







# BMJ Open Effectiveness of educational and psychological survivorship interventions to improve health-related quality of life outcomes for men with prostate cancer on androgen deprivation therapy: a systematic review

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## ABSTRACT

**Objectives** Androgen deprivation therapy (ADT), a common treatment for prostate cancer, has debilitating impacts on physical and psychological quality of life. While some interventions focus on managing the physical side effects of ADT, there is a paucity of interventions that also address psychosocial and educational needs. The objective of this systematic review was to identify psychological and educational survivorship interventions targeting health-related quality of life (HRQoL) outcomes in men on ADT.

**Design** A systematic review of randomised controlled trials.

**Data sources** Web of Science, Cochrane, EBSCO Host, PubMed, SCOPUS from inception (1984) to 28 January 2023.

**Eligibility criteria for selecting studies** Psychological and/or educational survivorship interventions targeting HRQoL outcomes for men on ADT; minimum 80% of participants on ADT; used a validated HRQoL outcome measure; published in English in a peer-reviewed journal.

**Data extraction and synthesis** Data extraction using pre-specified study criteria was conducted. Heterogeneity of eligible studies precluded a meta-analysis.

**Results** A total of 3381 publications were identified with eight meeting the criteria. Interventions were either psychological with a cognitive behavioural approach (n=4), or educational with (n=2) or without (n=2) psychoeducational components.

Two studies reported a statistically significant improvement using a specific HRQoL measure. Most studies were not adequately powered and/or included small sample sizes limiting the conclusions that can be drawn on effectiveness. The most effective interventions were (i) individually based, (ii) educational with a psychoeducational component, (iii) supplemented with information packages and/or homework and (iv) included personalised needs assessments.

**Conclusion** There is a paucity of literature reporting psychological and educational survivorship interventions targeting HRQoL outcomes for men on ADT. What is urgently needed are person-centred survivorship

## STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ To our knowledge, this is the first systematic review of educational and psychological-related interventions aiming to improve or maintain health-related quality of life in men on androgen deprivation therapy.
- ⇒ The focus on randomised controlled trials ensures a review of the highest level of evidence in relation to the effectiveness of educational and/or psychological interventions.
- ⇒ A number of studies had small sample sizes, and some had very short follow-up times so findings may not have fully reflected the men's experience over time.
- ⇒ Not all included studies were adequately powered, and two were powered for a pilot study only, so caution is needed in interpreting results.
- ⇒ Only studies published in English were included; hence, studies conducted in non-English speaking countries may have been missed.

interventions that are flexible enough to identify and address individual needs, taking into account the impact ADT has on both physical and psychological quality of life.  
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## INTRODUCTION/BACKGROUND

### Rationale

Prostate cancer is the second most commonly diagnosed cancer globally in men and a significant cause of morbidity and mortality.<sup>1</sup> Androgen deprivation therapy (ADT), also known as hormone therapy, describes a common form of prostate cancer treatment that blocks the production of the male androgen testosterone, a hormone that stimulates the growth of prostate cancer cells. By reducing the amount of testosterone

circulating in the body, the growth of prostate cancer is slowed, inhibiting progression of the cancer and increasing survival. ADT is the mainstay treatment for metastatic prostate cancer and routinely used as adjuvant or neo-adjuvant treatment with radiation therapy for intermediate to high-risk localised and locally advanced disease. Although very effective in reducing disease progression, the side effect profile is debilitating with significant impact on physical, psychological, sexual and metabolic health.<sup>2,3</sup>

Men undergoing ADT lose muscle mass and bone mineral density, increasing risk of falls and bone fractures, and are at greater risk of death from cardiovascular disease.<sup>4,5</sup> Moreover, men report a profound impact on health-related quality of life (HRQoL) from testosterone loss, in particular changes to mood and cognition, loss of sexual function and libido, hot flushes and physical changes such as genital shrinkage, weight gain and growth of breast tissue. Reports in the literature indicate that men on ADT have significantly lower HRQoL scores than other prostate cancer treatments such as brachytherapy, external beam radiation therapy (without adjuvant ADT) and radical prostatectomy.<sup>6</sup> In addition to treatment side effects, men undergoing androgen deprivation live with the knowledge that they have high-risk localised, locally advanced or metastatic prostate cancer. Rates of depression in men with prostate cancer are higher than the general population, and higher again in men treated with ADT.<sup>7-9</sup> Of further concern, men diagnosed with prostate cancer have a 70% higher risk of suicide when compared with the general population, with men undergoing ADT at increased risk of suicidal ideation.<sup>7</sup>

Survivorship care is an essential component of quality cancer care. Prioritising quality of life and well-being across the cancer trajectory, survivorship care incorporates the psychological, physical, social, emotional, financial and spiritual effects of cancer, from the point of diagnosis through the rest of life.<sup>10</sup> Survivorship interventions target short and long-term physical and/or psychosocial effects of the cancer and treatment.<sup>11</sup> Placing men with prostate cancer at the centre of their care, prostate cancer survivorship interventions should be widely accessible and take into account educational, psychosocial and informational needs in addition to physical activity, exercise medicine and nutritional interventions.<sup>12,13</sup> Consistent with current trends in prostate cancer survivorship care, intervention development and delivery should be guided by contemporary best practice frameworks that support responsive and coordinated short and long-term survivorship care.<sup>12</sup> There is a plethora of studies reporting the benefits of exercise medicine on the physical and psychological well-being of men on ADT, including increased muscle strength and weight control, lessening of fatigue and improved emotional well-being and quality of life. These studies have been soundly reviewed and reported in a number of recent systematic reviews focusing on the benefits of exercise in managing ADT-related toxicities and supporting the view

that referral to tailored exercise programmes should be considered standard of care when prescribing ADT for the treatment of prostate cancer.<sup>14-16</sup> Further systematic reviews report specifically on the positive impact of exercise on quality of life.<sup>17,18</sup> Similarly, there is evidence relating to the impact of lifestyle modification including exercise and nutrition on maintaining HRQoL in men on ADT.<sup>19,20</sup> Despite the success of these interventions, men on ADT report significant unmet informational and supportive care needs in relation to the impact of treatment for prostate cancer on their lives, including loss of masculinity, reduced sense of control, fear of death and dying, uncertainty around disease progression, insomnia, hot flushes, sexual dysfunction and mood changes.<sup>21-23</sup> Physical changes, growth of breast tissue, loss of hair and genital shrinkage can have a profound psychological effect with men feeling like their bodies have undergone a feminisation process causing embarrassment, grief and decreased self-esteem.<sup>24</sup>

With an estimated 30% to 50% of men diagnosed with prostate cancer undergoing ADT at some stage in their treatment trajectory,<sup>25</sup> and with a growing number of prostate cancer survivors predicted over the next few decades,<sup>26</sup> there is a critical need clinically for interventions that aim to improve overall health and HRQoL for men undergoing androgen deprivation, in addition to the benefits delivered by exercise and nutritional programmes.<sup>8,22,27</sup> This requires a systematic review and synthesis of the evidence in relation to key components and modes of delivery of educational and psychological survivorship interventions that are effective in improving HRQoL outcomes with the view to informing future intervention design.

## Objectives

This systematic review of the literature aims to (1) identify educational and/or psychological survivorship interventions ('interventions') targeting health-related quality of life outcomes for men with prostate cancer on ADT and evaluate their effectiveness and (2) analyse the key components and modes of delivery of these interventions to inform future intervention design.

## METHODS

This systematic review of randomised controlled trials was reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis 2020 Statement.<sup>28</sup> The review protocol was prospectively registered with PROSPERO (ID # CRD42022308096). No patients or public were involved in the study design.

## Eligibility criteria

### Inclusion criteria

Studies were included if they met the predetermined criteria for review: (1) compared an educational and/or psychological survivorship intervention targeting HRQoL outcomes for men on ADT with standard care or another

intervention, (2) randomised controlled trial study design with at least 80% of participants on ADT, (3) used a validated HRQoL measure to report primary or secondary outcomes and (4) available in English and published in a peer-reviewed journal.

For the purposes of this review, HRQoL was defined as specific health characteristics (such as health status, fitness, well-being and satisfaction) while also taking into account general quality of life factors such as physical, psychological, social and environmental factors.<sup>29</sup> There are a variety of validated instruments designed to measure HRQoL, including those that measure HRQoL more generally, and those that are more disease-specific.

### Exclusion criteria

Studies were excluded if they described (1) interventions for men on ADT that did not report on HRQoL outcomes or did not use validated HRQoL measures; (2) surgical, radiological or pharmaceutical interventions; (3) interventions using nutritional or dietary supplements or other ingestive therapies; (4) exercise and/or nutritional and dietary interventions; (5) complementary and alternative medicine (CAM) interventions; (6) case reports, conference abstracts, editorials and studies not of randomised controlled trial design; and (7) studies not reported in English or published in a peer-reviewed journal.

### Information sources and search strategy

Five electronic databases and search platforms were searched using key search terms: Web of Science, Cochrane, EBSCO Host, PubMed and SCOPUS. A search strategy was created and refined with the assistance of a health research librarian at the University of Southern Queensland (online supplemental material 1).

Terms within each set were combined using the Boolean 'OR' operator, and the sets were combined using the 'AND' operator. Potential search terms were trialled and mapped to indexed medical subject headings terms including prostatic neoplasms, randomised controlled trial and survivorship. Key search terms included prostate cancer, androgen deprivation therapy, randomised controlled trial, quality of life, side effects and survivorship. Reference lists of included articles were also searched.

All searches were run from database inception to 28 January 2023.

### Data collection, extraction and synthesis

Identified articles from each database were imported into EndNote. After removing duplicates, the remaining titles and abstracts were imported into COVidence. Initially, 10% of papers were independently reviewed against the eligibility criteria by three authors to check the inter-rater reliability (SS, NH and AG). The remaining title and abstracts were equally distributed between the same three authors who undertook independent review. Any disagreements were resolved by discussion until consensus was reached.

Full-text versions of potentially eligible studies were reviewed and screened against the eligibility criteria by one author (SS) using a data extraction table. Articles identified as meeting the inclusion criteria were checked by a second reviewer (NH). There were no disputes to resolve.

Data extraction using pre-specified study criteria was conducted by one author (SS) and checked by a second author (NH). Data extraction included study setting; participant demographics; study characteristics; intervention type, aim and outcomes measured; and results. Intervention characteristics extracted included intervention type and mode of delivery; content and components; frequency and duration. Outcomes included patient-reported HRQoL outcomes such as emotional, physical, social and functional well-being in addition to anxiety, depression, self-management and prostate cancer-specific HRQoL outcomes.

Due to the heterogeneity of the eligible studies (ie, diversity in outcome measures, duration, modes of delivery and aims), a meta-analysis was not conducted. This review followed Popay *et al.*'s guidance on the conduct of narrative synthesis in systematic reviews.<sup>30</sup>

### Study risk of bias assessment

Risk of bias was assessed by the lead author (SS) and independently checked by a second author (NH) using the Critical Appraisal Skills Programme Randomised Controlled Trials Standard Checklist.<sup>31</sup> Although the overall quality of the included studies was sound, and all studies had a clear protocol and research aims, there were some differences in the way some methods were presented. However, there were no issues around quality that led us to exclude a study. A detailed summary of the quality appraisal results can be found in online supplemental material 2.

### Patient and public involvement

None.

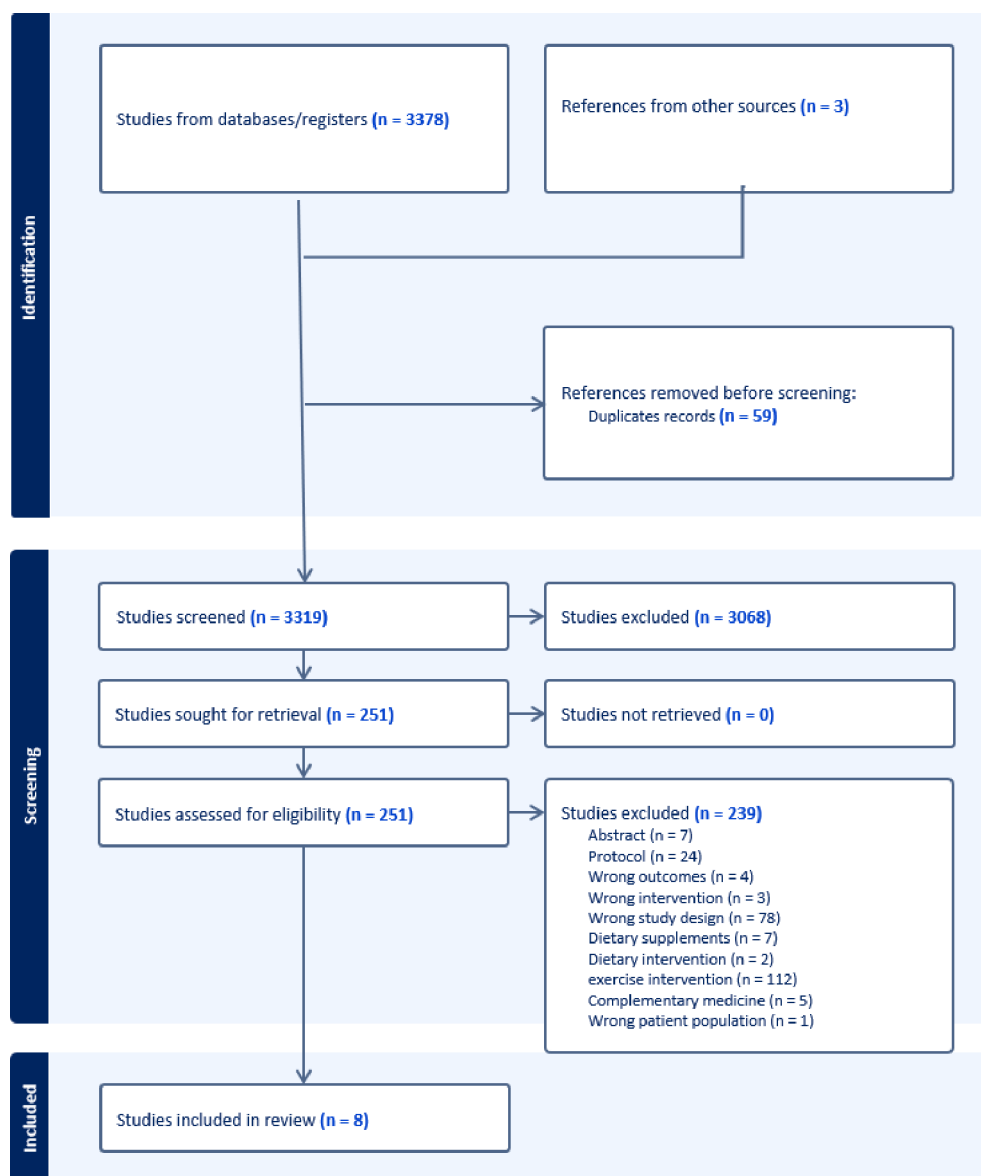
## RESULTS

### Study selection

The initial searches identified 3378 unique records with an additional three articles identified through other sources. Following removal of duplicates and title and abstract screening, 251 articles were included for full-text review. Eight publications<sup>32–39</sup> met the pre-established eligibility criteria and were included in the review (refer figure 1).

### Study characteristics

All studies were published since 2004. Three studies were from the USA,<sup>35 38 39</sup> one from Denmark<sup>33</sup> and one each from Australia,<sup>32</sup> Scotland,<sup>34</sup> England<sup>36</sup> and Northern Ireland.<sup>37</sup> Two studies were conducted using web-based technology,<sup>38 39</sup> two were telephone-based<sup>32 36</sup> and four involved in-person sessions in outpatient settings.<sup>33–35 37</sup>



**Figure 1** Flowchart of studies through the review process.

Six studies reported 100% of participants on ADT<sup>34–39</sup> and the remaining two studies reported greater than 89% on ADT.<sup>32 33</sup> Refer to online supplemental table 1 for a summary of included studies.

A total of 656 men participated in the studies. Mean age of male participants across all studies ranged from 66.0 to 74.9 years, with an overall mean age of 69.2 (SD±2.6) years. Only four studies recorded time since diagnosis<sup>32 36 38 39</sup> which ranged from 2.1 to 6.6 years. Three studies included men with advanced prostate cancer,<sup>32 34 39</sup> three studies included men with either localised or advanced disease<sup>33 35 36</sup> and two studies did not report stage of disease at all.<sup>37 38</sup>

All studies were described as randomised controlled trials and involved two arms (an intervention and a control).<sup>32–39</sup> Of the control arms across the eight studies, six were described as ‘Usual Care’,<sup>33–38</sup> one as ‘Minimally Enhanced Usual Care’,<sup>32</sup> and one as ‘Health Promotion Attention Control’.<sup>39</sup>

All studies included as a primary or secondary outcome, a specific HRQoL measure comprising general health, cancer-related or disease-specific quality of life plus additional outcome measures such as anxiety, distress, depression, coping styles, fatigue, physical activity, hot flushes, night sweats, cognitive functioning, supportive care needs, disease knowledge and self-efficacy (refer online supplemental table 1). Several general and disease-specific instruments were used to measure HRQoL outcomes across the studies. Two studies<sup>33 35</sup> used the general health-related HRQoL Medical Outcome Study Short Form-12 (SF-12)<sup>40</sup> to measure the impact of health on everyday life.<sup>29</sup> Two studies<sup>37 39</sup> used the Functional Assessment of Cancer Therapy - General (FACT-G)<sup>41</sup> to measure cancer-related HRQoL. Two studies<sup>34 36</sup> used the European Organisation for Research and Treatment of Cancer Study Group on Quality of Life Questionnaire (EORTC QLQ-C30)<sup>42</sup> to assess themes relevant to people



	Psychological				Education/Psychoeducation		Education only	
	Chambers	Stefanopoulou	Wu	Yanez	Dieperink	Paterson	Templeton	Pollock
<b>Mode of delivery</b>								
Web-based delivery								
Phone-based delivery or check in	•	•		•				
In person delivery					•	•	•	•
Individual intervention		•	•		•	•	•	•
Group based intervention	•			•		•		
+ home practice guide/diary	•	•	•	•				
Guided self help			•				•	
<b>Type of intervention</b>								
Psychological intervention	•	•	•	•				
Psychological (+ Educational component)	•	•		•				
Educational (+ Psychoeducation component)					•	•		
Education only intervention							•	•
One-size fits all style model	•	•	•	•			•	
Personalised - tailored to individual needs					•	•		
<b>Content</b>								
Cognitive behavioural - Stress				•				
Cognitive behavioural - Mindfulness	•							
Cognitive training	•	•	•	•				
Cognitive - relaxation training		•	•	•		•		
Includes ADT side effect management		•	•	•	•	•	•	•
Inc Booklet/Info package	•	•			•	•	•	
<b>Deliverer</b>								
Self-guided								
Nurse					•	•	•	•
Allied Health (Psychologist)		•						
Health Professional (other)	•			•	•	•		•
Mixed (multi D)					•	•		•
<b>Stage</b>								
Localised (EBRT)		•	•		•		•	•
Advanced	•	•	•	•	•	•	•	•
<b>Outcome</b>								
Statistically significant HRQoL outcome					•		•	
Positive trend in HRQoL outcome				•				
Nil statistically significant/positive trend HR QoL outcome	•	•	•			•		•
Statistically significant HRQoL associated outcome		•		•		•		

**Figure 2** Matrix of outcomes and intervention characteristics.

with cancer, and two studies<sup>32 37</sup> used the Functional Assessment of Cancer Therapy - Prostate (FACT-P)<sup>41</sup> to assess prostate cancer-specific HRQoL. In addition to using SF-12 to assess general HRQoL, one study used the Expanded Prostate Cancer Index Composite (EPIC)<sup>33</sup> to measure prostate cancer symptom-related HRQoL. All studies assessed participants at baseline and between 4 weeks and 9 months post intervention.

### Intervention characteristics and outcomes

Interventions delivered tended to be either psychological<sup>32 36 38 39</sup> or educational,<sup>35 37</sup> with two educational interventions also including a psychoeducational component<sup>33 34</sup> (refer online supplemental table 2 and figure 2). For the purposes of this review, interventions delivering cognitive behavioural or relaxation therapy, or cognitive training delivered by a health professional were categorised as psychological interventions. Educational interventions included information about treatment and physical symptoms and side effect management (with no cognitive behavioural approaches) and were delivered primarily by nurses or in combination with other members of the healthcare team such as physical therapists, clinicians or trained facilitators

### Psychological interventions

There were four psychological interventions.<sup>32 36 38 39</sup> One involved cognitive behavioural stress management (CBSM) interventions,<sup>39</sup> one cognitive behavioural therapy,<sup>36</sup> one mindfulness-based cognitive therapy<sup>32</sup> and one computerised cognitive training.<sup>38</sup> The content of two interventions<sup>36 39</sup> included information on ADT side effects in addition to the cognitive approaches. Mode of

delivery was web-based<sup>38 39</sup> or phone-based.<sup>32 36</sup> Two interventions were group-based<sup>32 39</sup> and two were individual only.<sup>36 38</sup> All four included homework in the form of a practice programme or diary, three had some degree of supervision<sup>32</sup> and one was a fully self-directed online package.<sup>38</sup>

None of these psychological interventions demonstrated a statistically significant improvement on HRQoL measures but two studies showed an improvement in HRQoL-associated outcomes on symptom burden and depressive symptoms.<sup>36 39</sup> Notably, however one of these studies,<sup>36</sup> while powered to detect a clinically significant difference in hot flush and night sweat rating, reported a modest sample size in each arm. The authors of the other study<sup>39</sup> reported that the study was underpowered to detect significant intervention effects.

### Educational interventions with psychoeducational component

There were two educational interventions that included a psychoeducational component.<sup>33 34</sup> Both interventions were individually based and delivered in person. They included explicit side effect management education and included written information packages. Both involved assessment of individual needs to enable delivery of a personalised, tailored intervention and involved a multi-disciplinary approach (delivered by nurses and/or allied health professionals).

One study demonstrated a statistically significant improvement in HRQoL outcome on SF-12 (physical component summary  $p=0.002$ ).<sup>33</sup> This study was both powered sufficiently and demonstrated a small to moderate effect size on prostate cancer-specific symptom

bother and physical HRQoL. The second study<sup>34</sup> was powered for a pilot trial sample size and did not report effect size. While not demonstrating statistically significant HRQoL outcomes over time, this study did demonstrate statistically significant reduction in unmet supportive care needs in the intervention group at 3 months compared with control ( $p=0.002$ ), with greatest improvements in the following domains of unmet needs: physical symptoms, fear of cancer spreading, fear of death and dying, changes in sexual feelings, informational needs and self-management.

### Educational interventions with no psychoeducational component

There were two educational interventions with no psychoeducational content included.<sup>35 37</sup> Both interventions were individually based and involved in-person delivery sessions. The first was nurse-delivered and included an information booklet for participants to supplement the education session.<sup>37</sup> This intervention demonstrated a statistically significant improvement in HRQoL outcome in FACT-G ( $p<0.001$ ) and FACT-P ( $p<0.001$ ) between pre-test and post-test, with additional significant changes in emotional and functional well-being following FACT-P subscale analysis ( $p<0.01$ ).<sup>37</sup> However, this study did not report power analysis or effect size and had a very short follow-up with the post-test questionnaire completed 4 weeks post intervention.

The second study involved multidisciplinary assessment and counselling on symptom management and was delivered by a dietitian, palliative care physician, and trainer.<sup>35</sup> There were no statistically significant differences between treatment arms for all primary and secondary outcomes nor did this study meet the recruitment target or report effect size.

### Significant outcomes

Importantly, only two of the eight studies reported a statistically significant improvement using a specific HRQoL measure, namely FACT-G and FACT-P scales and the SF-12. One was a nurse-led educational intervention<sup>37</sup> and the other was a multidisciplinary educational intervention with psychoeducational components.<sup>33</sup> Both interventions were delivered in the individual setting, and included supplementary educational materials and specific information on the management of ADT side effects.<sup>33 37</sup> One additional study,<sup>39</sup> a CBSM web-based programme, reported a positive trend in functional well-being ( $p=0.06$ ) and emotional well-being ( $p=0.07$ ) on the FACT-G subscale.

Although only two studies showed statistically significant changes related to specific HRQoL outcomes, there were three studies that showed statistically significant improvement in associated outcomes such as symptom burden, anxiety and depressive symptoms and unmet supportive care needs.<sup>34 36 39</sup> Of these,<sup>34 36 39</sup> two were psychological interventions<sup>36 39</sup> and one was educational/informational in design and included psychoeducational components.<sup>34</sup>

Irrespective of whether the statistically significant improvement was in HRQoL outcomes or an associated outcome, all five of these studies included homework or a supplementary information package and included specific information about ADT side effects. Four involved individual participation<sup>33 34 36 37</sup> and one was group-based.<sup>39</sup> Only two included individual needs assessment allowing for individual care planning and personalisation of the intervention for each participant.<sup>33 34</sup>

### DISCUSSION

This systematic review aimed to identify educational and psychological survivorship interventions targeting HRQoL outcomes for men with prostate cancer on ADT and analyse their key components, modes of delivery and their effectiveness in order to highlight any gaps in the literature and to inform future intervention design. Of the 3319 studies screened, only eight studies focused on addressing HRQoL issues for men on ADT. This small number of eligible studies indicates a lack of research into this area. Of note, the majority of included studies were not adequately powered and/or included small sample sizes limiting the conclusions that can be drawn on intervention effectiveness. Two reported small to moderate effect sizes in HRQoL outcomes<sup>33 39</sup> and three did not report effect sizes at all.<sup>34 35 37</sup> Consequently, caution needs to be applied when interpreting the findings including the studies that reported statistically significant changes.

The majority of included studies described interventions with cognitive-based psychological or psychoeducational components. Concerningly, only two studies demonstrated statistically significant improvements using a specific HRQoL measure.<sup>33 37</sup> One was a nurse-led educational intervention<sup>37</sup> which supports the evidence in the literature that nurse-led interventions lead to significant improvements in HRQoL.<sup>43</sup> The other was a multidisciplinary educational intervention with psychoeducational components.<sup>33</sup> Both interventions were delivered in the individual setting, and included supplementary educational materials and specific information on the management of ADT side effects.

In addition to the two studies reporting statistically significant HRQoL outcomes, a further three studies demonstrated significant associated outcomes that are likely to impact overall HRQoL, such as improvement in symptom burden, cancer-related depressive symptoms and supportive care needs.<sup>33 34 36 37 39</sup> Interestingly, what these five studies had in common was that they were clinician-led, primarily directed at individuals, included a supplementary information or homework package and included specific information about ADT side effects. All but one of the interventions demonstrating significant improvements were supervised which highlights the importance of participants feeling they are not alone by linking them to a person or team delivering the intervention.<sup>44 45</sup> Of note, only three of the eight studies were designed exclusively for men with metastatic prostate

cancer.<sup>32 34 39</sup> We expected more given that men with advanced prostate cancer are recognised as being at risk of poorer psychosocial outcomes.<sup>22 46</sup> In our experience, studies focusing on men with metastatic cancer are harder to recruit for; however, retention rates may be higher if the mode of delivery caters for their needs, highlighting the importance for interventions to be designed so they can be tailored to men's health and social needs, including modes of delivery that may lessen the impact of travel and appointment attendance.<sup>22 43</sup>

Interestingly, no single intervention included cognitive behavioural approaches in addition to educational and psychoeducational aspects. This was unexpected as the literature indicates that multimodal approaches combining cognitive-behavioural and educational approaches addressing disease and treatment management information, side effect advice, stress management, and problem solving, goal setting and cognitive behavioural approaches have been shown to reduce distress and improve HRQoL outcomes in the cancer setting.<sup>43 47–49</sup> Surprisingly, across all eight studies, only two included individualised needs assessments enabling personalised care and tailoring of the intervention to each participant's identified needs.<sup>33 34</sup> Both of these studies demonstrated a statistically significant outcome although only one showed a statistically significant change in a specific HRQoL outcome.<sup>33</sup> The other study<sup>34</sup> included a supportive care needs assessment which led to an individualised self-management plan, demonstrating an association between supportive care needs and HRQoL, with evidence in other studies that if supportive care needs are not met, HRQoL is impaired.<sup>50 51</sup> With a global trend towards personalised medicine and person-centred care, the design of future interventions addressing HRQoL for men on ADT should move away from a 'one size fits all' to an individualised approach.<sup>12 52</sup> Given the interplay between HRQoL and individual care needs it is vital that maintaining HRQoL should be a key goal in the delivery of person-centred survivorship care.

Until recently, models of care supporting the delivery of coordinated, accessible and personalised survivorship care have been missing from the prostate cancer setting. Since 2020, the Prostate Cancer Survivorship Essentials Framework<sup>12</sup> has provided a set of key domains that directly influence HRQoL in men with prostate cancer, yet when we reviewed the literature for examples of survivorship interventions that address these domains in the ADT setting (such as health promotion, vigilance, care coordination and personal agency), the results were sparse. Beyond exercise medicine and nutrition, there are very limited examples of effective survivorship interventions that address the informational, physical and psychological needs of men undergoing androgen deprivation. This void has implications clinically where psychological health issues can have a serious impact on HRQoL in men on ADT. Consequently, interventions that incorporate psychological care are paramount.<sup>52</sup> In addition, despite limited studies in this review demonstrating

significant improvement educational interventions may have on HRQoL, education is a crucial component of health promotion and personal agency and access to personalised educational interventions should be considered a critical element of best practice survivorship care. For health professionals looking for examples of effective and accessible interventions they can translate and deliver into clinical practice, the lack of effective educational and psychological interventions is of concern.

This systematic review comparing intervention type, mode of delivery, content, duration and outcome suggests that the most effective characteristics of interventions aiming to improve HRQoL outcomes for men with prostate cancer on ADT are interventions that are (i) individually based, (ii) educational in design with a psychoeducational component, (iii) supplemented with home-based information packages with reading and/or activities and (iv) include personalised individual needs assessments. Cognitive-based psychological components may add to the effectiveness when delivered in conjunction with educational components but appear to be less effective when delivered as a standalone intervention. While we focused on studies that included a validated HRQoL measure, it is critical to remember that addressing factors such as anxiety, depression and fear of recurrence will impact on overall HRQoL. Ideally, interventions should commence early, aligning as close of possible to commencement of ADT, and include a multisession approach with 'check in' opportunities between men and their healthcare team when the side effects really start to take hold, recognising that informational and supportive care needs can vary over time. Supervised sessions that are individually tailored appear to have a higher chance of improving HRQoL. The inclusion of low-intensity psychological care with cognitive behavioural approaches should be considered in relation to future design, specifically in relation to stress and coping, problem solving and goal setting.<sup>53</sup>

When designing interventions for men undergoing ADT, it is important that health professionals and researchers take into account the influence masculinity can have on health outcomes, and work to incorporate male preferences in terms of design and acceptability.<sup>46 54 55</sup> For example, a problem-solving approach can lead men to identify individual problems, explore solutions, set goals, test strategies and determine the best solution for them, with the ultimate goal to reduce or limit some of the sources of stress in their lives.<sup>53</sup> Competing demands between work, family and social commitments, and masculine ideals, such as stoicism and self-reliance can mean that men are reluctant to access services, and actively seek out support.<sup>55</sup> Interventions need to be accessible, men-centred and provide opportunities for targeted support tailored to the needs of the individual, using problem-solving approaches. In the clinical setting, consideration should also be given to access and equity with an increasing focus on technology.<sup>56</sup> At a minimum, interventions should include educational materials and information about the impact of ADT including side effect management, screening for distress and identification



of problems and needs, leading to an individualised person-centred care plan.<sup>57</sup>

## Limitations

This review included studies published in English only due to financial costs and time factors relating to professional translation; hence, studies conducted in non-English speaking countries may have been missed. Web-based machine translation such as Google Translate was not employed due to concerns around evaluation of context, and degree of accuracy in the absence of word for word translation.<sup>58 59</sup>

There were a number of studies with small sample sizes; some had very short follow-up times so findings may not have fully reflected the men's experience over time. Moreover, not all the studies were adequately powered, and two were powered for a pilot study only, so caution is needed in interpreting results. Despite these limitations, to our knowledge, this is the first systematic review of educational and psychological-related interventions aiming to improve or maintain HRQoL in men on ADT.

## CONCLUSION

It is well established that men on ADT often face severe decrements in quality of life. While there is a large body of literature describing the impact ADT has physically and psychologically, men still report significant unmet informational, educational and supportive care needs. There is limited evidence of interventions that effectively address these concerns. While there are many studies to mitigate ADT side effects using exercise, there is a scarcity of evidence evaluating the effectiveness of educational and psychological survivorship interventions on health-related quality of life, and what can be found appears to be hindered by small sample sizes and inadequate powering of studies. What is urgently needed are person-centred interventions that are flexible enough to identify and address individual needs, taking into account the impact ADT has on both physical and psychological quality of life.

When designing interventions for men undergoing ADT, it is imperative that health professionals and researchers incorporate men's health behaviours, consider male preferences in terms of design and acceptability and incorporate cognitive behavioural approaches with educational and psychoeducational components. Interventions need to be accessible, use problem-solving approaches and provide opportunities for targeted support tailored to the needs of the individual. A one size fits all approach with no psychoeducational component or individual assessment is least likely to address HRQoL outcomes in a meaningful way.

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