

How Does Paying Attention Improve Sexual Functioning in Women? A Review of Mechanisms



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ABSTRACT

Introduction: Female sexual dysfunction (FSD), consisting of a constellation of distressing sexual symptoms, is highly prevalent worldwide. Given the central role played by psychological factors in the development of FSD, psychologically and in particular mindfulness-based interventions have arisen as potential treatment options for women. Although mindfulness-based interventions have been evaluated in samples of women with gynecologic cancer; a history of sexual abuse; multiple sclerosis; and spinal cord injury; and provoked vestibulodynia, the mechanisms by which mindfulness leads to improvements in sexual functioning are largely unstudied.

Aim: To summarize the literature on mechanisms of mindfulness interventions in general and to hypothesize which mechanisms most likely apply to samples of women with FSD.

Methods: Medline was searched with terms such as *mindfulness*, *meditation*, *mediator*, *mode*, *moderator*, *mechanism*, *sex*, and *sexual dysfunction*. Only studies that conducted a formal mediation or moderation analysis were included. We also conducted a broader review on mechanisms in other populations, with slightly modified inclusion criteria: the terms *sex* and *sexual dysfunction* were removed and only studies from 2012 to 2016 and studies that included an active mindfulness intervention were included.

Main Outcome Measures and Results: In general populations, trait mindfulness and decentering were the most common mechanisms identified for the efficacy of mindfulness. In four studies that examined mediators of improvement in samples with FSD, the following mediators were found to be significant: relationship satisfaction, genital self-image, interoceptive awareness, depressed mood, anxiety, and trait mindfulness, of which interoceptive awareness had the most supporting evidence.

Conclusion: Clinicians and researchers can use the identified mediators of improvement (ie, interoceptive awareness, depression, and trait mindfulness) when making decisions about which patient might be more likely to benefit from a mindfulness-based approach to treating sexual dysfunction. Future work should examine these mediators and other putative mediators and moderators in randomized controlled trials of mindfulness. **Arora N, Brotto LA. How Does Paying Attention Improve Sexual Functioning in Women? A Review of Mechanisms. Sex Med Rev 2017;5:266–274.**

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Key Words: Mindfulness; Sexual Dysfunction; Body Image; Interoception; Meditation

INTRODUCTION

Mindfulness is defined as “the awareness that emerges through paying attention on purpose, in the present moment, and non-judgmentally to things as they are.”¹ Various forms of mindfulness treatment, including mindfulness-based stress reduction,^{2,3} mindfulness-based cognitive therapy (MBCT),^{4,5}

and other mindfulness-based interventions,⁶ have been tested in clinical⁷ and non-clinical^{8,9} populations. The literature evaluating mindfulness has exponentially increased since the late 1970s and, in particular, during the past decade. Several meta-analyses have synthesized the research on mindfulness to demonstrate its positive effects on general mental health,¹⁰ including stress and spirituality in healthy subjects,¹¹ depression severity,¹² relapse in patients with major depressive disorder,¹³ anxiety severity,¹⁰ psychological distress,¹² psychosis and schizophrenia,¹⁴ and physical health¹⁰ (Table 1).

During the past several years, mindfulness also has been applied to various populations of women with sexual dysfunction. The consensus statement from the Fourth International

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Table 1. Effect sizes of mindfulness on various outcomes

Study	Outcome	Effect size	95% CI	P value
Grossman et al (2004)	General mental health	d = 0.54	0.39–0.68	<.0001
	Physical health	d = 0.53	0.23–0.84	.0004
Chiesa and Serretti (2009)	Stress	d = 1.387	0.557–2.217	<.001
	Spirituality	d = 0.959	0.049–1.869	<.000001
Bohlmeijer et al (2010)	Depression severity	g = 0.26	0.18–0.34	<.001
	Psychological distress	g = 0.32	0.13–0.50	<.001
	Anxiety	g = 0.24	0.10–0.38	<.001
Piet and Hougaard (2010)	Relapse in MDD patients	RR = 0.66	0.53–0.82	<.001
Khoury et al (2013)	Psychosis and schizophrenia	g = 0.41	0.23–0.58	<.001

MDD = major depressive disorder; d = Cohen's d; g = Hedges' g; RR = relative risk.

Consultation on Sexual Medicine 2015 estimated that female sexual dysfunction (FSD) affects 40% to 50% of women worldwide.^{15,16} Although the most common type of sexual difficulty reported is low desire, others include inadequate arousal, orgasmic dysfunction, dyspareunia, vaginismus, lubrication difficulties, and not finding sex pleasurable.^{15,16} In Western samples, studies from the United Kingdom, United States, Sweden, and Australia have reported a prevalence of low sexual desire in women ranging from 33% to 55%.¹⁶ In a 2005 study of 29 countries, the prevalence of low desire in non-Western regions, such as East Asia, Southeast Asia, and the Middle East, was reported to be as high as 35% to 43%.¹⁵ Despite the high prevalence of sexual concerns globally, there is a paucity of research on its management.

Although there is a medication currently available in the United States for the treatment of low desire in women (flibanserin; Addyi, Sprout Pharmaceuticals, Raleigh, NC, USA) approved by the Food and Drug Administration,¹⁷ it is well known that flibanserin is not a panacea for all women with low sexual desire, and this is due in part to its significant side effect profile and its contraindication with alcohol, thereby limiting its applicability to the large population of women who experience low sexual desire.^{18,19} As such, researchers have become increasingly interested in non-pharmacologic approaches to sexual dysfunction to be used in combination with, or as an alternative to, medication.

Mindfulness lends itself especially well to the treatment of sexual dysfunction, because a large body of evidence supports the role of mindfulness in improving psychological symptoms,^{3,7,20–22} and the determinants of FSD rest heavily on psychological factors. Distraction, anxiety, negative body image, self-criticism, and judgment during sexual activity have been found to consistently underlie sexual concerns in women.^{23,24} Because mindfulness is designed to cultivate a state of present-moment, non-judgmental awareness, whereby distractions and negative thoughts are seen simply as “passing mental events,” mindfulness could be especially suitable for women with FSD, in which cognitive biases are significant. Preliminary evidence has demonstrated the utility of mindfulness in treating FSD in

several populations, including survivors of gynecologic cancer,^{25,26} women with a history of sexual abuse,²⁷ those with multiple sclerosis and spinal cord injury,²⁸ those recovering from prophylactic salpingo-oophorectomy,²⁹ those diagnosed with provoked vestibulodynia,³⁰ and those without any known etiology of dysfunction.^{31–38} Outcomes that have shown significant improvement after mindfulness-based treatment include sexual satisfaction,^{25,26,29,32,33,35} sexual desire,^{25,26,28,29,31,35,37} arousal,^{25,26,28,29,31,35,37} orgasm,^{25,26,35,37} sex-related distress,^{26,30,31,35,37} lubrication,^{25,35} intimacy,³⁶ sexual knowledge,²⁹ self-efficacy,²⁹ concordance of subjective and physiologic arousal,^{27,38} psychological barriers (attention, self-judgment, and clinical symptoms)^{28,34} to healthy sexual functioning, pain severity,²⁹ pain self-efficacy, pain catastrophizing, genital pain induced by cotton swab, and pain hypervigilance.³⁰

Despite a consistent picture emerging on the beneficial effects of mindfulness on sexual functioning, the mechanisms behind these effects are unclear. Elucidating the mechanisms of mindfulness in general and for FSD in particular is important, because it could allow for optimization of treatment, a deeper understanding of what components of therapy are most critical to producing outcomes, and potential matching of therapies to individuals who might be most receptive to treatment effects. The goal of this review was to critically examine the literature that might inform our understanding of the mechanisms by which mindfulness leads to improvements in sexual functioning. In doing so, we hope to provide a springboard for future work that not only evaluates feasibility and efficacy in delivering mindfulness-based interventions but also examines mechanisms.

METHODS

For this review, we used search terms including *mindfulness*, *meditation*, *mediator*, *mode*, *moderator*, *mechanism*, *sex*, and *sexual dysfunction* in Medline to identify any study that examined the effects of mindfulness on sexuality. Of the articles retrieved, only three studies conducted a formal analysis of mechanisms.

In addition to searching for publications focused on individuals with sex-related difficulties, we conducted, in parallel,

a broader review on mechanisms in other populations. For this broader review, *sex* and *sexual dysfunction* were removed from the search. Because of the extensive nature of this literature, stricter inclusion criteria were used: only studies from 2012 to 2016, only studies that included an active mindfulness intervention, and studies that conducted a formal analysis of mediators or moderators. The literature on the mechanisms of mindfulness in other populations was considered in light of how those identified mechanisms might apply to populations with sexual dysfunction.

RESULTS AND DISCUSSION

Part 1: Mechanisms of Mindfulness Effects in Studies of Sexual (Dys)Function

Among those studies that specifically recruited samples with a sex-related difficulty or examined sexual functioning as an end point, the following variables emerged as possible mechanisms by which mindfulness could be efficacious: increased relationship satisfaction, body image, interoceptive awareness, and trait mindfulness and decreased depressed mood and anxiety (Table 2).

Relationship Satisfaction

Khaddouma et al³³ used the Five Facet Mindfulness Questionnaire (FFMQ) to examine dating relationship satisfaction and sexual satisfaction in a sample ($N = 322$) of young people (mean age = 18.79 years, $SD = 2.35$), 76.4% of whom were women. The study found that the observing and non-judging of inner experiences components of mindfulness were associated with higher relationship satisfaction, which was mediated by sexual satisfaction. Because the study did not account for temporality in the mediation analysis, the study could not account for the likelihood of bidirectionality in the relation between sexual and relationship satisfaction, which means that relationship satisfaction also could mediate the effect of mindfulness on sexual satisfaction. Because results were presented for men and women combined, the extent to which these findings apply specifically to sexual complaints by women is unknown. Nonetheless, most of the sample was composed of women. The findings of this study align with theories of sexuality that posit that observing present-moment sensations and not evaluating or judging one's own or one's partner's performance can be an important component in having satisfying sexual experiences.³⁹

Body Image

Dunkley et al³² further explored factors such as negative body esteem and poor genital self-image in sexual satisfaction and the mechanisms through which mindfulness could intersect with these factors. Dunkley et al surveyed a large sample ($N = 1,021$) of undergraduate students (mean age = 20.86 years, $SD = 2.86$), 67.3% of whom were women. The Cognitive Distractions During Sexual Activity (CDDSA) Scale

performance and body subscales and the Genital Self-Image Scale were examined. The main outcome was assessed by the Golombok-Rust Inventory of Sexual Satisfaction and included evaluation of anorgasmia, vaginismus, non-communication, infrequency, non-sensuality, avoidance, and dissatisfaction for women. The study found that the participants' level of mindfulness significantly mediated the effects of sexual insecurities ($F_{6,679} = 40.15$, $P < .001$; CDDSA-performance, $F_{6,672} = 37.90$, $P < .001$; CDDSA-body, $F_{6,672} = 40.40$, $P < .001$) on sexual satisfaction. Specifically, the non-judgment of inner experiences and describing subscales of the FFMQ mediated the effects of genital self-image and cognitive distractions on sexual satisfaction in these women.

The investigators posited that the describing component of mindfulness gives women the ability to label thoughts and feelings associated with the appearance and functioning of genitals, which can decrease the discordance between psychological and physiologic sexual arousal in women, because women are purportedly less able to identify signs of their own sexual arousal compared with men.⁴⁰ Being able to describe these feelings also could allow women to gain more control over their sexual experiences. Moreover, past research on mindfulness has demonstrated improved body image,⁴¹ and the investigators posited that genital self-image is improved by mindfulness in the same way. In addition, non-judgment, which reflects the ability to accept internal thoughts and feelings, instead of ruminating on or evaluating them, could assist women in lessening the effect of cognitive distractions related to their own body and performance on their sexual experiences.

Interoceptive Awareness

Interoceptive awareness reflects an individual's ability to sense internal sensations in their body with accuracy. It is believed that those who have greater interoceptive awareness might be more "in tune" with their body. To examine interoceptive awareness and how it might be related to sexuality, Silverstein et al³⁴ conducted a cohort study with a small sample ($N = 20$) of undergraduate women (mean age = 20 years, $SD = 1.0$). The study identified two barriers to sexual functioning: being unable to notice bodily sensations and lack of self-acceptance. Then, participants were randomized to a 12-week meditation course or to an education control group. Those randomized to receive mindfulness showed a decrease in the psychological barriers to sexual functioning (attention to body sensations [$r = -0.44$, $P < .05$] and self-judgment [$r = -0.42$, $P < .05$]).

Interoceptive awareness was further tested as a mediator of the effect of an 8-week modified MBCT program on women ($N = 39$) who met the criteria for female sexual interest/arousal disorder (mean age = 43.9 years, $SD = 12.1$).⁴² The investigators found that the intervention resulted in increased sexual desire (as measured by the Sexual Interest/Desire Inventory), and that these improvements were mediated by changes in interoceptive awareness (as measured by the

Table 2. Mechanisms of mindfulness effect on sex-related outcomes

Study	Type of study	Intervention	Population (% men); mean age (SD)	Country	Sample size	Variables measured	Findings
Khaddouma et al (2015)	Survey	N/A	Undergraduate students currently in dating relationship (23.6%); 18.79 (2.35)	USA	322	Facets of trait mindfulness, sexual satisfaction, relationship satisfaction	Observing component of mindfulness → sex satisfaction → relationship satisfaction (PE = 0.08, CI = 0.02–0.15); non-judgment of inner experiences component of mindfulness → sexual satisfaction → relationship satisfaction (PE = 0.11, CI = 0.03–0.19)
Dunkley et al (2015)	Survey	N/A	Undergraduate students (32.7%); 20.86 (2.86)	Canada	1,021	CDDSA-body, CDDSA-performance, facets of trait mindfulness, GSI, GRISS	Sexual insecurities → non-judgment and describing components of mindfulness → sexual satisfaction for GIS ($F_{6,679} = 40.15, P < .001$), CDDSA-performance ($F_{6,672} = 37.90, P < .001$), CDDSA-body ($F_{6,672} = 40.40, P < .001$)
Silverstein et al (2011)	Cohort	12-wk meditation course	Undergraduate students (100% women); 20 (1.0)	USA	44	Reaction time for reporting bodily arousal, Mindful Attention Awareness Scale, facets of mindfulness, Brief Symptom Inventory, Scales of Psychological Well-Being	Meditation training → improved interoceptive awareness → improvement in psychological barriers (attention, $r = -0.44, P < .05$; self-judgment, $r = -0.42, P < .05$; clinical symptoms, $r = 0.49, P < .05$) to healthy sexual functioning
Paterson et al (2016)	Cohort	8-wk MBCT-S course	Women who met diagnostic criteria for sexual interest-arousal disorder	Canada	39	Sexual Interest/Desire Inventory, FSIDS-R, FSFI, FFMQ, Self-Compassion Scale, Multidimensional Assessment of Interoceptive Awareness, BDI	MBCT-S → interoceptive awareness → sexual desire ($B = 0.60, P = .31$); MBCT-S → trait mindfulness → sexual function ($B = 0.54, P = .014$); MBCT-S → depressed mood → sexual function ($B = 0.59, P = .009$); MBCT-S → self-compassion → sexual function ($B = 0.69, P = .007$); moderators of MBCT-S → sexual desire: interoceptive awareness ($B = 0.81, P = .006$); moderators of MBCT-S → sexual distress: depressed mood ($B = 0.42, P = .047$), total interoceptive awareness ($B = 0.46, P = .05$), age ($B = -0.43, P = .031$)

BDI = Beck Depression Inventory–II; CDDSA = Cognitive Distractions During Sexual Activity Scale; FFMQ = Five Facet Mindfulness Questionnaire; FSIDS-R = Female Sexual Distress Scale–Revised; FSFI = Female Sexual Function Index; GRISS = Golombok-Rust Inventory of Sexual Satisfaction; GSI = Genital Self Image Scale; MBCT-S = mindfulness-based cognitive therapy revised for sexual arousal disorder; N/A = not available; PE = point estimate.

Multidimensional Assessment of Interoceptive Awareness; $B = 0.60$, $P = .031$). Similarly, self-compassion (Self-Compassion Scale) mediated the intervention's effect on improving overall sexual function (Female Sexual Function Index; $B = 0.69$, $P = .007$).

Depressed Mood and Anxiety

Paterson et al⁴² also hypothesized that negative body judgments would be intricately related to depressed mood and anxiety, and because there is expansive literature demonstrating that mindfulness has the potential to decrease depressive and anxiety symptoms,^{10,12,13} decreasing depressed mood could be a significant mechanism by which mindfulness decreases sexual dysfunction. In support of this hypothesis, Paterson et al⁴² found that decreased depressed mood (as measured by the Beck Depression Inventory—II) did indeed mediate the intervention's effect on overall sexual function ($B = 0.59$, $P = .009$).

In addition to a decrease in depressed mood, a decrease in anxiety has been evaluated as a mediator of the effects of mindfulness on sexual functioning. Silverstein et al³⁴ found that anxiety was a significant psychological barrier to sexual functioning and reported that a 12-week meditation course significantly decreased the effects of anxiety on sexual functioning ($r = 0.49$, $P < .05$).

Trait Mindfulness

One of the most commonly studied outcomes of any mindfulness-based intervention is the extent to which participants actually experience an increase in state or trait mindfulness. Although most measurements, such as the FFMQ, conceptualize mindfulness as a trait—a “dispositional characteristic” that causes a person to tend to be mindful most of the time—other measurements, such as the Toronto Mindfulness Scale, conceptualize mindfulness as a state, which is a present-moment awareness brought on by mindfulness practice.⁴³ Paterson et al⁴² tested trait mindfulness (using the FFMQ) as a mediator and found that it significantly mediated the intervention's effects on sexual functioning ($B = 0.54$, $P = .014$). Although Dunkley et al³² conducted an analysis on the specific facets of the FFMQ to provide an improved understanding of the role of interoceptive awareness, they also reported trait mindfulness as a mediator in the relation among body cognitions, perception of performance, sexual insecurities, and sexual satisfaction.

Moderators

Although most of the research on mechanisms of mindfulness has examined mediators, some literature has demonstrated that the mechanism through which mindfulness acts might be through moderation. Although mediators account for or explain the relation between an intervention and outcome, moderators can affect the strength and/or direction of relation between an

intervention and outcome.⁴⁴ In the only study that examined moderators of the efficacy of mindfulness for sexual functioning, Paterson et al⁴² found that the change in sexual desire caused by the mindfulness intervention was moderated by interoceptive awareness ($B = 0.81$, $P = .006$), and that the change in sexual distress (Female Sexual Distress Scale—Revised) was moderated by depressed mood ($B = 0.42$, $P = .047$), interoceptive awareness ($B = 0.46$, $P = .05$), and age of participants ($B = -0.43$, $P = .031$). This study suggests that in addition to mediation, moderators can account for the strength of the effect of mindfulness on sexual functioning outcomes.

Part 2: Mechanisms of Mindfulness Effects in General Populations Studied

Mindfulness Interventions and Trait and State Mindfulness

State and trait mindfulness have been investigated as potential mediators of the effect of mindfulness training. Labelle et al⁴⁵ found that mindfulness training can increase trait mindfulness. Labelle et al conducted a study on cancer survivors receiving mindfulness-based cancer recovery (MBCR) treatment and found that MBCR led to an increase in the observing component of mindfulness, which increased mindful attention awareness, and the describing component.⁴⁵ They also found that non-judging mediated MBCR's effect on the demonstrated increase in non-reacting. In addition, a decrease in rumination mediated the effect of MBCR on observing, non-reacting, and acceptance. A decrease in worry mediated the effect of MBCR on mindful attention awareness and stress. Other studies have confirmed that variables such as rumination and emotional clarity can mediate the effect of a mindfulness intervention on trait mindfulness.⁴⁶

Moreover, increased trait mindfulness in turn can mediate subsequent effects of mindfulness training. Studies have shown that trait mindfulness mediates the effect of mindfulness training on several mental health conditions, including depression,^{5,7} anxiety,²⁰ self-reported and clinician-reported post-traumatic stress disorder,⁷ and general psychopathology.⁵ Furthermore, trait mindfulness mediates the effects of mindfulness training on worry,³ emotion regulation,²² self-compassion,²⁰ and psychological well-being.^{7,21} One study examined state mindfulness as a mediator and found that it also mediated the effects of treatment on psychological well-being.²¹ Based on this body of research in samples of women with sexual concern, changes in trait and state mindfulness could mediate the effects of treatment on sexual outcomes.^{32,33,42} By tending to a state of present-moment awareness, women might be able to decrease cognitive distractions and self-judgment during sexual activity and instead focus on body sensations that allow them to better recognize their arousal. Depression, anxiety, and decreased psychological well-being also are associated with FSD,²⁴ which means that, by improving these outcomes, mindfulness could improve sexual function.

Decentering

Another important mediator of the benefits of mindfulness is decentering. Decentering is described as disengagement or distancing from internal emotions or feelings and knowing that internal events are transient, instead of permanent, representations of self. Numerous studies have described decentering as a mechanism through which mindfulness interventions decrease state anxiety,⁴⁷ generalized anxiety disorder symptoms,³ and negative affect⁴⁷ and improve psychological well-being.⁶ Changes in decentering also might mediate the effects of mindfulness on sexual functioning such that women can perceive cognitive distractions or self-criticism or judgment during sexual activity as transient thoughts and not as facts or truths. Perceiving negative thoughts as transient instead of permanent could allow women to manage these thoughts more effectively, thereby preventing the thoughts from interfering with their sexual functioning.

Other Mechanisms

Other mediators of the effects of mindfulness described in the literature include fear of recurrence of problems and physical functioning on perceived stress and state and trait anxiety²; perceived thought control on trait anxiety and negative affect⁴⁸; transcendence, psychological maturity, and insight on psychological well-being²¹; self-compassion on worry and fear of emotion²²; gratitude and differentiation of self (capacity of emotional regulation) on intercultural competence⁴⁹; mindfulness state, social support, and positive emotion on acute respiratory infection duration and severity⁵⁰; craving on smoking⁵¹; and non-reactivity, visceral sensitivity, pain catastrophizing on irritable bowel syndrome severity, and quality of life.⁵²

Although the literature on mediators of the efficacy of mindfulness in broad populations is quite robust, by comparison, very little research has focused on moderators of the effects of mindfulness in these populations. One exception is a study by Barnhofer et al,⁴ which found that MBCT moderated the effect of depressive symptoms on suicidal cognitions, such that there was no relation between the variables in the MBCT treatment group, whereas the two variables were significantly associated in the control group.

Many of the mediators and moderators tested in other populations as described earlier are facets of emotional regulation and as such have the potential to mediate the effect of mindfulness on sexual functioning. Unfortunately, the literature on the efficacy of mindfulness in treating sexual functioning has not yet tested most of these potential mediators and moderators. Further research into these mediators and moderators and the role they play in mindfulness and women's sexuality is required.

Part 3: Neural Correlates

Many studies also have evaluated the neural mechanisms underlying the efficacy of mindfulness. These studies have reported increased cortical volume in the insula and anterior

cingulate cortex (responsible for interoceptive awareness) and decreased activity in the default mode network (responsible for ruminative processes).⁵³ However, few of these studies have conducted mediational analyses on these hypothesized mechanisms. Although no studies to date have explored neural correlates of improved sexual functioning with mindfulness training, alterations in sexual function³⁸ could be due in part to changes in the insula, given that the insula is associated with interoceptive awareness.

Limitations

Of the four studies that examined mechanisms behind mindfulness and its beneficial effect on sexual functioning, only one study examined a population with low sexual desire,⁴² whereas the remainder of the studies surveyed general undergraduate students. Studies in non-clinical samples have limited applicability to the populations who seek treatment for sexual concerns. Moreover, none of the four studies used control groups. In contrast, the literature in broader populations that examined the efficacy of mindfulness was replete with randomized controlled trials. Two of the four studies used surveys on trait mindfulness, whereas the other two studies incorporated an active mindfulness intervention. Investigating trait mindfulness is an important first step to understanding the role of mindfulness in FSD, but testing active mindfulness interventions increases clinical applicability.

Another limitation of the studies reviewed is that they were carried out in North America, yet population-based studies have found a high rate of sexual problems in non-Western samples.¹⁵ Moreover, given the roots of mindfulness in eastern cultures and Buddhism, it might be more easily integrated into other societies around the world. Another limitation is the nearly exclusive focus on heterosexual samples, with only two of the studies including sexual minority groups as a small portion of their samples. Future studies evaluating the effects of mindfulness on sexual functioning must strive to be more inclusive of samples with respect to their culture, ethnicity, sexual orientation status, relationship status, and social contexts.

CONCLUSION

Based on the currently limited literature, mindfulness has the potential to be an important treatment for sexual problems, at least in women. Preliminary studies investigating the mechanisms behind this effect have found that mindfulness acts by addressing the psychological barriers to satisfying sexual experiences. Specific mechanisms identified include a decrease in cognitive distractions related to body and performance, decreased depression and anxiety, and improved genital self-image, relationship satisfaction, interoceptive awareness, self-compassion, and self-acceptance.

Across survey studies, cohort studies, and studies of neural correlates, the following variables are found to most likely

account for the benefits of mindfulness: interoceptive awareness, reduced distractions, improved self-judgement, and greater attention to sexual arousal. State and trait mindfulness also were examined by several studies in women with FSD and other populations and have significant theoretical and empirical evidence supporting their role as a mechanism. Because mindfulness is the practice of paying attention to emotions and bodily sensations non-judgmentally, it follows that an increased tendency to, or skill in, achieving mindfulness could act as a mediator that helps women improve interoceptive awareness and sexual dysfunction. We also identified decreases in depression and anxiety as mediators, which (i) are more prevalent in women with sexual dysfunction and (ii) have already been successfully targeted by many mindfulness interventions documented by the literature. Although the amount of evidence supporting decreases in depression and anxiety as mediators of changes in sexual functioning is minimal, the extensive literature on the relations between depression and anxiety and mindfulness indicates that these psychological states are likely to play a role in the effect of mindfulness on sexuality. The role of other mediators such as age, relationship satisfaction, and decentering must be investigated further, because there is minimal theoretical and empirical evidence supporting these factors as mechanisms.

Clinical Implications

This review has identified some key potential mediators and moderators in the effect of mindfulness interventions on FSD. Although the applicability of these findings might be limited, because only one study used a clinical sample, this review could assist clinicians in identifying women seeking treatment who are most likely to benefit from mindfulness interventions for their sexual concerns. Specifically, those women with significant baseline anxiety and depression and women who have low baseline interoceptive awareness might be most likely to benefit. Moreover, researchers can explore these mediators in various clinical samples reporting sexual problems and the interactions between the mediators, because many of the mechanisms identified are intricately related.

Future Work

Future work should examine the role of moderating variables on mindfulness interventions and the role of mindfulness as a moderator of other associations. Variables such as competence of the facilitator, adherence to formal therapy, and informal home practice can change the therapeutic and mechanistic effects. For example, Crane et al.⁵⁴ found that individuals who practiced at home at least 3 days a week demonstrated a 50% decrease in likelihood of relapse than those who practiced for fewer days at home. In addition, to establish that a variable qualifies as a mechanism of effect, the mechanism variable must have occurred before the effect variable. However, most studies, except for the study by Labelle et al.,⁴⁵ did not account for timing when completing mediation analyses. Future work should use

higher-quality research designs to examine potential mechanisms and moderators through a temporal design with an active intervention group and a control group, ideally through randomized controlled trials. Future work also should examine this effect in diverse female populations, including populations that specifically report struggling with FSD.

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