

A systematic review on the efficacy of CBT interventions for the mental and sexual health of survivors of prostate cancer

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Abstract

Introduction: Prostate cancer (PCa) is the second-most frequently diagnosed oncologic condition among biological men, affecting physical and psychological well-being, as well as sexual health and quality of life. Prior research has shown that cognitive-behavioral therapy (CBT) can be effective in addressing a range of psychological and sexual problems but also in improving the sexual and mental health of survivors of PCa.

Objectives: This systematic review aimed to methodically research and summarize results concerning the efficacy of CBT in the mental and sexual health of survivors of PCa.

Methods: A systematic search was carried out via electronic databases until August 2022 (EBSCO, MEDLINE, Cochrane Library, and Web of Science). By combining specific search words and following the PRISMA checklist, we identified 15 eligible articles among 8616 initial records.

Results: Four studies showed evidence of intervention efficacy for the improvement of sexual health, specifically for overall sexual function, erectile function, sexual desire, and sexual satisfaction. Eight studies found intervention efficacy for the improvement of mental health dimensions, such as psychological distress, depressive symptoms, anxiety, and quality of life.

Conclusion: There is evidence that CBT interventions have the potential to effectively promote mental and sexual health in survivors of PCa, but further research comprising larger and more diverse populations is needed. Future studies should focus on understanding mechanisms of change through CBT interventions to ensure the mental and sexual health of survivors of PCa.

Keywords: prostate cancer; sexual health; mental health; depression; anxiety; quality of life; sexual dysfunction; CBT; RCT.

Prostate cancer (PCa) represents a major public health concern as it is the second-most common cancer diagnosed in men worldwide.¹ According to the National Comprehensive Cancer Network,² PCa mainly affects older individuals, aged >50 years.³ When a person is diagnosed with this oncologic disease, medical professionals consider various health aspects to decide what treatment options are most suitable. The most used treatments for PCa include active surveillance, radiation therapy, androgen deprivation therapy, and radical prostatectomy. Active surveillance involves regular checkups without any active treatment; radiation therapy refers to an active intervention with high-energy beams that target the prostate gland to destroy cancerous cells; androgen deprivation therapy encompasses reducing male hormones to slow down cancer cell growth; and radical prostatectomy consists of surgery through which the entire prostate gland is removed, occasionally including lymph node dissection.⁴

Although medical advances in PCa treatment have contributed to improving the prognosis, thus increasing patient survival rates over the past decade, the incidence of PCa continues to rise due to the aging of the population.¹ This means that more individuals will be living with difficulties associated with PCa diagnosis and related treatments in the

future.² For this reason, it is essential to develop and implement complementary therapeutic approaches addressing the emotional and sexual well-being as well as the quality of life (QoL) of survivors of PCa. Among the most common complications found in survivors of PCa is the experience of significant emotional distress (eg, anxiety, depression, low self-esteem), along with negative sexual consequences such as erectile dysfunction, orgasm dysfunction, lack of sexual desire, and overall sexual distress.^{5,6} Urinary incontinence, pain, and fatigue are also frequent side effects of treatment, causing significant distress and impairing patients' overall QoL.² In sum, treatments for PCa, particularly radical prostatectomy, have been associated with detrimental effects on patients' overall mental and sexual health, contributing to significant emotional, sexual, and relational distress^{7,8} and to decreased QoL in survivors.¹ Therefore, restoring sexual intimacy and emotional well-being is of utmost importance and should be a goal in the patient's care routines, incorporating specialized sexual interventions.⁹ The National Comprehensive Cancer Network² recommends that emotional and sexual distress be addressed within sexual rehabilitation to ensure the QoL.¹⁰ Therefore, sexual difficulties, such as erectile dysfunction, benefit from the expertise of health care professionals with a

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medical and/or psychological background and specific training in sexual rehabilitation,^{1,11} thus ensuring a multifaceted approach.^{12,13} Although such a combination of interventions is more effective in recovering sexual function after PCa than single-line interventions,¹⁴ they are often overlooked, and consequently, survivors regularly find their sexual health care needs unmet.¹⁵

Among the several therapeutical approaches available, cognitive-behavioral therapy (CBT) has shown to be effective in a range of psychological and sexual difficulties. These include anxiety, depression, and cancer-related distress while improving the patient's QoL¹⁶ and sexual functioning.¹⁷ CBT has also been tested as a strategy to improve the mental and sexual health of patients with PCa.¹⁸ Although previous systematic reviews have summarized study results on psychological interventions in PCa,¹⁹⁻²¹ they have not focused on CBT outcomes and did not include the most recently published trials. Therefore, the present review aims to systematically survey the effectiveness of CBT interventions with regard to the mental and sexual health of survivors of PCa. The conclusions should provide a broad overview of the topic, thus contributing to fine-tune clinical interventions and future research.

Methods

We summarized the results of the efficacy of CBT for survivors of PCa according to the following outcome variables: sexual satisfaction, sexual function, depression, anxiety, overall psychological distress, and QoL. The procedures of this review followed the Cochrane guidelines for systematic reviews²² to guide the analysis and reporting of results. The study protocol was registered with the International Prospective Register of Systematic Reviews (PROSPERO) and followed the PRISMA guidelines.²³

Search strategy

We systematically searched relevant articles using four electronic databases: EBSCO, MEDLINE (PubMed), Cochrane Library, and Web of Science. The search was performed until August 18th, 2022, without any further time limitations and involved articles only in English. The search was conducted with a search phrase starting with “prostate cancer AND” followed by combinations of “psychological interventions,” “mental health,” “cognitive behavioral intervention” (OR “CBT” OR “cognitive behavioral therapy”), “sexuality,” “sexual dysfunction,” “sexual health,” “depression,” “anxiety,” “quality of life,” and “randomized control trial.” This screening yielded 8616 results (Figure 1). After removal of duplicates, the corresponding author screened the remaining studies by title and abstract. The full text of the remaining articles was then revised to identify potentially eligible studies by one reviewer, which were cross-checked by two others. Thereby, no disagreements arose.

Eligibility criteria

According to the study's main goal of evaluating and critically reviewing the existing evidence on the efficacy of CBT interventions for the mental and sexual health of survivors of PCa, articles were included in accordance with the following prespecified criteria: (1) studies were based on a randomized controlled trial (RCT) design, as reviews on RCT are

considered the gold standard for systematic reviews²⁴; (2) the studied population involved patients with PCa and/or survivors; (3) patients received oncologic treatment; (4) studies tested a CBT intervention or a CBT combination intervention; (5) the outcomes reported sexual and/or mental health dimensions; (6) the CBT interventions were tested in comparison with a control condition. The exclusion criteria involved (1) studies in which outcomes did not comprise mental and/or sexual health, (2) studies reporting outcomes without discriminating results for survivors of PCa, (3) psychological interventions that did not use CBT strategies, and (4) feasibility and/or pilot studies (due to their limitation in investigating intervention efficacy).

Data extraction

One author extracted data from the articles, which were then double-checked by co-authors. Data characteristics included authors, journal, year of publication, number of participants, treatment type for PCa, control group condition, CBT intervention characteristics (eg, time of intervention, intervention content), main results, as well as strengths and limitations as identified by the authors. Extracted information was compiled and is presented in Table 1.

Risk of bias

To ensure the quality of the selected studies, the Cochrane Collaboration tool was used to assess the risk of bias regarding selection, detection, attrition, and reporting bias (Table 2). The corresponding author independently assessed the risk of bias for each study, while another author cross-checked the assessment. Detection bias regarding the blinding of participants was excluded, as this is hard to achieve in psychological trials.²⁵

Results

In all, 8616 citations were identified. After duplicate removal, 5654 articles were screened by title and abstract. A total of 5584 citations were eliminated, which left 70 full articles for eligibility analyses. Within these 70 articles, 55 were excluded due to violation of inclusion criteria, namely not including an RCT design (n = 22), not being available and no response to requests to provide them (n = 4), not mentioning if the intervention was CBT based (n = 12), the intervention not targeting the survivors of PCa directly (n = 1), results being generalized for patients with cancer without discriminating final results for survivors of PCa (n = 14), or no cancer population being used within the studied population (n = 2). As a result, 15 studies met the criteria and were included in the present review (Table 1).

Study demographics

Eleven studies included participants with localized PCa, while four focused exclusively on advanced PCa. Furthermore, 6 of the 15 selected articles examined a population that underwent either radiation therapy or radical prostatectomy treatment. Four studies involved participants with PCa, regardless of the treatment method. Three studies investigated patients undergoing androgen deprivation therapy only, while other two articles comprised a population that exclusively underwent radical prostatectomy. Moreover, three of the selected

Table 1. Effects of CBT-based interventions targeting the mental and/or sexual health of patients with PCa.

Study	No.	Intervention	Comparison	Components	Time of delivery	Deliverer	Follow-up	Outcomes	Main results
Bouchard (2018) ²⁷	192	Tablet-delivered psychosocial intervention	Attention-control health promotion	Cognitive restructuring, relaxation skill training	10 wk	Therapist	6, 12 mo	PCa anxiety	Experimental group lowered its PCa anxiety at postintervention ($b = -2.69, P = .03$) but no differences identified at follow-up
Benzo (2022) ⁴³	192	Tablet-delivered digital group CBSM	Attention-control health promotion	CBSM, self-management of stress, relaxation skill training	10 wk	Clinical psychologist	6, 12 mo	Urinary incontinence, urinary irritation, bowel function, hormonal function; depression	Experimental group improved in urinary incontinence (until 6 mo), urinary irritation, bowel function, hormonal function, and depression (until 12 mo)
Chambers (2017) ¹⁸	189	Mindfulness-based cognitive therapy	Minimally enhanced usual care	Mindfulness training	8 wk	Health professionals	3, 6, 12 mo	Psychological distress, cancer- and prostate-specific distress, mindfulness skills	Increases in mindful observing over time for experimental group vs usual care ($b = 0.22, P = .03$)
Chambers (2015) ²⁶	189 (couples)	Couples-based sexuality intervention	Peer-delivered telephone support, usual care	Skill training in couples communication, conjoint coping, psychoeducation	8 phone calls	Nurse	3, 6, 12 mo	Use of erectile aids; sexual function; sexuality needs; sexual self-confidence, masculine self-esteem, marital satisfaction	At 12 mo the experimental group used more erectile aids ($z = 2.41, P = .016$)
Chambers (2019) ³²	189 (couples)	Couples-based sexuality intervention or peer-delivered telephone support	Peer-delivered telephone support, usual care	Skill training in couples communication, conjoint coping, psychoeducation	6-8 phone calls	Nurse	2, 3, 4, 5 y	Sexual adjustment, use of erectile aids, unmet sexual supportive care needs, masculine self-esteem, marital satisfaction	Improvement in masculine self-esteem for men in the nurse intervention vs peer group, at 2 y ($z = 1.94, P = .05$) and 5 y postsurgery ($z = 2.01, P = .05$). At 4 y postsurgery, women in the nurse intervention had greater marital satisfaction than peer group ($z = -2.11, P = .04$). Group \times time interaction on relaxation ($F[1,306] = 12.74, P < .001$). CBSM condition increased relaxation ($b = 0.43, P < .001$)
Penedo (2020) ⁴⁰	192	Technology CBSM	Active control health promotion (half-day seminar)	CBSM, self-management of stress, relaxation skill training	10 wk	Tablet	6, 12 mo	Health-related QoL, ability to relax, cancer-related anxiety, cancer-related distress, feelings of cohesiveness	Health-related QoL, ability to relax, cancer-related anxiety, cancer-related distress, feelings of cohesiveness
Penedo (2006) ⁵¹	191	Group-based CBSM	Active control health promotion (half-day seminar)	CBSM, self-management of stress, relaxation skill training	10 wk	Clinical psychologist	9 mo	Benefit finding, QoL	Experimental group improved over time in benefit finding ($t = 2.65, P < .01$), stress management skills ($t = 3.35, P < .01$), and QoL ($t = 2.65, P < .01$)

(Continued)

Table 1. Continued

Study	No.	Intervention	Comparison	Components	Time of delivery	Deliverer	Follow-up	Outcomes	Main results
Penedo (2007) ³⁴	71	Group-based CBSM	Active control health promotion (half-day seminar)	CBSM, self-management of stress, relaxation skill training	10 wk	Clinical psychologist	12-13 wk after baseline assessment	Physical well-being, emotional well-being, sexual functioning, total well-being	Improvement in experimental condition vs control condition: overall well-being ($t = -2.79, P < .01$), physical well-being ($t = -2.35, P < .03$) emotional well-being ($t = -2.11, P = .04$) function ($t = -3.300, P < .01$)
Penedo (2003) ⁵⁰	92	Group-based CBSM	Active control health promotion (1-d seminar) Wait list	CBSM, self-management of stress, relaxation skill training	10 wk	Clinical psychologist	At intervention conclusion	QoL	Experimental condition improved in QoL vs control condition ($t = 2.9, P < .01$) and stress management ($t = -1.82, P = .07$) No differences between conditions
Schover (2011) ²⁸	115 (couples)	Internet-based sexual counseling, face-to-face counseling	Wait list	Sensate focus, gender-specific exercises for negative beliefs about sexuality, cognitive reframing, decision aid for ED training, relapse prevention	12 wk	Web format	3, 6, 12 mo	Sexual function, sexual satisfaction, dyadic adjustment, overall distress	
Siddons (2013) ³⁵	60	Cognitive-behavioral group intervention	Wait list	Cognitive restructuring; information/discussion on PCa, ED, intimacy and masculinity; relaxation and stress management; information on erectile aids; communication training	8 wk	Therapists	At postintervention	Mood, stress, general anxiety, PCa-related anxiety, QoL, sexual functioning	Improvement for experimental group vs control group: sexual confidence ($t = -5.36, P < .01$), masculine self-esteem ($t = 3.67, P = .001$), sexual drive ($t = -2.06, P = .04$). Decline in sexual behavior pre- to postintervention ($t = 2.64, P = .01$)
Stefanopoulou (2015) ⁴⁴	68	Brief telephone-delivered cognitive-behavioral intervention	Treatment as usual	Psychoeducation; negative thought/belief identification; breathing and relaxation strategies; CBT strategies for sleep and night sweats; relapse prevention	4 wk	Clinical psychologist	6 and 32 wk after randomization	Hot flushes and night sweats, mood, QoL	No significant outcomes for sexual or mental health dimensions
Traeger (2011) ⁵³	257	Group-based CBSM	Active control health promotion (half-day seminar)	Relaxation, cognitive restructuring, problem solving, coping skills, interpersonal skills, enhancement of social support networks	10 wk	Clinical psychologist	12 wk	Emotional well-being, illness perception, life stress, sexual function, urinary function	Experimental group showed greater improvements in emotional well-being than control group ($\beta = 0.13, P < .05$)
Wootten (2014) ³⁸	142	Online self-guided psychological intervention	Intervention + forum or forum only	Psychoeducation; communication training; training of cognitive skill PCa-related coping skill training; psychoeducation: sexuality intimacy and masculinity; relapse prevention	10 wk	Web delivered	3 mo, 6 mo	Psychological distress, QoL	Improvement in psychological distress for the combination treatment ($P = .02$; $\eta^2 = 0.07$) and benefit finding for the CBT intervention only vs the forum only ($P = .01$; 95% CI, 2.9-31.4)
Wootten (2016) ²⁹	142	Online self-guided psychological intervention	Intervention + forum or forum only	Same as Wootten (2014) ³⁸	10 wk	Web delivered	3 mo, 6 mo	Sexual satisfaction, sexual function, masculine self-esteem, sexual confidence	Combination intervention group improved in total sexual satisfaction ($P = .004$, $\eta^2 = 0.26$), overall sexual function ($t[34] = 3.51, P = .001$), masculine self-esteem ($t[33] = 3.21, P = .003$), and sexual confidence ($t[34] = 2.09, P = .04$) vs other groups. CBT-only condition showed improvement in masculine self-esteem ($t[32] = 2.21, P = .03$) vs forum-only group

Abbreviations: CBSM, cognitive-behavioral stress management; CBT, cognitive-behavioral therapy; ED, erectile dysfunction; PCa, prostate cancer; QoL, quality of life.

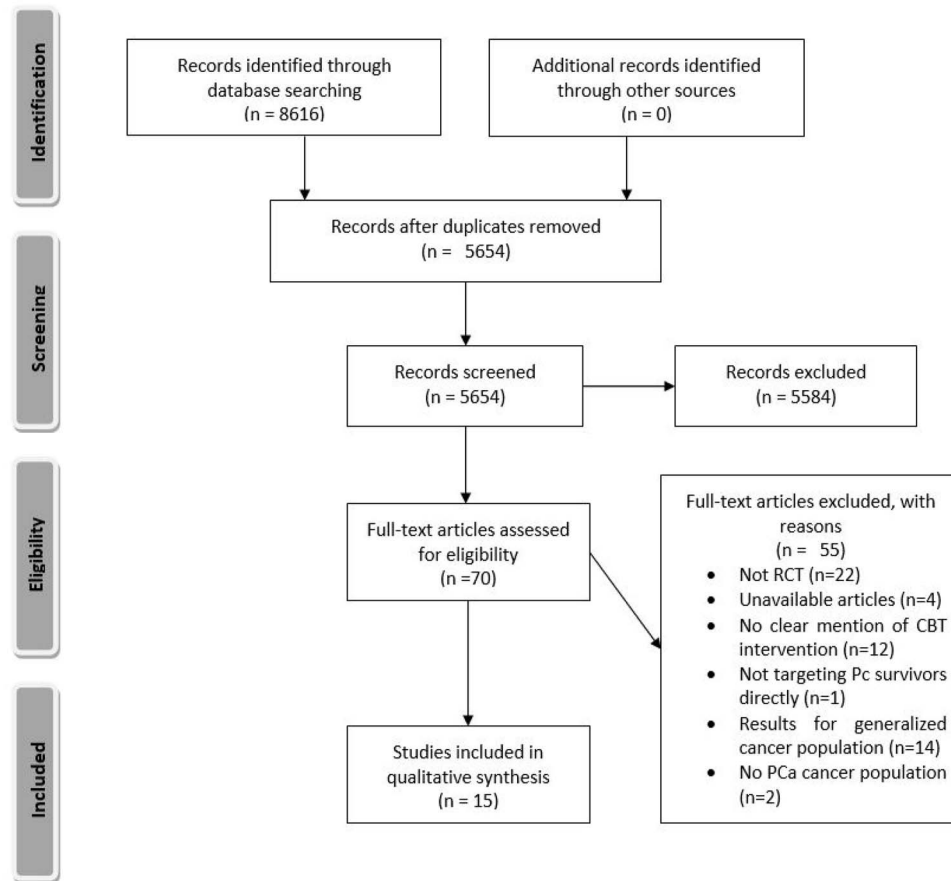


Figure 1. PRISMA flow diagram of study selection for systematic review.

Table 2. Risk of bias according to the Cochrane Collaboration tool.

Article	Selection bias	Attrition bias	Reporting bias
Benzo (2022) ⁴³	Low	Low	High
Bouchard (2018) ²⁷	Low	Low	High
Chambers (2017) ¹⁸	Low	Low	High
Chambers (2015) ²⁶	Low	Low	High
Chambers (2019) ³²	Unclear risk	Low	High
Penedo (2020) ⁴⁰	Low	Low	High
Penedo (2006) ⁵¹	Low	Low	High
Penedo (2007) ³⁴	Low	Low	Low
Penedo (2003) ⁵⁰	Low	Unclear risk	High
Schover (2011) ²⁸	Low	Low	High
Siddons (2013) ³⁵	Low	Low	High
Stefanopoulou (2015) ⁴⁴	Low	Low	Low
Traeger (2011) ⁵³	Low	Low	High
Wootten (2014) ³⁸	Low	Low	Low
Wootten (2016) ²⁹	Low	Low	Low

studies involved not only the patient but also the partner. Regarding ethnicity, two articles focused on non-Caucasian populations, namely African Americans (n = 1) and Hispanics (n = 2). The outcome variables of the studies involved mental health dimensions, such as anxiety (n = 4), psychological distress (n = 4), QoL (n = 4), and depression (n = 4), as well as sexual health variables, such as sexual function (n = 5), and sexual satisfaction (n = 2).

Intervention characteristics

Although all the articles involved a CBT-based intervention tested through an RCT, some differences could be identified by delivery, length, and/or content. Seven interventions were group based, five others were delivered individually, while three were developed for couple participation. Furthermore, six interventions were digitally delivered (tablet based or online), five were carried out face to face and three over the

phone, while one study used face-to-face and internet-based delivery (three-armed RCT comparing these two groups with usual care). The length of interventions lasted between 4 and 12 weeks and included various intervention strategies: seven studies adopted CBT approaches regarding improvement in communication, sex education, and cognitive strategies to reformulate maladaptive beliefs; seven used cognitive-behavioral stress management (CBSM); and just one article focused on mindfulness-based CBT. Thereby, three interventions focused on sexual health outcomes only, nine exclusively on mental health outcomes, and three on both. Finally, differences could be found regarding the sample size, ranging from 71 to 257 individuals (Table 1).

Acceptability

From the 15 studies selected for this systematic review, only 2 reported measuring acceptability perceptions of participants in the CBT-based intervention condition. In one study,²⁶ users reported that CBT-based counseling by a nurse over the phone was helpful. Another study²⁷ collected weekly feedback from participants and found the tablet-delivered CBT intervention to be acceptable. No differences in ethnicities were found.

Results regarding sexual health

Of the 15 articles selected, six investigated outcomes regarding the sexual health of survivors of PCa. Results are organized according to two main themes: sexual satisfaction and sexual function.

Sexual satisfaction

In a study conducted by Schover et al,²⁸ couples with recent PCa experience (N = 115) were randomized to one of three possible conditions: 3-month waiting list vs face-to-face CBT intervention vs CBT online intervention. A nonspecified sexual satisfaction assessment tool was employed. Despite no between-group differences in men, all participants showed significant improvements from baseline to 1-year follow-up regarding overall sexual satisfaction. These findings²⁸ stand in contrast to those of Wootten et al,²⁹ who investigated the efficacy of digital CBT based on a 10-week self-guided intervention (My Road Ahead) to promote the sexual and mental health of patients with PCa. In this program, 142 men were allocated to one of three treatment conditions (CBT intervention only vs CBT intervention with peer forum access vs forum only) and completed the International Index of Erectile Function (IIEF).³⁰ Results regarding sexual satisfaction indicated significantly greater improvement in sexual satisfaction for the combined condition (CBT intervention and forum) when compared with the forum condition or the CBT intervention alone. The effect size was large, and therapeutic improvements were maintained at the 3- and 6-month follow-ups. Furthermore, structural equation modeling analyses indicated that the improvement of sexual satisfaction was largely associated with improvements in sexual functioning and related to other ameliorations, such as sexual confidence and masculine self-esteem, for participants in the combined condition.

Sexual function

Regarding outcomes of overall sexual function, in which the total score of the IIEF³⁰ was considered, six studies were selected. A three-armed RCT conducted by Chambers et al²⁶ tested the efficacy of a couple-based sexuality intervention for men with localized PCa that lasted approximately 22 weeks and involved 6 to 8 phone calls delivered by a nurse or a peer

support volunteer (telephone-delivered nurse CBT intervention vs telephone-delivered peer support for couples vs usual care). After 189 heterosexual couples were allocated to one of the three conditions, no significant effects were found from baseline to 12-month follow-up regarding sexual function. Findings also indicated that sexual adjustment, defined as the adaptation to a satisfying sexual relationship,³¹ did not improve for the survivor of PCa.³² In that study, sexual adjustment was assessed indirectly by measuring variables of sexual function and satisfaction for male and female spouses (IIEF³⁰ and Female Sexual Function Scale,³³ respectively).

Penedo et al³⁴ investigated sexual function in 71 Hispanic patients with PCa who were assigned to a 10-week CBSM program or a control condition (half-day stress management seminar). Results showed that the experimental group significantly improved between pre- and postintervention regarding sexual function, but no group differences were found. In contrast, the digital CBT-based self-guided intervention of Wootten et al²⁹ indicated that the combined intervention (CBT with peer forum access) significantly increased sexual functioning when compared with the single-intervention conditions. The structural equation modeling suggested that the improvement of sexual function increased sexual satisfaction, erectile function, intercourse satisfaction, and orgasm function. Significant improvements regarding erectile function were also found for those taking part in the peer forum-only condition when compared with other conditions.

Regarding CBT-based interventions for couples with PCa, Schover et al²⁸ noted that overall sexual function did not differ between the experimental condition (traditional counseling vs internet based) and control condition (wait list) in the RCT. For erectile function, differences were found over time. Hence, while the control condition did not improve, both experimental conditions (internet-based and face-to-face counseling) showed significant progress in erectile function between baseline assessment and 1-year follow-up.

Using the same scale,³⁰ Schover et al²⁸ investigated sexual desire (also known as sexual drive) as a part of sexual function and did not find significant improvements over time or in conditions regarding the three-armed RCT (traditional sexual counseling vs internet-based counseling vs control). In contrast to these results, Siddons et al³⁵ used the Derogatis Interview for Sexual Functioning³⁶ to measure sexual desire in 60 survivors of PCa in an RCT (CBT group intervention vs wait list). They found significant improvements within the experimental group from pre- to postintervention. The same study³⁵ also investigated orgasm satisfaction, as another aspect of sexual function and as measured with the Derogatis Interview for Sexual Functioning.³⁶ Despite no differences from pre- to postintervention, further analyses on intervention effects, assessed via a hierarchical regression analysis, predicted that the CBT group intervention significantly improved orgasm satisfaction when compared with the wait list condition.

Results regarding mental health

Of the 15 articles, 12 investigated outcomes regarding the mental health of survivors of PCa. Results were organized according to main themes: psychological distress, depression, anxiety, and QoL.

Distress-related outcomes

Regarding disease-related psychological distress, we found two studies that addressed differences in men with PCa experience across time or groups. Schover et al²⁸ tested an

internet-based and a face-to-face CBT intervention for couples with PCa, controlling with a 3-month wait list and using the Brief Symptom Inventory–18,³⁷ and they identified no differences in overall distress over time or between groups. Moreover, Chambers et al¹⁸ used the same measure to assess psychological distress³⁷ while testing the efficacy of mindfulness-based cognitive therapy vs usual care in patients with advanced PCa (n = 189) over 8 weeks, reporting no significant outcomes across time or groups. Conversely, Wootten et al³⁸ who measured psychological distress using the 21-question Depression Anxiety and Stress Scales,³⁹ noted significant progress for participants (n = 142) undergoing a combined intervention (digital CBT-based self-guided intervention + peer forum) with a moderate effect size when compared with the control condition (peer forum only). Structural equation modeling further indicated that reductions in health worry and regret contributed significantly to the decrease of psychological distress within the combined treatment group. Another study⁴⁰ compared a CBSM intervention with an active control health promotion condition in 192 men with advanced PCa and revealed improvements for both conditions (experimental and control) over time, regarding cancer-related distress as measured with the Impact of Events Scale.⁴¹ Also, significant main effects were found after adjusting for age, comorbidities, and years since diagnosis, which decreased over time (at 12-month follow-up) for both conditions. Moderating factors included baseline interpersonal disruption, sexual functioning, and fatigue. Taken together, the results from these studies give unanimous indication whether CBT-based interventions effectively improve distress variables.

Depression

Four studies considered the impact of CBT with regard to depression. Penedo et al⁴⁰ used the PROMIS assessment tool⁴² to determine depression scores within the experimental and control conditions (CBSM intervention vs health promotion). They showed that CBT significantly decreased depression over time among men in the experimental group who reported high baseline social withdrawal. Benzo et al,⁴³ who conducted a secondary analysis on the Penedo et al⁴⁰ sample (n = 192), confirmed the significant improvement within participants in the experimental condition (CBSM), revealing that they presented short- and long-term improvements (6- and 12-month follow-up) in depression scores when compared with the control condition. In contrast, in a study⁴⁴ that assessed depression with the Hospital Anxiety and Depression Scale⁴⁵ in an RCT comparing a guided self-help CBT intervention and treatment as usual, the authors found no significant differences over time or groups (n = 68). Similar results were noted by Siddons et al,³⁵ who used the Depression Anxiety and Stress Scales³⁹ to measure depression within two conditions (8-week CBT group intervention vs wait list).

Anxiety

Five studies investigated outcomes regarding anxiety. Bouchard et al²⁷ used the Memorial Anxiety Scale for Prostate Cancer (MAX-PC)⁴⁶ to assess anxiety in survivors of PCa (n = 192) and found that the experimental condition (participation in a CBSM intervention) significantly lowered anxiety from the first to second assessment points in comparison with the control condition (attention control health promotion). This effect was maintained for up to six months. Additionally, an

ethnicity-based assessment was conducted comparing African American, Hispanic, and Caucasian men. All Black men who participated in the experimental condition showed significant improvements in anxiety, which were maintained up to 12 months (follow-up), when compared with Black men in the control condition and non-Hispanic White men in the control or experimental condition. Such results show that Black men benefited the most from this intervention in terms of reducing their anxiety.

Penedo et al⁴⁰ reported significant improvements in anxiety when testing their 10-week tablet-delivered CBSM intervention (vs active control health promotion) but only over time. Specifically, by using the MAX-PC,⁴⁶ they measured the overall score of cancer-related anxiety, PCa anxiety, prostate-specific antigen testing anxiety (all adjusted for age and years of diagnosis), and fear of recurrence (after adjusting for age) and found significant improvements in both conditions, when comparing the first and second data collection moments (baseline and 6-month follow-up). Scores also decreased over the third data collection point (12-month follow-up) for both conditions.

In contrast, three studies investigated the outcome of anxiety but did not find any significant changes over time or conditions. Stefanopoulou et al⁴⁴ used the Hospital Anxiety and Depression Scale⁴⁵ to assess anxiety among participants divided over an experimental group (CBT intervention) and a control group (treatment as usual) involving 68 participants over a 4-week intervention. Siddons et al³⁵ tested a CBT group intervention (vs control condition on wait list) and used the MAX-PC⁴⁶ among 60 participants. At last, Chambers et al,¹⁸ who also used the MAX-PC,⁴⁶ tested a mindfulness-based cognitive-behavioral intervention and did not find significant outcomes as compared with usual care.

Quality of life

Six studies measured QoL while testing their CBT-based intervention for patients with PCa. Three studies revealed no significant differences over time or conditions. Chambers et al¹⁸ tested a mindfulness-based cognitive therapy in patients with advanced PCa (vs usual care) and assessed QoL with the Functional Assessment of Cancer Therapy.⁴⁷ Penedo et al,⁴⁰ who tested a 10-week tablet-delivered CBSM (vs active control health promotion), used the Functional Assessment of Cancer Therapy–General (FACT-G⁴⁸) to measure QoL. Last, Stefanopoulou et al⁴⁴ tested a brief cognitive-behavioral intervention (vs treatment as usual) for men experiencing hot flushes following PCa treatment, using the Quality of Life of Cancer Patients Questionnaires.⁴⁹

Different outcomes were identified in three other studies. Penedo et al⁵⁰ tested a CBSM intervention that targeted QoL in patients with PCa (n = 92) and measured it using the FACT-G.⁴⁸ Results revealed significant differences between the conditions after 10-week exposure to either CBSM or control (one-day seminar). QoL did not change for the control group from pre- to postintervention, whereas it significantly improved for the experimental group. Results of a hierarchical regression equation showed that after controlling for participants' income, ethnicity, and baseline QoL, the CBSM intervention was a significant predictor of postintervention QoL. Furthermore, improved QoL was mediated by perceived stress management skills that were stimulated through the CBSM intervention. Penedo et al,⁵¹ who used the FACT-G⁴⁸ as well, found significant improvements in QoL

within patients with PCa ($n = 191$) who were participating in a group CBSM intervention (vs half-day educational seminar). Findings indicated that CBSM was a significant predictor of postintervention QoL, and significant increases occurred within the experimental group in comparison with the control condition. Penedo et al³⁴ also indicated that a 10-week CBSM intervention (vs half-day stress management seminar) in Hispanic patients with PCa ($n = 71$) was a significant predictor of QoL (measured with FACT-G–Spanish version)⁵² after controlling for income and baseline QoL. Traeger et al,⁵³ who aimed to improve emotional well-being as part of the health-related QoL of survivors of PCa, reported that participants allocated to the experimental condition (CBSM intervention) improved significantly when compared with the control group (half-day psychoeducational seminar), which was assessed with the FACT-G.⁵² Results also suggested that these improvements were partially explained by some changes in illness perception among men experiencing particularly high stress levels at baseline.

Discussion

The present systematic review aimed to summarize and clarify findings regarding the efficacy of CBT interventions on the mental and sexual health of patients with PCa. According to the 15 articles that met inclusion criteria, several outcome variables were considered. Efficacy for sexual dimensions was reported with an 8-week cognitive-behavioral group intervention,³⁵ a 10-week self-guided online intervention (My Road Ahead),²⁹ a 10-week group-based CBSM intervention,³⁴ as well as the traditional and online sexual counseling for couples of Schover et al.²⁸ These interventions showed that CBT-based strategies could improve the sexual satisfaction,²⁹ overall sexual function,^{29,34} and erectile function^{28,29} of survivors of PCa. However, CBT intervention efficacy was not found in all studies for all sexual dimensions, namely in terms of sexual satisfaction,²⁸ overall sexual function,^{26,28} and sexual desire.²⁸

Some of the selected articles contained particular aspects that should be highlighted. First, regarding the initial study of Chambers et al,²⁶ no significant results were found. Significant changes arose only in a secondary analysis³² and just for the female partner within 1 condition (peer group condition) at two- and three-year follow-up, when compared with usual care and nurse counseling. This does not clarify whether sexual adjustment could have been improved through a CBT-based intervention, which, in the present case, was nurse counseling. In another study, Schover et al²⁸ measured various sexual health dimensions, but significant improvements occurred only for erectile function. Despite the significant outcome, nonsignificant findings contrast outcomes of other studies on the improvement of sexual health dimensions,^{32,34,35} such as sexual satisfaction, overall sexual function, and sexual desire. Hence, the efficacy of CBT interventions on sexual dimensions of survivors of PCa was not unanimous when taking into consideration the outcomes of Schover et al.²⁸ Given the combination of delivery format (online) and target population (couples), which made this intervention unique in comparison with others, it may be important to consider these aspects within their possible limitations. A further influential factor could have been the use of a nonidentified assessment tool instead of the IIEF³⁰

to measure sexual satisfaction.²⁸ Regarding mental health dimensions, efficacy was found within two 10-week tablet-delivered CBSM interventions,^{27,40} four group CBSM interventions delivered in person,^{34,50,51,53} and two 10-week self-guided online CBT interventions,^{29,38} while no improvement in mental health among patients with PCa was observed in an eight-week group-based mindfulness cognitive therapy intervention¹⁸ or a four-week guided self-help CBT intervention.⁴⁴ Effective interventions were shown to improve survivors' overall distress,^{38,40} depressive symptoms,^{40,43} anxiety,^{27,40} and QoL.^{34,50,51} However, these findings stand in contrast with other articles that identified no significant differences with respect to overall psychological distress,^{18,28,40} depression,⁴⁴ anxiety,^{18,35,44} and QoL.^{18,40,44} Thereby, Schover et al²⁸ explained that the nonsignificant results regarding overall distress may be due to investigating a sample that was not distressed at baseline. Furthermore, we found that several studies with nonsignificant results commonly tested interventions with a shorter duration, ranging between four and eight weeks,^{18,35,44} contrasting those with significant findings that used interventions of 10 to 12 weeks.^{27,40,43,50,51}

Although results on CBT's efficacy on mental health dimensions for survivors of PCa were not homogeneous, the program that proved to be the most crosswise effective was the CBSM intervention.^{34,43,50,51,53} Further explanations for discrepancies in outcomes among studies may be found within the recruitment procedures,³⁵ types of analysis,³⁵ sample characteristics,^{27,32,35,40,44} sample sizes,^{34,35,44,50} intervention characteristics,^{18,40} or attention control group bias,⁴⁰ as the information given to active attention control groups may have influenced participants. Also, the evaluation of biomedical interventions may have influenced outcomes. Only three studies collected information on the use of medical aids.^{28,32,35} Two of these indicated that the intervention supported adherence to these medical treatments, with positive outcomes for survivors' sexual health. For the other studies, this aspect was not mentioned, leaving the possibility that such uncontrolled influential factors may have affected outcomes. Finally, intervention content and delivery format could explain discrepant results on CBT's efficacy in promoting the mental and sexual health of survivors of PCa. In sum, although further research should be conducted to investigate aspects that increase efficacy and explore mechanisms of change through CBT, the most commonly effective interventions among the present systematic review involved the use of CBSM,^{18,35,44} had a duration of 10 to 12 weeks,^{27,29,34,38,40,43,50,53} and addressed the survivors without their partners.

Limitations and future studies

Although the present systematic review followed the Cochrane guidelines to ensure a qualitatively rich systematic review, some limitations should be considered. First, the review did not compare CBT with other psychological interventions to understand efficacy in the context of other psychological approaches. Second, the review did not include a meta-analysis, as our primary aim focused on summarizing the existing literature and results regarding different intervention modalities within CBT. However, given some of the conflicting findings among the studies, future research should consider performing such an approach to clarify this topic. A third aspect is related to the specific characteristics of the selected articles: most of the studies used a moderate sample

size,^{34,35,44,50} which could limit the generalizability of outcomes. Furthermore, low retention rates were reported by two studies: An RCT concerning an 8-week cognitive-behavioral group intervention³⁵ and one regarding internet-based sexual counseling.²⁸ In terms of study quality, only one considered itself to be low.¹⁸ The surveyed studies also reported small effect sizes, except for the research of Wootten et al²⁹ regarding outcomes of sexual satisfaction. Finally, the reviewed articles oftentimes differed on the assessment measures employed, which may explain the discrepancy in terms of efficacy results when the same outcome dimension was considered. A possible limitation of most studies may have been the exclusion of acceptability measures, in which participants could report their satisfaction levels and the helpfulness of the intervention. In fact, just two studies examined user acceptability,^{26,27} which seems highly relevant, especially in terms of the importance of tailoring interventions to the target population.⁵⁴ Another limitation is the general lack of diversity within the population with regard to ethnicity as well as sexual orientation. Accordingly, we identified only two studies that included non-Caucasian populations^{27,50} and no studies of nonheterosexual couples.^{26,28,32}

Given the identified limitations, as well as the possibility that intervention length may have an impact on CBT's efficacy regarding the mental and sexual health dimensions of survivors of PCa, we suggest further research on several aspects. As existing literature suggests the importance of tailoring digital interventions to the specific needs of a target population,⁵⁴ the studies should systematically consider the acceptability of users, which was performed only by two studies. Furthermore, studies should attempt to compare patients undergoing different treatment protocols, as Wootten et al did,^{29,38} instead of focusing on just one treatment modality. Several of the present studies have restricted their inclusion criteria to a specific patient group (eg, radiation or radical prostatectomy), which may pose a limitation to the research on CBT interventions' efficacy in the PCa context. Moreover, as already argued by some authors,⁵⁰ the intervention duration should include longer periods,⁵⁰ as well as attention-matched control conditions, to minimize the bias caused by the increased investment in the experimental group.^{44,53}

Conclusion

The present systematic review aimed to understand how effective CBT-based interventions are for the mental and sexual health of survivors of PCa. In contrast to other systematic reviews summarizing a broader range of psychosocial interventions for survivors of PCa, the present systematic review took an in-depth focus on CBT-based interventions. We determined that, despite the limitations identified, CBT-based interventions for patients with PCa have shown a series of benefits in terms of their mental and sexual health. Specifically, CBT interventions, delivered personally or digitally, have the potential to support survivors of PCa in overcoming psychological distress, as well as improving depressive symptoms, sexual satisfaction, and sexual function (namely erectile function). We also identified that among the studies, the most commonly effective interventions involved the use of CBSM,^{18,35,44} had a duration of 10 to 12 weeks,^{27,29,34,38,40,43,50,53} and addressed the survivors

without their partners. As sustained by previous systematic reviews on this topic,¹⁹⁻²¹ further research is needed—specifically, to confirm findings, increase efficacy, and explore mechanisms of change through CBT interventions. Although there is evidence for the efficacy of CBT interventions on mental and sexual health dimensions in the context of PCa, future studies should attempt to include a larger and more diverse population, perform a meta-analysis, and consider controlling factors that may affect intervention efficacy. Furthermore, future research should continue to tailor and test e-health interventions, as they overcome traditional barriers associated with in-person formats.⁵⁵

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