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Published version

BINKS, Laura, DRURY-SMITH, Heather and HOLBORN, Catherine (2021). The psychological impact of prostate cancer after treatment: a critical review of the literature. *Journal of Radiotherapy in Practice*.

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The psychological impact of prostate cancer after treatment: a critical review of the literature

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Literature Review

Cite this article: Binks L, Drury-Smith H, and Holborn C. (2021) The psychological impact of prostate cancer after treatment: a critical review of the literature. *Journal of Radiotherapy in Practice* page 1 of 10. doi: [10.1017/S1460396921000455](https://doi.org/10.1017/S1460396921000455)

Received: 4 January 2021

Revised: 23 March 2021

Accepted: 24 March 2021

Key words:

anxiety; cancer treatment; depression; masculinity; patient with prostate cancer; post-treatment; Prostate cancer; psychological impact; sexual dysfunction

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Abstract

Aim: This critical review of the literature seeks to understand the psychological impact that treatment interventions may have on prostate cancer (PC) survivors.

Materials and Methods: A literature search was conducted using databases of peer-reviewed literature. The search terms used were devised using the building-blocks technique to divide the query into facets. The articles were manually assessed for relevance and appraised using the relevant Critical Appraisal Skills Programme (CASP) tool. Government guidelines and regulations were also used following a manual search on the National Institute for Health and Care Excellence (NICE) website. This process resulted in a total of 12 sources being included in the critical review.

Results: The key themes that arose from the review were masculinity, depression, anxiety and psychological implications related to sexual functioning. Psychological impact varies on an individual basis and is influenced by the quality of a patient's experience during and after treatment in relation to sufficient information giving and support.

Findings: Open communication should be encouraged by healthcare professionals to assess patient mental wellbeing. The extent of psychological impact varies on an individual basis; however, there are predictive factors that can make an individual more at risk of being affected psychologically post-PC treatment.

Introduction

Survivorship is emerging as an area of increased interest within the cancer sciences, with technological advances continuing to improve cancer survival rates. The importance of supporting patients' post-treatment is recognised in national agendas with the NHS Achieving World-Class Cancer Outcomes: A Strategy for England 2015–2020 recognising living with and beyond cancer as one of their six key points to address to improve care for all patients diagnosed with cancer.¹ Prostate cancer (PC) is the fourth most prevalent cancer worldwide with 5-year cancer survival at 99% in 2009–2015, and therefore this cohort of patients contributes to a large population of cancer survivors.²

Prostate cancer treatment options are dependent on the stage of the cancer, with the most common forms of treatment including radical prostatectomy, external beam radiotherapy and androgen deprivation therapy. Prostate cancer treatment often involves a combination of treatment modalities to control the disease and patients can develop a range of side effects. For example, radiotherapy is commonly associated with poorer bowel and urinary incontinence, whereas radical prostatectomy is commonly associated with sexual dysfunction.³ This was proven from the research outcomes of the ProtecT trial, which compared side effect outcomes of different treatments for localised PC.³

As survival rates have increased for PC, this has left survivors facing potential impact upon their psychological wellbeing. Traditionally, a biomedical model of care is used in the healthcare setting, rather than a holistic approach to care. The holistic approach supposes that mind and body are intertwined and should be treated as a whole, which is not the traditional medical view. There is increasing evidence demonstrating that health and illness are much more complex, which is illustrated by the biopsychosocial model.⁴ This has led to wider acknowledgement that patients whose psychological needs are met cope better with their illness.

Psychological symptoms can range from depression, adjustment disorder and anxiety.⁵ In the most severe of cases, patients may suffer from post-traumatic stress disorder (PTSD).⁵ Other forms of psychological stress can present in the form of guilt, loss of control, anger, confusion, increased vulnerability and fear.⁶ Side effects associated with PC treatment can also affect daily living such as continence issues and sexual dysfunction which can lead to relationship problems.⁷

It is important to address the topic of understanding the psychological impact upon PC survivors to analyse how patient's wellbeing may be affected post-treatment. The long-term physical side effects of prostate cancer treatments is currently understood; however the underlying

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Table 1. A table representation of the critical review's inclusion and exclusion criteria

Inclusion	Exclusion	Justification
Research published between 2009 and 2019	Research published prior to 2009	Only research from 2009 onwards was used to ensure data were relevant and would recognise any recent revelations in regards to the psychological impact on patients who have undergone prostate cancer treatment, and to reflect current treatment practices.
English language	Foreign language	Only international studies written in English were used to avoid inaccurate translation and due to the authors' capabilities.
Prostate cancer patients	Non-prostate cancer patients	Only studies on prostate cancer were used as relevant to the research question.
Peer-reviewed journals, non-peer-reviewed journals Peer-reviewed journal articles only were included to ensure reliability of the review. Localised and locally advanced prostate cancer	Metastatic prostate cancer	Only studies focused on localised and locally advanced prostate cancer were used, as the literature recognised patients with metastatic prostate cancer have different psychological concerns in relation to prognosis.
Patients who had undergone hormone therapy, radiotherapy, surgery or combination treatment	Active surveillance	All treatment methods were included in the study as some studies focused on more than one treatment modality making it a compound task to differentiate between the different treatment types impacting on psychological outcomes.
Peer-reviewed journals	Non-peer-reviewed journals	Peer-reviewed journal articles only were included to ensure reliability of the review.

impact this has on a patients quality of life (QoL) from a psychological perspective is not as widely understood.

The aim of this critical review is therefore to determine what impact PC treatments have upon the psychological wellbeing of patients with PC.

Method

A search of electronic databases for the review including Science Direct, PubMed and PsychINFO was undertaken using the key search terms listed in Table 1.

Inclusion and exclusion criteria

Inclusion and exclusion criteria were applied to the articles found, to focus and determine the final articles for review.

Search strategy

Snowballing was used when papers were found through reference lists on other articles to ensure other applicable studies were not missed. This search was conducted from October 2018 to April 2019. The building-blocks technique was used to divide the query into facets to break up the research question into concept blocks (Table 2). The author scrutinised the titles, date and abstracts to identify eligible studies. The PRISMA flowchart was used to demonstrate the search process to improve the reporting of the critical review (Figure 1).

Articles that met the inclusion and exclusion criteria were appraised using the appropriate Critical Appraisal Skills Programme (CASP) checklists relevant to the study design.

Results

In total 18 papers were identified as being eligible for the critical review, however, only 12 were selected that conveyed the common 3 themes identified; the 6 that were excluded focused on other psychological impact areas including fear of recurrence, PTSD

Table 2. A table showing the main facets behind the research question with relevant keywords that were used to conduct the literature search to ensure no relevant papers were lost

Facets	Keywords
Prostate cancer patients	Prostate cancer, prostate carcinoma, localised prostate cancer, locally advanced prostate disease, locally advanced prostate cancer, prostate cancer survivors
Psychological impact	Psychological implications, quality of life, psychological impact, psychological features
Post-treatment	Post-treatment, after treatment, post-processing, after treatment, after care

and thoughts of suicide, which were mentioned less in the literature and thus this was not deemed a key theme to include in this review. A summary table can be found in the appendix for the included studies. The three key themes identified are discussed below:

Discussion

Masculinity

Masculinity can be defined as referring to the behaviours, social roles and relations of men within a given society as well as the meanings attributed to them.⁸ Tsang et al. (2018) study demonstrated the words patients with PC most associated with masculinity were biologically based and included: sexual ability, sex drive and/or libido, being physically strong and maintaining bodily functions.⁹ This is alike to Chambers et al. (2017), Thomas et al. (2013) and Zaider et al. (2012) findings of association with the physical side effects of PC treatment, impacting on men's perceptions of their masculinity.^{6,7,10} Both Chambers et al. (2017) and Zaider et al. (2012) recognised the impact of sexual dysfunction such as erectile dysfunction and loss of libido having the potential to impact on patients with PC having a lower perception of their masculinity.^{6,10} Men who perceive this lower masculinity in

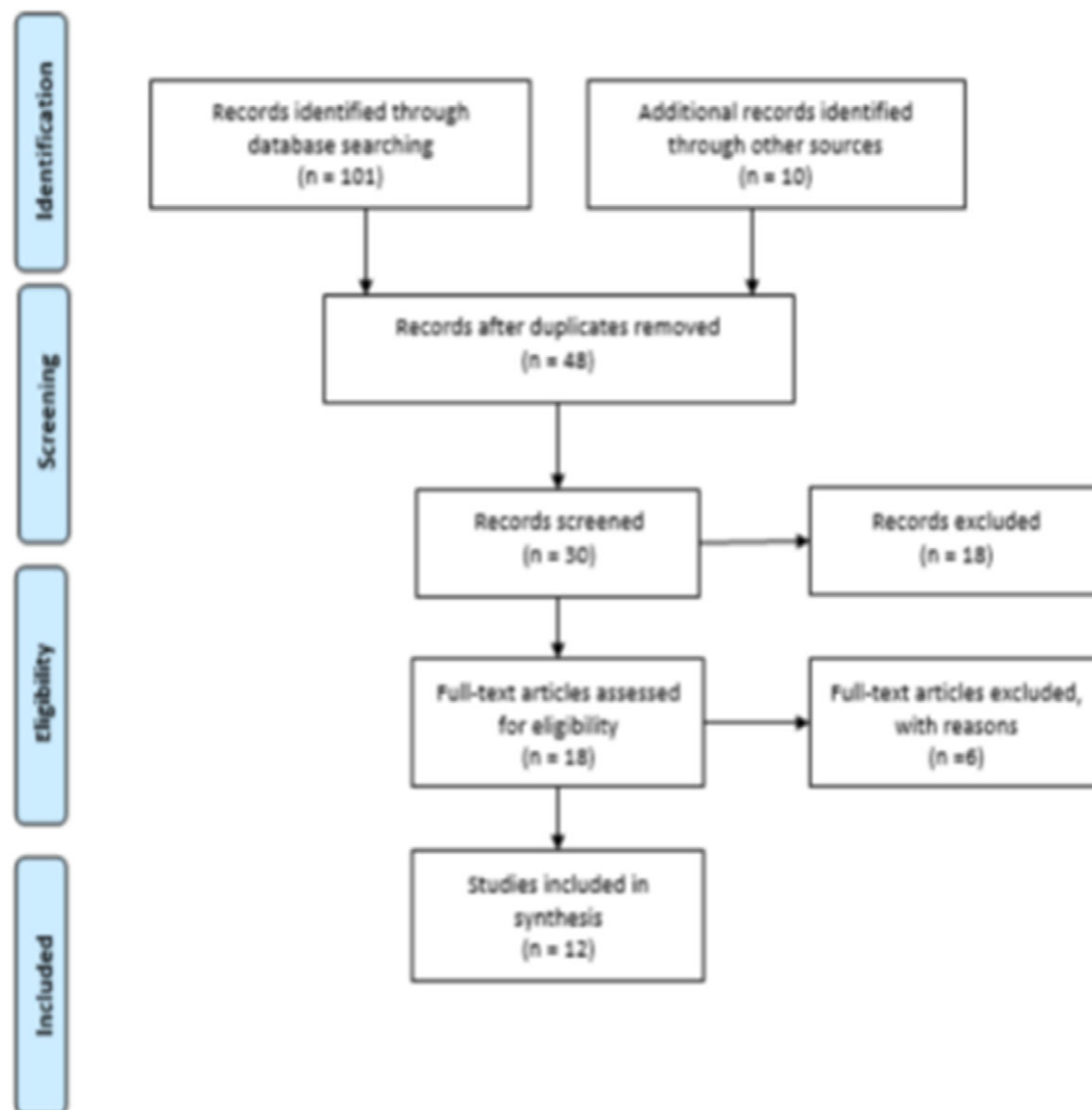


Figure 1. PRISMA flowchart demonstrating the data selection process.

themselves could be at increased risk of experiencing distress due to changes in sexual functioning as a result of curative treatment. It is evident from the literature the importance men place on their ability to perform sexually to maintain their sense of masculinity, to the extent of influencing treatment choice because of the likelihood of erectile dysfunction post-treatment. Chambers et al. (2017) and O'Shaunessy et al. (2015) both recognised how some men chose radiotherapy over radical prostatectomy to preserve their sexual functioning, with men who did undergo radical prostatectomy having a deeper fear of sexual dysfunction post-treatment and thus impacting on patients psychologically.¹¹ Although much of the literature included in this study acknowledges the impact of sexual changes on men's perceptions of their masculinity, this may be due to the resulting impact this can have on the individual's personal relationships. Both Zaider et al. (2012) and O'Shaunessy et al. (2015) recognised the impact on adjustment in survivorship may rely on the quality of intimate relationships.^{10,11} Zaider et al. (2012) found the association between diminished masculinity and sexual bother was strongest for men whose spouses perceived low marital affection.¹⁰ O'Shaunessy et al. (2015)

addressed how men are conscious of how they are perceived by those they care about, and that men did not just view sex for pleasure, but as an expression of love for their partners.¹¹ Some men revealed in the interviews they felt a new appreciation of their relationships they may have previously taken for granted.¹¹ It could therefore be beneficial to reduce the threat to masculinity for clinicians to not just focus on improving the physicality of erectile dysfunction, but a focus around broadening perceptions of sexual relationships could help patients. Erectile dysfunction interventions should therefore incorporate masculinity in a holistic way due to masculinity perceptions framing how patients with PC interpret what is happening to them post-treatment, as suggested by Chambers et al. (2017).⁶

Depression and anxiety

It is widely accepted across the literature that patients who have undergone treatment as a result of a cancer diagnosis are at greater risk of anxiety and depression, with Van Stam et al. (2017) comparing a general population sample of men of similar age with a

Table 3. A table of potential risk factors of depression and anxiety based on the critical review findings. This is a general guide. More research is required to prove this statistically but the table could be used as a guide to help healthcare professionals identify potential at-risk individuals

Factor	Lower risk	Higher risk
Age	Older age	Younger age
Sexuality	Heterosexual	Homosexual/ bisexual
Marital status	Married	Single
Treatment modality	Radiotherapy	Hormone therapy or radical prostatectomy
Presence of sexual dysfunction	No	Yes
Presence of urinary or bowel incontinence	No	Yes
Sexual engagement	Regular sexual intercourse/other forms of sexual expression performed	Low sexual encounters/do not engage in other forms of sexual expression

population of PC survivors.¹² Fourteen per cent of males had mental health symptoms including anxiety, depression and distress in the PC survivor group, compared with 6% of the general population group. It is evident from the literature that there are a variety of risk factors that make patients who have undergone radical treatment to the prostate more at risk of developing psychological symptoms post-treatment. Albaugh et al. (2017) and Sharp et al. (2016), both identified anxiety and depression being reported in patients with sexual dysfunction and decreased sexual activity.^{13,14} Van Dam, Wassersug and Hamilton (2015) identified that different treatment modalities can impact on patients differently, causing differences in severity of anxiety and depression.¹⁵ Although all patients reported of mood worsening post-treatment in all modalities studied, those who had received Androgen deprivation therapy (ADTs) reported of greater negative mood changes.¹⁵ This could be due to the side effects attributed to ADT, such as hot flushes, gynaecomastia and weight gain, and this interlinks with the theme of masculinity, and how if this is impacted on, this can then lead to mental health changes in patients.¹⁵ Van Stam et al. (2017) and Sharp et al. (2016) also recognised the impact treatment side effects could have on patient's mental health, and identified urinary dysfunction post-treatment as a risk factor for patients to go on to develop anxiety and depression.^{12,14} Age was additionally identified as a potential risk factor of anxiety and depression post-treatment, with younger patients at a heightened risk.¹⁷ Other risk factors were being widowed, lower educational levels, lower general health perceptions, bodily pain, fatigue, insomnia and financial issues.^{12,14} These potential risk factors could be used in a predictive table, for side effects and socio-demographic information to be aware of that may put an individual more at risk of suffering psychologically post-treatment (Table 3). Watts et al. (2014) observed that prevalence of anxiety and depression is evident before treatment, reducing during treatment, before rising again post-treatment, which could be attributed to reducing during treatment as patients feel supported by healthcare professionals who they are seeing during their treatment.¹⁶ Van Stam et al. (2017) and Watts et al. (2014) both recognise if attention is paid to modifiable factors that have been associated

with increased risk of anxiety and depression, these mental health problems may be identified earlier and relevant support and treatment can be given.^{12,16} This could be in the form of an epidemiological investigation to screen for at risk of patients. Furthermore, treating and managing psychological distress should be a key clinical objective to enhance clinical outcomes and patient QoL. Van Dam, Wassersug and Hamilton (2015) advise for patients and partners to be made aware of the psychological implications before commencing treatments, for patients to be more aware of psychological side effects so appropriate help can be sought at its earliest opportunity.¹⁵

Psychological impact with sexual functioning

The impact of PC treatments can have on a patient's sexual functioning is well understood from a biological basis; however, it is still an area not commonly discussed with patients before, during or after treatments.⁷ Analysing the literature revealed common themes to arise from patients with PC post-treatment regarding their experiences post-treatment in relation to sexual dysfunction. The importance of support was highlighted by Thomas et al. (2013) and Albaugh et al. (2017) with a strong focus on individual support with tailored advice being imperative to improve patient experience post-treatment from a psychological perspective.^{7,13} This support was suggested to be utilised through support groups, spousal support groups and understanding from healthcare professionals to help with the healing process; it is evident from the literature that men may not actively seek support such as communicating with their partners or seeking assistance for restoring sexual function unless it was via more private means such as obtaining Viagra prescriptions.¹⁷ The importance of partners was another theme to emerge in relation to the psychological impact of sexual functioning.^{7,13,17} The importance of maintaining intimacy did help some patients post-treatment in regard to their sexual relationships. Letts, Tamlyn and Byers (2010) conducted a comparison study comparing questionnaire results pre-PC treatment, which identified men were engaging regularly in sex and were satisfied in their relationships, with post-treatment interviews.¹⁷ The interviews revealed most men reporting no change in sexual desire; however, they were negatively affected in the form of distress due to erection changes, orgasm consistency and sexual satisfaction. Most men felt their sex lives were over and some stopped engaging in sexual activities; it is therefore evident how this could negatively impact on relationships and thus patient's psychological wellbeing by removing an intimate constituent of patient's personal relationships. Despite this, men reported of no change in the amount of affection expressed in their relationships in this study,¹⁷; however, Thomas et al. (2013) identified in their study focusing on gay and bisexual men with PC, how the majority of participants had no spousal support.⁷ Without this form of support, it could be suggested men of gay or bisexual orientation may be more at risk of suffering psychologically post-treatment. Treating patients as individuals in response to their sexual dysfunction was highlighted across much of the literature analysed including Hoyt & Carpenter (2015).^{6,17,18} This is due to the individual being affected differently in each case in response to changes in their sexual functioning, as well as different severities of sexual dysfunction presenting post-treatment. For example, the level of distress varied depending on the value men placed on sex or their perceptions of masculinity.¹⁸ Sexual-Self Schema (SSS) was identified as a factor of how much sexual dysfunction affected people depending on their own SSS, with a higher SSS and poor sexual functioning leading to more depressive

symptoms being observed in these patients.¹⁸ Sexual-Self Schema therefore may be an important difference in determining the impact of sexual morbidity on psychological adjustment.¹⁸ Thomas et al. (2013) highlighted the need for individual support for gay and bisexual men to tailor support for their needs, as gay sexual practice often has to alter in response to PC patients receiving treatment and these patients therefore need individual care plans.⁷ A need for accurate information regarding side effects in relation to sexual functioning is clearly an area requiring development as highlighted in the literature.^{7,13,17} Letts, Tamlyn and Byers (2010) reported unsatisfactory communication regarding sexual side effects from physicians, and Thomas et al (2013) thematic analysis identified a need for information around this subject, with preparation for treatment side effects being inadequate.^{17,7} Understanding the impact of anticipated side effects in relation to sexual functioning is imperative to treatment satisfaction.¹³ Alongside patient information giving, the sensitivity of healthcare professionals is key, in addition to when clinicians are helping patients with erectile dysfunction to broaden patient perceptions of sexual relationships as a way to help patients feel more supported.^{13,17}

Conclusion

The results from this critical review illustrate the complexity of the psychological impact that treatments can have on PC survivors. The current treatments available for PC are advanced and impressive, but with such remarkable survival rates and prevalence, one must step back to evaluate the QoL in survivors. The physical side effects of PC treatment correlate strongly with the potential for a significant psychological impact in terms of altering self-image in relation to masculinity, depression and anxiety and psychosocial impact related to sexual functioning changes. Current research such as the ProtecT trial found differences in the side effects of radical prostatectomy in comparison with radiotherapy, with men undergoing surgery more likely to experience problems with sexual function and urinary incontinence, with men undergoing radiotherapy also having sexual functioning problems and bowel incontinence.⁵ A future comparative study including ADTs should be conducted to help with patient treatment decision-making, and to tailor future information and advice for patients depending on the treatment chosen.

Throughout the literature, patients commented on how they would have felt better prepared for side effect presence if they had been given more comprehensive, tailored information and support. Sexual functioning side effects were commonly reported to have not been explained in a thorough manner, with limited information provided to patients. Appropriate information giving is therefore fundamental to ease the psychological burden of sexual dysfunction which can, in turn, lead to men's changing perceptions of their masculinity, and lead to anxiety and depression. A suggestion could be for oncologists and healthcare professionals to take a more comprehensive information giving approach, as well as being open and honest when discussing sexual functioning changes post-treatment. Encouraging openness can also find out more from an individual, and as identified in the literature, the severity of psychological impact on patients vary from individual to individual, and an individually-tailored care plan would best support patients post-treatment. The treatment consent process could also inform patients of the heightened risk of psychological conditions developing as a result of the physical side effects that can persist post-treatment, so support can be accessed at a patient's earliest

opportunity, as well as raising awareness of the normality of experiencing such psychological changes such as anxiety and depression post-treatment.

Prostate cancer patients are more at risk of anxiety and depression than men of similar age, but it would be wrong to assume all PC patients will suffer from psychological symptoms. Although psychological changes were reported in all studies, not all survivors were negatively impacted by PC and treatment. Some patients had the ability to turn their journey into a positive experience, and much could be learned from these men to help others who may struggle post-treatment. It would be beneficial to do a form of qualitative research on this cohort such as a focus group to identify coping mechanisms or access to support to better understand how healthcare professionals can help support those who may be struggling. Future studies must investigate the exact prevalence of patients affected psychologically by treatment to fully understand the severity of these psychological side effects and to potentially reframe national agendas to ensure patients are fully supported.

Some of the literature interpreted their results as being potential predictors of those who may be most probable to suffer from depression and anxiety following treatment. A large comparative study of patient-reported outcomes would help reveal if different treatment modalities had differing psychological impacts to identify a treatment modality that makes survivors more at risk. Having predictors would give healthcare professionals an awareness to ensure patients have support in place to help manage potential psychological changes. Based on the studies reviewed, a checklist could be created to help identify at-risk individuals based on the summary of results included in Table 3.

The need for treating all patients as individuals has previously been highlighted, due to differing sociodemographic data and different treatment side effects and severity, this can impact on patients psychologically differently. The feasibility of assessing the psychological impact of all PC survivors is not realistic due to the overstretched NHS for budget and resources, thereby utilising the research, predictors of at-risk individuals are more representative to target specific PC survivors. Risk checklists could be a formative way to assess patients before they start treatment to highlight those at risk based on sociodemographic data, and post-treatment questionnaires should be used to assess side effect presence and severity; patients highlighted as at risk in each of these groups should be directed to relevant support. Support can take different forms, and with PC patients, it is important more research is conducted to see which support patients would most utilise, or a range of support options should be available to suit the individual.

Acknowledgements. I would like to thank Catherine Holborn, MSc, Sheffield Hallam University, for being my dissertation supervisor throughout the write up of this clinical review, as well as Heather Drury-Smith, MSc, Sheffield Hallam University, for her continued support transforming this dissertation into a publication.

Financial Support. No financial support, self-funded.

Conflicts of Interest. The authors declare none.

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Appendix 1: Data Extraction Table

Author/year	Sample characteristics	Study design	Outcomes reviewed/measured	Key results	Key conclusions
Albaugh et al. (2017)	Men diagnosed with PC who had undergone treatment in the last 1–5 years with RT or RP. Men who has experienced SD. Recruited through PC awareness. Urology clinics and support groups. With $n = 27$. Mean age range 61–92.6% received surgery. Average time from treatment to interview 23.5 months.	Mixed-methods design. Open-ended interview questions with PC survivors and their partners. Prostate cancer patients only answered quantitative questionnaires regarding erectile functioning and orgasm.	Responses to questionnaires measured: <ul style="list-style-type: none"> Erectile hardness Erectile dysfunction Self-esteem and relationships Orgasm/climax Demographics Responses to open-ended interview questions measured: <ul style="list-style-type: none"> Prostate cancer survivors experience with SD post-treatment Prostate cancer survivors' partners experience with SD post-treatment 	Themes identified were frustration with sexual dysfunction, importance of support and understanding from others, depression and anxiety related to sexual dysfunction, importance of intimacy with partner, factors that impact treatment satisfaction, and education and comprehensive information about sex.	<ul style="list-style-type: none"> Prostate cancer survivors and their partners have a need for accurate information regarding side effects before, during and after treatment Prostate cancer survivors and their partners want providers to be sensitive to their sexuality and assist in finding appropriate help Men with SD report of frustration, depression and anxiety Support and understanding from partners and support groups important part of the healing process Understanding the impact of anticipated side effects is imperative to treatment satisfaction
Chambers et al. (2017)	Men diagnosed with PC at any stage and received treatment. Median sample size across studies reviewed $n = 20$. Mean age range 57–76.2. Sixty-nine per cent localised PC. Forty-five per cent participants treated with RP, 23% RT, 23% HT, 9% unreported. Time since treatment ranging from 0 to 60 months.	Systematic literature review using Medline, Psych INFO, CINAHL and EMBASE for the database search. PRISMA flow diagram demonstrates 52 articles identified, 14 quantitative, 38 qualitative	Studies which measured: <ul style="list-style-type: none"> ED Masculinity Or where masculinity emerged as a theme Psychological or QoL outcomes 	Seventeen per cent reported on ED scores from validated measurements. Masculinity score measurements study specific. ED and loss of libido was consistently described as impacting on men's masculinity post-treatment. Some men chose to undergo RT as opposed to RP to preserve sexual function which in their view was equivalent to masculinity. The majority of studies identified masculinity was lost or diminished. Some qualitative studies described masculinity as framing men's experiences and adjustment post-treatment.	<ul style="list-style-type: none"> Clinicians can help patients with ED broaden their perceptions of sexual relationships and make meaning of their experiences to decrease threat to masculinity Interventions for ED should incorporate masculinity in a holistic way Masculinity frames how men interpret what is happening to them Men's self of themselves and their masculinity suffers harm when affected by ED
Hoyt & Carpenter (2015)	English-speaking men treated for localised PC 2 years post-treatment with either RP or RT. $n = 66$. Assessed T1 (2 years) and T2 (4 months) post 2 years).	Questionnaires including CESD, Sexual-Self Schema (SSS) Scale for Men, Sexual Experience Scale and EPIC. Overall aim to evaluate if men's SSS moderates the impact of sexual morbidity of depressive symptoms.	Outcomes measures: <ul style="list-style-type: none"> Depressive symptoms SSS effects Sexual outcomes Sexual functioning 	No significant effect of SSS on depressive symptoms at T1; however, better sexual functioning was related to fewer depressive symptoms ($B = -.25, p < 0.05$). Results showed significant interactions between SSS and sexual outcomes. Among men with high SSS, poor sexual functioning was associated with increased depressive symptoms; loss of sexual function was particularly distressing. There was no significant effect of sexual functioning. Among men with high SSS, there was an inverse relationship between sexual engagement and depressive symptoms. Among men with lower SSS, greater frequency of sexual behaviour was associated with increased depressive symptom	<ul style="list-style-type: none"> Sexual-Self Schema may be an important individual difference in determining the impact of sexual morbidity on psychological adjustment. Men high on SSS are more vulnerable to psychological consequences of lower sexual functioning and less engagement in sexual activities

(Continued)

Appendix 1: (Continued)

Author/year	Sample characteristics	Study design	Outcomes reviewed/measured	Key results	Key conclusions
Letts, Tamlyn & Byers, 2010	Men diagnosed and treated with PC. <i>n</i> = 19. Ten men received RT, nine RP. Average 2 ½ years post-treatment. Age range 54–79. Recruited through cancer support groups.	Questionnaire prior to interview. Interviews. Sociodemographic data collected. Five-point scale results shaped interview questions, along with five pilot interviews. Interview location patient choice. Audio-taped and transcribed.	Outcomes measured: <ul style="list-style-type: none"> • Pre-treatment sexual functioning • Post-treatment sexual functioning • Impact of post-treatment sexual changes • Moderating factors of sexual functioning 	Not all aspects of sexual well-being are affected by treatments, and specific aspects and emotional impact varied on an individual basis. Majority reported prior to treatment to be engaging in regular sexual activity and satisfied with their relationship. Post-treatment, majority reported no change in amount and type of affection expressed, their sexual desire, their masculinity concept or quality of their relationship. However, majority of men described negative changes which caused distress including erection changes, orgasm consistency and sexual satisfaction. Most men believed their sex life was over and some stopped engaging in sexual activity.	<ul style="list-style-type: none"> • Majority of men experience distress due to sexual changes as a result of treatment • The level of distress experienced is dependent on the value placed on sex and men's perceptions of masculinity • Men did not converse with their partners regarding their emotions or seek assistance in restoring sexual function except for Viagra • Men reported unsatisfactory communication regarding sexual side effects between themselves and the physicians
O'Shaughnessy et al. (2015)	Men diagnosed and treated for PC and their partners. <i>n</i> = 30 men and partners. Average age of men 64.2 years. Mean time from treatment to interviews 3.6 years. Seventeen underwent RP, two HT.	Secondary thematic analysis of qualitative data. Four focus groups. Three interviews. Explaining themes of love, hope and faith. Data are collected by audiotape and handwritten notes. Analytical framework generated from results of previous study and literature search.	Outcomes measured: <ul style="list-style-type: none"> • Love (romantic, compassionate) • Hope • Faith 	Four key themes identified in love: romantic love, compassionate love, expressing love through sex and coping with lovemaking changes. Importance of passion and sexuality in relationships recognised by both men and partners. Men did not view sex as just for pleasure, but rather a key language to express love to partners. There is a deeper fear associated with men undergoing RP.	<ul style="list-style-type: none"> • Most men experienced unresolved issues undermining psychosocial well-being. • Challenges of the cancer pathway either benefitted men and their partners strengthening relationships or exposed cracks in men's resilience and relationships • Men are conscious of how they are perceived by those they care about • Common theme from the interviews was most men felt they had a new appreciation of their relationships they may have previously taken for granted • Men described hope as dynamic and linked to vulnerability of disease progression, treatment side effects, love and emotional connections in relationships
Sharp et al. (2016)	Men diagnosed with invasive PC between 1995 and 2010. Identified through cancer registries. Country-stratified random sample followed by inclusion/exclusion criteria <i>n</i> = 6559.	Postal questionnaire. Responses matched to cancer registry files for diagnosis date, Gleason score and clinical stage. Cancer symptoms 1 week before questionnaire completion were measured using EORTC QLQ-C30 and EORTC QLQ-PR25 QoL measurement. Psychological well-being is measured using DASS-21 self-report scale.	Responses measured: <ul style="list-style-type: none"> • Depression • Anxiety • Distress • Sociodemographics • Clinical predictors 	Fifty-four per cent response rate. Ninety one per cent included in analysis. Seventeen per cent scored for depression. Sixteen per cent scored for anxiety. Eleven per cent scored for distress. Depression was lower in older men and educated men, and higher in unmarried men and unemployed. Risk of depression, anxiety and distress was higher in men who had treatment for depression. Comorbidities was associated with increased risk of anxiety. Risk of depression was higher in men with higher urinary and ADT-related symptoms, and fatigue, insomnia and financial issues. Higher sexual activity reduced risk of depression, anxiety and distress.	<ul style="list-style-type: none"> • Higher symptom scores positively correlated with a higher risk of poor psychological wellbeing. • Cancer-related symptoms are more important in determining survivor's well-being than socio-demographic and clinical factors • There is significant overlap of survivors demonstrating two or more psychological wellbeing measurements • PC-specific symptoms of urinary symptoms and ADT symptoms most associated with psychological well-being • Further research required on associated between ADT and masculinity required • Increased sexual activity was associated with lower risk of psychological well-being

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Appendix 1: (Continued)

Author/year	Sample characteristics	Study design	Outcomes reviewed/measured	Key results	Key conclusions
Thomas et al. (2013)	Australian men self-identifying as gay or bisexual diagnosed with PC within 7 years. Participants must be able to read in English. Previous treatment was not essential. $n = 10$. Seven RP, two RT with ADT and one active surveillance. Average time diagnosis to participation 26 months.	Online focus group conducted over a 4-week period. Themes identified. Demographic questionnaire with self-report on primary treatment. Structured questions added to forum by moderator. Printout of transcript. Three reviewers analysed transcript. Three coders agreed on themes identified.	Patient experience was assessed with the common themes identified being: <ul style="list-style-type: none"> • Accessing help and support • Impact of incontinence • Impact of sexual changes and identity • Changed sexual relationships • Emotional state moderated by the ability to re-evaluate life • Changed sexual relationships • Finding the right healthcare professional • Current needs to improve quality of care • Online focus group experience 	Thematic analysis identified a variety of emotional responses including shock and disbelief, the need to confront mortality and a need for information. Three participants felt a tailored support group would be beneficial. Three participants identified an inner strength as a result of challenging PC diagnosis. One participant struggled with normal social interaction and daily routine due to incontinence, with regret over undertaking treatment. Majority of patients experience of sexual changes impacted masculine perception of themselves. Altered gay sexual practice was identified as a common issue.	<ul style="list-style-type: none"> • Psychological impact may be significant over an extended time-frame • A sense of regret was occasionally identified over treatment choice when failing to meet expectations • Participants may have felt less supported as a majority did not have spousal support • Preparation for treatment side effects was inadequate • A need to tailor advice for gay/bisexual men may help patients feel supported, in particular to sexual functioning support • Need for individual care plans
Tsang et al. (2018)	Studies that made reference to patient's sense of masculinity analysed. Treatment interventions recorded. 64% patients received HT. $n = 810$ collectively, age range 42–93. Sixty-six terms extracted. Forty per cent reported changes in men's perceptions of masculinity as a result of PC treatment.	Critical review using Google Scholar and PubMed for the database search; only peer-reviewed articles between 1997 and 2016. Forty-two articles identified, 24 qualitative studies. Extracted separately by two authors. All terms associated with masculinity were recorded.	Measured outcomes included: <ul style="list-style-type: none"> • Masculinity terms • Frequency of masculinity terms • Biological feature or social norm recorded • Comparison of terms generated from patient self-reported outcomes or through psychological assessment instruments chosen by researchers 	Forty per cent reported changes in men's perceptions of masculinity as a result of PC treatment. The four most commonly used terms by patients, all of which appeared in six or more separate studies, were as follows, in descending order: sexual ability, sex drive and/or libido, being physically strong and maintaining control of bodily functions. Terms used by researchers to characterise masculinity not explicitly reported by patients in descending order, the three most frequently used terms were as follows: self-reliant/independent, sexual ability and stoicism	<ul style="list-style-type: none"> • Loss of masculinity is largely experienced biologically as opposed to socially • Interdisciplinary collaboration between health professionals crucial for improving QoL in PC patients • There were notable differences between what patients perceived as a decline in their masculinity when spontaneously self-reported, and when elicited through pre-existing measures • Patients most often reported changes in bodily function whereas their responses on formalised measures reflected social and psychological concepts
Van Dam, Wassersug & Hamilton (2015)	Localised PC patients diagnosed and treated and PC patients' partners. PC patients $n = 295$, 82 ADT, 213 non-ADT. Partners $n = 84$, 42 ADT partners, 42 non-ADT. Ninety-four per cent partners were female. Most participants in this study were not patient-partner dyads. Recruited through prostate email listservs and social media through adverts. Partners of patients could participate regardless if their partner participated.	Online questionnaire completed by patients and their partners assessing mood changes. Mood measured by the Profile of Mood States. Comparison of ADT patients with other treatments.	Mood changes were assessed through questionnaires at two different stages along with the following outcomes: <ul style="list-style-type: none"> • Patient's current mood • Mood prior to treatment • Relationship adjustment • Sexual functioning • Comparison of outcomes of ADT treatment versus other PC treatments 	POM's scores for ADT patients and non-ADT patients entered into ANOVA showing a significant effect in age. Men on ADT reported worsened fatigue and lower scores of vigour. No significant difference on treatment for depression, tension, anger or confusion. Partners of men with PC regardless of treatment, POM scores showed a similar pattern. Both PC patient groups reported worsening mood since having treatment but men on ADT reported greater increases in negative mood and decreases in positive mood.	<ul style="list-style-type: none"> • ADT impacts on PC survivor's mood more significantly than other PC treatments • Mood is affected more so in younger patients • Prostate cancer partners verify patient mood changes but view this concurrently • ADT psychological changes can impact on relationships and QoL for both survivors and partners • Patients and partners are likely to benefit from being made aware of the psychological implications before commencing ADT

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Appendix 1: (Continued)

Author/year	Sample characteristics	Study design	Outcomes reviewed/measured	Key results	Key conclusions
Van Stam et al. (2017)	Prostate cancer survivors alive >5years post-diagnosis with stages I–IV carcinoma. <i>n</i> = 644. Compared to an age-matched population <i>n</i> = 644.	Observational case-control study. MH was measured using 5-item MH Inventory of the Short Form Health Survey. Analysis of covariance and chi-square tests. Sociodemographic, QoL and clinical characteristics were measured in PC survivors.	Measured outcomes included: <ul style="list-style-type: none"> • Sociodemographic data • Treatment intervention • Time since diagnosis • Health-related QoL • MH 	Clinically relevant MH symptoms observed in 14% of PC survivors and 6% GenPop control. Being widowed, lower educational levels, lower general health perceptions, bodily pain, urinary bother and less sexual satisfaction was the most important correlates of lower MH scores in PC survivors. Lower general health perceptions, role limitations due to physical problems and bodily pain correlated with lower MH scores in the GenPop.	<ul style="list-style-type: none"> • Long-term PC survivors have poorer MH outcomes than men in an age-matched population • Attention to modifiable factors associated with MH problems may help to prevent/limit MH problems in PC survivors.
Watts et al. (2014)	Men with biopsy confirmed PC. For meta-analysis inclusion, only journals that measured prevalence were included. Journals included time of treatment, when treatment ceased and type of treatment. Twenty-seven journal articles reviewed. <i>n</i> = 4494. Seven questionnaires are used for meta-analysis.	Systematic literature review and meta-analysis. Six electronic databases are used for literature search. Mesh terms used. No restriction of publication date. Meta-analysis data only in questionnaire form. Questionnaire had inclusion/exclusion criteria. Varied depression/anxiety measurements across the questionnaires. Three researchers extracted data from six randomly selected articles and compared extracted results; point system was used to allow for objective assessment of consistency.	Measured outcomes from the meta-analysis: <ul style="list-style-type: none"> • Number of studies reporting depression • Number of studies reporting anxiety • Number of patients measured for depression • Number of patients measured for anxiety • Pre-treatment, on-treatment and post-treatment anxiety and depression prevalence 	Depression and anxiety prevalence are highest in patients who have yet to undergo treatment (17.27% and 27.4%, respectively), lowest in patients who currently undertaking treatment (14.7% and 15.9%) before rising again in patients completed treatment (18.44% and 18.49%). Prevalence of clinical depression and anxiety in British men >65years is estimated to be less than 9% and 6%, respectively, in contrast to the prevalence reported in patients with PC of the same age.	<ul style="list-style-type: none"> • Prevalence of anxiety and depression in PC is high across all treatment stages • Additional epidemiological investigation is required to offer a more risk adapted approach with more intensive screening and support being offered to individuals who are most at risk of psychological morbidity — dependent on treatment stage • Identification, treatment and management of concurrent psychological distress should be a key clinical objective as a means of enhancing clinical outcomes and patient QoL.
Zaider et al. (2012)	<i>n</i> = 75. Men with localised PC in the past year were treated at one of the two cancer centres and their partners. Received RT or RP. Men must be married or living with their partner of either sex.	Baseline assessment was conducted as part of enrolment onto a couple-based intervention in a pilot trial. Sexual bother subscale from Prostate Health-Related Quality of Life Questionnaire and Masculine Self-Esteem and Martial Affection subscales.	Outcomes measured: <ul style="list-style-type: none"> • Men's adaption to ED • Loss of masculinity post-treatment 	Approximately one-third of men felt they had lost a dimension of their masculinity following treatment. Diminished masculinity was the only significant, independent predictor of sexual bother, even after accounting for sexual functioning status. The association between diminished masculinity and sexual bother was strongest for men whose spouses perceived low marital affection.	<ul style="list-style-type: none"> • Diminished masculinity is prominent but understudied in PC survivors • Men who perceive LoM may be more likely to experience distress because of their ED • Impact on adjustment in survivorship may rely on quality of intimate relationships