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REVIEW

Mindfulness-Based Therapies for Sexual Dysfunction: a Review of Potential Theory-Based Mechanisms of Change

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Abstract A number of recent clinical trials have suggested that mindfulness-based therapy may be an efficacious treatment for sexual dysfunction. However, little is known regarding the mechanisms of action for these treatments or whether these mechanisms are unique to mindfulness-based therapies. Such knowledge would aid in maximizing the impact and dissemination of these interventions. This article provides a review of potential mechanisms utilizing empirically supported theoretical models of sexual dysfunction and mindfulness meditation. These mechanisms include (a) shifting locus/quality of attention during sex, (b) decreasing negative sexual schemas, (c) altering negative expectancies/goals for sex, (d) reducing behavioral/experiential avoidance, (e) lessening engagement with negative sex-related cognitions, and (f) improving the relational context. Current evidence for the importance of each potential mechanism is summarized and recommendations regarding future directions of research are provided.

Keywords Sexual dysfunction · Mindfulness · Mechanisms · Mediators

Introduction

Sexual dysfunction is currently defined by the Diagnostic Statistical Manual of Mental Disorders (DSM 5; APA 2013) as impairment in one or more areas of sexual function (sexual desire, arousal, orgasm, and sexual pain) resulting in significant levels of subjective distress. This group of disorders is very common. For example, distressing low sexual desire is reported by about 15% of women in the USA (Shifren et al. 2008), although some estimates are as high as 31% (McCabe and Goldhammer 2013). Similarly, erectile dysfunction is reported by 22% of men over 40 (Laumann et al. 2007). Sexual dysfunction is, by definition, highly distressing to the individual and is associated with poorer mental health and quality of life (Atlantis and Sullivan 2012; Forbes et al. 2015; Stephenson and Meston 2015a). Given these high rates of prevalence and the potentially severe impact on individuals and their relationships, it is essential to develop and test theoretical models of these disorders, as well as effective treatments based on these models.

While the DSM 5 includes distinct diagnoses for problems in different aspects of sexual function, current theoretical models suggest the disorders share common etiological and maintaining factors. While a number of models have been proposed (e.g., Basson 2000; McCabe 1991), the model supported by the greatest amount of empirical evidence is Barlow's (1986) model of sexual dysfunction. Barlow's original model posits that individuals experiencing sexual dysfunction enter sexual situations with negative expectancies (expecting sex to go poorly), negative affect (e.g., anxiety), and a low sense of efficacy in influencing the outcome of sexual activity. This negative mindset results in hypervigilance to indicators of threat (Mogg and Bradley 1999) such as perceived impairments in sexual arousal or negative partner responses (Purdon and Holdaway 2006). This biased attention and threat sensitivity increases activity of the sympathetic nervous system (SNS), resulting in a number of physical symptoms such as increased heart rate and sweating. The individual then interprets these physiological symptoms as indications of their own fear and additional evidence that impaired sexual

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function is likely, further narrowing attention to threat-related stimuli and beginning a negative feedback loop. This focus on stimuli perceived as threatening, and corresponding distraction from sexually arousing stimuli, eventually results in decreased physiological and psychological sexual arousal and disengagement from the sexual activity. After repeated negative sexual experiences, the individual begins avoiding sexual activity, decreasing the likelihood of positive sexual experiences and maintaining the negative mindset that initiates the dysfunctional cycle (Table 1).

This model is based on a number of classic experiments assessing the effects of performance demand, anxiety, and attention on sexual arousal in men (e.g., Barlow et al. 1983) and has been supported by a number of subsequent studies (e.g., Cranston-Cuebas et al. 1993; Nelson and Purdon 2011). The authors of the model have also provided an updated and expanded version meant to apply specifically to impairments in female sexual arousal, desire, and orgasm (Wiegel et al. 2005). The revised model includes increased focus on additional concerns that can draw attention during sexual activity which are specifically relevant to women, e.g., pregnancy or body image self-consciousness. Despite these differences in the content of distracting foci of attention, Barlow's model suggests that, for both men and women, the primary maintaining factors of sexual dysfunction include negative expectancies and affect in sexual situations, a low sense of efficacy, negative interpretations of physiological arousal, distraction, and eventual avoidance of sexual activity.

Table 1 Etiological/maintaining factors of sexual dysfunction and corresponding facets/consequences of mindfulness practice

Etiological/ maintaining factor for sexual dysfunction	Examples	Relevant facets/ consequences of mindfulness	Examples
Locus and quality of attention	Focus on body-image concerns (e.g., "I must look so fat right now") Evaluative monitoring of one's sexual performance (e.g., "am I hard enough to keep going?")	Increased attentional control. Shift in tone of attention from unpleasant to neutral.	Improved ability to notice distraction (e.g., thoughts regarding body image) and mindfully redirect attention to physical sensations Awareness of full range of physical experiences (e.g., pleasure, pain, numbness) without judging them as good or bad
Negative sexual schemas	Perception of self as incompetent Assumption that one will be unresponsive to sexual situations Automatic associations between one's sexual response and feelings of shame/embarrassment	Increased awareness of physical response Cultivation of self-acceptance/-compassion.	Noticing previously ignored vaginal lubrication, challenging perceptions of "frigidity" Acceptance of current sexual difficulties without viewing them as indicators of being globally incompetent (e.g., "I can be a real man, regardless of my erectile function")
Negative expectancies/G-oal orientation	Expectation that one will not be able to become erect during sex, and that this will constitute a "failure," leading to negative partner responses	Focus on the present Non-striving	Letting go of specific goals for sex such as achieving erection or reaching orgasm Noticing one's current sexual experiences, rather than forecasting impaired sexual function and negative consequences
Behavioral and experiential avoidance	Making excuses to avoid sexual activity such as exhaustion or headache Attempting to distract during sex by running through list of upcoming chores	Increasing engagement with previously avoided aspects of experience	Engaging in sexual activity despite anxiety regarding one's inability to "perform" Allowing for awareness of memories related to past sexual trauma rather than attempting to distract oneself
Engagement with negative sexually related cognitions	Having the thought that not reaching orgasm means there is something fundamentally wrong with me and that I will never enjoy sex Accepting this thought as true, initiating additional thinking patterns such as recalling other perceived evidence that something is wrong with me	Meta-cognitive awareness/de-centered perspective	Having the thought that not reaching orgasm means there is something fundamentally wrong with me and that I will never enjoy sex Then, recognizing these thoughts as a transient product of the mind and allowing them to pass from awareness naturally
Relational context	Inability to discuss sexual topics, limiting understanding of sexual preferences and fears; e.g., perceiving partner's low sexual desire as an indicator of a lack of love/attraction vs. gaining the understanding that it results from flashbacks associated with past sexual assault	Improved communication Decreased emotional reactivity during discussion of emotionally salient topics	Tolerating strong emotions necessary to attend to, verbally reflect, and validate a partner's fears that they will be abandoned if they are not able to perform sexually (rather than minimizing these concerns as "unrealistic" or attempting to problem-solve)

Based on these theorized maintenance factors, cognitive behavioral therapy (CBT) for sexual dysfunction focuses on the individuals' biased and unhelpful thoughts regarding sex (cognitions), as well as their unhelpful behaviors (e.g., rigid scripts for sexual activity) and ineffective coping methods (e.g., avoidance). CBT is a broad term encompassing a variety of specific interventions including psychoeducation (Brotto et al. 2008a, b), cognitive restructuring (Kinder and Curtiss 1988; van Lankveld et al. 2009), directed masturbation (Andersen 1981), communication training (Hucker and McCabe 2014), and couples-based sensate focus (Weiner and Avery-Clark 2014). A number of studies support the efficacy of these treatments (e.g., Heiman 2002) in treating a range of sexual dysfunctions. For example, Ravart et al. (1996) randomized heterosexual couples with the female partner reporting hypoactive sexual desire to CBT or a waitlist and found that those receiving CBT exhibited significantly greater desire at post-treatment. Similarly, van Lankveld et al. (2006) found that women with life-long vaginismus (a sexual pain disorder) were more likely to be able to engage in intercourse with their partners than was a control group, and that these gains increased further over a 12-month follow-up.

However, many trials assessing CBT for sexual dysfunction have been hampered by methodological limitations such as small samples sizes, lack of control groups, and incomplete reporting regarding effect size and rates of treatment response (Pyke and Clayton 2015). Even in studies utilizing high-quality methods, the impact of treatment can vary significantly. Frühauf et al. (2013) conducted a meta-analysis of studies assessing CBT for sexual dysfunction, including only trials that compared CBT to a waitlist or another active therapy condition. There were notable differences in effects depending on type of dysfunction. For example, effects on low desire in women were large ($d = .91$), whereas effects on orgasm dysfunction in women were moderate ($d = .46$). The authors reported an overall moderate effect size of .58 across sexual dysfunctions. Thus, while numerous studies suggest that CBT is efficacious in treating a range of sexual difficulties, there is clearly room for improvement.

Researchers have also noted a number of practical limitations in the implementation of many CBT interventions. For example, traditional sensate focus includes a series of couples-based exercises wherein couples engage in physically intimate activities and engage in open communication about their physical and emotional responses to touch. This treatment thus requires both a current sexual partner, and a willingness by both partners to engage in physically intimate activities. These conditions are not met for all individuals seeking treatment for sexual dysfunction (e.g., Catalan et al. 1991). Additionally, the psychological mindedness and motivation to engage in relatively complex interventions such as cognitive restructuring are not common to all individuals seeking therapy for sexual dysfunction.

Mindfulness

Mindfulness has been defined as "paying attention in a particular way: on purpose, in the present moment, and nonjudgmentally" (Kabat-Zinn 1994, p. 4). Mindfulness is typically considered a secular adaptation of Buddhist Vipassana meditation techniques that have been practiced in various Eastern cultures for thousands of years (Brotto and Smith 2014). Mindfulness meditation's emphasis on nonjudgmental attention to, and acceptance of, one's current experience is distinguishable from other meditation traditions. For example, concentrative techniques prescribe a specific mantra (repeated word or phrase) that is explicitly used to disengage from the meditator's usual mental processes (Sedlmeier et al. 2012), in contrast to the encouragement in mindfulness meditation to simply observe one's current mental processes whatever they may be.

Proponents of mindfulness-based therapies (MBT's) often consider their approach distinct from traditional CBT in a number of ways. First, while the emphasis of CBT interventions is typically to *change* thought content and behaviors, MBT's generally invite patients to simply attend to and *accept* their present experience without attempting to change it in any way. Indeed, while the stated goal of many CBT interventions is to directly reduce negative mood states (e.g., systematic desensitization is meant to directly and immediately decrease anxiety), MBT's encourage curiosity, openness, and acceptance to all aspects of one's current experience, including emotions such as anxiety or sadness (Bishop et al. 2004). As another example, cognitive therapy for depression would involve patients completing thought records wherein they identify, then actively evaluate and challenge, depressive thinking patterns such as catastrophizing and labeling. Alternatively, a mindfulness-based approach to depression would rarely include such active engagement with thoughts—instead encouraging the simple acknowledgment of thought content and allowing it to naturally pass out of conscious awareness. Additionally, researchers (Carmody 2015) have suggested that MBT's may be distinguishable from CBT in that they attend to a broader range of experiential information (e.g., all physical senses vs. a focus on muscle tension and deep breathing in relaxation paradigms), and that they represent a more distilled and comprehensive attention training program compared to components of CBT such as cognitive restructuring and mood monitoring.

Many studies have been conducted assessing the efficacy of mindfulness-based treatments for a variety of psychological disorders. A recent comprehensive meta-analysis (Khoury et al. 2015) found moderate to large improvements in symptoms of depression and anxiety over the course of various MBT's (such as mindfulness-based stress reduction—MBSR and mindfulness-based cognitive therapy—MBCT), and that

these effects were similar to those found in traditional CBT interventions. Additional recent reviews and meta-analyses support the efficacy of various MBT's for many specific diagnoses including recurrent major depressive disorder (Kuyken et al. 2016), social anxiety disorder (Norton et al. 2015), and posttraumatic stress disorder (Banks et al. 2015).

There is also some evidence that MBT's may be empirically distinguishable from traditional CBT. For example, integrative behavioral couple therapy (IBCT), while not explicitly a mindfulness-based approach, was created as an expansion of traditional cognitive-behavioral couple therapy and incorporates many similar themes regarding acceptance and understanding of current difficulties to balance change-based interventions (Stephenson et al. 2016). IBCT has been shown to be distinct from traditional behavioral couple therapy in terms of delivery (Christensen et al. 2004), outcomes (Christensen et al. 2006), and potential mechanisms (Doss et al. 2005).

However, in contrast to enthusiasm surrounding MBT's as a "new" therapeutic approach (e.g., Ruiz 2012), other researchers have questioned the practical importance of the distinction between CBT and MBT's. First, rather than standalone treatments, the norm is for mindfulness-related concepts and approaches to be integrated into existing cognitive-behavioral paradigms. Examples include the aforementioned IBCT, dialectical behavior therapy (Linehan and Wilks 2015), and MBCT (Segal et al. 2013). Such combined treatments speak to the shared underpinnings of CBT and mindfulness interventions in that they both focus on how individuals relate to their thoughts and emotions and how these experiences influence behavior.

Indeed, a compelling argument has been made by Arch and Craske (2008) that CBT and another acceptance-based intervention, acceptance and commitment therapy (ACT), share many of the same ultimate goals and mechanisms. For example, both cognitive restructuring (CBT) and acceptance of distressing thoughts (ACT) likely enhance exposure to typically avoided aspects of one's internal experiences such as high levels of anxiety, as well as provide an increased sense of predictability and control over these experiences. Similarly, Teasdale et al. (2002) have provided evidence that both cognitive therapy and MBCT may reduce depressive symptoms by increasing meta-cognitive awareness—the ability to see thoughts and emotions as transient mental events rather than core aspects of one's self.

In sum, the degree to which mindfulness represents a variation/component of CBT vs. a fundamental shift in philosophy and delivery of treatment is an ongoing debate within the field of clinical psychology. However, it is clear that mindfulness-based interventions can in some cases be distinct and have outcomes that differ from traditional CBT. Mindfulness-based interventions also hold great appeal for a wide range of providers, even those not trained in the use of CBT, and may be more flexible to implement in real-world settings. As such, it is not surprising that there is increasing interest in applying mindfulness in the field of sexual dysfunction.

Mindfulness for Sexual Dysfunction

Beginning in 2003, Dr. Lori Brotto and her colleagues began a series of studies on the application of mindfulness for sexual dysfunction (Brotto 2013). In the intervening years, this research team has published the results of multiple clinical trials of MBT's for sexual dysfunction in women (e.g., Brotto et al. 2008a; Brotto and Basson 2014), and other researchers are beginning to evaluate these treatments (e.g., Bober et al. 2015). For example, Brotto et al. (2008a, b) conducted a pilot trial with 26 women reporting sexual dysfunction (i.e., distressing impairment in sexual desire/arousal) participating in a brief 3-session mindfulness-based group treatment. The content of this intervention included basic psychoeducational information regarding female sexual response, common myths regarding sexual activity (e.g., "real" sex must always include orgasm for both partners), and a number of mindfulness interventions including mindfulness of the breath and the body scan. They found significant improvements from pre-treatment to post-treatment on a range of measures including sexual desire and sexual distress. Additionally, women with a history of childhood sexual abuse (CSA) seemed to benefit most from treatment. These findings have replicated in a number of smaller uncontrolled studies (Brotto et al. 2008a, b; Hocaloski et al. 2016). Variations on this initial protocol (e.g., focusing on sexual pain disorders rather than sexual desire/arousal, adding additional sessions, individual vs. group protocols, incorporation of cognitive interventions such as thought restructuring) have also been tested against a waitlist condition, with results generally suggesting superior outcomes for active treatment in most (Brotto and Basson 2014; Hucker and McCabe 2014), but not all cases (Brotto et al. 2015; see cited studies for additional information regarding intervention content).

Reported pre-post effect sizes of MBT for female sexual dysfunction are typically moderate to strong on measures of sexual desire, arousal, and sexual satisfaction/distress (Stephenson and Kerth under review). For example, Brotto and Basson (2014) reported a cohen's d of 1.07 for increases of sexual arousal and .56 for improvements in sexual distress. In cases where effect sizes of active treatment vs. waitlist are reported, they tend to be moderate. For example, Hucker and McCabe (2014) reported a wait list controlled partial n^2 of .32 for increased sexual satisfaction for participants completing an online MBT for female sexual dysfunction. In one study directly comparing CBT and MBT for women with sexual distress and a history of CSA (Brotto et al. 2012), both groups reported similar improvements in sexual distress over the course of treatment.

These initial studies suggest that MBT's may be efficacious in treating disorders of desire/arousal and sexual pain in women. There are also clinical reports that suggest promise in the treatment of other female and male sexual dysfunctions (Brotto and Goldmeier 2015); however, systematic trials in these areas have yet to be conducted. Given the widespread interest in mindfulness meditation, it is likely that research in this area will continue to expand to encompass a wider variety of participants (e.g., men) and diagnoses (e.g., anorgasmia).

While additional clinical trials such as those already summarized would be useful, leading researchers have suggested that, to maximize our understanding of empirically supported psychotherapies, studies on the overall efficacy of treatment packages should be supplemented with research identifying principles of change (e.g., Tolin et al. 2015). Kazdin (2007) provided an excellent summary of the potential benefits of identifying mechanisms of change, including bringing parsimony to similar treatments, allowing for increased efficiency of interventions, and improving the degree to which therapies can be applied in real-world settings. Indeed, a shift toward identifying such trans-theoretical mechanisms is taking place in a number of areas include anxiety disorders (e.g., Brake et al. 2016) and couple therapy (Benson et al. 2012).

Unfortunately, there is currently a lack of evidence as to the mechanisms through which MBT's for sexual dysfunction are effective (Brotto 2013). This limited assessment of mechanisms mirrors research on MBT's more generally (Chiesa and Serretti 2011; Fjorback et al. 2011), however, research is beginning to address these questions. For example, Gu et al. (2015) recently outlined a number of potential mechanisms through which MBT's may impact psychopathology generally and found support for increases in mindfulness, decreases in worry/rumination, and decreases in cognitive and emotional reactivity.

While this preliminary evidence provides a useful foundation, the authors point out that more work is needed, partly because some mechanisms may be unique to certain problems (e.g., anxiety vs. depression) or populations (e.g., men vs. women). To date, there are no published papers that comprehensively outline the theoretical case as to *why* MBT's should be effective in treating sexual dysfunction based on empirically supported scientific models of sexual impairment and mindfulness. To address this need, the primary goal of the current review is to provide an initial discussion of the links between sexual dysfunction and mindfulness in order to identify theoretically based mechanisms of treatment response that can be assessed in future studies in this area. The assessment of these factors in the rapidly expanding area of mindfulness research can simultaneously improve our knowledge of the consequences of these interventions, explicitly test current theoretical models, and allow for the exploration of similarities and differences between mindfulness-based and traditional CBT interventions for these common conditions.

Models of Sexual Dysfunction and Mindfulness

Barlow's (1986) model continues to represent the most empirically supported model of sexual dysfunction available. Barlow's model identifies a number of essential causal/maintenance factors for sexual dysfunction (Sbrocco and Barlow 1996; Wiegel et al. 2005) including the locus and quality of the individual's attention, negative sexual schemas, negative expectancies regarding sexual activity, dysfunctional attribution patterns, and behavioral or experiential avoidance of sexual activity. An additional contributor to sexual dysfunction supported by many studies is the quality of the relational context (e.g., Byers 2005; Fisher et al. 2015; McNulty et al. 2016). If MBTs are effective in treating sexual dysfunction, they are likely to be impacting one or more of these factors.

Similar to sexual dysfunction, a number of theoretical models of mindfulness have been proposed (e.g., Grabovac et al. 2011; Shapiro et al. 2006). Kabat-Zinn (2005) has outlined seven specific attitudinal foundations of mindfulness such as Non-judging (reducing one's inherent tendency to categorize experiences as "good" or "bad"), Beginner's Mind (attempting to experience even oft-repeated sensations as if for the first time), and Non-Striving (having no goal other than noticing one's current experience). These foundations are the basis for MBSR, which has been supported as an efficacious intervention for a range of mental and physical health conditions (Khoury et al. 2015).

Carmody (2015) provided a somewhat simpler model that posited three basic principles of mindfulness practice. First, mindfulness cultivates the ability to notice that the primary components of one's present experience—physical sensations, cognitions, and "tone" (pleasant, unpleasant, or neutral)—are connected but distinct. Second, mindfulness increases one's ability to notice the automatic processes that tend to link these components of experience. This noticing allows for mindful (as opposed to reactive) choices to redirect attention to targets of one's choosing, improving one's ability to regulate emotional arousal. Third, mindfulness can lead to the development of a "de-centered" perspective – a concept similar to meta-cognitive awareness as discussed above.

Another widely used model of mindfulness was proposed by Baer and colleagues (Baer et al. 2006, 2008). This model, based on a series of factor analytic studies, suggests that mindfulness consists of five facets: Non-Reactivity to inner experience (the ability to notice and "sit with" one's thoughts or emotions without engaging in automatic reactions such as avoidance or over-engagement), Observing (frequently observing and being aware of internal and external experiences, i.e., smells, sounds, emotions), Describing (being able to verbally describe one's current emotions, sensations, and

thoughts), Acting With Awareness (being consistently aware of one's current experience rather than "running on automatic," or being frequently distracted), and Non-Judgment of inner experience (being accepting of one's own thoughts and emotions as opposed to being critical of one's experience). These five facets of mindfulness are thought to represent related but distinct components of mindfulness and the Five Facet Mindfulness Questionnaire (FFMQ; Baer et al. 2006) has been supported as a valid scale that assesses these facets (e.g., Bohlmeijer et al. 2011; Brown et al. 2015).

Research in some areas of psychopathology has begun to provide evidence that certain facets of mindfulness may exhibit specific links to symptoms of disorders. For example, a number of studies have suggested that Acting with Awareness and Non-Judgment may exhibit the strongest association with symptoms of Posttraumatic Stress Disorder (e.g., Owens et al. 2012; Vujanovic et al. 2009; Wahbeh et al. 2011). Similarly, some facets of mindfulness may be more strongly associated with sexual dysfunction than others. For example, Adam et al. (2015a) developed a version of the FFMQ to specifically measure levels of mindfulness during dyadic sexual activities. In a sample of women without sexual difficulties, they found that multiple facets of the mindfulness during sex were correlated with sexual distress, but that Acting with Awareness exhibited the strongest association. A second study (Adam et al. 2015b) generally replicated these results using groups of women with and without reported orgasm difficulties. They found that mindfulness during partnered sex explained 54% of the variance in sexual distress in their combined sample, and that the Acting With Awareness subscale exhibited an association with distress almost twice as strong than any other facet of mindfulness.

In sum, current evidence suggests that sexual dysfunction is caused and maintained by a number of specific cognitive, emotional, and behavioral factors, and that mindfulness-based therapies may be efficacious in treating sexual dysfunction. Additionally, it is likely that increases in specific facets or consequences of mindfulness (e.g., Acting With Awareness, meta-cognitive awareness, etc.), may ameliorate sexual dysfunction by acting on specific maintaining factors (e.g., distraction from sexual stimuli). Formally testing these potential mechanisms of action would improve our knowledge and implementation of these interventions, and allow us to determine which mechanisms are unique to MBT's and which are common to more firmly established therapeutic methods such as CBT. Below, I outline a series of theoretically and empirically supported maintaining factors of sexual dysfunction, and the mechanisms through which increased mindfulness may impact these factors.

Theoretical Links Between Sexual Dysfunction and Mindfulness

Locus and Quality of Attention

Barlow (1986) and others (e.g., de Jong 2009; Lorenz et al. 2012) have provided strong evidence that the physiological effects of moderate anxiety do not necessarily impair sexual arousal. Rather, anxiety may impair arousal in some cases primarily through its impact on one's locus and quality of attention. As outlined above, individuals with sexual dysfunction tend to exhibit decreased focus on "erotic cues" during sexual activity. In other words, they do not focus on physical pleasure, the attractiveness of their partners, etc. Rather, their attention is drawn to "non-erotic cues" (Purdon and Holdaway 2006). Importantly, non-erotic cues can include stimuli that are relatively non-sexual nature (e.g., negative thoughts regarding one's own physical attractiveness, dirty laundry in the room, etc.), or sexual factors that are viewed in an evaluative manner. For example, spectatoring/performance monitoring, wherein individuals focus narrowly on their arousal in order to judge its adequacy during sexual activity, has long been associated with sexual dysfunction (Meston 2006; Regev and Schmidt 2009). These processes imply explicitly judgmental attention to a sexual stimulus—one's own arousal. As such, both the locus (sexual vs. non-sexual) and quality (accepting vs. evaluative) of attention are essential in differentiating between erotic and non-erotic cues. Focus on non-erotic cues during sexual activity is identified by Barlow's (1986) model as the primary proximal cause of impaired sexual function (Sbrocco and Barlow 1996). Additionally, attending to non-erotic cues during sex has been empirically associated with impaired sexual function and well-being in a number of more recent studies (e.g., Nelson and Purdon 2011; Nobre and Pinto-Gouveia 2008a, b; Purdon and Holdaway 2006).

Mindfulness meditation is thought to impact attention in a number of ways that may influence this key maintaining factor of sexual dysfunction. First, research suggests that meditation can result in broad increases in attentional control (e.g., Cahn and Polich 2006), possibly by altering the structure of sensory cortices (Fox et al. 2014) and activity in the anterior cingulate cortex (Tang et al. 2015). These changes alone may increase the likelihood that individuals with sexual dysfunction can successfully attend to erotic cues. Additionally, many components of MBT's explicitly encourage increased non-judgmental attention to physical sensations. For example, the body scan (Kabat-Zinn 2005) involves individuals progressing through different parts of their body and bringing awareness to their physical sensations. When patients invariably notice that they have been distracted, they are able to practice repeatedly bringing their attention back to the body. This specific skill of maintaining body awareness in the face of distractions could directly improve one's ability

to focus on physical sensations during sex, rather than distractors such as non-sexual aspects of the environment, memories of past negative sexual experiences, or catastrophic forecasting regarding possible outcomes of the sexual activity (Brotto and Smith 2014).

However, as outlined above, even increased attention paid to sexual stimuli may not be helpful if that attention is evaluative in nature. For example, a woman may be encouraged to attend to vaginal sensations rather than body image concerns. However, this attentional shift may not improve arousal if this attention is tied to evaluative cognitions such how close, or not, she is to reaching orgasm. Thus, a shift in the locus of attention may be insufficient to improve sexual function unless accompanied by a fundamental shift in the "tone" of that attention from unpleasant to neutral (Carmody 2015). Mindfulness also attempts to foster this quality of awareness—the body scan specifically encourages a curious, accepting, and non-judgmental attention paid to bodily sensations, with the meditator simply noticing the quality of sensations, rather than judging them as positive or negative or attempting to change them in any way. Such changes may be reflected by increases in Acting With Awareness of one's present experience and increased Non-Judgment (Baer et al. 2006).

This shift in locus and quality of attention is also an explicit goal of multiple CBT interventions such as sensate focus (Masters and Johnson 1970) and directed masturbation (Andersen 1981). Although these treatments pre-dated widespread dissemination of mindfulness, they are similar in many ways. For example, sensate focus exercises include the explicit goal of becoming more aware of one's physical sensations, especially pleasure (Regev and Schmidt 2009). Similarly, directed masturbation prescribes self-touch of genitals and other erogenous zones with the aim of increasing women's awareness of their existing physiological responses to sexual contact. Research suggests that these interventions significantly improve sexual function and well-being in many cases (e.g., Jones and McCabe 2011; Sarwer and Durlak 1997); however, there is little empirical evidence as to whether increased attention to physical sensation mediates these improvements.

Leading researchers have acknowledged the similarities between these CBT interventions for sexual dysfunction and mindfulness, and suggest that MBT's may represent a broader, more generalized application of these same processes (Brotto 2013). For example, directed masturbation exercises focus primarily on sensations of touch; however, mindfulness exercises could focus equally on smell, sounds, and other sensory information. Similarly, while sensate focus exercises encourage focus on pleasurable sensations, mindfulness exercises such as the body scan would entail equal awareness of sensations typically judged as negative such as pain or numbness. Further research is needed to test whether the broader focus of mindfulness leads to larger increases in awareness, and whether these differences translate into increased improvement in symptoms of sexual dysfunction.

Negative Sexual Schemas

Schemas are subconscious collections of beliefs, assumptions, and associations that are activated when an individual faces schema-relevant situations (e.g., Beck 1963). Schemas are often adaptive, allowing for rapid evaluation of, and response to, a wide variety of situations. Schemas also shape the specific information that is attended to or ignored during an experience, and the information that is subsequently remembered (Cyranowski and Andersen 2000). Negative or inaccurate schemas, however, are common risk factors of a variety of psychological disorders (e.g., Foa and Kozak 1986), including sexual dysfunction. Wiegel et al. (2005) suggested that negative sexual schemas include assumptions regarding failure in sexual situations, perception of the self as incompetent/unable to control the outcome of sexual interactions, and maladaptive attributional patterns.

Other researchers have provided additional detail regarding the specific content of negative sexual schemas. For example, Kuffel and Heiman (2006) conceptualized negative sexual schemas as including low subjective importance of sex in one's life, the assumption that one would have difficulty becoming sexually aroused, negative evaluations of one's arousal as disgusting, feelings of being over-controlled and being unable to "let go" during sex, and a general sense of discomfort regarding sex. Andersen and Cyranowski (1994) organized female sexual schemas into positive aspects (including perception of the self as passionate, romantic, and open to sexual activity) and negative aspects (including sex being associated with embarrassment and danger). They found that women can exhibit mixtures of these positive and negative aspects, including "Co-Schematic" (endorsing high levels of both positive and negative aspects) and "Aschematic" (endorsing low levels of both) orientations. Alternatively, men seem to exhibit either a multi-faceted positive sexual schema, including aspects of passion, power/aggression, and openness to sexual experience, or a general lack of schema indicating perception of one's self as generally non-sexual (Andersen et al. 1999).

Barlow's (1986) model identifies these negative sexual schemas as a necessary pre-cursor to sexual dysfunction. The interaction between these negative schemas, biological predispositions such as an inherited central nervous system hypersensitivity, and social stressors are thought to cause negative affect upon entering a sexual situation, which initiates the cognitive and emotional feedback loop leading to impaired sexual function (Wiegel et al. 2005). Indeed, studies have shown that individuals with negative self-schemas tend to enter sexual situations with fewer positive emotions and more discomfort (e.g., Cyranowski and Andersen 1998), are less

likely to engage in partnered sexual activity (Andersen et al. 1999), and are less likely to see themselves as sexually competent (Quinta Gomes and Nobre 2012). Additionally, experimentally inducing positive sexual self-schemas seems to result in greater positive affect and immediate increases in physiological and subjective sexual arousal in response to erotic stimuli (Kuffel and Heiman 2006). Furthermore, interventions that focus specifically on altering negative sexual schemas may improve sexual function and well-being (Meston et al. 2013).

Two common themes spanning negative sexual schemas are judgment and disengagement. As outlined above, women with negative sexual schemas tend to automatically and harshly judge both themselves (as incompetent, bad, etc.) and their sexual response (as dirty, shameful, etc.). Additionally, both men and women with negative sexual schemas perceive themselves as disengaged, unresponsive, and generally non-sexual. It is possible that mindfulness practice may alter both of these components of negative sexual schemas. First, mindfulness may improve individuals' ability to notice previously ignored physical responses. Indeed, two separate studies have supported this effect in the context of sexual activity. Brotto et al. (2012) found that two sessions of mindfulness training significantly increased the concordance between physiological measurement and subjective assessment of sexual arousal in women. In other words, women's subjective assessment of their own sexual arousal was more accurate following mindfulness training. Similarly, Silverstein et al. (2011) found that participants who were provided with mindfulness training became significantly faster at noticing their sexual arousal as compared to controls. Improved ability to notice one's naturally occurring response to sexual stimuli may directly contradict aspects of negative sexual schemas that paint the individual as "frigid" or "impotent," providing new evidence that he/she is capable of responding to sexual activity.

Additionally, one of the foundational components of mindfulness is to practice non-judgmental awareness (Kabat-Zinn 2005) and the goals of MBT's typically include patients being able to suspend their judgment of their present experience. It is possible that this ability, when applied to thoughts and emotions surrounding sexual activity, may reduce the frequency and/or impact of negative judgments applied to one's sexual response, eventually changing the content of one's sexual schema. For example, if a female with impaired sexual arousal can repeatedly apply her mindfulness practice during sexual activity, she may experience fewer negative thoughts regarding herself and her sexual responses (e.g., "this is disgusting," "I can't ever let go"), which may shift underlying schemas over time.

Research assessing the association between levels of mindfulness and the content of schemas is just beginning (Silberstein et al. 2012), but initial results suggest a correlation between the two in the context of some disorders (e.g., substance use disorders; Shorey et al. 2015). Additional research assessing the possibility that increased mindfulness changes sexual schemas in the context of treatment is needed. Given the multi-faceted nature of both mindfulness and schemas, it will be important to explore the possibility of specific effects of subcomponents in addition to broad main effects. For example, the Non-Judgment facet of mindfulness may be particularly helpful in reducing aspects of sexual schemas related to self-judgment such as the "embarrassed/conservative" aspect suggested by Andersen and Cyranowski (1994).

CBT also attempts to shift underlying schemas, and does so in a more explicit way than MBT's, using methods such as cognitive restructuring, role-play, and behavioral experiments. As with attentional focus above, there is little empirical evidence regarding whether CBT is effective in shifting the content of sexual schemas using these methods, or whether it does so more effectively than MBT's. It is important to note, however, that MBT's differ from CBT in that they do not require the explicit discussion and verbal exploration of underlying core beliefs to the same extent as cognitive interventions. This difference may be particularly important in cases where patients are unwilling (e.g., because of pronounced avoidant coping methods) or unable (e.g., because of brain injury or other cognitive impairments) to engage in the challenging and abstract processes inherent in cognitive therapy. Additionally, while cognitive work attempting to shift schemas and core beliefs is typically best conducted in a one-on-one therapeutic relationship, mindfulness practice is typically taught and practiced in groups. As such, even if MBT's are only partially as effective as cognitive interventions in inducing changes to maladaptive schemas, their flexibility and ease of implementation would still make them important targets of research.

Negative Expectancies/Goal Orientation

While schemas are fairly abstract, multi-faceted constructs, a specific result of schemas are the expectancies and goals one brings to sexual situations. Barlow's (1986) model suggests that individuals with sexual dysfunction bring a particular "dysfunctional mindset" into sexual situations that is characterized by the expectation that sex will go poorly, and that they will not be able to alter this outcome. In other words, they expect to "fail" at sex. A number of studies have suggested that negative expectations contribute to impaired sexual function. For example, Cranston-Cuebas et al. (1993) showed that, when men with erectile dysfunction ingested a (placebo) pill that they were told would detract from their erection, they exhibited decreased physiological arousal. More generally, having negative expectancies has been shown to contribute to disengagement from a range of tasks (Sbrocco and Barlow 1996). In sexual situations, this response would likely

consist of decreased attention to erotic cues, decreasing arousal.

Holding negative expectancies when entering sexual activity implies a number of underlying component processes. First, the individual must be focusing on the future (predicting the outcome of the sexual activity), rather than the present moment. Second, he/she must have a specific goal in mind for the activity—typically to "perform well" by becoming aroused, reaching orgasm, etc. Third, he/she must believe that falling short of these performance goals is negative and equates to "failing" at sex. Mindfulness encourages habits of mind that run counter to each of these cognitive processes.

First, by encouraging engagement with the present moment rather than the future, mindfulness may decrease the degree to which individuals attempt to forecast the outcome of sexual activity, or at least their tendency to engage with and worry about these forecasts. Second, the Non-Striving attentional foundation of mindfulness (Kabat-Zinn 2005), which encourages meditators to let go of their expectations and goal orientations, would counter specific goals related to sexual function. Third, mindfulness encourages non-judgmental acceptance. This acceptance would include the experience of discrepancies between one's desired level of sexual function and one's actual experience during sexual activity. In other words, the lack of orgasm, erection, etc. need not be judged as a "failure." Rather, the individual can bring acceptance and appreciation to whatever sensations he/she is currently experiencing, even in the context of minimal sexual arousal.

In sum, by encouraging a non-striving mindset that is present-focused and non-judgmental, mindfulness should hypothetically decrease negative expectancies regarding sex over time, and reduce the degree to which any forecasted outcome is judged as negative. These changes would likely be accompanied by different goals and motivations for engaging in sex. Rather than performance-related outcomes such as reaching orgasm, goals may shift to more general aims such as noticing physical pleasure, appreciating feelings of connection and closeness with a partner, and being open to whatever the sexual experience provides. These changes would represent large shifts in perspective in many cases, especially for men, who are more likely to endorse performance-related conceptualizations of sexual activity (e.g., McCarthy and Wald 2013).

Circumstantial evidence for the positive effects of shifting goals and expectations for sex comes from research on the efficacy of sensate focus. An overarching goal of sensate focus is to shift couples' conceptualization of sex from a goal-oriented "performance" to an opportunity for emotional and physical connection (Regev and Schmidt 2009). To reach this goal, sensate focus utilizes "non-demand" activities in which couples explicitly agree to "ban" sexual activity and focus on the exchange of non-erotic pleasurable touching. Couples who successfully implement this intervention typically gain a broader, more flexible conceptualization of sex that encompasses physical and emotional intimacy, and which does not require any specific physical response or behavior to be considered "successful." MBT's may represent another method of reaching this end-state, providing a method of practice that can be used outside of sexual contexts, and by individuals without a current sexual partner.

Behavioral and Experiential Avoidance

Avoidance is thought to be central maintaining factor of a wide range of psychological disorders (Foa and Kozak 1986; Wilamowska et al. 2010). For example, leading cognitive theories of posttraumatic stress disorder suggest that symptoms such as flashbacks and hyperarousal are maintained because beliefs regarding the threatening nature of traumatic memories are never disconfirmed by the individual confronting and tolerating them (Ehlers and Clark 2000). Similarly, Barlow's (1986) model suggests that the dysfunctional feedback loop of increased SNS activation, negative affect, cognitive biases, and impaired sexual function eventually results in avoidance of sexual situations. This avoidance then prevents positive sexual experiences and, thus, new learning that could disconfirm negative schemas and expectancies.

Sexual avoidance can be overt in nature. For example, Sbrocco and Barlow (1996) reported that 90% of men seeking treatment for erectile dysfunction "quit" when losing their erection during partnered sexual activity. This behavioral disengagement in the midst of sexual activity can generalize to avoiding sexual situations in the future (e.g., by making excuses such as fatigue, headache, etc.). Avoidance can also be covert or experiential. Hayes et al. (1996) have described experiential avoidance as attempting to avoid focusing on specific distressing aspects of one's current experience through distraction or other methods. For example, "laundry listing"—focusing on a list of chores that need to be completed rather than one's current sexual experience—is a commonly reported by women with sexual dysfunction. In more extreme cases, women can attempt to dissociate during sexual activity, dramatically decreasing their engagement in the activity (Staples et al. 2012).

Numerous studies have suggested an association between behavioral avoidance and sexual dysfunction. Most individuals seeking treatment for sexual dysfunction exhibit notable patterns of avoiding sexual activity (Schover and LoPiccolo 1982). Avoidance-related processes have also been shown to be associated with levels of sexual pain (Davis et al. 2015; Desrochers et al. 2009) and orgasmic function (Staples et al. 2012). High levels of avoidance may predict worse response to treatment (Desrochers et al. 2010) and reduced avoidance may mediate the efficacy of cognitive-behavioral treatments of sexual dysfunction (ter Kuile et al. 2007). While there is

little research explicitly assessing the role of experiential avoidance in sexual dysfunction, distraction (as discussed above) has been associated with sexual dysfunction and distress. While distraction may be indicative of ineffective engagement in the sexual active (i.e., lack of attention to sexual cues), it may also be a consequence of effortful disengagement/avoidance (Sbrocco and Barlow 1996).

Perhaps the most fundamental tenant of mindfulness is attention to and engagement with the present moment. While mindfulness meditation does not require a lack of distraction or the absence of urges to avoid aspects of one's experience (Kabat-Zinn 2005), the essence of mindful attention—the attempt to pay attention to the here and now without attempting to change it—is antithetical to both behavioral and experiential avoidance. Indeed, multiple researchers have argued that exposure to previously avoided distressing thoughts, sensations, and emotions is a primary mechanism of efficacy for mindfulness-based treatments (Arch and Craske 2008; Treanor 2011). Multiple studies have empirically supported this claim, showing that mindfulness significantly reduces avoidance of unpleasant emotions (Davis et al. 2014; Hooper et al. 2010; Roemer and Orsillo 2007). Based on this evidence, mindfulness in the context of sexual activity should counteract experiential avoidance by directly increasing the individuals' engagement with the sexual situation despite potential anxiety and discomfort.

One population for which this mechanism may be particularly important is women with a history of CSA. Researchers (e.g., Leonard and Follette 2002) have suggested that the negative impact of CSA on adult sexual dysfunction may be partially a result of increased likelihood of engaging in experiential avoidance during sexual activity. This tendency to distract or dissociate during sexual activity may be a response to traumatic sexual memories and/or feelings of disgust, shame, and self-blame associated with one's own sexual response (e.g., Staples et al. 2012; Stephenson et al. 2012; Westerlund 1992). Treatments that do not explicitly address this tendency toward experiential avoidance and related negative judgments of the self may be less effective for this population. Indeed, empirical evidence suggests that, for individuals with a history of childhood trauma, mindfulness-based interventions for a range of disorders may be more efficacious than cognitive therapies without meditation training (Williams et al. 2014). In response, researchers have begun to adapt mindfulness-based intervention specifically for women with sexual dysfunction and a history of CSA (Follette and Pistorello 1995). Brotto et al. (2008a, b) have also provided evidence that women with a history of CSA may exhibit better response to mindfulness-based treatments for sexual function than those without CSA.

It seems less clear whether mindfulness alone would decrease explicit behavioral avoidance of sex. While mindfulness can decrease negative affect (e.g., Snippe et al. 2015), which is associated with behavioral avoidance (Dickson et al. 2012), the decision of whether to engage in sexual activity depends on a number of factors aside from the individual's willingness. For example, Brauer et al. (2014) found that partner responses to sexual difficulties strongly predicted whether women continued to engage in sexual activity despite physical discomfort. As such, it may be necessary that MBT's involve sexual partners in order to consistently reduce behavioral avoidance of sexual activity.

CBT focuses much more explicitly on behavior change than do MBT's, for example, by scheduling specific times when sensate focus exercises will take place. As such, CBT may be more effective at directly targeting behavioral avoidance of sex. Indeed, decreasing behavioral avoidance is one of the few mechanisms of CBT for sexual dysfunction that has received empirical support (ter Kuile et al. 2007). However, the effectiveness of directly inducing such behavior change would depend on both partners' agreement that such change is needed. As documented in the literature on integrative behavioral couples therapy (e.g., Christensen et al. 2015), there is often disagreement between partners as to whether and how much change is needed, and attempts to force change can counterproductively lead to increased "digging in" by the individual who is most satisfied with the status quo. IBCT addresses this problem by increasing acceptance and understanding of current emotions and behaviors before attempting to induce change—a technique in line with mindfulness approaches. In sum, arguments can be made in favor of either CBT or MBT's being more effective in reducing the avoidance that maintains sexual dysfunction and further research is needed to determine whether the approaches work equally well, or whether one may be preferable in some circumstances.

Engagement with Negative Sexually Related Cognitions

In a recent review of research supporting the efficacy of MBT's for sexual dysfunction, Brotto and Smith (2014) suggested that shifts in how the individuals interpret their sexual dysfunction (e.g., seeing impaired sexual function as impermanent rather than life-long) may partially account for the impact of treatment. Indeed, Barlow's model (e.g., Wiegel et al. 2005) posits that the "sexually dysfunctional mentality" of individuals with sexual dysfunction includes maladaptive attributional patterns and beliefs regarding sex. This suggestion has been supported by both correlational (Scepkowski et al. 2004) and experimental (Weisberg et al. 2001) evidence showing that attributing sexual problems to causes that are internal and stable may contribute to impaired sexual function and lower sexual satisfaction (Jodoin et al. 2011; Stephenson and Meston 2016). Other negative automatic thoughts during sex (e.g., my partner will think I am less of a man/woman) are also predictive of sexual dysfunction (Nobre and Pinto-

Gouveia 2008a, b) and traditional CBT for sexual dysfunction typically includes directly challenging inaccurate or unhelpful thoughts and myths regarding sex (Stinson 2009).

It is possible that mindfulness practice, given its emphasis on acceptance and self-compassion, may change the content of these cognitive interpretations of impaired sexual dysfunction. However, MBT's generally differ from cognitive therapies in that changing thought content is not an explicit goal of treatment. Instead of systematically challenging and reformulating dysfunctional thinking patterns, MBT's aim to impact one's relationship to thoughts by increasing awareness that they are "just thoughts." In other words, the goal is to increase the individual's understanding that thoughts do not necessarily represent objective truth, but are instead transient products of the mind that do not need to be endorsed or engaged with—otherwise known as metacognitive awareness or a "de-centered perspective" (Carmody 2015).

MBT's have been shown to increase metacognitive awareness (Teasdale et al. 1995), possibly by increasing activation of the frontopolar cortex (Tang et al. 2015). There is also evidence that increased metacognitive awareness mediates the effect of MBT's on depression (Teasdale et al. 2002). Indeed, it is possible that even cognitive therapies improve psychopathology through their impact on metacognitive awareness, rather than changing the content of thoughts (e.g., Barber and DeRubeis 1989; Halford et al. 1993). Based on these findings, it is possible that MBT's for sexual dysfunction may function not by changing the content of cognitions regarding impaired sexual function but, instead, by improving patients' ability to simply acknowledge these thoughts without having to engage with them. The comparison of these two potential mechanisms of change—altered content of thoughts vs. engagement with thoughts—offers a unique opportunity to directly compare factors that are theoretically central to CBT and MBT's, respectively, allowing for a direct comparison of theories and subsequent strong theoretical conclusions.

Relational Context

While Barlow's model provides excellent coverage of intrapersonal factors that potentially cause and maintain sexual dysfunction, it provides less guidance regarding how sexual function is influenced by the interpersonal context within which sex typically takes place. Many studies have supported the strong links between sexual dysfunction and a variety of relational factors including relationship satisfaction (Fisher et al. 2015; McNulty et al. 2016), length of the relationship (Schmiedeberg and Schröder 2016), partner responses during and after sexual activity (Muise et al. 2014; Rosen et al. 2015), compatibility between partners in terms of sexual preferences (Mark et al. 2013; Mark and Murray 2012), and general patterns of both sexual and non-sexual communication (Mark and Jozkowski 2013). Indeed, some researchers have suggested that many cases of sexual problems can be most accurately conceptualized as adaptive responses to negative relational environments (Bancroft et al. 2003).

While Barlow's model suggests that "relationship factors" influence affect and expectancies when entering sexual activity, little detail is provided as to what specific aspects of relationships are important, nor how these variables may interact with other maintaining processes such as distraction or avoidance of sexual activity. Similarly, most MBT's for sexual dysfunction that have been formally assessed include limited coverage of relational issues, and few include participation by relational partners. Thus, is it not surprising that these interventions often fail to significantly improve relationship quality (e.g., Brotto and Basson 2014; Brotto et al. 2008a). These null results are important given that negative relational contexts may predict poorer response to treatment for sexual dysfunction (Brotto et al. 2013; Stephenson et al. 2013).

This lack of attention to relational factors is notable given that large meta-analyses have suggested that mindfulness training may have even larger positive impact on interpersonal relationships than on individual emotion regulation factors (Sedlmeier et al. 2012). Additionally, clinical trials of MBT's that do include both partners in romantic relationships provide promising results. Carson et al. (2004) adapted MBSR into a couples-based intervention and found significant improvements in a range of relational outcomes as compared to a wait list. Similarly, Christensen et al. (2015) developed integrative behavioral couple therapy (IBCT), which expands traditional CBT techniques to include a range of acceptance-based interventions. IBCT has been shown to be at least as effective as traditional cognitive-behavioral couple therapy (Christensen et al. 2004). Finally, in the one study assessing an MBT for sexual dysfunction that included education specifically for partners and couple communication training, significant increases in emotional intimacy and communication between partners were reported (Hucker and McCabe 2014). In sum, evidence suggests that MBT's which include both relational partners can significantly improve relational quality, and that the relational context can impact individual sexual dysfunction. However, minimal research has investigated potential relational mechanisms through which MBT's may ameliorate sexual dysfunction.

There is evidence that acceptance-based interventions can have a range of specific effects on relationships, including reduced disruptive emotional arousal during conflict (Baucom et al. 2015), and increased feelings of acceptance toward one's partner (Carson et al. 2004). There is particularly strong evidence that mindfulness improves the quality of couples' communication. Both clinical trials (Doss et al. 2005) and studies using controlled conflict discussion paradigms (e.g., Barnes et al. 2007) have shown that partners with higher levels of mindfulness are more likely to use positive

communication techniques (e.g., reflection) and less likely to use negative techniques (e.g., criticism, stonewalling, problem-solving emotions, etc.). In the one study focusing on relational consequences of an MBT for sexual dysfunction, Hucker and McCabe (2014) assessed a range of outcomes and found the largest effect sizes for improved communication between partners. These effects are in line with research that emphasizes the importance of attentive, active listening in facilitating effective communication (Bavelas et al. 2000). Mindfulness may increase engagement with the present moment even in the context of strong emotions that are likely to arise during discussion of emotionally sensitive topics such as sexual dysfunction.

Improved communication may positively impact sexual function in a number of ways, including increasing knowledge and understanding of each partner's preferences regarding sexual activities (Mark et al. 2013). As a result, the couple may be better able to agree on sexual activities that allow for satisfying sexual experiences, and which do not depend on unimpaired sexual function. For example, a heterosexual woman with a sexual pain disorder may be better able to discuss her anxiety regarding intercourse with her partner, including the influence of past traumatic sexual experiences and her fear of disappointing him. Based on such a discussion, the two may be able to discuss alternatives to intercourse, such as oral sex, that can maintain feelings of physical pleasure and emotional intimacy while reducing negative consequences such as disruption of sexual activity or negative partner responses (e.g., Rosen et al. 2015; Stephenson and Meston 2015b). The resulting positive experiences may reduce negative affect and expectancies regarding sexual activity, resulting in improved sexual function and well-being.

In terms of facets of mindfulness, Describe may be particularly important in influencing relational factors. In order to share one's emotional experience with a partner, one must be able to notice these experiences and label them with words. Thus, the degree to which individuals improve in their ability to describe their current experience may mediate the degree to which MBT's facilitate improved communication with partners. This mechanism may be most important for men, who are more likely to experience difficulties identifying and describing emotional experiences (Levant et al. 2009). Indeed, Laurent et al. (2013) found that, for men in particular, high scores on the Describe subscale of the FFMQ predicted decreased cortisol response during a couple conflict discussion. They suggested that the ability for men to verbally communicate their emotional experience to female partners may play a uniquely important role in improving the tone of conflict. Similarly, the ability to effectively communicate distress regarding sexual dysfunction to one's partner without becoming "flooded" and disengaging from the conversation (Carrère and Gottman 1999) would likely be beneficial in improving the couple's ability to cope with impairments in male sexual function.

Brotto (2013) has noted that MBTs may be more flexible than classic sensate focus and other CBT interventions because they can be used for individuals not currently in a relationship. However, there is little research assessing whether receiving mindfulness training in the absence of a current relationship results in improvements that carry over to future sexual interactions with a partner. Establishing this translation from individual mindfulness practice to using mindfulness during sex with a partner is essential. Indeed, Adam et al. (2015a, b) found that, rather than overall levels of mindfulness, only the degree to which women utilized mindfulness in partnered sexual situations differentiated between those with and without orgasm difficulties. Further research that includes relational partners, or which explicitly assesses the effects of relational status on outcomes, is needed to further explore these issues.

Directions for Future Research

Kazdin (2007) provides a number of recommendations to improve research on mechanisms of change in psychotherapies including (a) using theory to guide identification of mechanisms, (b) including measures of mediators in treatment studies, (c) assessing multiple potential mediators concurrently, (d) measuring variables at multiple points during treatment, and (e) directly manipulating proposed mediators. These recommendations should be implemented in future research assessing MBT's for sexual dysfunction and this review has attempted to clearly identify mechanisms that can be measured in future trials. Ideally, multiple potential mediators will be assessed simultaneously, at multiple times over the course of treatment, using gold-standard validated assessment techniques.

An additional helpful method would be to conduct dismantling studies that systematically add or remove treatment components that should impact specific mediators. For example, two versions of MBT that either do or do not include couple communication training could be compared to assess the importance of improved communication as mechanisms of change. Similarly, different versions of MBT that include or exclude cognitive restructuring could be compared. This comparison would be especially helpful given that almost all MBT's for sexual dysfunction assessed to date have included some amount of cognitive restructuring (e.g., Brotto and Basson 2014), making it unclear whether mindfulness is a necessary component of effective treatment, let alone a sufficient one. Recent research directly comparing cognitive restructuring to acceptance-based coping alone (Stappenbeck et al. 2015) presents a useful starting point for this work.

Knowledge regarding mechanisms underlying treatment efficacy of mindfulness-based treatments for psychopathology is currently limited (Khoury et al. 2015). However, research in this area is growing rapidly, with many researchers

beginning to examine psychological (Gu et al. 2015) and neurological (Cahn and Polich 2006; Tang et al. 2015) mechanisms that explain the effects of mindfulness on many psychological disorders and health conditions. Similar work in the area of sexual dysfunction will ideally be guided by established theory (e.g., Barlow 1986; Carmody 2015).

Such work may significantly benefit patients and scientists. Rather than assessing the efficacy of quite similar multicomponent therapies (e.g., MBSR, MBCT, ACT, etc.) in isolation, scientists may be able to evaluate the degree to which specific interventions within these therapies effectively target and change the most important maintaining factors of sexual dysfunction. This information may allow for the integration of treatment methods, resulting in more efficacious and efficient protocols. This ability to target treatment, and potentially match active components to an individual patient's case conceptualization, would be especially helpful in facilitating the widespread use of these methods in managed care settings or other situations in which treatment time may be limited. In sum, research on mechanisms of action represents an excellent opportunity for translational research, simultaneously enriching basic science regarding theoretical models of sexual dysfunction and mindfulness, while also improving patient access to effective treatment.

Compliance with Ethical Standards This article does not contain any studies with human participants performed by the authors.

Conflict of Interest The author declares that he has no conflict of interest.

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