

Mindfulness-based therapies for men and women with sexual dysfunction: a systematic review and meta-analysis

Abstract

Mindfulness based interventions (MBI) may be an effective treatment for sexual dysfunction among men and women. This literature review identified seven trials for sexual dysfunction and MBI. Of these, four trials were Randomised Control Trials (RCTs) including a control-group wait list and three studies with a within-subject design. A meta-analysis synthesized the results across these trials which demonstrated an overall low to moderate effect size (Cohen's $d=0.55$). Moderate statistical heterogeneity between studies was evident with possible publication bias. Sub-group analysis revealed differences between study weights, where overall higher effect sizes were found among RCTs ($d=0.65$) than within-subject design studies ($d=0.27$). However, within-subject design studies tended to include pre and post-physiological measurements (e.g. vaginal photoplethysmography), which may provide a more precise evaluation of the benefits of MBI, rather than studies based on self-report measures only. This review identified a gender inequality; clinical trials recruiting women predominated with a 6:1 female to male ratio. Whilst MBI looks promising, significantly more research is needed, particularly among men. It is important for both practice and policy to develop an understanding of the potential benefits of non-prescription intervention alternatives to medication, and of the role MBI might play as a biopsychosocial adjunct in support of those experiencing sexual dysfunction.

Key words: Mindfulness based intervention, sexual dysfunction, gender, inequality, systematic review

Introduction

Sexual dysfunctions are a group of disorders marked by clinical disturbances in the engagement and experience of sexually satisfying behaviours (APA, 2013). Examples include female orgasmic disorder, female/male sexual interest/arousal disorder, genito-pelvic pain/penetration disorder, premature ejaculation, delayed ejaculation, erectile disorder or substance/medication induced sexual dysfunction (APA, 2013). Those with sexual difficulties in the general population, can experience compromised well-being and relationship quality (World Association for Sexual Health, 2008). Indeed, sexual dysfunction tends to be co-morbid with mental health problems, including depression (Sorenson, Giraldi & Vinberg, 2017), and physiological problems, such as cancer (Jalambadani, Garmaroudi & Tavousi, 2018). According to Hobbs (2016) between 427,000-762,000 people in the UK report feeling distressed about their sex lives. Estimates of sexual difficulties include 22-41% of men, and 33-51% in women (Mercer et al., 2013). Similar outcomes have also been identified by Mitchell et al. (2016) where 38.2% of men and 22.8% of women report a sexual dysfunction in the United States according the DSM-5 (APA, 2013). Treatment tends to include pharmaceuticals and/or psychosocial support (Hobbs, 2016). Research has centred on erectile dysfunction where pharmaceuticals have largely been approved for men by the US Food and Drug Administration (FDA), but limited FDA approved pharmaceutical support has been made available to women (Jaspers et al., 2016). Physiologically, nitric oxide stimulates the enzyme guanylate cyclase and converts it into cyclic guanosine monophosphate which relaxes the smooth muscle cells and increases the blood flow to the clitoris and labia minora in women and the penile corpora cavernosa in men (Uckert et al., 2007). The use of Phosphodiesterase type 5 (PDE5) inhibitors (eg, sildenafil) increases levels of nitric oxide and are used to support sexual functioning among men and women (Uckert et al., 2007). However, lower levels of PDE5 (e.g. sildenafil) have been found in the clitoris and labia

minor compared to the penile corpora cavernosa (Uckert et al., 2007). Whether experimental doses of PDE5 have varied in experimental trials between men and women requires clarification.

However, there are significantly fewer pharmaceutical studies among women than men in this field and the research appears conflicting (Lo Monte, Graziano, Piva, & Marci., 2014). For example, a recently introduced pharmaceutical called flibanserin for sexual arousal disorder for women has been reported to be generally ineffectual in addition to having side effects including sleeping difficulties (Jaspers et al., 2016).

With reference to psychotherapeutic interventions, different approaches have been used to treat sexual dysfunction, including Cognitive Behavioural Therapy (CBT), psychoeducational and psychodynamic approaches (e.g. Fruhauf, Gerger, Schmidt, Munder, & Barth, 2013). CBT is the preferred therapeutic treatment for depression and anxiety (Briers, 2009). Briefly, CBT is a talking therapy directed at managing cognition and behaviour (Briers, 2009). In relation to sexual dysfunction, cognitive factors might include body image, distractibility during intimacy and a negative evaluation of one's sexual performance (Stephenson & Kerth, 2017).

When reviewing the literature on CBT and sexual dysfunction, Jasper, et al., (2016) found a clear gender disparity across 19 Randomized Control Trials (RCTs) for therapeutic intervention for sexual dysfunction; only one of these studies included men (Berner & Gunzler, 2012). The effect size for the studies ranged from low to moderate. A similar meta-analysis conducted by Fruhauf et al (2013) yielded a moderate effect size of 0.58 for the treatment group compared to the control group. Generically, drop-out rates were reported to be high (Hobbs, 2016). Overall, RCTs investigating CBT in sexual dysfunction (including online CBT support) do look promising, although outcomes are inconsistent. This might be due to the limited numbers of research studies conducted in this area (Hobbs, 2016).

One of the few examples of an online intervention study, conducted by Anderson, et al., (2011) included a total of 78 men randomly allocated to a treatment intervention (online CBT, email therapeutic support) or a control group (online support only). These participants were provided with seven weeks of support where the treatment group received 55 minutes of weekly online CBT. Telephone assessments using the erectile dysfunction International Index of Erectile Functioning were given at commencement, during and six months post treatment. Whilst the outcomes looked promising, and indeed improvements in the treatment group were evident, the differences between group treatments were small ($d=0.1$). Nevertheless, this did increase to $d=0.88$ at 6-month follow-up, so delayed effects are possible.

An alternative approach, or certainly a complementary one, to CBT is mindfulness and this is gaining popularity within health services for the treatment of anxiety and depression (NICE, 2010). Briefly, mindfulness refers to being attentive to one's experiences in the present moment (NICE, 2010). Mindfulness Based Cognitive Therapy (MBCT) recognises cognitive distortions, negative thinking and so forth but brings this thinking into the present moment, with acceptance (Felder, Dimidjian, & Segal, 2012). CBT, MI, MBT and MBCT may be used for both couples and individuals with sexual dysfunction (Felder et al., 2013). In relation to sex, mindfulness can be used to focus the mind on the sexual moment (Brotto & Basson, 2014; Hucker & McCabe., 2015; Paterson, Handy & Brotto., 2016).

Whilst initial Mindfulness Based Intervention (MBI) trials look promising in minimising sexual dysfunction symptomology (e.g. Wammen-Rathenborg, Zdaniuk & Brotto., 2019), concerns have been raised about how MBI compares to other treatments including pharmaceuticals (Pyke & Clayton, 2015). The effects of Mindfulness-Based Therapies (MBTs) for female sexual dysfunction have been reviewed by Stephenson and Kerth (2017) in a meta-analysis. This included 449 participants in 11 trials of which four studies were waitlist control groups and two studies were under review at the time of the meta-analysis.

The meta-analysis inclusion criteria were diverse; psychosexual treatments and psychoeducational interventions were included as well as sexual dysfunction co-occurring with other conditions, such as cancer. Ideally, sexual dysfunction with co-occurring problems would warrant an individualised Systematic Review. Whilst a varied inclusion arguably increases the power for analysis it might also provide misleading results (Borenstein, Hedges, Higgins & Rothstein, 2009). Despite multiple outcome measures, the analysis yielded non-significant results, overall it identified that MBT supported subjective well-being and sexual functioning as well as minimising sexual pain.

The rationale for carrying out the present review is that as yet, existing reviews have failed to consider the effectiveness of MBI in sexual dysfunction among both men and women. Research does, however, point to MBT supporting subjective well-being and healthy sexual functioning (Bornstein et al., 2009). Moderate improvements might be seen with MBI. This assumption is guided by meta-analyses on CBT and sexual functioning (Cohens $d=0.55 - 0.58$ e.g. Bergeron et al., 2001, Fruhauf et al., 2013) and Stephenson & Kerth's (2017) MBI and sexual functioning meta-analysis (Hedges $g=.28$ to $.63$). Additionally, we wanted to provide an up to date review on whether MBI does support sexual dysfunction, whether gender is equally represented in the available psychosocial clinical trials and whether this warrants further exploration. Whilst gender is the priority focus in the present review, we are also interested to establish how well-represented cultural and minority groups are within existing trials. Collectively, this review aims to establish whether MBI is effective for treating sexual dysfunction and to contribute research and practice implications based on our findings.

Methods

The current Systematic Review (SR) and Meta-Analysis (MA) was carried out by four reviewers to systematize the findings of MBI primary studies for sexual dysfunction among men and women. A set of strict inclusion and exclusion criteria were applied to the research to minimise heterogeneity among studies. We were aware that this might affect levels of applicability and generalizability, however the review aimed to minimise any potential confounding variables across studies (Borges de Almeida & Garcia de Goulart, 2017). Primary studies were included based on the [criteria outlined below](#).

Inclusion and Exclusion Criteria

Studies were [included](#) from the current review based on the following criteria:

Studies [recruiting](#) men or women diagnosed with sexual dysfunction using DSM-5 criteria (APA, 2013). However, [in order to ensure all types of sexual dysfunction were included](#), database searches also included [the terms *erectile dysfunction*, *sexual desire* and *sexual pain*](#) which are not terms used in the DSM-5 (APA, 2013).

[Intervention type](#) included mindfulness-based interventions including MCBT, MI, MBI, individual or group therapy.

[Peer-reviewed](#) journal articles.

[Quantitative](#) study designs ([RCTs, cohort, within-subjects, mixed and longitudinal studies](#)).

[Studies](#) were published in English.

[Studies using gold standard assessment tools](#) (see data collection section for further detail).

The date limit set on publication dates was 2009-2019 (no studies prior to 2009 included MBI and sexual dysfunction without additional physiological problems) and the age group was 18 years old and above. No limit on gender, sexuality or culture was [applied](#).

Studies were [excluded](#) from the current review based on the following criteria:

Sexual dysfunction co-occurring with mental health problems and/or physiological problems such as cancer, diabetes and so forth.

Non- mindfulness-based interventions.

Articles that were not published in a peer-reviewed journal (e.g. books, undergraduate thesis, grey literature, reviews, meta-analysis, newspapers and magazine articles) (McGinn, et al 2016)

Qualitative research studies.

Data Collection including the Search Strategy

A systematic search based on MBI/MI and sexual dysfunction was conducted in February 2019. PubMed, PsycINFO, Web of Science and **Cochrane Library advanced search** were accessed to capture a diverse range of research studies related to sexual dysfunction and mindfulness. The search terms initially included sexual dysfunction, erectile disorder, premature ejaculation, delayed ejaculation, male hypoactive sexual desire disorder, female orgasmic disorder, genito-pelvic pain penetration disorder, male hypoactive sexual arousal disorder, mindfulness, mindfulness-based interventions and MBCT. This was proceeded with Boolean operations and included the following search terms:

1.(“mindfulness-based intervention” OR “mindfulness” OR “mindfulness-based cognitive therapy” OR “mindfulness- based cognitive behaviour therapy” OR mindfulness-based cognitive behaviour intervention” OR ”mindfulness-based cognitive sex therapy” OR “mindfulness intervention”) AND “sexual dysfunction”

This was proceeded with variations of individualised sexual dysfunctions alongside mindfulness-based interventions. All keywords were used to maximise the number of studies included in the initial review process (Eady, Wilcznski & Haynes, 2008).

2.1# AND (“men” OR “women”) 3.1# AND (“ethnicity” OR “black minority or ethnic” OR “BME” OR “African American”); 4.3# AND (“sex”); 5.1#AND “sexual desire”; 6. 1# AND “lubrication”;7.1#AND (“female orgasmic disorder” OR “female sexual interest/arousal disorder” OR “genito-pelvic pain/penetration disorder” OR “premature ejaculation” OR “delayed ejaculation” OR “erectile disorder” OR “male sexual interest/arousal disorder”); 8. 1# AND “erectile dysfunction”; 9. 1# AND (“sexual pain” OR “vulvodynia”) 10. 1 AND (“gay” OR “homosexual” OR “lesbian” OR “bisexual” OR “LGBT” OR “LGBTQIA”).

This review conformed to recommendations from the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (Moher, Liberati, Tetzlaff, & Altman, 2009). Duplicate articles were removed from the search along with a review of the abstracts to establish whether the studies met the inclusion criteria. The full texts of studies compatible with the inclusion criteria were read in full and included in the Systematic Review. A quality evaluation review of the included papers was guided by the National Institute of Health (NIH) study quality assessment tool (2014). Based on this assessment tool, these studies passed the initial assessment process and generally scored fair to good by clearly: stating study objectives; defining populations; using valid and reliable measures; including pre- and post-intervention outcomes and a control group along with follow-ups. Only studies which had used gold standard assessment tools were included and were both reliable and valid. Assessments included the International Index of Erectile Functioning (Rosen et al., 1997); The Female Sexual Distress Scale (FSDS, Derogatis et al., 2002); The Sexual Interest and Desire Inventory (SIDI, Clayton et al., 2006); The Female Sexual

Function Index (FSFI, Rosen et al., 2000) and Painful Intercourse Self-Efficacy Scale (PISES; Lorig et al., 1989). Collectively, the Cronbach alpha values were moderate to high and ranged between 0.707- 0.975.

Data Analysis

The primary outcome measure looked at whether MI supported sexual functioning ONLY among women and men (inclusion criteria). Secondary data analysis via a small number of studies examined, for example, in-house interventions vs online interventions, group vs individual MI interventions and/or gender comparisons. We decided to conduct a subgroup analysis comparing RCTs with within-subject design in order to identify the appropriateness of using these approaches for MI and sexual functioning and the effectiveness of MI on the different sexual difficulties.

A random effects model was used owing to the variation of sample sizes across the studies (Borenstein et al., 2009). According to Valentine, Pigott & Rothstein (2010), a meta-analysis can be conducted on two studies using random effects variance as other synthesising techniques are less valid. Indeed, a random effects model assumes that they are estimates of their own effect sizes where variance might be due to sampling error and study variance. If there is only sampling error, the random effects model converges to the fixed effects model (Borenstein et al., 2009).

The differences between both means (M) and standard deviations (SD) of the summary statistics from each study were therefore taken from baseline measurements and post treatment outcomes (taken at 0 and 2-12wks) for both control (or equivalent) and experimental groups of the included studies. We used Cohen's d to measure the effect size which was adjusted for bias due to overestimation of the population effect size in small samples. As a rule, the interpretation of the effect sizes is that 0.8 is large, 0.5 is moderate and 0.2 is small (Cohen, 1997).

Each study had an estimate of true effect of MBI on sexual functioning. Residual heterogeneity estimates using Cochran's Q and I² were used. The I² statistic is used to estimate whether the total variation across studies is due to heterogeneity or by chance (Higgins, Thompson, Deeks, & Altman, 2003). The confidence interval (CI 95%) utilised indicated the range in the true effect between these variables. A funnel plot along with a trim and fill analysis was carried out to address publication bias (Duval & Tweedie., 2000) and Rosenthal's (1979) fail and state outcome was used to establish how many studies would be needed to make the combined studies effect size non-significant, so that the new combined effect size of zero.

These were analysed manually and using R (R Core Team., 2013) and JASP (2018) software to determine effect sizes (Cohen's d) that would establish whether MBI had any positive impact on sexual dysfunction.

Results

Studies included in the Meta-Analysis

PubMed Database Searches based on search terms 1-10 produced 40 studies. Following a filtering analysis based on the inclusion criteria, one study was identified that included men and 8 studies included women. PsycINFO Database Searches based on terms 1-10 yielded 49 studies. Following a filtering analysis based on the inclusion criteria, one study was identified using men and 10 studies with women. Web of Science Database Searches yielded 69 studies. Following a filtering analysis based on the inclusion criteria, two studies were identified with men and 5 studies that included women. **Cochrane database searches yielded 0 studies.** Searches did not identify any studies on sexual dysfunction and MBI among ethnic/BME (black, minority, ethnic)/African Americans populations or LGBT groups in Pubmed, PsycINFO, Web of Science or **Cochrane database.**

As can be seen in figure 1, collectively the search yielded 158 study titles and abstracts for mindfulness and sexual dysfunction (Pubmed=40; PsychINFO=49; Web of Science=69; Cochrane database = 0). Forty-two duplicates were removed leaving 116 records, and 104 records were excluded after reading abstracts as they did not adhere to the inclusion criteria. This left 12 studies, 5 of which were excluded at full text. Reasons for exclusion included alternate interventions along with mindfulness; unsuitable pre and post-intervention outcomes; insufficient statistical information and/or no non-sexual distress group as a control group with a sexual dysfunction experimental group (Silverstein, et al., (2011) Pyke & Clayton, 2015; Chivers & Brotto, 2017; Velten, Margraf, Chivers & Brotto, 2018; Deziel, Godbout & Herbert, 2018).

No further studies were excluded at this point. This selection process yielded 7 studies that implemented trials evaluating sexual dysfunction interventions, with 6 female samples and one male sample. Full papers for the 7 studies were reviewed.

Insert Figure 1 about here (Figure 1: Selection Process: PRISMA Flow Diagram for Systematic Review)

Summary of studies included in this review

Insert Table 1 about here (Table 1: An overview of the individual studies)

Table 1 shows that the total sample size included in this review was (n=441). Of these, 10 participants were men and 331 were women. The two smallest sample sizes (n=10 Bossio et al., 2018; n=26 Paterson et al., 2016) were pilot studies. The average age of participants ranged from 30-43 years. All studies' drop-out rates at endpoint were 20% or lower for the group allocated to MBI. Only one study provided a formal diagnosis of sexual dysfunction by

a trained clinician (DSM-1V) (Brotto et al., 2014). The remaining studies were based on a subjective assessment of participants' sexual dysfunction which was diverse and ranged from erectile dysfunction, sexual pain disorder, orgasmic disorder and arousal difficulties. Further, the studies included well-being along with sexual dysfunction where psychosocial factors were taken into consideration such as depression (see table 1). The primary researcher in most instances was a clinical psychologist.

Bossio et al's., (2018) study was a mixed study design including a within-subjects design and a qualitative component (excluded from this review). The remaining studies included 2 studies with a within-subject design (Brotto et al., 2016; Paterson, Handy & Brotto, 2016) and 4 randomised controlled studies with a waitlist control group for up to 3 months (Brotto & Basson, 2014; Gunst et al., 2018; Guillet et al., 2019). Studies' Bossio & Basson, (2014); Paterson et al., (2016); Brotto et al., (2016) Bossio et al., (2018) provided MI group therapy as the intervention (n=6) whereas Gunst et al.'s., (2018) study was individual MBI based therapy (n=1). Only Hucker & McCabe's study (2015) used an online mindfulness-based intervention support group for sexual dysfunction and participants were required to be in a relationship to be included in the study.

None of the studies were blinded, but clearly this would be difficult to achieve.

Supplementary statistical material was provided by Gunst et al., (2018) study including baseline measurements, post MBI intervention treatment and follow-ups (3 and 6 months). Follow-up data varied between the studies. To expand, the studies provided the M and SD for baseline and post interventions between 2-12 wks. Limited M and SD for post-treatments at 3- and 6-month follow ups were available. Therefore, effect sizes have been predominately based on intervention outcomes taken at 2-12 weeks to maximise consistency of outcomes.

Detailed demographic information including culture, educational background, age, gender and diagnosis/disorder was provided among studies Brotto & Basson (2014); Brotto et al., (2016); Paterson et al., (2016) and Gunst et al., (2018). Ethnic breakdown had been included in studies' Paterson et al., (2016); Brotto et al., (2016) and Brotto & Basson (2014).

However, sexuality was only mentioned in studies' Gunst et al., (2018) and Paterson et al (2016). **The collective sample predominated among a Canadian and American white cohort; though Gunst et al's study was based on a Swedish cohort and Hucker & McCabe, (2015) included an Australian cohort.**

Excluding Bossio et al.'s, (2018) study, no mention of whether the collective cohort was on prescription medication to support sexual dysfunction was provided. This would have made a useful demographic complement as this might be a confounding variable to MBI outcomes. It was not established whether the participants were receiving any additional treatments, whether mindfulness or otherwise, during the baseline, post and follow up measurements.

In-house laboratory studies using, for example, the vaginal photoplethysmography (VPS) and/or use of erotic movies to measure physiological changes were used in studies' Brotto et al., (2016) and Paterson et al., (2016). Owing to unavailable neutral stimulus data available in Paterson et al (2016) study, for consistency, erotic output measurements were included. The remaining studies focused on subjective/perceived sexual functioning only.

Findings from Meta-Analysis

Primary data analysis of sexual functioning between studies

Insert Table 2 and figure 2 about here (Table 2: Means and Standard Deviations with totals; Figure 2: Forest Plot based on Study Effect Sizes using R based on JAMA design (R Core Team, 2013).

A forest plot (figure 2) was produced to graphically present the weighted outcome means of the included studies. Indeed, all studies possessed a relatively small sample size ranging from 10 to 115. This was reflected in the forest plot with relatively wide horizontal lines and small 'black boxes'. However, fewer weights and compromised precision appeared in all studies which ranged from 4-20.8%. Nevertheless, collective study outcomes were in favour of MBI, although the overall effect sizes ranged from low to high (0.12-0.94).

The summary effect size for MI on sexual functioning for the included studies was $d=0.55$ (low to moderate); CI [0.24, 0.87]. Here, $Z=3.93$ was significant ($p<0.001$). The overall heterogeneity of the sample was low to moderate ($I^2=43\%$). Indeed, the tau (an estimate of the SD of the distribution of true effect size) appears to be relatively homogenous 0.06 ($p=0.10$). A trim and fill analysis yielded no differences in outcome.

When looking at the individual studies, the largest effect size suggesting that MI supported sexual functioning was identified in Hucker & McCabe's (2015) study with effect size Cohen's $d=0.94$; CI [0.39, 1.49]. This was followed by Gunst et al., (2018), $d=0.85$; CI [0.35-1.34]. Similarly, Brotto & Basson (2014), $d=0.70$; CI [0.32-1.09].

MI was found to have a moderate effect on sexual functioning in Paterson, Handy & Brotto's, (2016) study with effect size Cohen's $d=0.64$; CI [0.15 to 1.43]. Further, Bossio et al's (2018) study had effect size Cohen's $d=0.63$; [-0.66 to 1.92]. The sample size was very small ($n=10$) where the confidence interval (CI 95%) included a vertical line of no effect of non-significance ($p>0.05$).

Of small effect size, where MI had a smaller effect on sexual functioning was found in Brotto et al.'s (2014) study with effect size $d=0.14$; CI [-0.34, 0.62]. The confidence intervals (CI

95%) included a vertical line of no effect of non-significance ($p>0.05$). In Brotto, Chivers, Millman & Albert (2016) study Cohens $d=0.12$; CI [-0.32, 0.56]. The confidence interval (CI 95%) included a vertical line of no effect of non-significance ($p>0.05$).

Subgroup analysis and study design

A sub-group analysis looking at MI and sexual functioning outcomes between within-subject design and RCTs was carried out to provide further details on heterogeneity. The sub total of the within-subject design was low with effect size $d=0.27$; CI [-0.09, 0.64] and for RCT's moderate to high with $d=0.65$; CI [0.31, 0.99]. Within-subject design reduced the overall effect size. Heterogeneity was low to moderate on both subgroups (I^2 within-subject design=43% and RCTs =53.4%, $p<0.05$).

Subgroup analysis and sexual difficulties

The highest effect size was for ejaculation where Cohen's $d=0.63$; CI [-0.66, 0.92]. However, there was a vertical line of no effect of non-significance ($p>0.05$). Similarly, lubrication had a moderate effect size, $d=0.63$; CI [0.28, 0.97]; desire, $d=0.57$; [0.25, 0.90], and orgasm, $d=0.57$, CI [0.23, 0.91] and $d=0.48$; CI [0.25, 0.70]. The smallest effect size was identified in the reduction of sexual pain; $d=0.16$, CI [-0.10, 0.42].

The summary effect of MI on varying sexual difficulties was low to moderate $d=0.46$; CI [0.30, 0.62]. However, sexual pain significantly reduced the overall effect size. Here, $Z=5.74$ which was significant ($P<0.001$). The overall heterogeneity of the sample was low ($I^2=28\%$). Indeed, the tau (an estimate of the SD of the distribution of true effect size) looks homogenous 0.01 ($p=0.22$).

Discussion

The aim of this review was to establish whether MBI could support sexual functioning among health populations of men and women with sexual dysfunction. It further explored whether the effect sizes varied between the different types of sexual difficulties and between the study designs. It further highlighted the limited available research conducted in this area and the evident gender disparity within it.

This review revealed an overall limited number of studies looking at sexual dysfunction and MBI among men and women from varying socioeconomic and cultural backgrounds. It was evident that MBI had some positive effect on sexual functioning among those experiencing sexual dysfunction. With reference to the overall positive effect of MI on sexual dysfunction, we found a low to moderate effect size (Cohen's $d=0.55$; CI [0.24, 0.87]). When comparing our outcomes with the exiting literature, our effect size reflected that of Bergeron et al.'s (2001) review on CBT and MBI for sexual dysfunction (Cohen's d also =0.55). Taking this further, we decided to conduct a sub-group analysis. For men, there was a moderate effect size in sexual functioning (Cohen's $d=0.63$; CI [-0.66, 0.92]). For women, there were moderate effect sizes for lubrication, (Cohen's $d=0.63$; CI [0.28, 0.97]); desire, (Cohen's $d=0.57$; [0.25, 0.90]), orgasm, (Cohen's $d=0.57$, CI [0.23, 0.91]) and sexual arousal (Cohen's $d=0.48$; CI [0.25, 0.70]). The smallest effect size was identified in the reduction of sexual pain; (Cohen's $d=0.16$, CI [-0.10, 0.42]). Overall, the effect sizes were lower than Stephenson & Kerth's meta-analysis (2017) where Hedge's g ranged from 0.28 to 0.48 for sexual pain and $g=0.61$ to 0.63 for sexual arousal and desire. Nevertheless, lower effect sizes were identified for sexual pain and higher effect sizes with sexual arousal and desire in their study. A disparity in outcomes might reflect the differences in study designs and overall number of studies and participants included.

Outcomes appeared similar (within range) for both men and women (Cohen's $d=0.63$ for men and Cohen's $d=0.12$ to 0.94 for women), though clearly one pilot study of 10 men cannot be considered generalizable to the wider male populace with erectile dysfunction and certainly cannot form the basis of a gender comparison in MBI (Bossio et al., 2018).

Outcomes were predominately based on self-report measures rather than being based on the measurement of physiological changes using for example a vaginal photoplethysmography (VPS) (Brotto et al., (2016); Paterson et al., (2016)). The outcomes for measurable physiological changes were weaker when compared to self-report measures. A subgroup analysis between RCTs and within subject design revealed a low effect size (Cohen's $d=0.27$; CI [-0.09, 0.64]) for within subject designs and a moderate to high with (Cohen's $d=0.65$; CI [0.31, 0.99]) among RCTs. The use of self-report measures in the remaining studies might suggest a placebo effect and an over-evaluation of MI in supporting sexual dysfunction (Bradford & Meston, 2011), especially given the difficulties around blinding in these studies.

This review identified a gender, ethnic and/or sexuality-based discrepancy in the literature. According to Hofrichter (2003) there is an exploitation link between gender, socioeconomic groupings and ethnicity represented in research and healthcare and research forms a critical part of addressing these health disparities (Szaflarski & Vaughn, 2015). Indeed, no studies on MBI and sexual dysfunction had targeted BME groups and/or varying sexualities.

Additionally, to the best of our knowledge there are no further studies looking at MBI and sexual dysfunction among men. The Bossio et al., (2018) study is therefore important in raising awareness when establishing the role MBI might have in supporting sexual well-being via a therapeutic approach for men. The authors identified that limited predictors of men's need/willingness to access and engage with therapeutic based interventions are available.

Indeed, compared to women, men are less likely to access psychological therapies for anxiety

and depression (IAPT; e.g. McManus, Bebbington, Jenkins & Brugha, 2016) and according to some sources this translates across the therapies/psychological interventions (McManus et al., 2016). Certainly, more women than men consult their GPs and men may develop alternate ‘coping mechanisms’ (Hunt, Adamson, Hewitt & Nazareth, 2011). This may be due to perceived masculinities being reinforced by gendered societal roles (Seidler, Dawes, Rice, Oliffe & Dhillon, 2016).

Whilst research has centred on how MBI supports sexual dysfunction among women compared to men, limited research has looked at how different medications might support women’s sexual functioning. According to one source (possibly erroneous, Segal, 2015), the FDA has approved 26 drug trials for men and only one for women (Jervis, 2015; Segal, 2015). This is reflected in NICE guidelines (2017) where a clear intervention disparity is evident. Indeed, NICE guidelines have focused on male erectile dysfunction (NICE, 2017), but limited guidelines appear available for female sexual dysfunction.

Therefore, an understanding gained through research on identifying health disparities is critical in the development and promotion of suitable interventions among culturally and gendered diverse groups via biopsychosocial constructs (Gopalkrishnan, 2018). Indeed, the science of eliminating health disparities as postulated by Dankwa-Mullan et al, (2010) suggests that health research should address science, practice and policy via refined mechanisms and multilevel effects. Yet since the medicalization and pathologization of sexual dysfunction which appears more prevalent within the last 10 years (Segal, 2015) such cross disciplinary interventions via multilevel effects are being informed by research guided by the pathologization of sex as constructed by the DSM-5 (APA, 2013). Perhaps the limited number of effective drug trials for women may reflect an ‘over inflated problem’ (Segal, 2015) where the estimated 43% of women with sexual dysfunction has been overstated

(Jervis, 2015). Segal (2015) argues that, “... *our distress is best thought of as contained in our individual bodies, expressing a disease, in need of a drug*” (p. 916). This could be said for both men and women where according to Holdcroft (2007), health care maybe fundamentally flawed because of the failure of research to include gender differences in the study design. This was certainly evident in this review; though, this does appear to be changing (Bossio et al, 2018).

This SR is not without its drawbacks. Indeed, a limited number of studies with varied designs were included in this review. Additionally, the small sample size was difficult to work with when developing a representative quantitative narrative analysis. The strict inclusion criteria may have been too narrow and the reviewers were candid when measuring the pre and post intervention outcomes in these studies. Whilst this was aimed at minimising heterogeneity, it might not reflect a true representativeness of how MBI can support sexual functioning (Borges de Almeida & Garcia de Goulart, 2017). We were also mindful that unpublished studies (file drawer effect) may have illuminated this review with regards to gender differences, MBI and sexual dysfunction (Rosenthal, 1979). **The** Rosenthal (1979) fail and state outcome in this review estimated 72 studies would need to be added to make the combined studies effect size non-significant, so that the new combined effect size is zero. There is power in publishing negative results and until this is encouraged in the scientific community it could be argued that research bias may continue to misinform healthcare services (Holdcraft, 2005; Goodchild Van Hilton, 2015). In addition, research studies have predominated among Brotto and colleagues. Therefore, the sample has been limited to a predominately white heterosexual female population with similar designs which might not be generalizable across different nationalities and cultures. However, the authors of these studies have identified **their** limitations. Certainly, generic variation among the study designs, sample size, gender and duration of study could have increased the risk of Type II error (Greco,

Zangrillo, Landoni, 2013). Moreover, it was a challenge to find MBIs that were not combined with psychoeducation, which may have skewed the outcome whether positively or negatively (Stephenson & Kerth, 2017).

Sexual dysfunction is a very diverse term. Both this review and Stephenson & Kerth's (2017) meta-analysis found that MBI was least effective for sexual pain compared to arousal.

Therefore, differences between MBI and, for example, low sexual desire compared to orgasmic disorder or premature ejaculation may vary. Research should focus on MBI and specific sexual dysfunctions rather than on its generic application. However, since only one study in this review included a formal diagnosis (Brotto et al., 2014), there would have to be diagnostic consistency across trials otherwise it would be difficult to establish whether MBI was supporting sexual dysfunction or subjective sexual distress which might be transient (less than 6 months, DSM-5, APA, (2013). This might have been the case for the remaining studies in this review. Further, the use of the behaviour taxonomy v1 (BCT taxonomy) in the development of a MBI is necessary as variations of MBI intervention in all studies might have impacted study outcomes (Michie et al., 2005). This approach would aim to enhance study validity and reliability (Michie et al., 2005). Given the small number of studies, it might also be useful in the future to consider current and recently completed studies, which could be sourced on trial register websites. This would also facilitate investigation into how active the field is currently. Finally, combining RCTs and within-subject design outcomes was not ideal and clearly the sub-group analysis identified between-study differences in design. Similarly, a clearer understanding would have been obtained if follow up effect sizes had been calculated; however, available data among the studies was inconsistent. Certainly, Bossio et al's (2018) outcomes were estimated from a graph as statistical information was limited.

In conclusion, it appears that MBI has a low to moderate positive impact on sexual functioning for both men and women. However, there is a clear gender health disparity in the research literature when looking at MBI and sexual dysfunction. This appears to have permeated science, practice and policy, where the priority intervention focus for men is medication and [for women](#), MBI and alternative therapies (Jervis 2015; Segal, 2015). Certainly, Bossio et al.,'s (2018) study highlighted the limited [available](#) predictors on men's willingness to access and engage in psychologically based interventions. This would be a good starting point for further research to be conducted. It should be highlighted briefly that no previous literature reviews have identified studies that have included minority groups (BME and LGBT). NICE guidelines should be mindful of making evidence-based intervention recommendations prior to research reflecting diverse and culturally attuned practices. Nevertheless, Birmingham Healthy Minds IAPTS (NICE guidelines, 2017) appears to be encouraging minority groups into IAPTS for depression and anxiety. Hopefully other services will follow. With this, healthcare services might want to consider the use of MBI for sexual dysfunction. However, significantly more research is needed among a larger and more diverse population, with the use of controls. [This would allow for the development of](#) a fuller picture of the potential benefits of non-prescription interventions (such as MBI) whether individually or as a biopsychosocial adjunct that caters for those from varying socio-economic, cultural and gendered backgrounds who experience sexual dysfunction.

Conflicts of Interest

None

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