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Psychological interventions for the sexual sequelae of cancer: A review of the literature

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Abstract
Introduction Despite the frequency of sexual side effects of cancer, treatment outcome studies focus almost exclusively on pharmacologic agents, most of which are completely ineffective for women. We conducted a systematic review of the literature on psychological interventions for sexual difficulties following cancer.
Methods We searched eight research databases using the terms "sexual dysfunction," "cancer," and "psychological therapy" for empirical studies (not case illustrations). Three independent raters evaluated studies using a modified version of the Oxford Centre for Evidence-Based Medicine System to rate the level of evidence for every retrieved study.
Results We identified 27 papers ranging in level of evidence from 1b (randomized controlled trial) to 4 (expert committee report or clinical experience). Youth showed positive outcomes on sexual knowledge, body image, and sexual functioning, and treatments administered by paraprofessionals were equally effective. Thematic counseling, addressing mental health, social functioning, and sexual functioning, significantly improved quality of sexual relationships, independent partner presence, whereas other studies revealed more pronounced benefits if the partner participated. Despite the importance of talking to a cancer care provider about sexual difficulties, interventions designed to empower patients to do so were ineffective. Treatments addressing sex education were more effective if they also addressed motivation and self-efficacy. Only three treatment outcome studies focused on ethnic minority (African-American or Hispanic) sexual concerns and one focused on sexual minority (Lesbian) issues.
Discussion There was moderate support for the effectiveness and feasibility of psychological interventions targeting sexual dysfunction following cancer but attrition rates are high, placebo response is notable, and there are often barriers impeding survivors from seeking out psychological interventions for sexual concerns.
Implications for cancer survivors Despite the prevalence of sexual difficulties following cancer treatment, psychological interventions are a viable, but not often sought after option to help improve sexual functioning, intimacy, and quality of life for cancer survivors and their partners.

Keywords Sexual dysfunctions · Cancer · Psychological treatment · Psychological therapy · Sex counseling

Cancer commonly involves sexual side-effects that become a burden to the cancer survivor. The diagnosis, treatment, and medications for treatment-associated side effects, Quality of Life (QoL) and psychological sequelae, and visually identifiable disfigurement, may act alone or in

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combination to dampen sexual function. Although the definitions of sexual dysfunctions have been widely criticized and are currently undergoing revision for the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders, at present, the major types of sexual response symptoms involve desire (e.g., how interested one is in sexual activity), arousal (erection for men and degree of vaginal lubrication and sensitivity for women), orgasm, genital pain, and vaginismus (inability to permit vaginal penetration due to pelvic floor hypertonus) [1]. Evidence-based treatments are largely available only for men, and most of these are pharmacological. Our goal was to review the literature on existing psychological treatments for sexual difficulties following cancer, beginning by examining prevalence rates of sexual dysfunction after cancer.

Prevalence of sexual problems among men with cancer

Erectile dysfunction (ED) affects the majority (85%) [2] of prostate cancer patients following surgery [3]. Complaints include reduced orgasmic sensation [4], decreases in erectile rigidity, and a complete absence of orgasm. While sexual desire and sensations may still be present, radiation therapy can decrease voluntary erection [5]. Climacturia (urinary leakage during orgasm) can also be quite distressing [6].

Testicular cancer patients report specific complaints, including loss of desire (20%), ED (11.5%), orgasmic disorder (20%), ejaculation disorder (44%; i.e., lack of emission), decreased sexual activity (44%), and sexual dissatisfaction (19%) [7]. While sexual dysfunction may result from physiological treatment effects, desire, orgasmic pleasure, and sexual satisfaction are also strongly related to psychological function (e.g., sexual performance anxiety) [8]. Other examples of sexual dysfunction related to cancer therapy in men include dyspareunia with bladder cancer [see [9] for review] and problems with sexual desire, pleasure, and partner intimacy in head and neck cancer [10].

Prevalence of sexual problems among women with cancer

Estimates reveal 40–100% of female cancer patients experience sexual dysfunction [11]. Breast cancer survivors experienced sexual difficulty [12] that is sometimes linked with body image [13]. Premature ovarian failure following treatment may directly affect sexual functioning and impair sexual well-being by interfering with fertility and inducing iatrogenic menopause [14]. With the increasing use of adjuvant aromatase inhibitors, sexual symptoms can worsen [15] and sexual problems may continue among long-term breast cancer survivors [16]. Cancer can also negatively impact marital relationships and normal sexual functioning due to misunderstandings about the partner's emotional and physical experience [17].

In women with cervical cancer, radical hysterectomy has been found to be associated with lubrication problems, decreased sexual frequency, and sexual response problems [18]. Other sexual problems associated with radiotherapy [19] are highly distressing sequelae of cervical cancer [20]. The sexual self-schema, or view of oneself as a sexual person, may also be disrupted in these patients [21]. However, it is also possible that pre-existing negative views of the sexual self may adversely affect recovery in sexual functioning among survivors.

Young women with malignant ovarian germ cell tumors experienced significantly less sexual pleasure and more infrequent sexual activity, but better dyadic satisfaction and cohesion compared to non-cancer controls [22]. Up to 60% of ovarian cancer patients reported adverse effects on their sex lives, especially younger and married women [23]. Many women who underwent prophylactic ovarian removal did not report sexual problems post-surgery, but those who were not in a sexual relationship before surgery were reluctant to begin one due to negative cognitions (e.g., sex is not important) and sexual avoidance [24].

Prevalence of sexual difficulties in other cancers

Evidence suggests that negative sexual sequelae also occur in cancers not directly affecting the genitals or sex organs. A 3-year longitudinal study of bone marrow transplant patients revealed a significant decrease in the frequency of sexual activity [25]. The most common complaint for men was impairment in sexual desire and arousal and, for women, lack of perceived attractiveness. Treatment side effects for patients receiving hematopoietic stem cells may cause a lengthy cessation of sexual activity, making sexual recommencement difficult [26].

Rectal cancer treatments have been associated with negative [27] and persisting [28] effects on sexual function. Even with nerve-sparing techniques, individuals report high levels of sexual dysfunction [29, 30]. Less than half of women with colorectal cancer were sexually active 1 year following radical excision and/or radiotherapy [28]. Compared to men, however, women had relatively fewer sexual complaints 2 years later [31].

Nearly all lung cancer survivors experienced impairments in sexual function with worsening symptoms over time. Being male and having a higher mood were protective factors against such sexual sequelae [32].

Overview of treatments for sexual dysfunction following cancer

Because cancer-related sexual complaints persist long after physical healing, some survivors seek treatment at specialized sexuality treatment centers. At the Sexual Health Program of the Memorial Sloan Kettering Cancer Centre, a recent review found that most sought help for painful intercourse (65%), vaginal dryness (63%), low sexual desire (46%), and orgasmic disorder (7%) [33]. Unfortunately specialized sexual medicine clinics are rare within larger cancer centers, and the majority of patients do not receive adequate care, leading to chronic sexual complaints.

Although the literature reviewed indicates an abundance of data on the prevalence of sexual difficulties following cancer, data on effective treatments are scant. Treatments are classified as medical (hormonal and non-hormonal), psychological, and physical. Since the approval of sildenfil citrate (Viagra) in 1998, there has been a myriad of studies exploring the efficacy of one of the phosphodiesterase (PDE) 5 inhibitors (i.e., sildenafil, vardenafil, or tadalafil) in men with sexual dysfunction following cancer. Generally, these studies find that PDE-5 inhibitors, although effective, do not resolve all ED cases [34], and issues of non-compliance are common [35]. Counseling can play an important role in helping partners to create more realistic expectations of treatment outcomes, to learn new techniques in love-making, and to increase the use of medical therapies for ED [36]. Furthermore, while more invasive treatments (i.e., penile prostheses, vacuum erection devices or penile injection therapy) may be more effective for some cases of ED compared to sildenafil, patients prefer less invasive methods [35].

Despite initial enthusiasm, empirical investigations of sildenafil in women have not been promising. With the exception of women who have documented insult to pelvic autonomic inputs [37], PDE-5 inhibitors are ineffective for the majority of women with sexual dysfunction [38]. Moreover, although sometimes used clinically, there are no published reports on the efficacy of sildenafil for women with impaired genital arousal associated with radical hysterectomy. Androgens have more recently been used for women experiencing a loss of sexual desire—a common symptom following cancer treatment. Although the majority of women report a statistically significant improvement in sexually satisfying events [39], trial participants were all postmenopausal, estrogen-replete women who were healthy at baseline. The only published study of testosterone use in female cancer survivors with impaired sexual desire showed no significant benefit over placebo on any domain of sexual function or mood [40]. Additionally, because of safety concerns, testosterone therapy is often not considered in cancer patients with sexual dysfunction [41].

Conversely, psychological interventions for sexual sequelae of cancer may be helpful since they target the whole individual, beyond the symptom. These psychosocial interventions are not associated with adverse events but their availability in standard practice is unknown. Here we conducted a systematic review of psychological intervention studies for cancer-related sexual difficulties. For our purposes, "psychological" was defined as any intervention incorporating psychological techniques (e.g., cognitive therapy, skills training, couples exercises, traditional sex therapy, or psychoeducation).

Design

Literature search

We conducted a systematic literature review of all published studies before May 2010 relating to psychological treatment for sexual dysfunction following cancer. Articles were retrieved through a search of the PubMed, EMBASE, GoogleScholar, PsychINFO, PsychARTICLES, PsychBOOKS, PsychEXTRA, and PsychCRITIQUE databases. Search terms included combinations of the terms sexual dysfunction, cancer, and psychological therapy. The search was limited to articles published in English, and those describing a clinical trial testing a psychological treatment with some component that addressed sexual complaints/dysfunction specifically. Only studies where the experimental group was compared to either a control group or baseline were included; case studies were not.

Levels of evidence

We used a slightly modified version of the Oxford Centre for Evidence Based Medicine guidelines for assigning levels of evidence [42] rating system, which has been previously used to rate levels of evidence for the International Consultation on Sexual Dysfunctions [43, 44]. Levels of evidence were based on "the ability of the study design to minimize the possibility of bias and to maximize attribution" [43] and were rated on a level of evidence scale ranging from 1–4. Level 1a represents a meta-analysis of randomized controlled trials (RCT) or a systematic review. Level 1b represents an RCT. Level 2a represents one controlled study without randomization. Level 2b represents a type of quasi-experimental study. Level 3 represents a non-experimental descriptive study, such as a comparative study, a correlational design, or a case-control study. Level 4 is the weakest level of evidence and represents an expert committee report or opinion and/or clinical experience from a respected authority. The three authors independently rated each paper. Any paper which

showed discrepant ratings by any of the three raters was re-rated by all three raters until consensus was reached. Levels of evidence for each of the 27 studies reviewed are presented in Table 1.

Statistical calculations

We calculated effect sizes using Cohen's d statistic for studies basing their findings on calculated group means and including treatment and control or comparison groups. We calculated Cohen's d using pooled standard deviations and post-intervention means from the treatment and control groups. In repeated-measures studies, we calculated Cohen's d using pre-and post-intervention means. Data for the effect sizes was extracted and calculated; and, an effect size of 0.2 was interpreted as small, 0.5 as medium, and ≥0.8 as large [45].

Results

We identified 27 relevant studies, including 23 RCTs and four non-controlled trials (NCTs) (Table 1).

Study characteristics

The number of participants ranged from 20–384, the mean age was 51.2 years, and the range from 15–80. Six studies focused on breast cancer [46–51]; seven on gynecological cancers [52–58]; two on either breast or gynecological cancer [59, 60]; nine on prostate cancer [61–69]; one on intestinal cancer [70], and two on any type of cancer [71, 72]. Of the 27 studies, 17 reported on ethnicity, with the vast majority of participants identifying as Caucasian. Only two studies [57, 64] focused on African-American cancer survivors and one focused on mono-lingual Spanish speaking survivors [69].

Levels of evidence

Levels of evidence are reported in Table 1. There was 100% agreement on the ratings between the three raters on 25 of the 27 studies. On the two studies where ratings were discrepant, all authors re-read the papers and revised their ratings. Upon re-review, there was complete agreement between the reviewers.

Randomized controlled trials

Adolescent cancer Canada et al. [71] delivered individual counseling to enhance psychosexual development among adolescents. Sexual knowledge, body image, and sexual concerns showed significant and positive improvements in the immediate treatment group compared to the 3-month wait-list control group, with good effect sizes.

Breast cancer Christensen [46] evaluated the effects of a structured couples counseling program on psychosocial discomfort following mastectomy compared to individually tailored counseling or a no-treatment control. The couple-counseling intervention educated couples about psychosexual misconceptions and realities following mastectomy and assisted the couple in integrating new information and ways of relating to each other. Sexual satisfaction was significantly higher for men and women following treatment compared to control.

Ganz et al. [47] tested a comprehensive menopausal assessment (CMA) intervention to relieve treatment-related menopausal symptoms among women with breast cancer compared to a usual care control group. After initial assessment, the CMA was followed by education, counseling, pharmacological and/or behavioral interventions, psychosocial support, and referrals tailored to each woman's individual needs. Although there was no measurable improvement in general QoL, sexual response and menopausal symptoms improved in the CMA group compared to control.

Recently, Kalaitzi et al. [48] investigated a brief psychosexual intervention for women with breast cancer, designed to address psychological distress and problems related to sexuality and body image following mastectomy. The intervention led to significant improvements compared to the no-treatment control group. Notable study features were the high rate of acceptance to participate and a zero per cent drop out rate.

In the only study identified focusing on female ethnic minority cancer patients, Schover et al. [49] developed a structured peer counseling program to improve sexual response, increase knowledge about reproductive health, and decrease menopausal symptoms and infertility-related distress in African American women with breast cancer. The intervention produced significant improvements, however, the effect size was small.

Salonen et al. [50] examined the efficacy of a telephone support intervention for women with breast cancer versus a control group. The telephone support was administered by a physiotherapist during one telephone call 1 week after surgery. The 3–25 min telephone call covered teaching/information about breast cancer, instructions on home exercises, giving advice and general health information, counseling on stress-related problems, focusing on the therapist-survivor relationship and a systematic approach, and examining participants expectations. There was no explicit focus on sexuality. There were no significant differences between the intervention and control groups on the quality of life domains of health/functioning,

Table 1 Descriptive characteristics of 27 studies included in the systematic review of psychological interventions for sexual dysfunction following cancer including levels of evidence (LOE)

Study	Sample	Sexual intervention	Sexuality-related endpoint	Outcome	LOE	Effect sizes of measured sexuality-related endpoints
Ayaz & Kubilay (2009)	*N*=60 intestinal cancer survivors with a stoma assigned to "case group" or control. M age=43.7 in both groups. 66–70% of groups were men.	8 bi-weekly home visits by a trained nurse for those assigned to the case group. Control group consisted of one interview 4 months after hospital discharge and sexual health assessed with questionnaires. Solutions for sexual problems sought using the PLISSIT model (not manualized) to guide assessment and treatment recommendations	Desire, vaginal dryness, dyspareunia, erectile dysfunction, causes of sexual problems, body image, and relations with a partner.	100% participation rate. Golombok-Rust Inventory of Sexual Satisfaction used to evaluate sexual functioning before and at two time points after the PLISSIT intervention. Nearly every domain of sexual functioning significantly improved in both the case and control groups with significantly greater improvements in the case group.	2a	n/a
Brotto et al. (2008)	*N*=22 women with gynecologic cancer[a], M age=49.4	Mindfulness-based group PED[c] intervention (3 1-h monthly sessions) using manualized treatment. No control group.	Sexual response[b] (Female Sexual Function Index), relationship adjustment (Dyadic Adjustment Scale), and psychophysiological arousal	Complete data available for 19 women out of 30 who agreed to participate (63%). Significant improvements in sexual desire, arousal, orgasm, satisfaction, and sexual distress; trend towards improved psychophysiological arousal; improvement in measured QoL. (especially for more depressed women)	2b	0.66–4.47
Cain et al. (1986)	*n*=80 women with gynecologic cancer[a], M age=59	Individual or group thematic counseling (8 sessions) using a structured protocol. Random assignment to standard counseling (control), thematic individual counseling, or thematic group counseling.	Sexual behavior and satisfaction were two of several topics covered in the counseling.	72 of 80 women (90%) enrolled completed the program and 60 completed 6-month follow-up. Significantly better quality of sexual relationship from pre to post-counseling and significantly higher gains in individual and group counseling vs. control.	1b	n/a
Caldwell et al. (2003)	*n*=21 women with gynecologic cancer[a], M age=47.1	Psychosexual group therapy (12 weekly ninety-minute sessions). Group leaders followed a structured syllabus outlining the topics to be covered.	Sexual response[b] (Changes in Sexual Functioning Questionnaire), mood, communication with partners, and coping.	16 of 21 women (76%) completed all assessments. Treatment significantly improved sexual response, frequency of sex, sexual pleasure, and arousal. Trend towards improvement found at 3-month follow-up. No significant change in mood at follow-up.	2b	0.22–1.35
Campbell et al. (2007)	*n*=30 African American men with prostate cancer (M age=62.1), and their partners (M age=58.7)	Random assignment to either partner-assisted Coping Skills Training intervention (6 weekly 1-h telephone sessions) vs "usual care." Treatment was manualized.	Self-efficacy (Self-Efficacy for Symptom Control Inventory); general health and disease specific QoL (Expanded Prostate Cancer Index Composite) including items on sexual functioning; partner QoL (Profile of Mood States-Short Form and Caregiver Strain Index).	157 eligible, 45 expressed willingness to participate, 40 randomly assigned to group, 30 completed all assessment points. Treatment significantly decreased bowel bother; trend towards improvement in symptom-related QoL (i.e. sexual bother) for patients and spouses. No significant effect on general quality of life or negative mood.	1b	0.25–0.45
Canada et al. (2005)	*n*=51 men with prostate cancer (M age=65.5) and their partners (M age=61.8)	Random assignment to standardized couples counseling vs. attending alone (4 sessions). Treatment was manualized.	Erectile functioning, female sexual response[b], marital adjustment, psychological distress, and utilization of ED treatments.	51 of 84 completed treatment (60.7%). No significant difference between the two groups. Combined group outcomes showed treatment significantly improved sexual function and satisfaction in men and their partners, emotional distress in men, increased prevalence of men's usage of ED	1b	0.14–1.03

Table 1 (continued)

Study	Sample	Sexual intervention	Sexuality-related endpoint	Outcome	LOE	Effect sizes of measured sexuality-related endpoints
				treatment. Loss of improvement on most measures by 6 months for men and 3 months for women. No significant effect on marital adjustment.		
Canada et al. (2007)	*n*=21 adolescents with cancer, M age=21	"Adaptive" random assignment to individual counseling with educational and supportive component, plus phone call 1 month later (two 90-min sessions) or to wait-list control (and received intervention 3 months later). Materials delivered in a workbook.	Psychosexual development including anatomy/physiology, cancer and puberty, cancer and sexual function, cancer and fertility, body image, sexual behavior options during treatment, relationship issues, sexual communication, and assertiveness.	21 completed all assessments out of 24 enrolled. Passage of time had no significant benefit and significantly increased distress. Intervention significantly increased cancer-related sexual knowledge, confidence about appearance, and body competence; and significantly decreased sexual concerns, expressing affection concerns, emotional distress, and less fear of dating for those who were single.	1b	0.42–1.24
Capone et al. (1980)	*n*=56 women with gynecologic cancer[a], age range 20–80. *N*=41 women in the control group.	In-hospital individually tailored counseling (minimum 4 sessions) with first session taking place before cancer treatment. Sexual rehabilitation was added for sexually active participants. No information on whether intervention was manualized.	Individual counseling program focused on shaping expectations, facilitating attainment, behavioral change, holistic concept of the self, and processing information.	No information on attrition. Treatment group more likely to have resumed sexual intercourse (59%) compared to non-counseled group (20%). Sexual functioning significantly better in counseled group at 3, 6, and 12 months after the intervention compared to non-counseled group.	2a (no indication of randomization)	n/a
Christensen (1983)	*n*=20 women with breast cancer (M age=39.7) and their partners (M age=39.5)	Random assignment to structured couples treatment program (4 sessions) or control group. Intervention was structured.	Psychological disturbance, marital adjustment, sexual satisfaction, self esteem, depression, and anxiety.	No significant difference between treatment and control groups on any variable. Mean scores on sexual satisfaction significantly higher than mean scores in the control group. Also, mean scores on psychological discomfort significantly lower in treatment compared to control group.	1b	0.42–0.49
Fobair (2002)	*n*=20 lesbian women with breast cancer, M age=47	Supportive-Expressive group therapy for lesbian women (12 weekly sessions). No control group. Intervention was structured.	Primary outcomes were mood, anxiety, depression, and psychological adjustment to cancer. Sexuality was a secondary outcome.	20 of 20 recruited completed all assessment points. No significant effect of treatment on sexuality. Significant positive effect of treatment on mood, anxiety, and self-efficacy.	2b	n/a
Ganz et al. (2000)	*n*=72 women with breast cancer, M age=54.5. Multiple exclusion criteria.	Intervention focused on hot flashes, vaginal dryness, and stress urinary incontinence. Stratified by age and tamoxifen use then randomized to comprehensive structured menopausal assessment (CMA) intervention (3 sessions) vs. usual care control group. Treatment was manualized.	Outcome measures were Sexual response[b], menopausal symptoms, and general health.	72 women completed treatment out of 76 randomized (95%). CMA significantly improved menopausal symptoms more than usual care group. CMA resulted in significantly improved sexual attractiveness for self and partner, frequency of sex, arousal, lubrication, and orgasm. Women in usual care group had significantly improved arousal and orgasm.	1b	n/a
Giesler, (2005)	*n*=99 men with prostate cancer, M age=63.8	Patient-spouse dyads randomized to symptom management and PED[c]	Sexual worry, disease specific QoL, anxiety re: cancer recurrence,	85 completed treatment of 99 who were randomized. Treatment significantly	1b	0.21–0.50

		strategies (online interactive treatment once a month for 6 months) vs. standard care arm. Manualized by a computer program.	depression, and dyadic adjustment.	reduced sexual dysfunction and interference of sexual dysfunction with role activities. No significant group difference on sexual bother.		
Halford et al. (2001)	n=90 women with breast or gynecologic[a] cancer, M age=n/a	Randomized trial of couple-based psychological intervention (CanCOPE; six 90–120 min sessions conducted in patients' homes) vs. control. Manualized treatment.	Sexual response[b] and relationship satisfaction (Dyadic Adjustment Scale).	No data provided	4	n/a
Jeffries et al. (2006)	n=47 women with gynecologic[a] cancer, M age=42.98	Prospective and longitudinal randomized trial of PED[c] group intervention (2 2-h sessions) vs. control (30-min instruction on use of dilators). Manualized treatment.	Compliance with vaginal dilation following pelvic radiotherapy.	47 women accrued and followed out of 56 randomized. Treatment significantly enhanced dilator compliance. Between group differences disappeared by 6 months. By 12 months, only 5 women were still dilating once/week.	1b	d=0.70 for frequency of dilation at 6 weeks, and d=0.36 for frequency of dilation at 6 months
Kalaitzi et al. (2007)	n=20 women with breast cancer, M age=51.8	Randomized to either structured psychosexual intervention, including couples and sex therapy, after mastectomy (6 sessions) included patients' partners vs. control group. No information on control group or whether experimental treatment was randomized was provided.	Sexual and body image, situational (state) and trait anxiety, and depression.	No information on attrition provided. Mean data by group not provided (only p levels indicated). Treatment significantly improved depression; anxiety; marital and body-image satisfaction; increased orgasm; and sex initiation frequency.	1b	n/a
Lepore et al. (2003)	n=250 men with prostate cancer, M age=65	Lecture on relationships and sexuality provided by a clinical psychologist. Randomized to either group education lectures plus facilitated 45 min peer discussion (6 sessions), group education alone, or standard medical care (control group). Participants received written materials. Discussion group not manualized.	Prostate cancer knowledge, health behaviors, management of physical side effects, and general and disease-specific QoL (UCLA Prostate Cancer Index), including items on sexual functioning.	Of 279 randomized to treatment, 250 (90%) completed the study. Treatment group significantly better than both control groups on bother from sexual difficulties. No significant treatment effect on sexual or genitourinary functioning, but all groups showed improvement over time. No significant effect on depression or mental health. Among men without a college degree, the intervention significantly improved physical health.	1b	0.19–0.48
Maughan & Clarke (2001)	n=36 women with gynecologic[a] cancer, M age=50	Randomized to either a specialist nurse-led active treatment focused on quality of life and sexual function where the intervention was conducted in patients' homes (average 3 sessions) and partners encouraged to participate vs. control (standard information and nursing care). Unknown if intervention was manualized.	Sexual response[b] (Lasry Sexual Functioning Scale for Breast Cancer Patients) and frequency of intercourse.	Of 36 women randomized, 34 completed treatment. Treatment led to a quicker resumption of intercourse, sexual response, more frequent sexual intercourse, less sexual anxiety, higher libido, and QoL but improvements also seen in control group.	1b	n/a
Mishel et al. (2002)	n=239 men with prostate cancer, M age=64	Randomized to either an individualized uncertainty management intervention delivered by telephone vs. same intervention but also delivered to family member vs. usual care control group. Intervention (8 sessions) delivered by a nurse. Treatment structured.	Sexual response[b], erectile functioning, satisfaction with sexual functioning, cancer knowledge, and patient-provider communication.	Significantly greater improvement in sexual satisfaction for African-American men in active treatment vs. control group only up to 4 month point. Non-significant trend towards improved erectile functioning in treatment group. All groups showed significant decline in number of symptoms.	1b	0.04–0.29
Molton et al. (2008)	n=101 men with prostate cancer, M age=60	Randomized either to group-based cognitive-behavioral stress management intervention (10 2-h sessions) vs. control condition (one 4-hr seminar). In-	Sexual response[b] and satisfaction (UCLA Prostate Cancer Index).	Of 121 men who completed the baseline assessment, 101 completed post-treatment intervention (83.4%). Significantly greater improvement in recovery	1b	0.01–0.88

Table 1 (continued)

Study	Sample	Sexual intervention	Sexuality-related endpoint	Outcome	LOE	Effect sizes of measured sexuality-related endpoints
		tervention was manualized.		from sexual dysfunction in treatment vs. control group. Men with higher interpersonal sensitivity in the treatment group showed larger improvements in sexual functioning.		
Northouse et al. (2007)	n=235 men with prostate cancer (M age=63) and spouses (M age=59)	Randomized either to standard care+a family based intervention called the FOCUS Program (three 90-min home visits and two 30-min telephone sessions) vs. a control condition (standard clinic care). Intervention nurses received intensive training. Treatment was manualized.	General symptom distress and prostate-specific symptoms (Expanded Prostate Cancer Index Composite); coping strategies; communication; appraisals of illness/care-giving; and general and cancer—specific QoL.	Out of 263 dyads randomized, 235 (90%) completed the 4-month assessment and 218 (83%) completed all 3 follow-up assessments. No significant treatment effect on any quality of life variable. Treatment group reported significantly less illness-related uncertainty and increased communication with spouses. Spouses received most benefit from treatment (overall QoL, increased communication, and fewer problems re: husband's urinary incontinence.	1b	−.04–0.12
Penedo et al. (2007)	n=71 monolingual Spanish speaking men with prostate cancer, M age=65.5	Randomized to either a culturally sensitive 10-week group based cognitive-behavioral stress management (CBSM) intervention on a weekly basis (2 h sessions with homework exercises) vs. control (half-day psychoeducational stress management seminar). Intervention was manualized.	General and cancer specific QoL; and current sexual functioning (Expanded Prostate Cancer Index Composite).	71 completed post-intervention follow-up out of 93 men randomized (76%). Treatment significantly improved QoL in multiple domains, including physical and emotional well-being, and sexual functioning. Non-significant trend towards improved sexual functioning in control group.	1b	n/a
Robinson et al. (1999)	n=32 women with gynecologic[a] cancer, M age=47	Women randomized to either group PED[c] to increase vaginal dilation (two 1.5-h sessions) or control group (written information and brief counseling). Intervention was structured.	Global sexual health (Sexual History Form Global Score); sexual history, knowledge, and fears; and dilator compliance.	32 completed treatment out of 40 originally randomized. Treatment significantly reduced fears about sexuality but no effect on global sexual functioning; increased sexual knowledge only in older participants; improved dilator compliance for younger women only.	1b	d=−1.082 for the Sexual History Form, d=0.626 for sexual knowledge, and d=−0.3530 for Fears about cancer & sexuality
Salonen et al. (2009)	n=228 women with breast cancer, M age=56.5	Women were quasi-randomized to either a single physiotherapist—delivered telephone support intervention 1 week after surgery (length varied from 3–25 min) vs control. Intervention was structured but individualized to the woman's needs. Control group received standard written information in the hospital.	General health & disease specific QoL, including items on sexual functioning.	228 women completed treatment out of 250 who agreed to participate and provided consent. Intervention group had a significantly better body image, worried less about the future, and had fewer post operative side effects; a small clinical but not significant improvement in sexual functioning; no difference in general QoL between groups.	2a	n/a
Schover et al. (2006)	n=60 African American women with breast cancer, M age=49	Assigned to immediate counseling vs. 3-month wait-list group. Intervention was a structured counseling program (three 60–90 min sessions) with a trained peer counselor. Manualized treatment.	Sexual response[b], menopausal symptoms, and dyadic adjustment.	48 women completed the study out of 60 women enrolled (80%). Significant effect of treatment on reproductive health knowledge, overall psychological distress, sexual response	1b	0.13

				and satisfaction, and menopausal symptoms with most changes occurring between baseline and post-counseling. Women with sexual dysfunction at baseline did not improve; those without sexual dysfunction showed statistically but not clinically significant improvements. 81% rated the program as "very useful."		
Scott, Halford, & Ward (2004)	n=94 women with breast or gynecologic[a] cancer (M=51) and partners (M age=53)	Intervention focused on couple coping in couples where the woman had early stage breast or gynaecologic cancer. Stratified by diagnostic group then randomized to either medical information education, patient coping training, or couple-coping training. Couple-coping intervention conducted in patients' homes (6 2-h sessions plus 2 half-hour telephone calls). Intervention manualized.	Sexual response was primary outcome[b].	66 (70%) of couples completed follow-up 1 year later out of 94 recruited to the study. Significant benefit of couple coping treatment over other two conditions on communication. No treatment effect on sexual functioning but women tended to show a decline in problems over time whereas men's problems did not change. Significant effect of couple-intervention on sexual self-schemas and perceived partner acceptance of body image. No effect of treatment on sexual desire, arousal, or orgasm but significant treatment effect on sexual intimacy. No effect of treatment on sexual communication. No treatment effect on warmth.	1b	0.81–0.92
Weber et al. (2004)	n=30 men with prostate cancer, M age=58.6	Intervention focused on producing a supportive environment for the participants to discuss cancer-related problems. Randomized to dyadic support intervention (administered by a trained prostate cancer survivor) for 8 sessions vs. the control group (receiving usual care). Sessions were not standardized or manualized.	Outcomes focused on incontinence and erectile dysfunction (UCLA Prostate Cancer Index); social support; self-efficacy; and depression symptomology.	30 completed the 8-week protocol out of 32 randomized. No significant treatment effect on urinary or sexual function; compared to control group, dyadic support group showed significantly less bother by sexual function and a trend towards greater recovery from urinary and sexual function compared to control group.	1b	0.12–0.73

[a] Gynecologic cancer may include endometrial, uterine, cervical, ovarian, vaginal, fallopian tube, or vulvar cancers.

[b] Sexual response refers to measures of sexual desire, arousal, orgasm, and pain

[c] PED=Psychoeducation

socioeconomic, psychological/spiritual, or family, nor on the quality of life global score. However, women in the intervention group had significantly better body image, less worry about the future, and fewer postoperative side effects compared to the control group. Sexual functioning was clinically but not statistically improved in the intervention group.

Gynecologic cancer Cain et al. [52] tested the long-term benefits of individual and group thematic counseling compared to standard cancer counseling among women newly diagnosed with gynecologic cancer. Thematic counseling included learning to anticipate possible difficulties in sexual functioning (suggestions were given to remedy those difficulties). Although participants in all three groups improved psychosocial functioning at the immediate post-counseling assessment, at 6-month follow-up women in the individual and group thematic treatment groups described significantly better sexual relationships than those in the standard counseling group.

Capone et al. [53] investigated the effectiveness of in-hospital individual counseling for psychosocial adjustment in patients newly diagnosed with gynecologic cancer versus a control group. For those who were sexually active prior to their cancer diagnosis, a sexual rehabilitation component was added to the intervention. Patients in the counseled group were significantly more likely to resume sexual intercourse than those in the control group.

Maughan and Clarke [54] implemented a specialist nursing intervention on women's experiences with gynecological cancer. They observed a non-significant trend towards increased positive emotional, cognitive, social, and sexual functioning for the women in the counseled group. Interestingly, 60% of women in the control group reported decreased satisfaction with intercourse at 6 months following surgery versus 20% of women in the treatment group. Although there was insufficient information to calculate effect sizes, the data suggested that the specialist nursing intervention positively influenced QoL and sexual response.

Scott et al. [59] examined a couple-coping intervention on the psychological well-being of married women receiving treatment for breast or gynecological cancer and their partners compared to individual coping training, or a medical education control. The contents of both coping interventions were similar, however, the couple-coping intervention focused on helping the couple conjointly cope with cancer, and included sexual counseling. While this intervention produced significant positive results compared to either control group, the dyadic intervention had no effect on couples' expression of warmth or on the women's sexual responsiveness. These researchers tested a similar cognitive-behavioral program in women with breast or gynecologic cancer [50] and their partners, either individually or as a couple. Although the authors suggested that the couples-based intervention was more effective than individual support, no data were provided.

Vaginal dilation is a recommended therapy for women who receive pelvic radiotherapy, given the known sexual morbidity that follows. However, compliance rates are notoriously low. Robinson and colleagues [55] assessed barriers to vaginal dilator use and developed a psycho-education (PED) incorporating the Information-Motivation-Behavioural (IMB) skills model [73] and information on improving sexual health. For women younger than 50, the experimental intervention improved dilator compliance compared to the control intervention (written information on sexuality and cancer with brief counseling). For older women, the intervention did not increase compliance; however, a higher percentage of older women in the control group followed recommendations to dilate compared to younger women.

Data from Jeffries et al. [56] also supported the effectiveness of PED intervention to enhance vaginal dilation compliance based on the theoretical framework from the IMB skills model [73] compared to treatment as usual (providing women with a dilator and informational manual). Those receiving PED were significantly more likely to dilate at the 6-week mark compared to the control group.

Prostate cancer In a study designed to enhance sexual rehabilitation following prostate cancer, Canada et al. [61] recruited men who had been treated with radical prostatectomy or radiation therapy. Standardized counseling sessions were identical for the couples intervention and the individualized format (control group), and included education on sexual function, options for treating ED, and sex therapy techniques, while addressing negative beliefs towards sexuality and cancer that impede help-seeking. The intervention produced large treatment effects in all sexuality endpoints, except sexual desire. The presence of the female partner during sessions did not significantly affect outcomes, possibly because behavioral homework was assigned to all partners in both groups. Treatment effects were not powerful enough to maintain long-term changes in behaviors or cognitions, and the authors attributed this to the brevity of the intervention.

By focusing on the spouses of men with prostate cancer, Northouse et al. [62] studied the efficacy of a post-surgery family-based intervention with patient-spouse dyads compared to couples receiving standard care. While patients benefited from the intervention, the spouses received the most benefit. These results highlighted the importance of including spouses in any psychological treatment outcome study following cancer-induced sexual dysfunction.

Giesler et al. [63] aimed to improve the QoL of prostate cancer patients using a patient-spouse cancer care intervention program. They implemented symptom management and psychoeducational strategies to eliminate or reduce the impact of problems related to sexual, urinary, and bowel dysfunction. While the intervention was beneficial on most endpoints, the most consistent improvements were on sexual domains. Importantly, intervention effects were moderated in some patients according to their baseline levels of depression, suggesting that baseline psychological functioning can influence improvement in sexual function and bother.

Weber et al. [64] examined whether trained long-term prostate cancer survivors could provide effective support to men recently treated with radical prostatectomy. The dyadic intervention was effective at reducing depression and increasing self-efficacy in men after surgery in one small study. Although both groups showed improvement in urinary and sexual functioning over time, the dyadic support group showed greater (although non-statistically significant) recovery compared to the controls.

In a larger study of men with prostate cancer, Lepore et al. [65] implemented group education-plus-discussion to increase prostate cancer knowledge and QoL and compared it to those receiving standard medical care (control group) or an education intervention group. While the educational intervention positively influenced several outcomes, including sexual bother, it did not affect sexual or urinary functioning. The greater improvements observed in the education-plus-discussion group suggest that whereas education does ease some sexual distress, discussion with peers is necessary for reducing fears about sexual problems. Both interventions were found to be particularly beneficial for men with less formal education.

In a nurse-administered telephone PED treatment to Caucasian and African-American men with prostate cancer, Mishel and colleagues [66] focused on managing uncertainty, improving symptom control, and increasing sexual satisfaction and ability to have an erection. African American men significantly improved on sexual satisfaction, and while there was a trend towards some improvement in their ability to have an erection, this effect was not statistically significant. The most meaningful aspect for men was that treatment provided a means to ask questions and obtain information about managing side-effects.

In a pilot study of African American survivors of prostate cancer and their partners, Campbell et al. [67] evaluated the efficacy of telephone-based coping skills training (CST). Survivors reported improvement in QoL across several domains with larger effect sizes for improvement of bowel and sexual symptoms. Spouses reported improved functioning in depression, fatigue, and vigour where moderate effect sizes were observed. Participants found that the communication skills learned were especially valuable.

Molton et al. [68] tested the effect of interpersonal sensitivity on a cognitive-behavioral stress management (CBSM) program with older men recovering from radical prostatectomy. Men with higher levels of interpersonal sensitivity were more likely to believe that sexual dysfunction was a threat to masculine identity. While the CBSM program significantly improved recovery of sexual function for all participants, men with higher levels of interpersonal sensitivity showed the greatest improvements.

In a study of 71 monolingual Spanish speaking prostate cancer survivors randomized to either a 10-week CBSM group intervention (2-hr sessions, once/week for 10 weeks) versus a control group which provided one half-day psychoeducational seminar, Penedo et al. [69] found a significant improvement in sexual functioning with the intervention. The intervention also resulted in significant improvements in physical well-being, emotional well-being, and total well-being.

Intestinal cancer Sixty patients living in Ankara, Turkey who were living with a stoma were randomized to either the intervention group, which consisted of eight home visits, or the control group, which consisted of one interview a day before hospital discharge and another interview after 4 months [70]. The PLISSIT model (permission, limited information, specific skills, and intensive therapy) was used as a guide in the case group to provide information on sexual functioning to patients and their partners. Sexual functioning increased after 6 weeks, in line with expectations about the resumption of sexual activity in cancer survivors post-surgery. There was a significant increase from pre-test to the final-test on several subscales of sexual functioning including: sexual frequency in men and women, satisfaction in men and women, avoidance in women, impotence in men, anorgasmia in women, and global sexual functioning scores in men and women. However, the control group also saw significant improvements in sexual frequency, satisfaction, avoidance, premature ejaculation, impotence, and anorgasmia. Those with more education had better outcomes, and having a temporary stoma did not alter findings with regards to those with permanent stomas. Those who could perform their own stoma care had better sexual functioning. The authors also hypothesized that some of the improvements in sexual functioning may have been due to the intervention's ability to improve perceived sexual attractiveness, negative feelings, body image, reduce performance anxiety, and eliminate barriers.

Non-controlled trials

Brotto and colleagues [57] developed a brief PED intervention targeting sexual arousal complaints in Caucasian

women with cervical or endometrial cancer. They found significant improvements from pre-treatment on measures of sexual functioning and marginally significant improvement in both physiological and subjective perception of genital sexual arousal with a modest effect size. The PED resulted in increased ability to experience pleasure from genital stimulation for women with higher levels of baseline depressive symptoms. Women reported the mindfulness training to be helpful in encouraging them to tune into existing (and previously ignored) genital arousal.

Caldwell et al. [58] explored the effects of a supportive-expressive psychosexual group intervention focusing on body image and sexuality issues in gynecologic cancer survivors. Sexual response increased significantly from pre- to post-treatment along with a non-significant trend towards improved orgasmic functioning. Only frequency of sex remained a significantly sustained gain 3 months after treatment, suggesting that further intervention may be necessary for maintaining gains in sexual functioning.

Fobair [51] evaluated a Supportive-Expressive group therapy for lesbian women diagnosed with early stage breast cancer focusing on several issues including: problems concerning cancer diagnosis; treatment-related concerns; coping with cancer and its treatment; expression of thoughts and emotions; mood changes; self-efficacy; relationships with doctors, family, friends and partners; changes in body image and sexuality; and reordering life values and personal goals. Although mood, stress levels, sense of self-efficacy, conflict at home, pain, and sleep improved, there were no significant changes in body image or sexuality.

Schover and colleagues [72] developed a program of sexual rehabilitation, evaluating male and female cancer patients with various cancers who were seeking help for a sexual problem. Outcomes did not vary with timing of referral, type of psychotherapy or location of the sessions, although patients rated outcomes more positively when they had more therapy sessions. Although type of treatment, non-specific treatment effects, number of sessions, age, gender, and ethnicity were not controlled, the data suggested that a sexual rehabilitation program in a medical setting is feasible and effective across a variety of cancer types, and it was welcomed enthusiastically by patients.

Discussion

Our systematic review yielded 27 empirical studies exploring psychological interventions for sexual difficulties following cancer. Nineteen of the 27 studies were given a level of evidence of 1b corresponding to a RCT. The studies varied widely in their exclusive focus on sexual difficulties, endpoint measures employed, how manualized the intervention was, and sample sizes. Moreover, it is well known that only a small subset of cancer survivors will seek out psychological treatments for cancer-related sexual difficulties, and attrition rates are significant; however, we can draw some general conclusions.

The length of a psychological intervention may influence its effectiveness and maintenance of cognitive and behavioral improvements among cancer survivors and their spouses. A three-session counseling intervention may be too brief, especially if it includes teaching other coping strategies [51, 59]. A longer intervention may be necessary to empower patients to discuss sexuality with their providers. Conversely, it is also possible that barriers around talking about sexuality are too great to be overcome by a behavioral intervention alone [66].

Thematic counseling, which addresses other aspects of mental health and social functioning, significantly improved quality of sexual relationships, even if a partner was not present in treatment [52], however, some studies found that partner presence provided significantly greater improvements for women's sexual intimacy and sexual self-schema [59].

Some evidence suggested it was not necessary for a mental health professional (e.g., psychologist) to deliver the treatment. Maughan and Clarke [54] showed significant patient improvement in sexual response and intercourse frequency after three sessions with a nurse clinician. There is also a beneficial effect of having treatment administered by peers. For men with prostate cancer, discussing sexual distress with peers significantly improved the positive effects of education alone [65].

Other research suggests that providing cancer survivors with education alone is insufficient for producing behavior change. In the case of vaginal dilators, discussing motivation and self-efficacy skills was essential [55]. Moreover, knowledge only increased in the older women and vaginal dilator compliance only increased in the younger women. These data suggest that future psychosexual interventions should focus on more than providing patients with (written) information and must evoke the patients' motivational and self-efficacy skills.

A small number of studies focused on patient-related characteristics that might interact with psychological treatment. Treatment focused on African-American cancer survivors is feasible and effective [66, 67], and a cognitive-behavioral stress management group for Spanish speaking men with prostate cancer significantly increased sexual functioning relative to a control group [69]; but, no studies have reported on outcomes in other ethnic minority groups. A group intervention focusing on sexuality among Lesbian women with breast cancer failed to significantly improve

sexual response or body image but did improve mood [51]. Having greater interpersonal sensitivity was one patient-related variable associated with greater improvement in sexual function in men [68].

In several studies, an initial improvement in sexual functioning was not maintained at the follow-up assessment point [56, 61]. This suggests that cancer survivors may benefit from having a "booster session" some months following the end of their treatment in order to attenuate the loss in gains made from the intervention.

Taken together, this systematic review provides moderate support for the effectiveness and feasibility of psychological interventions targeting sexual complaints following cancer in both men and women, although more research is clearly needed. Moreover, given the strong placebo response, as evidenced by the significant improvement among survivors in the control group across several studies [46, 47, 61, 65, 69, 70], it is imperative that future studies of psychological interventions for sexual dysfunction in survivors contain a control group. If found effective against a comparable control, then the clinical implications are such that we might be challenged to implement such treatments more broadly into the clinical setting where time and energy are currently focused primarily on survival and only minimally on QoL issues such as sexual health.

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