

Review

A Systematic Review Exploring the Effectiveness of Mindfulness for Sexual Functioning in Women with Cancer

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Abstract: Sexual intimacy is a basic human need that is associated with quality of life whereby its absence can significantly impact both interpersonal and personal wellbeing. This systematic review aimed to provide an up-to-date evaluation of the available literature on mindfulness treatments for sexual functioning in women diagnosed with cancer. Electronic searches including PubMed, PsycINFO, Web of Science and registered clinical trials yielded 10 studies that met the inclusion criteria. The results showed that treatment intervention designs varied and included mixed methods, randomised clinical trials, single arm non-randomised trials and those with the absence of any control. Furthermore, both brief and longer-term mindfulness interventions were trialled across different sexual domains. Whilst inconclusive, mindfulness-based interventions appear to support sexual function and quality of life in both early- and post-cancer survivors. However, in some instances, there were outcome inconsistencies in sexual desire, arousal and orgasm. This review has identified a current shortage in research on the effectiveness of mindfulness-based treatments for supporting sexual functioning in women with cancer; and so far, no research has been conducted in palliative care. This unmet need in supporting sexual functioning in women with cancer, including palliative care, carries important implications for both psychosexual and oncological healthcare services as sexual intimacy does not end with cancer diagnosis or prognosis.

Keywords: cancer; mindfulness; sexual function; palliative care; quality of life; women



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1. Introduction

The incidence rate for cancer in the UK alone has increased by 12% over the past 20 years [1]. However, whilst the prevalence of cancer is increasing, so are survival rates post-diagnosis [2]. This may partly be due to innovative cancer treatments becoming available along with an increase in the use of cancer drugs [3]. Nonetheless, a cancer diagnosis can have a profound impact on the wellbeing of an individual [4]. Cancer, along with its treatment, impacts multiple biopsychological symptoms, including pain, nausea, exhaustion, depression and anxiety [4] and has a functional impact on work, social engagement, family, relationships and intimacy [5]. An important component of cancer treatment is the incorporation of quality-of-life interventions [6], which includes sex and sexuality, to support sexual wellbeing [5]. Indeed, expected changes in a patient's sex life during cancer treatments, including when sex should be avoided, have been outlined [7]. Examples of this include surgical recovery, increased risk of infection with chemotherapy or increased levels of radiation with seed brachytherapy [7]. Marie Curie has also addressed the areas of sex, sexuality, intimacy and body image from a quality-of-life perspective and provided psychosexual recommendations in supporting sex in palliative care [8].

Regardless of cancer type, cancer and its treatment can have detrimental effects on sexual functioning [9]. Women who are undergoing cancer treatment commonly report sexual dysfunction, including vaginal dryness/lack of lubrication, sexual pain, early menopause and loss of sexual desire [10,11]. Furthermore, a commonly reported sexual dysfunction

after cancer treatment among women is hypoactive sexual desire disorder HSDD [6]. HSDD is the persistent absence of sexual desire, sexual fantasies or the absence of pleasure during sex that causes marked distress [12], which can be lifelong, acquired, situational or specific [12]. According to research [13], sexual desire and body image are interrelated. Indeed, sexual wellbeing can be affected by diagnosis, medication and treatments, which consequently damage body tissues such as the vagina owing to radiation therapy or insufficient lubrication caused by chemotherapy [14]. Additionally, feeling sore, exhausted, anxious, depressed and with a reduced libido further contribute to changes in sexual desire [1].

Psychosocial interventions have been employed with varying effectiveness in supporting post-cancer treatments. One intervention that has gained some momentum within the UK National Health Service (NHS) is mindfulness [15]. Briefly, mindfulness is all about focusing on the present moment and bringing negative thoughts to one's awareness with acceptance. Mindfulness can mitigate negative self-thoughts and instead increase wellbeing and sexual self-efficacy that in turn supports sexual functioning [16]. Its applications are diverse and have extended to both pre- and post-cancer treatment interventions. The reported benefits of mindfulness-based approaches among post-cancer treatment patients include reduced anxiety and depression, and concerns regarding recurrence [17,18]. Additional benefits have included feeling less isolated and having a positive body image [19]. A systematic review with meta-analysis among 29 randomised control trials (RCTs) found mindfulness therapy to significantly reduce anxiety, depression and fatigue, as well as increasing levels of mindfulness, post-traumatic growth and improved quality of life when compared with control groups across different types of cancer. Furthermore, in a pilot study with 42 women with breast or gynaecological cancer, a two-hour weekly group mindfulness-based cognitive intervention was delivered over eight weeks [20]. Outcomes of this study indicated a reduction in distress with overall improvements in quality of life, post-traumatic growth and mindfulness. These successful outcomes continued to show improvement at three months post-intervention follow-up. The authors of this trial suggested that more trials are needed to provide systematic evidence of this therapy in healthcare [20].

Mindfulness therapy has also proved to be successful in supporting varied sexual dysfunctions by minimising their symptoms among both men and women. Overall effect sizes have ranged between $d = 0.55$ and $d = 0.65$ in favour of mindfulness [21,22]. Subgroup analysis in seven studies found a moderate effect size in erectile functioning for men ($d = 0.63$; CI $[-0.66, 0.92]$) and for women. There were also moderate effect sizes for lubrication ($d = 0.63$; CI $[0.28, 0.97]$); desire ($d = 0.57$; $[0.25, 0.90]$); orgasm ($d = 0.57$, CI $[0.23, 0.91]$); sexual arousal ($d = 0.48$; CI $[0.25, 0.70]$); and sexual pain ($d = 0.16$, CI $[-0.10, 0.42]$) reported [21].

The effectiveness of a psychoeducational intervention for early-stage cervical and endometrial cancer with sexual difficulties among women following a hysterectomy has also been described [9]. The authors of that study identified that interventions targeting sexual desire among this group were sparse. The authors piloted three one-hour structured sessions of mindfulness-based psychoeducation among 22 women. Improvements were seen with sexual desire, arousal, orgasm, satisfaction, sexual distress, depression and overall wellbeing. Further research was later conducted examining the impact a brief mindfulness-based cognitive behavioural intervention had on the sexual functioning of women who had been treated for gynaecologic cancer [23]. Thirty-one women ($n = 22$ experimental group, $n = 9$ waitlist control group) participated in the study. It was concluded that the brief mindfulness-based intervention was effective for improving sexual functioning across all sexual domains and in the reduction of sexual distress.

Furthermore, a mixed methods study examined the effectiveness of a 12-week online intervention incorporating mindfulness for women experiencing sexual difficulties after colorectal and gynaecologic cancer [24]. The women in this study reported significant improvements across sexual domains, including sexual desire, sexual function and sex-

ual satisfaction. A narrative analysis based on feedback of the intervention suggested a preference to an interactive component to the intervention.

A further study intervention addressing sexual dysfunction among women with BRCA $\frac{1}{2}$ mutations following a salpingo-oophorectomy received a psychosexual intervention including mindfulness [25]. Overall, improved sexual functioning, including desire, arousal, satisfaction, and a reduction in sexual pain, were all reported, along with increased levels of sexual self-efficacy. Similar research assessed the effectiveness of the short- and long-term effects of mindfulness on female carriers of the BRCA $\frac{1}{2}$ mutations who developed menopausal symptoms after salpingo-oophorectomy surgery [26]. Whilst quality of life measurements increased post-intervention, there was no significant difference in levels of sexual functioning and satisfaction. Using a short-term mindfulness intervention among a Chinese cohort [27] of 26 women who had been diagnosed with breast cancer, small effect sizes were reported in improvements for sexual satisfaction and lubrication post-intervention. This study, however, failed to report on any statistically significant improvement in sexual desire.

Based on reviewing this literature, it appears that the consensus is that short- or long-term mindfulness treatments can successfully support sexual wellbeing. Whilst systematic reviews and meta-analyses have been conducted on the effectiveness of mindfulness on women diagnosed with cancer in the domains of quality of life, sleep, stress, anxiety distress and wellbeing [17,28], there remains a shortage of systematic reviews addressing the effectiveness of mindfulness for sexual functioning in women diagnosed with cancer and after cancer treatment. Therefore, the current review aimed to provide an up-to-date evaluation of the available literature on mindfulness interventions for sexual functioning among women diagnosed with cancer and/or after cancer treatments including palliative care.

2. Materials and Methods

This systematic review consisted of a single phase whereby preliminary data were gathered on the findings of mindfulness-based interventions aimed at supporting women's sexual functioning with or after cancer treatments including palliative care. This scope is arguably and deliberately narrow as the key purpose and interest was to review quality of life in the context of sexual functioning, as opposed to looking at other domains, such as pain, sleep, anxiety, mental health and so forth, which have been assessed by other systematic reviews and meta-analyses [17,28]. Several stages followed that were guided by previous tried and tested procedures [29]. This included defining the research question, followed by confirming inclusion and exclusion criteria, search of the literature, selection of research studies based on the inclusion and exclusion criteria, the extraction of information or data from the selected studies, evaluation of risk of bias in the research, presentation of results and evaluation of the quality of evidence.

2.1. Inclusion Criteria

- Any cancer
- Published between 2008 and 2022 inclusive (no studies prior to 2008 that mapped to inclusion/exclusion criteria were available)
- Mindfulness-based interventions
- Women
- Sexual function or sexual dysfunction
- Any stage of cancer treatment
- After cancer treatment
- Palliative care
- Quantitative or mixed study design (we were only interested in measured outcomes for the purposes of this review)
- Peer-reviewed journals
- Any age
- No limit on participant's sex or sexuality was applied

2.2. Exclusion Criteria

- Non-peer-reviewed articles
- Meta-analysis/systematic reviews/literature reviews
- Non-human studies
- Research dissertations/books/grey literature
- Qualitative studies
- No domains outside of sexual function or dysfunction
- Studies published prior to 2008

A systematic search based on the above criteria was conducted in December 2022 by three independent reviewers. This review conformed to recommendations from the Preferred Reporting Items for Systematic Reviews (PRISMA) statement [30]. Outcomes are presented in Figure 1. All reviewers were consulted throughout the review process and independently searched [clinical.gov](https://clinicaltrials.gov) registered clinical trials, PubMed, PsycINFO, Web of Science, and Cochrane Library advanced search based on the inclusion and exclusion criteria. This was preceded with Boolean operations. Regular meetings were held to endorse triangulation between researchers [31].

2.3. 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”) OR “mindful compassion” OR “mindfulness and compassion therapy”

2. 1# AND “sexual dysfunction” OR “sexual function” OR “sexual wellbeing”

3. 2# AND “cancer” OR “post cancer” OR “post cancer treatment” OR “terminal cancer” OR “palliative care”

This was preceded with variations of individualised sexual function and dysfunctions alongside searches 1–3. All keywords were used to maximise the number of studies included in the review process [32].

4. 3# AND “sexual desire” 5.3# AND “sexual arousal” AND 6.3# AND “lubrication”; 7.3 “orgasm”, 8.3 #AND (“female orgasmic disorder” OR “female sexual interest/arousal disorder” OR “genito-pelvic pain/penetration disorder”).

2.4. Selection Criteria

PubMed, PsycINFO, Web of Science and registered clinical trials were searched based on the search criteria 1 to 4. PubMed database searches produced 20 studies. Following a filtering analysis based on the inclusion and exclusion criteria, there were 9 eligible studies. PsycINFO yielded five studies, one of which was eligible for inclusion based on the criteria employed. Web of Science database searches yielded one study. Registered clinical trials (treatment intervention) via [clinical.gov](https://clinicaltrials.gov) searches yielded a further three eligible studies.

2.5. Data Extraction and Management

Duplicate articles were removed from the review along with research studies falling into the exclusion criteria. Abstracts were initially read and those that did not meet the inclusion criteria were excluded. The full texts of papers that mapped to the inclusion criteria were read in full. Primary information extracted from the research articles included gender, country, study design, sample size, self-report measures, other assessment methods, the type of cancer, stage of cancer and sexual function along with the “type” of mindfulness intervention (refer to search terms).

Following a filtering analysis based on the inclusion and exclusion criteria for all search engines, including the removal of duplications, 10 studies were identified as eligible for inclusion in this systematic review. All the reviewers were coders in this review, and in order to establish the level of observed agreement or inter-rater reliability, a percentage agreement method was adopted with the assistance of RevMan 5.4 software [33].

2.6. Quality Assessment of the Included Studies

Cochrane RevMan 5.4 was used to conduct quality evaluation of these studies [33]. RevMan 5.4 incorporates a section on the quality of the studies, which looks at key characteristics including methods, participants, interventions and pre- and post-outcomes along with a risk of bias table. The latter identifies amber, green or red studies that range from low to high levels of bias. Based on this quality evaluation, the included studies passed the assessment evaluation and scored high (green) by stating suitability of the study design, population and the assessment tools used.

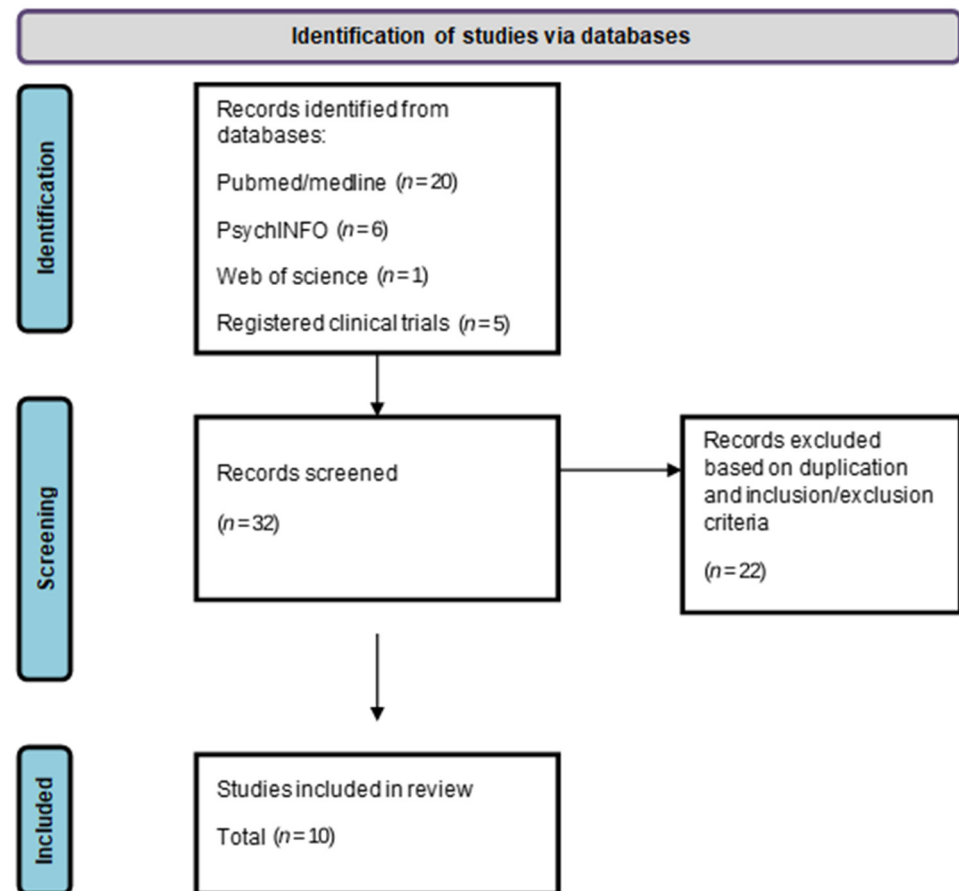


Figure 1. Mindfulness intervention on sexual function among women after cancer treatments including palliative care—PRISMA flow chart.

3. Results

As can be seen in Figure 1, there were 10 eligible studies published between 2008 and 2022 (summarized in Table 1). There were insufficient studies and data to make conducting a meta-analysis possible. Most of the studies were conducted either during early-stage cancer [8] or after cancer treatment and predominated among gynaecological and breast cancers [23,27,34]. Three studies looked at risk-reducing salpingo-oophorectomy (RRSO) [25,26,35] and one study combined colorectal and gynaecological cancers [36]. Notably, no studies were found to target those with cancer in palliative care. Moreover, no research addressing mindfulness, sexual function and cancer has so far been conducted in the UK. The included studies contained national and cultural variations, ranging from the United States [25,35], Canada [9,23,24,36], the Netherlands [26], China [27] and Iran [35]. Whilst demographics varied, ethnicity appeared limited to white, Hispanic, native American and Asian groups [23–25,27]. Other demographics targeted relationship status (sexuality not included), cancer type, duration cancer free, treatment received for

cancer and educational background. Mean age groups across the studies ranged from 38 to 55 [24]. Those in early menopause predominated among research studies [25,26].

Study design varied from RCTs comparing mindfulness intervention with a Care As Usual (CAU) control group [26,27], single arm non-randomized studies [25,36] and mixed study designs [14,37], including RCT waitlist control research [23,35], within study designs with a narrative analysis [24] and thematic analysis [9]. Sample sizes ranged between 19 [35] and 66 participants [26].

The mindfulness interventions varied with a range from half a day (approximately 4 h [25,36] to 12 weeks [9,23,35] and were predominantly delivered as an in-person group presentation. This excluded two studies [24,37] that were delivered online. The mindfulness interventions included a mindfulness-based intervention [14], mindfulness-based stress reduction [26,28,35], mindfulness based cognitive interventions [14,25,36], brief mindfulness-based cognitive behavioural intervention [23] and psychoeducation with mindfulness intervention [9,24]. Follow-up measurements ranged from one month [35] to 12 months [26]. Of the 10 studies, five were pilot studies [9,14,24,25,37].

The main outcome measures for sexual function used across studies included gold standard assessment tools, which have been outlined in Table 1. Assessments included the Female Sexual Distress Scale (FSDS) [38]; the Sexual Interest and Desire Inventory (SIDI) [39] the Female Sexual Function Index (FSFI) [40], the Sexual Interest and Desire Inventory-Female (SIDI-F) [39] and PROMISSexFS2.0 [41]. Collectively, the Cronbach alpha values ranged between 0.70 and 0.95. However, these were not easy to source in some studies [23,25,26,36]. Additional assessments included sexual arousal assessment including a vaginal photo-plethysmograph [9,23]. Overall outcomes favoured the mindfulness intervention in which higher levels of sexual functioning were reported. However, this excluded one study [26] where no improvement in sexual distress or functioning was found, and in another study [34], the frequency of orgasm decreased.

Table 1. The Effectiveness of Mindfulness for Sexual Functioning in Women After Cancer Treatments.

Author/Year	Country	Study Design	Sample	Outcomes
Gorman et al. (2022) [37]	USA	Pilot 8-week mixed methods study Online mindfulness-based intervention No control group Quantitative post-intervention(1 month) Qualitative 2–3 months post-intervention Main outcome measures for sexual function: PROMISSexFS2.0 Cronbach $\alpha = 0.71$ New Sexual Satisfaction Scale short form Cronbach $\alpha = 0.95$.	$N = 22$ women breast and gynecologic cancer survivors Mean age 53 years old. $N = 10$ qualitative thematic analysis online group NVivo used	Levels of sexual interest and desire increased.
Sears et al. (2022) [14]	Canada	Pilot 8-week mixed methods study Mindfulness-based cognitive intervention No control group Main outcome measures for sexual function: Female Sexual Distress Scale Cronbach $\alpha = 0.97$ Sexual Function Questionnaire Cronbach $\alpha = 0.79–0.89$ Sexual Interest/Desire Cronbach $\alpha = 0.71–0.83$	$N = 30$ women post-breast cancer Mean age 54 years old $N = 18$ group qualitative thematic analysis	Reduction in sexual distress and increase in both sexual desire and arousal
Chang et al., 2022 [27]	China	Six-week non-randomised controlled group intervention (non-RCT) Mindfulness-based stress reduction and control group (care as usual) Post-measurements taken at 6 weeks Main outcome measures for sexual function: Female Sexual Function Index Cronbach $\alpha = 0.79–0.89$	$N = 51$ women treated for breast cancer $N = 26$ (MBSR mean age 50 years) $N = 25$ (CAU mean age 45 years) Post-cancer on hormone treatment	Those in the MBSR group had higher levels of sexual functioning than the CAU group. This excluded sexual desire in which no statistical significance was found between the experimental and control group

Table 1. Cont.

Author/Year	Country	Study Design	Sample	Outcomes
Bagherzadeh et al., 2020 [34]	Iran	Mixed methods study Eight-week RCT MBSR and control group (group intervention) Qualitative analysis—content analysis One-month follow-up measurements taken Main outcome measures for sexual function: Female sexual function index Cronbach $\alpha = 0.85$	$N = 52$ women treated for breast cancer $N = 26$ (MBSR, mean age 49 years) $N = 26$ control mean age 44 years $N = 18$ content analysis qualitative (not additional group)	Higher levels of sexual function were reported in the MBSR than control group. Whilst sexual desire and arousal increased, frequency of orgasm decreased in the MBSR group.
Bober et al., 2020 [35]	USA	Single arm non-randomised study Four-hour group mindfulness-based cognitive intervention (MBCI) followed by one booster telephone call 1 month later Final follow-up at 2 months Main outcome measures for sexual function: Female Sexual Function Index Female Sexual Distress Scale. Cronbach α was not easy to source for each of these scales in the main text.	$N = 22$ women mean age 38 years after early menopause ovarian suppression treatment (SHARE-OS)	Brief, low-intensity group MBCI intervention reduced sexual dysfunction in breast cancer survivors on OS treatment.
Van Driel et al., 2019 [26]	Netherlands	Eight-week RCT to MBSR or CAU group Final follow-up at 12 months Details of mindfulness intervention were provided Main outcome measures for sexual function: Female Sexual Function Index Female Sexual Distress Scale MENQOL Menopause-Specific Quality of Life Cronbach α was not easy to source for each of these scales in the main text.	$N = 66$ women (mean age 48 years) carriers of BRCA1/2 mutation who developed menopausal symptoms after risk-reducing salpingo-oophorectomy $N = 34$ MBSR $N = 32$ CAU	Linear mixed modelling revealed MBSR had no improvement in sexual functioning. However, compared to the control group the intervention improved menopause-related quality of life in women post-procedure

Table 1. Cont.

Author/Year	Country	Study Design	Sample	Outcomes
Brotto et al., 2016 [9]	Canada	Mixed methods design Non-RCT Twelve-week online group intervention consisting of psychoeducation with mindfulness Qualitative narrative analysis “Pilot study” Final follow-up at 6 months Main outcome measures for sexual function: The sexual beliefs and information questionnaire revised Cronbach $\alpha = 0.70$ Female Sexual Function Index Cronbach $\alpha = 0.87$ Female Sexual Distress Scale Cronbach $\alpha = 0.95$	$N = 46$ women mean age 55 years with colorectal and gynaecological cancer After cancer treatments $N = 30$ gynaecologic $N = 8$ colorectal $N = 8$ other cancer $N = 6$ participants for qualitative research (not additionally)	Significant improvements in sex-related distress and levels of sexual function were reported across all cancers
Bober et al., 2015 [25]	USA	Pilot study Single arm non-randomised study Four-hour group mindfulness-based cognitive intervention Followed by 2 phone counselling sessions Two-month follow-up measurements taken Main outcome measures for sexual function: Female Sexual Function Index Sexual Self-Efficacy Scale Sexual Knowledge Scale Cronbach α was not easy to source for each of these scales in the main text.	$N = 37$ women mean age 44 years After early menopause ovarian suppression treatment (SHARE-OS)	Brief, low-intensity group MBCI intervention reduced sexual dysfunction in breast cancer survivors on OS treatment. Further levels of sexual self-efficacy increased

Table 1. Cont.

Author/Year	Country	Study Design	Sample	Outcomes
Brotto et al., 2012 [23]	Canada	RCT waitlist control mindfulness-based cognitive behavioural intervention Three mindfulness sessions over 3 months Details on mindfulness intervention were available Final follow-up at 6 months Main outcome measures for sexual function: Female Sexual Function Index Female Sexual Distress Scale Sexual Function Questionnaire Cronbach α was not easy to source for each of these scales in the main text. Sexual arousal measurement: Vaginal photo-plethysmograph	$N = 31$ women with gynaecological cancer mean age 54 years. Waitlist control: $n = 9$ Experimental group $n = 22$ After cancer treatments	The mindfulness intervention increased levels of sexual function. Perception of genital arousal during an erotic film increased post-intervention despite no change in physiologically-measured sexual arousal
Brotto et al., 2008 [24]	Canada	Quantitative and qualitative research (no control group as acknowledged by authors) Twelve-week psychoeducation programme with mindfulness CBT Three mindfulness sessions over 3 months Details on mindfulness intervention were available Followed by a thematic analysis Final follow-up at 6 months Main outcome measures for sexual function: Female Sexual Function Index Sexual Beliefs and Information Questionnaire Sexual arousal measurement: Vaginal photo-plethysmograph The Film Scale	$N = 22$ women with early-stage gynaecological cancer mean age 49 years. Early-stage cancer Of the 17 women who had had their ovaries removed, 11 were receiving oestrogen. $N = 19$ women engaged in qualitative component of the research (not in addition to $n = 22$)	The mindfulness intervention increased levels of sexual function. This included sexual arousal, desire and physiological and perceived genital arousal

4. Discussion

This systematic review raised several concerns over the existing body of literature looking at the sexual function and treatment of women with early or post-cancer treatments. Those diagnosed with cancer are more likely to experience sexual difficulties that can become exacerbated with treatment whereby up to a quarter will cease sexual activity [9,23,24,27]. Sexual pain is often a common side effect [42], which has been associated with deteriorating quality of life. This systematic review found that mindfulness supports sexual functioning among women after cancer treatments, which included breast, gynaecological or post-prophylactic surgery [23–25,27,36]. Nonetheless, in two studies, no changes in sexual functioning were reported [26,27]. In one study, the frequency of orgasm decreased, though the quality of the orgasm was not determined [36]. Furthermore, it has been suggested [24,25] that mindfulness interventions have lower effects on sexual pain compared to other sexual domains.

Research into cancer and sex is not new, yet little research has centred around women's sexuality after cancer treatment. Very few established treatments have been developed to support sexual functioning, which has possibly left women and their partners with short- or long-term difficulties [25]. There appears to have been no mindfulness-based research conducted in palliative care. Conducting research on sexual matters in palliative care might raise ethical concerns. However, since sexual intimacy is both a basic human need and associated with quality of life, its absence might significantly impact both interpersonal and personal wellbeing [23,24].

Though Macmillan [7] and Marie Curie [8] provide information on sexual intimacy, there are no clinical trial interventions on mindfulness conducted in the UK for sexual functioning in women with cancer. This scarcity of research suggests a lack of evidence-based support being made available to patients undergoing cancer treatments. However, women associate sexuality as central to their quality of life and wellbeing and yet limited research has looked at cancer and sexual intimacy [9]. This is about supporting an individual's personal choice in how they wish to spend the end of their life and how healthcare practitioners should be in an evidence-based position to provide that support. Many patients seek information and support regarding cancer treatment, physical changes, and sexual and psychological responses following a cancer diagnosis; so, unless healthcare professionals address sexual issues, cancer patients rarely disclose their sexual concerns [43]. Certainly, when healthcare providers have more resources to offer patients suffering from treatment-related sexual dysfunction, they are more likely to raise this topic for discussion [25,35].

Nevertheless, discussing sexual matters and changes associated with sexual functioning before and after cancer treatments can cause embarrassment and discomfort [5]. Talking about sex is a delicate matter and might prove difficult for healthcare staff and patients, which can become compounded by religious and cultural factors. One way to mitigate these factors among patients is by using digital health, which has revolutionised healthcare practice making innovative interventions more accessible to diverse populations. Online mindfulness interventions appear effective in supporting sexual functioning in women (46,47) including sexual functioning in women with cancer [14,24]. Whilst research is limited, the consensus is that this can support a geographically wider cohort or support those who might not be able to attend face to face counselling.

For example, patients before and after cancer treatments experiencing lethargy and discomfort might be in a better position to access online resources rather than physically attending appointments [44]. With added strain on NHS resources, online interventions can minimise this along with the costs incurred [44]. In a meta-analysis including four studies looking at online interventions for sexual health among those with cancer, outcomes suggested that online-based interventions incorporating psychosexual education and cognitive focused interventions appear to improve sexual functioning among post-cancer patients and their partners [5]. According to one team of researchers [24], online mindfulness-based intervention might be more beneficial for overcoming some of the emotional barriers in research trials.

Undeniably, the studies reviewed here demonstrate some innovative means of addressing sexual functioning and distress in women with cancer by including in-person and online intervention options [24]. The studies included in this review were delivered across four hours to three months. Research suggests that a mindfulness-based intervention delivered over four to six consecutive weeks might be as effective as those delivered across twelve weeks [43]. This extends to subjective pain reduction [44]. However, it appears that mental wellbeing requires a longer duration to reduce levels of anxiety and depression [44]. Nonetheless, mindfulness interventions delivered over half a day (approximately four hours) followed by a phone call top-up has been reported to improve levels of sexual functioning, mental wellbeing and quality of life [25,36]. Owing to the impact cancer treatments may have, further evaluation on the effectiveness of brief mindfulness interventions for sexual functioning is warranted as this might minimise discomfort and attrition rates in cancer patients. In palliative care, having clinical trials that confirm the effectiveness of brief mindfulness interventions on sexual functioning that supports quality of life could enhance end-of-life wellbeing and minimise discomfort [25].

The research appears to be at its early stages and more RCTs among diverse groups worldwide are necessary to confirm the efficacy that mindfulness has for sexual functioning. Furthermore, it is difficult to determine whether sexual function improvements are due to the effectiveness of the intervention, the level of sexual satisfaction with their partners or the understanding of sex with the absence of intercourse. The inclusion and exclusion criteria employed in this review did not include the partners of those with cancer. Nonetheless, it was evident that research on the impact having cancer has on sexual intimacy and relationships remains scarce in the literature and requires a focus in the context of quality of life. This would also suggest the need for more extensive demographics attending to these variables. Likewise, chemotherapy and radiation can impact sexual functioning, which leads to vaginal dryness and pain [7,8]. Pain management may also require more extensive interventions in addition to mindfulness. Variations in the uses of mindfulness interventions were apparent across studies, which varied from having a psychoeducational, a cognitive or a stress reduction focus. This could raise reliability and validity considerations owing to inconsistencies in the mindfulness interventions being used. Perhaps the use of a behaviour taxonomy in the development of a mindfulness intervention may yield more consistent outcomes [32].

This systematic review identified cultural, ethnic and/or sexuality-based discrepancies in the demographics. There is an exploitation link between socioeconomic groupings and ethnicity represented in research and healthcare whereby research forms a critical part of addressing health disparities [45]. Indeed, the studies in this review had a very narrow demographic overview, which is easily amendable in future research since no ethnic or cultural group, gender or sexuality is excluded from cancer or palliative care.

The findings of this review must be considered in light of some limitations. A limited number of research studies with varied mindfulness designs and intervention durations makes it challenging when discussing the effectiveness of using mindfulness intervention among this particular cohort. The authors of this systematic review imposed a strict set of inclusion and exclusion criteria, which was aimed at minimising heterogeneity. However, this leads to the exclusion of useful studies in the grey literature that may have further supplemented the current understanding on this topic. Indeed, the inclusion of non-peer-reviewed research might have corrected a potential publication bias. Furthermore, men after cancer treatment were excluded from this study, which may have supported a better understanding regarding gender differences and responses to mindfulness interventions in sexual functioning, sexual dysfunction and cancer type. This review has identified a huge scope for future research to be conducted both quantitatively and qualitatively. A further systematic review and hopefully meta-analysis on this matter, following additional research publications, would be valuable, particularly if research extends to palliative care and the sexual needs and quality of life among end-of-life patients.

In conclusion, the research studies incorporated within this review provided an in-depth understanding of sexual function and mindfulness-based approaches to treatment for cancer patients. Overall, mindfulness interventions appear to improve sexual functioning in women with cancer. Improved sexual functioning following cancer is associated with an enhanced quality of life [23–25,35]. When women are provided with information along with skill-based education applications, this can enhance sexual health and quality of life more broadly [25]. This review raised awareness of a need for more research to be conducted including mindfulness-based clinical trials, preferably performed with controls, and qualitative studies. A series of RCTs would hope to provide a more concrete evaluation on the impact that mindfulness has on sexual wellbeing among those with cancer or after cancer treatment, and qualitative approaches to research would aim towards providing a more insightful and in-depth understanding of the experiences that those in the early stages of cancer and post-cancer survivors have in terms of sexual functioning and quality of life. Those with cancer or post-cancer have many concerns with partner-related reactions, body image changes, fear of recurrence and sexual self-efficacy, which can result in the belief that the sexual arousal capacity has been extinguished completely [9]. Arguably, women in palliative care are missing out on sexuality and quality of life care, as well as wellbeing-focused end-of-life interventions. This unmet need in supporting sexual functioning in women with cancer including palliative care holds important implications for both psychosexual, relationship and oncological health care services as sexual intimacy should not have to end with a diagnosis or prognosis.

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