion of the circular human sexual response cycle, as described by Basson (2000, 2001, 2003) and emphasizing the responsive nature of sexual desire and the impact of prior sexual encounters on motivation for future sexual encounters. Mindfulness practice (approximately 20 min) used the breath and body as focus points. In addition to at home practice of breath and body mindfulness, participants were encouraged to carry out a body scan that included attention to their genital areas, and they were reminded to be mindful compassionately and non-judgmentally. Women were invited to include a visual component to this practice as they used a hand-held mirror to look at their own genitals. They were also asked to complete details of their own sexual response cycle at home including their own motivations to be sexual as well as a list of possible stimuli that they might find effective.

Session 3 began with an in-depth review of the home mindfulness practice followed by a discussion of Gottman's principles for satisfying relationships (Gottman, 2000), and an introduction to the cognitive behavioral model. Specifically, a sexual scenario derived from the women's own shared experiences was used to illustrate the relationship between thoughts, emotions, and behavior. A discussion of how mindfulness and cognitive therapy may complement one another followed—i.e., specifically that mindfulness might allow one to become more aware of problematic thoughts. Women were also given a description of how thoughts might be challenged, though considerably less time was spent on this skill than on mindfulness practice and rationale. In-session mindfulness practice used sounds and thoughts as the focus of attention. For home practice women were encouraged to repeat the body scan that included genital self-focus from the previous two weeks but this time incorporate some light touch to allow women to focus on sensations that arise with touch. This was framed as a non-masturbatory exercise designed to continue the mindfulness and non-judgmental awareness of the genitals and not meant to elicit sexual arousal. They were also asked to practice mindfulness of thoughts daily.

The final (4th) session was devoted to home practice review, introduction of sensate focus to be used at home with a partner, and a discussion on incorporating tools to boost sexual arousal (e.g.,

fantasy, erotica, and vibrators) during certain mindfulness practices. For women who were not currently involved in a relationship, they were encouraged to read the sensate focus material, and visualize how they might use it with a future partner. Strategies for ongoing progress and practice and potential obstacles to these were discussed. Facilitators emphasized throughout that these sessions should be considered an introduction to practices that enhance "mind skills" and represent only the beginning of a new way of thinking and being. On-going practice would allow potentially increasing sexual benefit.

Sessions were led by two trained sexual medicine facilitators (often with a third trainee present), each of whom had their own personal mindfulness practice as well as considerable clinical experience working with sexual desire and arousal concerns and using mindfulness in therapy. Prior to becoming a facilitator, this individual was required to observe at least two full groups and attend weekly supervision sessions with the team. Facilitators used a 30-page treatment manual[1] that outlined the content and addressed group process issues for each session. Mindfulness practices were led either by one of the group facilitators or projected through a CD player using previously recorded guided sessions by Kabat-Zinn (www.mindfulnesscds.com). Session contents were adapted to the particular demographics of the group as needed; for example, if a participant identified as same-sex attracted, then facilitators used language that conveyed partners may be women or men.

Data analysis

Pre-treatment group comparisons were carried out using an Independent samples *t*-test for continuous variables and with a chi-square test for categorical variables. We then used a mixed between (immediate treatment group, delayed group) −within (time 1 to time 2) Repeated Measures analysis of variance (ANOVA) to compare treatment versus delayed treatment group on effects from time 1 to time 2. When the interaction between time and group was not significant, we carried out main effects of time and group, separately. In all cases we reported effect sizes using Cohen's *d* for dependent samples from time 1 to time 2, for each treatment group separately. We used intent-to-treat analyses of all participants who provided baseline (i.e., pre-treatment) data. Data from nine women who dropped out prior to the third treatment session were carried forward from pre- to post-treatment to provide a conservative estimate of change. To examine the long-term effects of treatment (to the six month follow-up point), we next examined the full group of women (*n* = 115; those who were in the immediate treatment group as well as women in the delayed treatment arm who received treatment following the wait-list period) across three time points (immediate pre-treatment, immediate post-treatment, and six month follow-up) using a within-subjects Repeated Measures ANOVA. To examine predictors of the primary endpoint of sexual desire, we used change scores in each domain of the FFMQ, change in mood symptoms (BDI), and mean homework compliance scores using the enter method of a multiple regression analysis.

Results

Sample characteristics

Demographic comparisons among the 115 women who took part in at least one of the four treatment sessions revealed no significant pre-treatment differences between the 68 women in the

immediate treatment arm and the 47 women in the delayed treatment arm on age [$t(113) = -0.70$], relationship status [$\chi^2(4) = 1.53$], relationship duration [$t(109) = -0.73$], number of children [$t(109) = 1.21$], ethnicity [$\chi^2(6) = 3.80$], or education [$\chi^2(6) = 5.81$], all *p*'s > .05. Although all women reported complaints of low or loss of sexual desire, 71% of women in the immediate treatment arm and 72% of women in the delayed treatment arm met criteria for HSDD as defined by the DSM-IV-TR. The majority of those women had complaints that were secondary (i.e., acquired HSDD). Sixty three percent of women in the immediate treatment arm and 64% of women in the delayed treatment arm met criteria for FSAD. About a third of women in both groups met diagnostic criteria for both HSDD and FSAD at study entry. Although there appeared to be more women in the delayed treatment group who were dissatisfied with the level of closeness in their relationship (Table 1), this group difference was not statistically significant, $\chi^2(1) = 0.10$, *p* > .05. Nearly a third of the participants had previously sought treatment for their sexual difficulties, and the two most common previously sought treatments were marital/relationship therapy and systemic hormone therapy. A total of 38.6% of women (no significant differences between the groups, $\chi^2(1) = 0.13$, *p* > .05) reported a history of sexual abuse, either as a child or as an adult (Table 1). An independent samples *t*-test comparing women who had a history to those with no self-reported history of sexual abuse did not find significant group differences on pre-treatment levels of either sexual desire, $t(105) = 2.03$, or sexual distress, $t(111) = 1.40$, *p* ≥ .05.

Among the 115 who completed at least the first treatment session, six women dropped out from the study following session 2 and another three women dropped out following session 4 but prior to their post-treatment assessments, leaving a total of 106 women who completed all four treatment sessions along with the post-treatment assessments (90.6% retention rate from consented sample). An additional 11 women were lost to follow-up after the post-treatment assessment (81.2% retention rate from consented sample). The post-treatment data from these 11 women were carried forward to their follow-up assessment to provide a

Table 1
Baseline (i.e., pre-treatment) demographic measures of women assigned to the immediate treatment group (*n* = 68) and those assigned to the delayed treatment (*n* = 47) condition. Data represent means ± standard deviations.

Measure	Immediate treatment	Delayed treatment
Age (mean yrs; SD)	40.8 11.0	42.3 12.7
Relationship status		
Married/common-law	82.1%	85.1%
Dating	7.5%	6.4%
Single	10.4%	8.5%
Length of relationship (mean yrs; SD)	12.6 9.8	14.1 12.0
Ethnicity		
Euro-Canadian	79.4%	85.1%
South/East Asian	10.3%	12.8%
Other	10.3%	2.1%
Highest education		
Highschool	5.9%	14.9%
Some college	33.8%	34.0%
University degree	36.8%	36.2%
Post-graduate	23.5%	14.9%
Diagnoses (%)		
HSDD	70.6%	72.3%
FSAD	63.2%	63.8%
HSDD + FSAD	37.8%	36.2%
Dissatisfaction with relationship closeness	46.0%	62.2%
Past treatment of sexual difficulty	30.0%	27.7%
History of sexual abuse	32.8%	46.8%

Note: HSDD = Hypoactive Sexual Desire Disorder; FSAD = Female Sexual Arousal Disorder.

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[1] Available from the first author upon request.

conservative estimate of change and allow for repeated measures analyses. There were no significant differences in the proportion of women in the immediate versus the delayed treatment groups who dropped out.

An independent samples t-test was used to compare the 95 women who completed all treatment sessions and assessments at all assessment time points with the 22 women who dropped out from the study at some point after the consent process. There were no significant differences between these two groups on age, relationship length, or either primary endpoint at baseline − sexual desire or sex-related distress, p's > .05 (Fig. 1).

There were no significant differences between the women assigned to the immediate treatment arm and those assigned to the delayed treatment arm on baseline differences in sexual desire scores (SIDI), $t(107) = -0.098$, or on sex-related distress (FSDS), $t(112) = -0.162$, p's > .05. Mean scores for both groups were in the clinically significant range (Table 2). Women reported that 30% of penile–vaginal intercourse events for those in the immediate treatment arm and 27.8% of such events for those in the delayed treatment arm resulted in orgasm, $t(108) = 0.345$, p > .05. The mean level of depressive symptoms at baseline was in the non-clinical range and did not differ between groups, $t(112) = -0.304$, p > .05. Neither the individual domain scores nor the total score on

the FSFI significantly differed between the arms [arousal, $t(90) = -1.205$; lubrication, $t(90) = 0.802$; orgasm, $t(90) = 0.597$; satisfaction, $t(89) = -1.307$] and total FSFI scores were in the range comparable to women with sexual dysfunction (Rosen et al., 2000), and did not differ between the two groups [$t(82) = 0.505$], all p's > .05. There were also no significant baseline differences between the two groups on domains of dyadic adjustment [consensus, $t(109) = -0.218$; satisfaction, $t(109) = 0.032$; cohesion, $t(109) = -0.074$; and affection, $t(109) = -0.085$], all p's > .05 (Table 2).

Effects of treatment

A mixed 2 (group) by 2 (pre to post) Repeated Measures ANOVA was carried out on each of the primary and secondary endpoints followed by pairwise comparisons in cases of a significant interaction. On the primary endpoint of sexual desire (SIDI), there was a significant group by time interaction, $F(1,107) = 8.25$, $p = .005$, such that scores for women in the immediate treatment group increased from pre- to post-treatment ($d = 0.97$) and desire was not significantly changed for women in the delayed-treatment group ($d = 0.12$). On the co-primary endpoint of sex-related distress, the group by time interaction was not statistically significant,
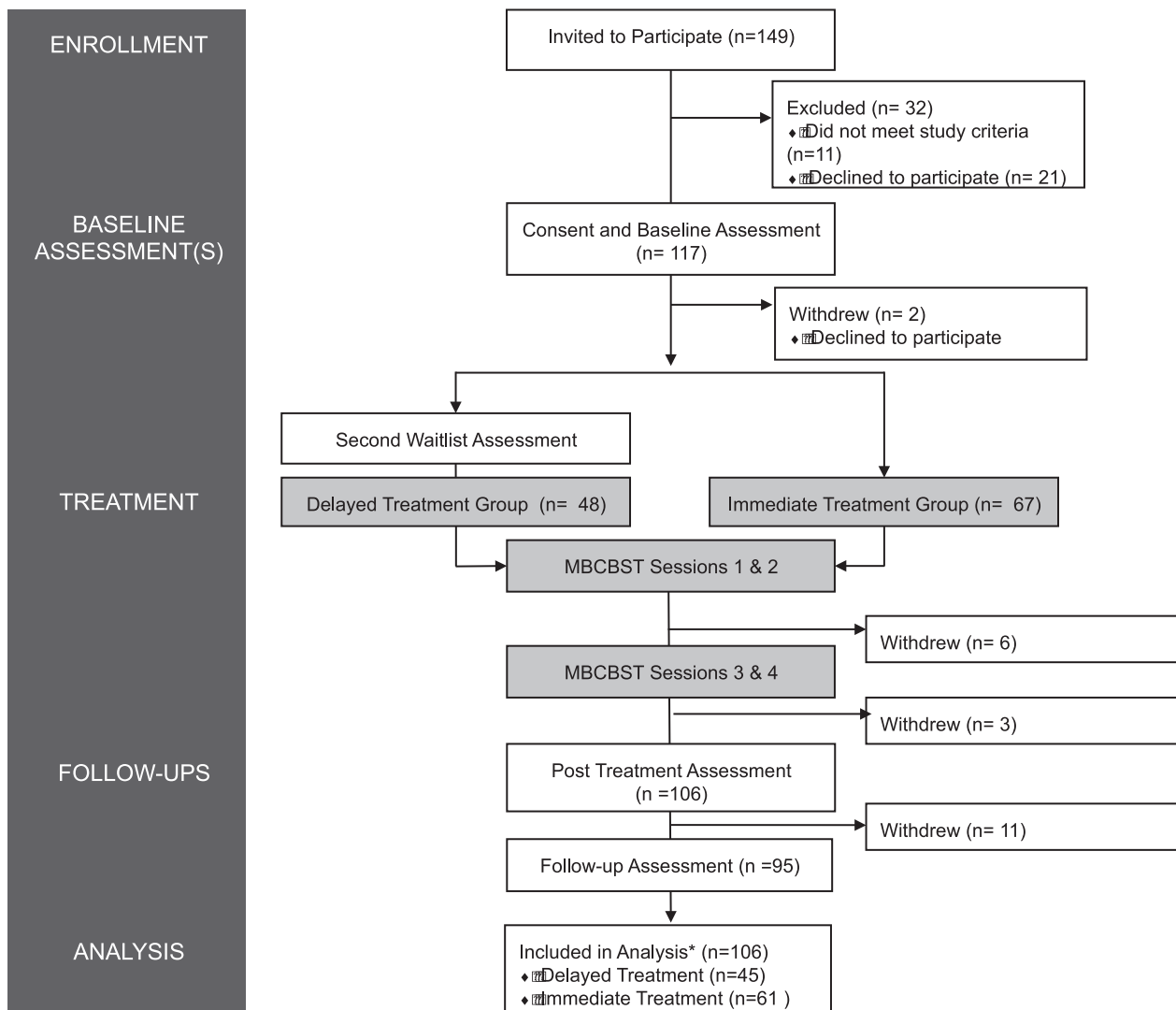

Fig. 1. CONSORT diagram.

Table 2

Sexual desire (SIDI), sexual distress (FSDS), sexual response (FSFI), sexual arousal (DASA), mood (BDI), and dyadic adjustment (DAS) in women assigned to the immediate treatment arm ($n = 68$) and those assigned to the delayed treatment ($n = 47$) condition. Data represent Means ± SD.

Measure	Immediate treatment		Delayed treatment		Scale range
	Mean	SD	Mean	SD	
SIDI**					0–51
Time 1	16.06	7.01	16.02	7.50	
Time 2	21.56	9.74	16.96	8.91	
FSDS					0–48
Time 1	29.82	9.32	30.11	9.01	
Time 2	25.78	11.38	27.24	10.98	
FSFI					
Arousal***					0–6
Time 1	2.57	1.08	3.01	1.41	
Time 2	3.41	1.38	2.59	1.38	
Lubrication**					0–6
Time 1	3.66	1.43	3.58	1.71	
Time 2	4.21	1.42	3.52	1.86	
Orgasm					0–6
Time 1	2.64	1.61	2.38	1.70	
Time 2	3.18	1.84	2.42	1.59	
Satisfaction*					0–6
Time 1	2.87	1.21	3.26	1.39	
Time 2	3.56	1.40	3.33	1.34	
Total score**					2–36
Time 1	19.55	5.35	18.94	4.88	
Time 2	23.05	6.07	19.01	5.11	
DASA					0–7
Mental excitement*					
Time 1	3.12	1.35	2.96	1.43	
Time 2	3.43	1.30	2.81	1.20	
Genital tingling*					
Time 1	2.92	1.30	2.87	1.35	
Time 2	3.27	1.29	2.71	1.32	
Genital wetness					
Time 1	2.71	1.19	2.56	1.26	
Time 2	2.94	1.20	2.50	1.27	
Genital pleasure**					
Time 1	3.25	1.45	3.33	1.65	
Time 2	3.60	1.35	3.07	1.53	
BDI					0–63
Time 1	9.62	6.94	10.02	6.97	
Time 2	8.68	7.43	9.00	6.67	
DAS					
Dyadic consensus					0–65
Time 1	49.00	7.26	48.84	8.32	
Time 2	48.58	7.30	49.51	7.54	
Dyadic satisfaction					0–50
Time 1	38.09	5.59	36.82	7.22	
Time 2	37.75	5.75	37.16	7.31	
Dyadic cohesion					0–24
Time 1	15.04	3.31	14.53	4.26	
Time 2	14.93	3.33	14.91	4.22	
Affectional expression					0–12
Time 1	6.53	2.49	6.47	2.70	
Time 2	7.15	2.46	6.62	2.61	

Note: Data for the immediate treatment group reflect assessments that were taken immediately pre-treatment (Time 1) and 2–4 weeks post-treatment (Time 2). Data for the delayed treatment group reflect assessments that were taken at two pre-treatment time points, spaced 3 months apart. Higher SIDI scores reflect more sexual desire. FSDS scores indicate more sexually-related distress. Higher FSFI scores denote better sexual functioning. Higher DASA scores reflect more sexual arousal. Higher BDI scores reflect more depressive symptoms. Higher DAS scores reflect better relationship adjustment/satisfaction. Significant time by group interaction, ***$p < .001$, **$p < .01$, *$p < .05$.

$F(1,112) = 0.45$, $p > .05$, however, there was an overall main effect of time on FSDS scores, $F(1,112) = 15.53$, $p < .001$ ($d = -0.56$), suggesting that distress lessened between the first and second assessments even without treatment. Scores on the FSDS decreased an average of 4.04 units for women who received treatment and by 2.9 units for women who did not receive treatment (Table 2).

On secondary endpoints, there was a significant group by time interaction for FSFI arousal, $F(1,81) = 23.57$, $p < .001$, with arousal improving significantly with treatment ($d = 1.07$) and actually decreasing in the no treatment arm ($d = -0.51$). On FSFI lubrication, there was a significant group by time interaction, $F(1,80) = 7.39$, $p = .008$, with scores increasing significantly with treatment ($d = 0.75$) and not changing in the absence of treatment ($d = -0.10$). For FSFI orgasm scores, the group by time interaction was not statistically significant, $F(1,81) = 2.87$, $p = .094$, but the main effect of time was statistically significant, $F(1,81) = 4.10$, $p = .046$ ($d = 0.37$). Satisfaction scores on the FSFI showed a significant group by time interaction, $F(1,80) = 5.15$, $p = .026$, with satisfaction improving significantly more in the treatment ($d = 0.80$) than in the no treatment ($d = 0.09$) group. On FSFI total scores, the group by time interaction was statistically significant, $F(1,67) = 8.88$, $p = .004$, with total scores improving significantly more for the treatment ($d = 1.04$) than the no treatment ($d = 0.02$) group.

On the DASA arousal subscales, the interaction of group and time was statistically significant on the mental excitement domain, $F(1,112) = 4.56$, $p = .035$, with scores increasing significantly in the treatment group ($d = 0.38$) and not changing in the no treatment group ($d = -0.20$). On the genital tingling domain, the group by time interaction was also statistically significant, $F(1,112) = 6.05$, $p = .015$, with scores increasing significantly in the treatment group ($d = 0.42$) and not changing in the no treatment group ($d = -0.25$). On the genital wetness DASA domain, neither the group by time interaction, $F(1,112) = 1.16$, nor the main effect of time, $F(1,112) = 0.708$, were statistically significant, p's > .05. On the DASA domain of genital pleasure, the group by time interaction was statistically significant, $F(1,112) = 8.86$, $p = .004$, with scores increasing significantly in the treatment group ($d = 0.42$) and decreasing by the same magnitude in the no treatment group ($d = -0.40$).

There was no group by time interaction on the BDI, $F(1,112) = 0.008$, $p > .05$, but a significant main effect of time, $F(1,112) = 4.69$, $p = .032$ such that depressive symptoms significantly decreased with time among the total sample from time 1 to time 2 ($d = -0.29$).

Dyadic adjustment was analyzed by each of its four subscales. Group by time interactions were not significant for dyadic consensus, $F(1,98) = 1.56$; dyadic satisfaction, $F(1,98) = 1.12$; dyadic cohesion, $F(1,98) = 1.09$; or affectional expression, $F(1,98) = 1.39$, $p > .05$ in all cases. For each of these subscales, the main effect of time was also not statistically significant, except in the case of dyadic affectional expression where there was a marginally significant improvement with time, $F(1,98) = 3.894$, $p = .051$ ($d = 0.30$).

Repeated measures analysis of treated participants at all assessment points

A one-way repeated measures ANOVA was carried out on the full sample of treated participants ($n = 115$, and included those in the immediate treatment group as well as those in the delayed treatment group using their immediate pre-treatment data) across three time points: immediate pre-treatment, immediate post-treatment, and 6-month follow-up. As shown in Fig. 2, sexual desire significantly increased across the three time points, $F(2,216) = 29.14$, $p < .001$, and an examination of effect sizes suggests that there was a medium effect from immediate pre- to immediate post-treatment, $d = 0.559$, and no significant change from post-treatment to follow-up, $d = 0.03$. Sexual distress showed a similar pattern in that the overall analysis was significant, $F(2,228) = 15.41$, $p < .001$. There was a small to moderate effect

from pre- to post-treatment, $d = -0.310$, and no change in distress from post-treatment to follow-up, $d = -0.137$ (Fig. 2).

On sexual functioning subscales of the FSFI, a one-way ANOVA across the three time points was statistically significant for arousal, $F(2,158) = 29.01$, $p < .001$ ($d = 0.63$ for pre to post, $d = -0.06$ for post to follow-up); lubrication, $F(2,154) = 10.69$, $p < .001$ ($d = 0.30$ for pre to post, $d = 0.02$ for post to follow-up); orgasm, $F(2,158) = 8.34$, $p < .001$ ($d = 0.30$ for pre to post, $d = -0.03$ for post to follow-up); sexual satisfaction, $F(2,142) = 10.18$, $p < .001$ ($d = 0.44$ for pre to post, $d = -0.01$ for post to follow-up); and FSFI total scores, $F(2,116) = 17.42$, $p < .001$ ($d = 0.58$ for pre to post, $d = -0.13$ for post to follow-up) (Fig. 3).

Subscales on the DASA were next analyzed across the three time points on the full sample. The overall analysis was significant for the mental excitement subscale, $F(2,228) = 10.25$, $p < .001$, with scores increasing from pre- to post-treatment ($d = 0.53$), and no effect from post-treatment to follow-up ($d = -0.16$). A similar effect was observed on the genital tingling subscale, $F(2,228) = 12.10$, $p < .001$, with scores increasing from pre- to post-treatment ($d = 0.53$), and no effect from post-treatment to follow-up ($d = -0.06$). The overall ANOVA for genital wetness scores was statistically significant, $F(2,228) = 8.954$, $p < .001$, with scores increasing from pre- to post-treatment ($d = 0.44$), and no effect from post-treatment to follow-up ($d = 0.02$). Genital pleasure also significantly increased with treatment, $F(2,224) = 13.715$, $p < .001$, with scores increasing from pre- to post-treatment ($d = 0.53$), and no change from post-treatment to follow-up ($d = 0.01$) (Figs. 4 and 5).

Depressive symptoms showed a significant overall reduction across the three time points, $F(2,228) = 7.59$, $p = .001$, though the effect size was small both from pre- to post-treatment ($d = -0.12$) as well as from post-treatment to follow-up ($d = -0.13$).

None of the subscales of the Dyadic Adjustment Scale showed a significant one-way repeated measures ANOVA when all three time points were examined [consensus, $F(2,176) = 0.458$; satisfaction, $F(2,176) = 1.794$; cohesion, $F(2,176) = 0.121$; and affection, $F(2,176) = 2.720$] all p's > .05.

Multiple regression: predicting improvements in sexual desire

We used change in each of the five mindfulness facets of the FFMQ, change in mood symptoms, and homework compliance
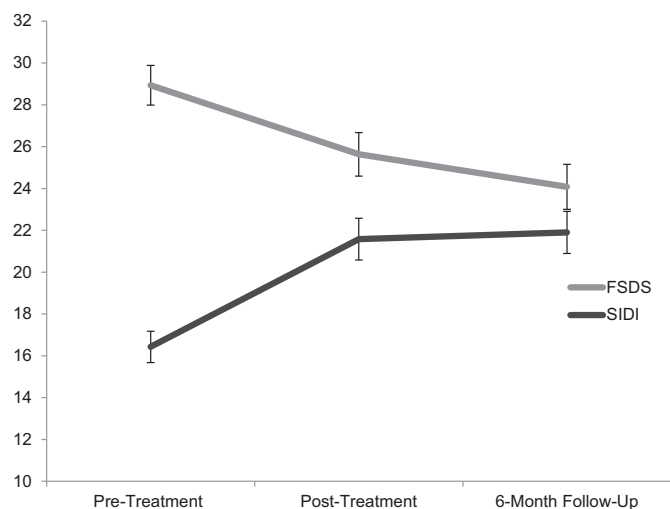

Fig. 2. Effects of treatment on full sample ($n = 115$) from pre-treatment to post-treatment to 6-month follow-up on Sexual Interest and Desire Inventory (SIDI) scores and Female Sexual Distress Scale (FSDS) scores. Data represent means ± standard errors.

scores to predict improvements in SIDI scores. Using the enter method and change in SIDI from pre- to post-MBCST among the full sample of treated participants ($n = 115$) as the criterion, a significant model emerged, $F(7,91) = 3.40$, $p = .003$, adjusted R square = 0.146. Significant predictors were describing sensations (Beta = 0.204, $p = .048$) and change in depressive symptoms (Beta = -0.20, $p = .05$). Non-reactivity to sensations was a marginally significant predictor (Beta = -0.182, $p = .08$). Compliance with homework, as rated by the group facilitators, was not significantly predictive of improvements in sexual desire.

Discussion

Beneficial effects of treatment on sexual functioning

Overall, we found that compared to a delayed treatment control group, a four session group mindfulness-based therapy significantly improved sexual desire, arousal, lubrication, satisfaction, and overall sexual functioning. Arousal domains of mental sexual excitement, genital tingling, and genital pleasure also significantly improved more with treatment than the control condition. Sex-related distress, on the other hand, significantly lessened between assessments, regardless of whether treatment was administered or not. A similar effect was observed for FSFI orgasm scores, depressive symptoms, and affectional expression towards one's partner. In all cases where treatment led to an improvement in symptoms compared to the control condition, there was no significant loss of from post-treatment to 6-month follow-up.

These findings of significant improvements on most domains of sexual functioning including subscales of mental and self-reported genital arousal and pleasure add to the growing empirical literature showing the beneficial effects of mindfulness-based treatment for sexual difficulties in women (Brotto, Basson, Carlson, & Zhu, 2013; Brotto, Basson, et al., 2008; Brotto, Erskine, et al., 2012; Brotto, Heiman, et al., 2008; Brotto, Seal, et al., 2012).

We endeavored to capitalize on the expected mindfulness-enhanced ability to stay focused on sexual stimulation by optimizing the stimulus. As sessions progressed, we integrated arousal-enhancing tools into at-home mindfulness practice to provide a type of "super-stimulus" on which to focus attention. This was achieved by asking women to use sexual fantasy, a personal vibrator, or visual erotica of her choice to first elicit a sexual arousal response. If automatic negative thoughts arose in reaction to the sensations, women were encouraged to take note of these as "mental events" and refocus their attention on the sexual sensations. That the mental arousal, genital tingling, and genital pleasure domains of the DASA significantly improved with treatment (and not the control condition), suggests that the treatment, in addition to targeting desire for sex, specifically increases both physical and psychological components of sexual arousal. Given the failure of pharmaceutical agents to effectively and safely increase sexual arousal (Chivers & Rosen, 2010), these findings suggest that MBCST might be considered in the treatment of FSAD and low arousal more generally.

Lack of effect of treatment on sex-related distress

Sex-related distress improved over time in both groups of women, regardless of whether or not they received treatment, and the effect size was moderate ($d = -0.56$). Clinical experience confirms the therapeutic effect of a careful assessment, with validation of symptoms and their sequelae on relationships and self-image, along with an explanation of the many factors involved in a woman's low desire. While waiting for treatment, positive expectancy effects are likely as women were aware that following their
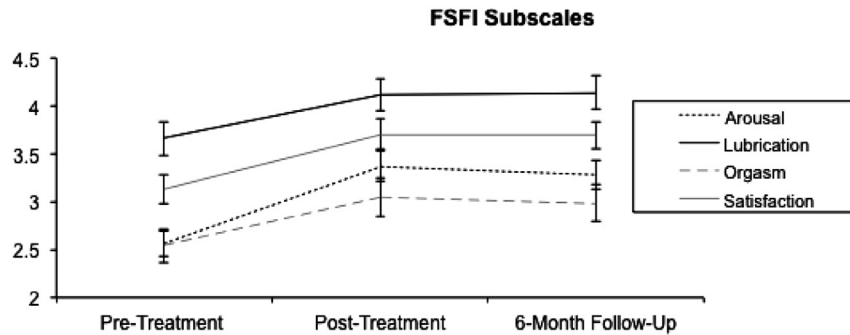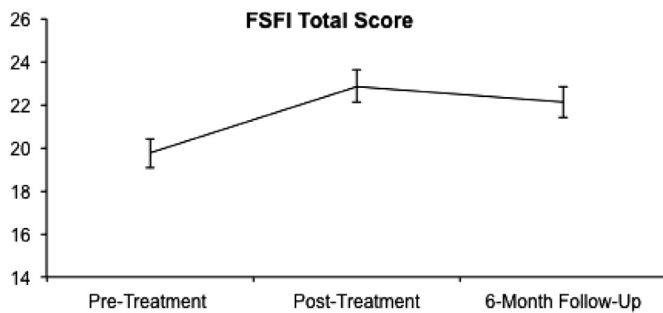
Fig. 3. Effects of treatment on full sample ($n = 115$) from pre-treatment to post-treatment to 6-month follow-up on Female Sexual Function Index (FSFI) subscales of arousal, lubrication, orgasm, and satisfaction. Data represent means ± standard errors.

Fig. 4. Effects of treatment on full sample ($n = 115$) from pre-treatment to post-treatment to 6-month follow-up on Female Sexual Function Index (FSFI) total scores. Data represent means ± standard errors.

delayed condition, they would be receiving treatment. Expectancy and placebo effects are common in most areas of psychological treatment (Boot, Simons, Stothart, & Stutts, 2013) and treatment of sexual dysfunction in women is no exception (Bradford & Meston, 2007, 2009, 2011). Interestingly, there was also a main effect of improved orgasm scores in both groups with a small effect size. Women were not recruited on the basis of orgasmic difficulties and improvement while waiting for treatment likely arose from both the lessened distress about their sexual lives in general and less distraction from thoughts about impossibility of beneficial treatment. Depressive symptoms, although low and in the non-clinically significant range at baseline, also significantly improved between assessments, regardless of treatment, though the effect was small ($d = -0.29$). Again, as women experienced less distress, they may have been more hopeful about the prospect of receiving treatment in the near future, and this may have improved their mood.
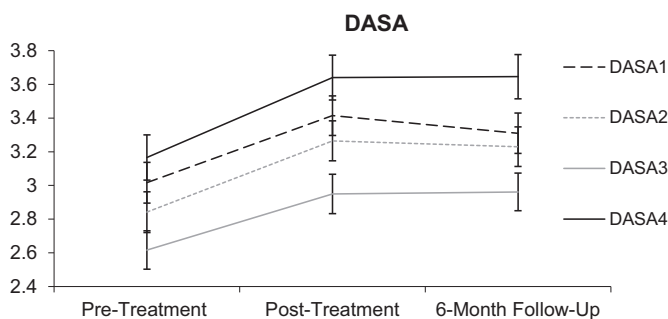

Fig. 5. Effects of treatment on full sample ($n = 115$) from pre-treatment to post-treatment to 6-month follow-up on Detailed Assessment of Sexual Arousal (DASA) subscales of (1) mental excitement, (2) genital tingling, (3) genital wetness, and (4) genital pleasure. Data represent means ± standard errors.

Mechanisms of action

To our knowledge, this is the first study to explore the outcome of brief mindfulness training in terms of changes in mindfulness and sexual function. When women are practicing "non-judgment" in their at-home sexual context, this may reflect less self-judgment as well as more acceptance of the partner. Feelings for a partner (and mood) were the strongest predictors of women's sexual desire and response in a large 11 year longitudinal study as women transitioned through the peri- and post menopause (Dennerstein, Guthrie, Hayes, DeRogatis, & Lehert, 2008) and for women of identical genetic risk i.e., monozygotic twins, who are discordant for HSDD, relationship factors play a key role (Burri et al., 2013). Increased acceptance of the present sexual context may also be relevant. A tendency for women to need things "in order" prior to accepting and attending to sexual stimulation or "arousal contingency" was one of three factors determining a proneness to sexual inhibition of women's arousal (Sanders et al., 2008).

Increased ability to describe sensations (which predicted improvements in sexual desire), may lead to awareness of sexual physical sensations, sexual excitement from those sensations and from the partner's arousal, as well as from sexual stimuli in the world generally in between times of sexual activity. Interestingly it was the describing facet (putting feelings into words without judging) of the FFMQ that showed a positive association between gray matter volume in the right anterior insula and right amygdala, and mindfulness tendency (Murakami et al., 2012), suggesting that increased insular volume may reflect one's greater awareness of one's own stressful state and more ability to cognitively temper emotions. This research raises the possibility that mindfulness training may have tempered the anxiety, guilt, self-criticism, and frustration that may preclude women's arousal from sexual stimuli. This speculation is also supported by a recent review of imaging data which concluded that mindfulness training enables a person to be less emotionally reactive to and more accepting of a given affective state (which presumably would include the mind state during a sexual experience), and that this was related to enhanced ability to engage frontal cortical structures to dampen amygdala activation (Chiesa, Brambilla, & Serretti, 2010).

Homework compliance during the sessions did not significantly predict the improvements in sexual desire that were seen with treatment. This was contrary to our hypothesis that women who engaged more with the homework exercises would have more benefit than women who practiced only minimally or not at all. It is possible that the clinician-derived measure of homework compliance was not a valid reflection of women's experience with their practice at home. Secondly, it is possible that the benefits of mindfulness practice on sexual desire are not dose-dependent. In

support of this, recent research finds a significant effect of mindfulness even after a single 20-min session of practice, suggesting that even novice practitioners can glean benefits (Cebolla et al., 2013). Similarly, on-line mindfulness therapy was shown to benefit stress, but improvement in stress scores did not depend on the amount of practice (Krusche, Cyhlarova, King, & Williams, 2012).

Limitations

Any study that is based on convenience clinical samples has limitations. It is possible that our sample of women may not be representative of the larger population of women experiencing sexual concerns. Women willing to seek treatment and complete several sessions of assessment and treatment may differ from those who suffer in silence. Although we attempted to recruit all women seeking treatment for desire and/or arousal concerns in our center, the clinician performing the intake assessment carried out some pre-screening (i.e., to rule out major exclusion criteria) before informing potential candidates about the study. Thus, although we believe that the current sample may be generalizable to other treatment seekers, we acknowledge the select sample studied. We are also reassured of the generalizability of our findings given that our analysis comparing women who participated in treatment to those who were assessed but not treated did not reveal any significant group differences on demographic variables. Moreover, despite the fact that only 50% of the sample had true randomization to group (with the other 50% being assigned to group based on their availability), there were no significant differences between the women assigned to the two arms at pre-treatment.

A major limitation in interpreting the effects of any multi-modal treatment is the extent to which we can attribute the effects to any particular aspect of the treatment. Therefore, it is possible that women improved simply in response to receiving education. Although plausible, it is likely not the main contributor of the positive outcomes. Future studies in which the multi-modal treatment is dismantled such that mindfulness can be directly compared to education are needed in order to verify this empirically. Furthermore, it is not clear whether the benefits of treatment were due to the mindfulness components, the cognitive behavioral components, to sensate focus and the more sex therapy-relevant aspects, or to some other non-specific factors of therapy. Given that sex-related distress improved in women with time, even in the absence of treatment, non-specific factors were likely at play.

Clinical implications

This study adds to a growing body of research suggesting that brief mindfulness training can significantly improve several aspects of sexual response, including sexual desire and arousal and overall sexual functioning (Brotto, 2013). In the current climate of sexual pharmaceuticals, there has been much interest in finding a panacea to improve women's loss of desire (Clayton, Dennerstein, et al., 2010; Clayton, Goldmeier, et al., 2010); however, despite considerable investment of time and money, there is no medication approved by the Food and Drug Administration or Health Canada. Trialed medications to date have shown marginal or no benefit and all lack long-term safety data (Brotto, Bitzer, Laan, Leiblum, & Luria, 2010). Findings from the present study would suggest that women may safely and with benefit learn to address the documented negative and judgmental thoughts, and tendency so commonly reported by women with low sexual desire to multi-task, distract, and be pulled into non-erotic thoughts (Carvalho & Nobre, 2010; Dove & Wiederman, 2000).

Readers might question if only clinicians with extensive experience in both sexual health and mindfulness meditation can deliver treatments similar to those described in this paper. Although such dually-trained experts may be seen as ideal, we would suggest the possibility that non-sexual health clinicians who have a solid foundation in personal and professional mindfulness practice would also be appropriate. Moreover, given the plethora of online resources for mindfulness meditation practice as well as ready availability of books on the practice, after a thorough clinical history, women may be counseled to consider adopting a general mindfulness practice prior to any further more specific sexual therapy. Qualitative feedback endorses the therapeutic effect of a group setting for addressing women's sexual difficulties (Brotto et al., 2013), in keeping with our own experience that MBCST is not only cost-effective but superior to an individual approach. Moreover, the presence of others while learning mindfulness has been considered to be an important component (Kabat-Zinn, 1982). Also of clinical relevance, given the frequent comorbidity of depression and HSDD (Shifren et al., 2008), is the possibility of augmenting the sexual benefit from mindfulness by subsequent discontinuing of antidepressants along with their frequent sexually negative side-effects (Graf, Walter, Metzger, & Abler, 2013): the ongoing mindfulness practice may well prevent recurrence of depression (Segal et al., 2002).

Conclusion

A brief MBCST intervention was associated with significant improvements in sexual desire and other domains of sexual functioning. Benefit was maintained at six months following treatment. Distress improved with time, regardless of treatment, and may have related to positive expectancy effects for women in the delayed treatment condition as they anticipated receiving treatment in the near future. Improved sexual desire was predicted by changes in facets of mindfulness (describing sensations), and improvements in depressive symptoms. The common comorbidity of sexual dysfunction and depression and anxiety coupled with MBCT's record of benefit to current depression and anxiety plus preventing depressive relapse encourages future research into the potential use of mindfulness to address these difficulties concurrently.

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