A systematic review of tools used to assess body image, masculinity and self-esteem in men with prostate cancer

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Abstract

Objective: Masculinity, body image and self-esteem are important interlinked factors affecting prostate cancer (PCa) patients’ quality of life. The aim of this systematic review was to identify and evaluate all tools measuring these domains in men with PCa.

Methods: This review was conducted according to PRISMA guidelines with a priori protocol registered. Pubmed, Embase, Medline and Psychinfo were searched from inception to May 2020. Studies using a predefined tool which measured any body image, self-esteem or masculinity construct in men with PCa were included, as well as validation studies of these. Reliability, validity and responsiveness of tools identified were objectively evaluated against the COSMIN taxonomy of measurement properties.

Results: From 1416 records screened, a final 46 studies consisting of 17 different tools were included in the systematic review. Seven tools were identified assessing body image, nine masculinity and one self-esteem, varying widely in their number of items, possible responses and domains assessed. Most tools had evaluated internal consistency through Cronbach’s alpha analysis; however, structural and discriminative validity, and responsiveness were lacking for many. Additionally, only one tool identified was specifically developed and evaluated in patients with PCa: The Masculinity in Chronic Disease Inventory.

Conclusions: Numerous tools have been used for the measurement of body image, masculinity and self-esteem in men with PCa. However, few were developed specifically for these patients. More research is therefore needed to ascertain specific factors affecting these outcomes in PCa patients, so valid, reliable and clinically relevant tools can be developed.

KEYWORDS
body image, cancer, masculinity, mental health, oncology, patient reported outcome measures, prostate cancer, psycho-oncology, quality of life, self-esteem
Prostate cancer (PCa) is one of the most common cancers in men, with 47,000 new cases per year in the UK.1 With 10-year survival at over 80%, PCa is an often-chronic disease, presenting a unique set of challenges to mental health and wellbeing. An estimated 60% of men with PCa experience psychological distress,2 with many factors contributing to this, including the effects of treatment, anxiety about prostate specific antigen level, and the distress of a cancer diagnosis. While the effect of PCa on generic outcomes such as quality of life (QoL), or diagnoses of depression and anxiety have been well-researched, more peripheral concepts, also relating to QoL, have received less focus. PCa has been shown to have an impact on men’s self-esteem,3 body image4 and sense of masculinity5 Furthermore, these concepts are connected and often are all mentioned as being affected by a diagnosis of PCa. Levy et al’s qualitative study reported those who experienced bodily changes due to their PCa reported decreases in their sense of masculinity, as well as lowered self-esteem.6 Furthermore, Langeller et al’s qualitative review of exercise interventions in 105 men with PCa found exercise improved both masculinity and body image.7 Similarly, a study of 230 American men with PCa found those who adhered more strongly to masculine scripts experienced poorer mental health,8 suggesting the three domains may be linked as both moderators of QoL, as well as outcomes in their own right.

It has been suggested that the side effects of treatments and their impact on men’s QoL are not assessed enough, or discussed, by some clinicians.9 Masculinity, body image and self-esteem have all been measured by studies in PCa patients, either to assess the effect of the disease and its diagnosis on these outcomes, or to compare interventions to try and improve these outcomes. However, a wide range of tools currently exist for this measurement, with each containing different domains, response items, methods of distribution, and limited evidence for their use in men with PCa. Therefore, there is a need for identification of available tools, and those which are most suitable for both clinical and research purposes.

This systematic review therefore aims to (a) summarise all tools that have been used to measure masculinity, body image and self-esteem in studies of PCa patients to date and (b) establish the validity and suitability of these tools for use in men with PCa.

2.1 Study eligibility criteria

Studies were deemed eligible if their population was exclusively or mainly men with PCa, and were reporting on body image, self-esteem and masculinity outcomes, written or fully translated into English. Due to the paucity of literature in specific validation studies of tools to measure masculinity, body image and self-esteem, search criteria were widened to include experimental, observational and randomised controlled studies that used questionnaires as part of a predefined tool to measure the above outcomes. Studies involving mixed cancer populations where results specific to the PCa cohort were not reported were excluded, as were systematic reviews. Studies that did not calculate any validity measures for their tool (such as internal consistency/reliability) in a PCa cohort were also excluded.

2.2 Information sources and search

PubMed, Embase, Medline and Psychinfo were searched for eligible studies from inception up to 6th May 2020. The search terms used were: (prostate cancer OR prostate neoplasm) AND (body image); (prostate cancer OR prostate neoplasm) AND (masculine OR masculinity); (prostate cancer OR prostate neoplasm) AND (self esteem). A reference review of identified systematic reviews was conducted for additional studies, and grey literature (unpublished studies) was searched for via abstracts available on EMBASE.

2.3 Study selection

Two independent reviewers (J.B. + O.B.) screened titles, abstracts and subsequently full texts against eligibility criteria post de-duplication of results. Discrepancies after full text review were discussed until 100% agreement was reached. After study selection, the tools used in each study were summarised.

2.4 Data collection and items

Data extraction was conducted by two independent authors (J.B. + O.B.). All data was extracted to a pre-defined extraction sheet detailing the number of patients the tool was used in, the country and language in which it was used, age and demographic data of the participants, primary outcomes of each study and method of collecting responses. Data extracted specific to the tools used were name of the tool used, author of the tool, whether the tool had been modified for the study, domains, response format, scoring method and whether the tool had been developed specifically for PCa patients, and if available, information on structural validity, internal consistency, discriminative validity and overall response rate from participants. Measures were extracted to objectively assess validity of each tool used based on criteria set out by the COnsensus-based Standards for the selection of health status Measurement INstruments (COSMIN) checklist.11 This checklist assesses the methodological quality of studies assessing the measurement properties of patient reported
outcome measures (PROMs). It determines the extent to which aspects of a PROM have been assessed and reported on by studies, specifically if they have evaluated the reliability, validity, responsiveness and interpretability. Thereby, it provides an overall assessment of the quality of a PROM being assessed.

One author (Hoyt) was contacted personally for more information about the domains assessed and scoring method for the tool used in their studies.\textsuperscript{12,13} We received the scale and scoring method which was used to complete Table 3.

### 2.5 | Risk of bias assessment

Risk of bias of individual studies was assessed using the COSMIN risk of bias tool\textsuperscript{11} – an adapted version of the COSMIN checklist specifically for use in systematic reviews to assess the methodological quality of single studies on measurement properties of PROMs. This evaluated the quality of individual constructs assessed in a study, including PROM design, validity, consistency and responsiveness. Pre-determined criteria for evaluating the quality of each construct exist, giving them a rating of “very good,” “adequate,” “doubtful” or “inadequate.” Relevant sections of the tool were used depending on which constructs were reported in studies, with an overall risk of bias table generated for each construct and study.

### RESULTS

#### 3.1 | Study selection

A total of 2126 studies were identified, with a further eight added through reference review and conference abstract databases (Figure 1). Initial screening resulted in 136 full-text articles assessed for eligibility. Of these, a final 46 studies were included in the review.

The final number of tools identified was 17. Of these, seven were modified versions of tools already identified, either using subscales, specific items, removing specific items or translating the tool to an alternative language. There was one tool used to measure self-esteem, nine to measure masculinity, and seven to measure body image. Tools identified as well as validation articles in PCa patients are summarised in Table 1.

#### 3.2 | Body image

Body image was assessed in a total of 2753 patients, using seven different tools across 10 studies (Table 2). The most frequent of these was the Body Image Scale (BIS), used in 697 participants. Participants ranged in age from 54 to 90 and were undergoing a variety of treatments, including radical prostatectomy, ADT and radiation. None of the body image tools were specifically developed for PCa.

![Figure 1: PRISMA flow diagram of studies included in this review](image-url)
cohorts, instead being tested in other cancer populations,\textsuperscript{30} adults and adolescents\textsuperscript{31} and American undergraduates.\textsuperscript{32} No studies aimed to specifically validate the tools used; seven evaluated internal consistency using Cronbach's alpha.

The BIS by Hopwood et al\textsuperscript{30} was used twice in English,\textsuperscript{26,28} twice in other languages\textsuperscript{22,23} and once with one of the items removed.\textsuperscript{21} The BIS, although intended for use in all cancer populations, was originally developed and validated in breast, large bowel, testicular, gynaecological cancers and lymphoma. In the studies identified by this review, internal consistency was stated for four of the five studies, being sufficient in all (Cronbach's alpha = 0.72-0.90).

The "Concern about Body Image" scale was used in one study of 1089 patients undergoing radical prostatectomy.\textsuperscript{4} It was adapted from research done by Clark et al on men with metastatic PCa, where body image was identified as a dimension of QoL.\textsuperscript{33} The scale was found to have acceptable internal consistency (Cronbach's alpha = 0.82) and was tested on the largest group of patients of all body image tools identified.

The Physical Self Perception Profile was used in one study of 58 men, having been originally validated in a college-aged, largely active population, based on applying self-esteem theory to physical perception.\textsuperscript{32} Three of the subscales of this tool relate to and are predictive of physical activity – strength, sports participation and conditioning. This suggests this scale may be less adequate in measuring body image in men with cancer, where fatigue is one of the most commonly experienced side effects of treatment.\textsuperscript{34}

\begin{table}[h]
\centering
\begin{tabular}{|l|l|l|l|l|l|}
\hline
\textbf{Tool} & \textbf{Number of studies used in} & \textbf{Number of patients} & \textbf{Developed for PCa Patients?} & \textbf{PCa validation article} & \textbf{Internal consistency (+/?/−)} \\
\hline
\textbf{Body Image} & & & & & \\
Body Image Scale & 2 & 228 & No & + & \\
Body Image Scale (modified) & 1 & 98 & No & ? & \\
Italian Body Image Scale & 1 & 103 & No & + & \\
German Body Image Scale & 1 & 268 & No & + & \\
Concern about body image\textsuperscript{*} & 1 & 1089 & No & + & \\
MBSRQ appearance evaluation subscale & 1 & 104 & No & + & \\
Derogatis Body Image Scale (modified) & 1 & 74 & No & + & \\
Physical self-perception profile & 1 & 58 & No & ? & \\
Treatment Specific Item\textsuperscript{*} & 1 & 737 & No & ? & \\
\hline
\textbf{Masculinity} & & & & & \\
Conformity to masculine norms inventory (abbreviated) & 1 & 234 & No & + & \\
Conformity to masculine norms inventory (self-reliance, emotional control subscales) & 1 & 230 & No & + & \\
Conformity to masculine norms inventory (emotional control subscale) & 1 & 246 & No & + & \\
Conformity to masculine norms inventory (emotional control, self-reliance and dominance subscales) & 1 & 59 & No & − & \\
Bem sex role inventory – short form & 3 & 280 & No & + & \\
Importance of sex role inventory & 1 & 185 & No & + & \\
Cancer related masculine threat & 2 & 127 & No & + & \\
EORTC-QLQ-PR25 (item 19) & 4 & 2098 & Yes & Van Andel et al\textsuperscript{64} & ?
\hline
PC-QoL (masculine self-esteem subscale) & 14 & 3846 & Yes & Clark et al\textsuperscript{5} & +
\hline
FACT-P (item: I am able to feel like a man) & 1 & 1425 & Yes & Esper et al\textsuperscript{66} & ?
\hline
Male role norms inventory - revised (restrictive emotionality subscale) & 1 & 66 & No & + & \\
Masculinity in chronic disease inventory & 1 & 565 & Yes & Chambers et al\textsuperscript{58} & +
\hline
Masculinity in chronic disease inventory (5 factor version) & 1 & 225 & Yes & + & \\
\hline
\textbf{Self-esteem} & & & & & \\
Rosenberg self esteem inventory & 4 & 624 & No & + & \\
\hline
\end{tabular}
\caption{Overview of tools identified in this review (+ = Cronbach's alpha ≥0.70; ? = Cronbach's alpha not reported; − = Cronbach's alpha <0.70)}
\end{table}
The body image tool used by Moinpour et al in 737 men consisted of 15 treatment-specific items generated from input from nurses and physicians, (Table 2), although no specific psychometric evaluation of the tool in PCa patients is mentioned.27

The MBRSQ-Appearance Evaluation subscale was used in one study of 104 men,24 having been developed by Cash et al35 for use with college students. In previous studies, the entire Appearance Evaluation subscale has been found to be unstable, in particular the item “Most people would consider me good-looking,” which has shown associations with both gender and weight, where overweight was associated with instability.36 Internal consistency was sufficient (Cronbach's alpha = 0.981).

A modified BIS adapted from the Derogatis Sexual Functioning Inventory37 was used by Taylor-Ford et al,29 in a study of 74 men yet to undergo treatment. This was developed in university students, and in initial evaluation the body image subscale was found to have one of the lowest coefficients of internal consistency (0.58, N = 325).37 Derogatis et al also found the body image subscale was profoundly affected by sexual functioning, where female and male patients experiencing sexual dysfunction reported body image scale values 1.5 standard deviations below the normative mean. Considering the prevalence of sexual dysfunction in men diagnosed with PCa, use of this body image scale on its own may be in fact measuring body image related to men's sexual dysfunction instead of body image as a discrete concept.

| PROM                                      | Author          | Number of items | Properties assessed                                                                 | Response options                                                                 | Scoring    |
|-------------------------------------------|-----------------|-----------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|------------|
| Body Image Scale                          | Hopwood         | 10              | Self-consciousness, feeling less physically attractive, dissatisfied with appearance, less feminine, difficulty seeing self naked, feeling less sexually attractive, avoiding people, feeling body is less whole, being dissatisfied with body, dissatisfied with scar | 0 (not at all), 1 (a little), 2 (quite a bit), 3 (very much)                      | Summed     |
| Body Image Scale modified                 | Hopwood         | 9               | Same as above, with removal of "dissatisfied with scar" item                          | 0 (not at all), 1 (a little), 2 (quite a bit), 3 (very much)                      | Summed     |
| Italian BIS                               | Hopwood         | 10              | Same as above, in Italian                                                            | 0 (not at all), 1 (a little), 2 (quite a bit), 3 (very much)                      | Summed     |
| German BIS                                | Albani          | 20              | Rejecting body evaluation, vital body dynamics                                        | 6 point scale                                                                    | Summed     |
| Concern about body image'                 | Adapted from Clark | 3              | Concern about loss of muscle tone, negative feelings about the way body looks, feeling that body is getting soft and flabby | Very much/some/a little/not at all                                              | "Recalibrated so scores ranged from 0-100" |
| MBRSQ appearance evaluation subscale      | Cash            | 7               | Feelings of physical attractiveness, and satisfaction with looks                     | 1 to 5                                                                           | Summed     |
| Derogatis BIS modified                    | Derogatis (from sexual functioning inventory) | 5            | Satisfaction with face, genitals, upper body/chest, overall physical appearance, perceived change in appearance | 1 (not at all satisfied/greatly worsened) to 7 (totally satisfied/greatly improved) | Averaged   |
| Physical self perception profile          | Fox and Corbin  | 30              | Sports competence, perceived bodily attractiveness, perceived physical strength and muscular development, perceived level of physical conditioning and exercise, and physical self-worth | 1 to 4                                                                           | Not stated  |
| Treatment specific item                   | Moinpour        | 1               | Concerns with body image                                                             | "No change in appearance," "occasional concern," "often," "most of the time," or "constant" concern that appearance is worsening | Either classified as "not frequent" or "frequent" |

Abbreviations: BIS, Body Image Scale; PROM, patient reported outcome measure.
Masculinity was measured in 9021 patients using a total of nine different tools (Tables 1 and 3), and was the outcome measured most frequently, being used in 32 studies.5,8,12-20,38-58 The age range of all patients was 42 to 87 years, and studies were carried out in the United States (US), Canada, South Africa and Australia. Five tools had validation articles where they were used specifically in men with PCa in their complete form.

The Bem Sex Role Inventory – Short Form was used in three studies of 280 patients total, with one study also adapting the tool to create an Importance of Sex Role Inventory by changing the response options to ranking the importance of each item instead of agreement.46 The short form of the tool was shown to have higher levels of

| TABLE 3 | Psychometric properties of the tools used to measure masculinity |
|---------|---------------------------------------------------------------|
| PROM                | Author                  | Number of items | Properties assessed                                                                 | Response options                                      | Scoring                              |
| Conformity to masculine norms inventory (abbreviated) | Mahalik, Locke et al | 22             | Winning, emotional control, risk-taking, violence, dominance, playboy, self-reliance, primacy of work, power over women, disdain for homosexuals, pursuit of status | 0 (strongly disagree) to 3 (strongly agree)            | Summed                               |
| Bem sex role inventory – short form | Bem                      | 30             | Masculinity, femininity, androgyny                                                  | 1 (never or almost never true) to 7 (always or almost always true) | Mean scores for masculinity and femininity domains |
| Importance of sex role inventory | Galbraith                | 20             | Importance of masculinity and femininity items                                     | 1 (very important) to 5 (not at all important)          | Summed                               |
| Cancer related masculine threat | Hoyt                     | 25             | For example, "Having cancer makes me feel like less of a man"; "Cancer makes me inferior to other men"; "Cancer is taking away my masculinity"; "My body has to function well for me to feel like a man" | 1 (disagree strongly) to 5 (agree strongly)            | Mean score                            |
| EORTC-QLQ-PR25 (item 19) | Van Andel                | 1              | "Have you felt less masculine as a result of your illness or treatment?"          | 1 (not at all) to 4 (very much)                         | Linearly transformed to 0–100 scale   |
| PC-QoL (masculine self-esteem subscale) | Clark                    | 8              | Appraising masculinity as diminished, not feeling oneself to be a "whole man," negative evaluations of self when related to masculinity | 1 (not at all) to 5 (very much)                         | Summing and transformed to 0-100 scale |
| FACT-P (I am able to feel like a man) | Esper                    | 1              | "I am able to feel like a man"                                                     | 1 (strongly agree) to 5 (strongly disagree)            | Reverse coded                        |
| Male role norms inventory - revised (restrictive emotionality subscale) | Levant                  | 7              | Measuring extent to which men feel they can display emotion                        | 1 (strongly disagree) to 6 (strongly agree)             | Mean score                            |
| Masculinity in chronic disease inventory | Chambers                | 28             | Physical strength and fitness, sexual importance, family responsibility, emotional self-reliance, optimistic capacity, action approach | 1 (not at all true) to 5 (very true)                    | Summed                               |
| Masculinity in chronic disease inventory (5 factor version) | Chambers/Occhipinti    | 22             | Physical strength and fitness, sexual importance, family responsibility, emotional self-reliance, optimistic action | 1 (not at all true) to 5 (very true)                    | Summed                               |

Abbreviation: PROM, patient reported outcome measure.

3.3 | Masculinity

Masculinity was measured in 9021 patients using a total of nine different tools (Tables 1 and 3), and was the outcome measured most frequently, being used in 32 studies.5,8,12-20,38-58 The age range of all patients was 42 to 87 years, and studies were carried out in the United States (US), Canada, South Africa and Australia. Five tools had validation articles where they were used specifically in men with PCa in their complete form.

The Bem Sex Role Inventory – Short Form was used in three studies of 280 patients total, with one study also adapting the tool to create an Importance of Sex Role Inventory by changing the response options to ranking the importance of each item instead of agreement.46 The short form of the tool was shown to have higher levels of
reliability in university students (alpha = 0.82-0.89) compared to the long form (alpha = 0.81-0.85),\textsuperscript{59} while a shortened, Spanish translation of the scale validated in an older Brazilian population (mean age = 74.4) was shown to differentiate two factors corresponding to masculine and feminine scales.\textsuperscript{60}

Cancer Related Masculine Threat is a tool developed by Hoyt, and used in both of his studies measuring masculinity in 127 men with PCa.\textsuperscript{12,13} Development was informed by current literature as well as with interviews with men with cancer to measure the discord between men’s experiences and beliefs regarding cancer, and their masculinity.\textsuperscript{13} It was found to have moderate positive correlations with other measures endorsing traditional aspects of masculinity: the Male Role Norms Inventory – Revised\textsuperscript{61} (r = .52, P < .001), and the unmitigated agency subscale of the Extended Personal Attributes Questionnaire\textsuperscript{62} (r = .48, P < .01). This confirmed Cancer Related Masculine Threat as a related although distinct construct. The tool also showed stability between the scores recorded at baseline and 8 weeks (r = .85, P < .001).\textsuperscript{13}

The Conformity to Masculine Norms Inventory (CMNI) was used in four studies totalling 769 patients, either in an abbreviated form,\textsuperscript{14} or with certain subscales used.\textsuperscript{8,39} The CMNI is described as encompassing dimensions of masculinity in the United States.\textsuperscript{63} Factor analysis and development were carried out with students, with internal consistency ranging from coefficient alpha = 0.72 to 0.91 for each of the 11 subscales, with test retest validity for the 11 subscales over 2 weeks ranging from 0.76 to 0.95.\textsuperscript{63} Internal consistency in PCa patients ranged from Cronbach’s alpha = 0.56 for the Dominance subscale,\textsuperscript{15} to 0.89 in the Emotional Control subscale.\textsuperscript{39} Only one study reported on missing responses, stating 88/353 (24.9%) participants left entire measures, or >10% of any given measure blank.

The EORTC-QLQ-PR25, PC-QoL and FACT-P are all scales developed specifically to measure health outcomes in men with PCa, and were used in a total of 19 studies, comprising 7369 men. Four studies used item 19 from the EORTC-QLQ-PR25 “Have you felt less masculine as a result of your illness or treatment?,” although none reported on internal consistency of the measure. In an international field study validating the EORTC-QLQ-PR25 in 13 different countries and 642 PCa patients, the hormonal treatment-related subscale, which contains item 19, showed the lowest internal consistency both at baseline and after treatment (Cronbach’s alpha = 0.41 at baseline, 0.39 after treatment), leading the authors to recommend that results from this scale be reported at the individual item-level,\textsuperscript{64} supporting the use of item 19 alone.

The PC-QoL masculine self-esteem subscale was used by 14 studies spanning three countries. Three of these were follow-up studies of the same cohort in which the subscale had previously been used.\textsuperscript{40,42,43} The scale was developed using qualitative interviews with 130 PCa patients, and validated in a sample of 349,\textsuperscript{5} leading to the definition of 11 domains, with some specific to those with PCa. The masculine self-esteem subscale showed good internal consistency (0.91), although three items concerning feeling less of a man converged with the sexual intimacy subscale, with the correlation between masculine self-esteem and sexual dysfunction higher in PCa patients (−0.21 vs −0.42 in comparison patients). This suggests PCa patients were more likely to conflate masculinity with sexual performance than their counterparts. All studies reporting satisfactory internal consistency values (Table 1) demonstrated that masculine self-esteem exists as a discrete and reliable construct.

The Masculinity in Chronic Disease Inventory (MCD-I) was used in two studies.\textsuperscript{16,58} The original tool was developed specifically for use with PCa patients (Table 3), undergoing the most extensive psychometric evaluation out of all tools in this review (Appendix 1). Chambers et al developed the tool from focus groups with 26 expert patients and healthcare professionals and 15 survivors, and conducted initial face validity testing with a convenience sample of 19 men with PCa. It was subsequently tested in 403 Australian men with PCa, and was found to be acceptable, valid and reliable, with convergent and divergent validity analyses confirming that the six domains assessed were relevant to men with PCa. Goodwin et al used the scale in a group of 622 men with chronic diseases such as hypertension, hypercholesterolaemia, osteoarthritis and skin cancer and recommended the use of a 5 factor structure in future, which also showed sufficient structural validity according to the COSMIN criteria (Appendix 1).\textsuperscript{65}

One study used the “I am able to feel like a man” item from the FACT-P tool, developed by Esper et al\textsuperscript{66} as an adjunct to the Functional Assessment of Cancer Therapy (FACT),\textsuperscript{67} which has been used to date in over 26 000 patients.\textsuperscript{68} The PCa subscale, within which the “I am able to feel like a man” item is contained, showed acceptable internal consistency in initial evaluation (alpha = 0.65-0.69) within two cohorts of US men with localised and advanced PCa,\textsuperscript{66} and was able to differentiate between patients at different disease stages.

The MRNI-R restrictive emotionality subscale (Table 2) was originally developed and tested in a group of US undergraduates,\textsuperscript{61} and the restrictive emotionality subscale showed good internal consistency within the initial sample (Cronbach’s alpha = 0.87) and PCa cohort (Cronbach’s alpha = 0.85). The results from Darabos et al, where the 66 men sampled somewhat disagreed with restrictive emotionality norms, has been supported in Levant’s use of the tool in older men, but also suggests a tool more specific to the often older PCa cohort may have been warranted.\textsuperscript{69}

3.4 | Self-esteem

Self-esteem was measured in four studies totalling 624 US patients,\textsuperscript{3,70-72} all using the Rosenberg Self-Esteem scale (RSE; Table 4).\textsuperscript{73} The scale was developed in 1965 and validated in American students.\textsuperscript{73} Internal consistency values were reported by two studies and were both acceptable (0.84\textsuperscript{3} and 0.88\textsuperscript{73}). However, a review of the use of the scale in cancer patients by Curbow et al suggested that items used by the RSE may not be the only important concepts relevant to cancer patients (and furthermore, PCa patients), as cancer patients do not seem to differ from the general population in their levels of self-esteem, and because null effects are often seen in interventions trying to target self-esteem in cancer patients.\textsuperscript{74}
masculinity and self-esteem respectively were rated "Very Good" (n = 28), 30, 39 and 50% of the studies on body image, masculinity and self-esteem respectively were rated "Inadequate."

**TABLE 4** Psychometric properties of the self-esteem tool identified

| PROM                                      | Author         | Number of items | Properties assessed                               | Response options                      | Scoring                                      |
|-------------------------------------------|----------------|-----------------|--------------------------------------------------|---------------------------------------|----------------------------------------------|
| Rosenberg self esteem inventory           | Rosenberg      | 10              | Positive and negative statements related to self-esteem | 0 (strongly disagree) to 3 (strongly agree) | Summed with half of items reverse scored     |

Abbreviation: PROM, patient reported outcome measure.

**4 | RISK OF BIAS – COSMIN**

The COSMIN risk of bias criteria for internal consistency were analysed for all 45 studies included (Appendix 1). 38% (n = 17) of studies were rated "Inadequate" on their reporting of internal consistency according to the criteria, while the remaining studies were rated "Very Good" (n = 28). 30, 39 and 50% of the use in PCa patients by this review. It is therefore the only tool that can be recommended for use in PCa patients, and specifically aimed to measure masculinity, identifying concepts pertinent to this patient group. The scale was concluded to be acceptable, valid and reliable, with an adequate risk of bias assessment. It is therefore the only tool that can be recommended for use in PCa patients by this review.

**5 | DISCUSSION**

This review identified 17 tools, with masculinity the only outcome with tools developed or psychometrically evaluated in men with PCa. This highlights the need for further research and development of tools specific to these patients, that can be used reliably and accurately in studies. Many tools were developed for younger populations than PCa patients, and although many had acceptable psychometric properties for these groups, it is unlikely they measured domains of body image, masculinity and self-esteem that are important to men in later life, as it has been highlighted that men's attitudes towards their body image and self-esteem change in older age. Furthermore, Occhipinti et al.'s exploratory factor analysis of the MCD-I in a mixed cancer population, resulting in a different tool, suggests psychometric properties of tools may differ depending on cancer population, further reinforcing the need for tools specifically for men with PCa.

Some scales included in this review have been the subject of systematic reviews already, however no reviews have examined the use of these tools exclusively in PCa patients. The BIS has been reviewed in cancer patients, confirming its validity but also highlighting the need for further research into its use in a more diverse group of cancer patients, due to the majority being breast cancer patients. The RSE has also been reviewed in cancer patients, assessing 16 studies that used the tool, and finding it may be of limited use in cancer cohorts due to differences in the way studies score the scale, and that other aspects of self-esteem that may be important to patients are not recognised.

The Masculinity in Chronic Disease Inventory was the only tool identified that had undergone extensive psychometric evaluation in men with PCa, and specifically aimed to measure masculinity, identifying concepts pertinent to this patient group. The scale was concluded to be acceptable, valid and reliable, with an adequate risk of bias assessment. It is therefore the only tool that can be recommended for use in PCa patients by this review.

Risk of bias assessment for the remaining studies included revealed consistent problems in study design. This firstly came from the fact that many studies used convenience samples, introducing sampling bias into these results and reducing their applicability to wider populations. Secondly, all tools relied on self-reported measures, which could also introduce bias, due to the subjective and sensitive nature of the domains assessed. In future, validation studies should be carried out for the tools identified in this review, measuring criteria set out by the COSMIN methodology in PCa patients, to ensure that the use of these tools in the future generates meaningful, validated results.

One of the most pertinent points brought up by this review is the lack of tools developed specifically for PCa patients. Instead, we identified the recurrent use of tools measuring body image, masculinity and self-esteem that may not be suitable in this group. Most tools identified in this review had undergone little psychometric evaluation in PCa patients, and any evaluation that was carried out rarely went further than calculations of internal consistency. This measure is limited in proving the appropriateness of a tool, while the few studies that had included measures of structural validity still did not prove the tools are measuring the parameters they claim to. Tools developed for mixed cancer cohorts also failed to recognise the importance or multidimensionality of these three outcomes for men with the disease. This highlights the need for more qualitative research to further understand treatment decisions, mental health and lifestyle choices which are important to PCa. As well as qualitative work, existing tools should be psychometrically evaluated in men with PCa to justify their use in this patient group.

Topics previously identified by the literature include loss of sexuality and assessment of conformity to masculine ideals affecting men with PCa's masculinity; bodily functioning affecting body image; and role in the community as an advocate or mentor affecting self-esteem. These concepts are not included in current tools and would benefit from consideration in future tool generation.

**5.1 | Review limitations**

As with any systematic review, this study has limitations. The large amount of heterogeneity between tools, and the use of subscales or abbreviated forms of tools for which no validation had occurred limited the comparisons that could be drawn between different methods of measurement. Furthermore, many tools underwent limited psychometric evaluation, meaning a full COSMIN assessment was not possible. Finally, despite the comprehensive search strategy utilising two authors, pertinent articles within the literature could still have been
missed within this review considering the broad area of interest within in this review.

5.2 | Clinical implications

The reframing of PCA as a chronic disease has led to increased emphasis on treatment side effects, benefits and harms that men may experience, as these will have a lasting impact on their lives and mental wellbeing. Tools to measure men's health related QoL can be used to help guide treatment decisions, understand what is important to men in the course of their diagnosis and treatment, and facilitate discussions with clinicians.

Body image, masculinity and self-esteem can all impact men's mental health extensively, which further affects their QoL. There is a relationship between physical functioning and quality life measures. Multiple studies have found sexual functioning was linked to men's perceptions of their masculinity, with a similar relationship between sexual functioning and self-esteem and depression. The connection between physical functioning and QoL indicators, although difficult to ascertain causality, highlights the fact that better tools to measure these factors could help clinicians recognize difficulties in physical and mental functioning their patients may be experiencing. This review also emphasizes that tools to measure body image, masculinity and self-esteem in PCA patients should be used with caution, as many of these tools have undergone limited validation, and may not be measuring constructs which are relevant to men with PCA.

We highlight the current lack of tools specifically developed for PCA patients, showing how current studies and clinicians using these tools to measure the outcomes of body image, masculinity and self-esteem in PCA patients may not be measuring these constructs in a way that is sensitive to the unique position of these patients. Therefore, more qualitative research to help establish the domains of these outcomes that are important to men with PCA, followed by validation studies of current tools is needed. This will enable clinicians to use these tools in clinical practice to help understand how their patients' mental wellbeing can be best supported during their diagnosis and treatment.

6 | CONCLUSIONS

Body image, masculinity and self-esteem are important mental wellbeing outcomes affecting the QoL of men with PCA. A wide range of tools varying in domains assessed, items and possible responses were identified for each of these. However, most have not undergone formal validation in men with PCA, limiting their evidence-based use in this group of patients. Therefore, more research is warranted to validate currently available tools but additionally, to develop more disease specific tools for use in this unique patient group, allowing clinicians to better address their mental wellbeing.

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CONFLICT OF INTEREST

The authors declare there is no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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SUPPORTING INFORMATION
Additional supporting information may be found in the Supporting Information section at the end of this article.

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