





REVIEW

The impact of testicular cancer and its treatment on masculinity: A systematic review

Victoria Dax^{1,2}  | Maria Ftanou^{2,3} | Ben Tran^{4,5,6} | Jeremy Lewin^{4,5,7}  |
Rebecca Wallace¹  | Zac Seidler^{8,9,10} | Joshua F. Wiley^{1,2} 

¹School of Psychological Sciences, Turner Institute for Brain and Mental Health, Monash University, Melbourne, VIC, Australia

²Peter MacCallum Cancer Centre, Melbourne, VIC, Australia

³Melbourne School of Population and Global Health, University of Melbourne, Melbourne, VIC, Australia

⁴Sir Peter MacCallum Department of Oncology, University of Melbourne, Melbourne, VIC, Australia

⁵Department of Medical Oncology, Peter MacCallum Cancer Centre, Melbourne, VIC, Australia

⁶Division of Personalized Medicine, Walter and Eliza Hall Institute, Parkville, VIC, Australia

⁷Ontrac at Peter MacCallum Cancer Centre, Victorian Adolescent and Young Adult Cancer Centre, Melbourne, VIC, Australia

⁸Orygen, Melbourne, VIC, Australia

⁹Centre for Youth Mental Health, University of Melbourne, Melbourne, VIC, Australia

¹⁰Movember Foundation, Melbourne, VIC, Australia

Correspondence

Joshua F. Wiley, Turner Institute for Brain and Mental Health and School of Psychological Sciences, Monash University, 18 Innovation Walk, Melbourne, Victoria 3800, Australia.
Email: joshua.wiley@monash.edu

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Abstract

Objective: The purpose of this review was to synthesise the literature on the topic of masculinity and testicular cancer (TC) and investigate the relative impact of TC on men's view of their masculinity.

Methods: Searches were conducted across four databases (MEDline, PsycInfo, CINAHL Plus and Scopus) for articles published before April 2022 that included (1) TC and (2) masculinity. Two researchers independently rated studies for inclusion with a third resolving conflicts. Of the 6464 articles screened, 24 articles (10 quantitative and 14 qualitative) were included in the review. Articles were rated for quality and a narrative synthesis was performed.

Results: Overall, results indicated some men experience a shift in the way they relate to their sense of masculinity following diagnosis and treatment for TC. Being single and without children was related to the experience of negative masculinity-related outcomes, possibly due to a compounding lack of relational support and being unable to conform to protector, provider traditions. Men who described testicle loss as symbolic of their diminished masculinity were also negatively impacted. However, recent, high-quality literature on the topic using standardised masculinity measures was limited.

Conclusion: Some men experience a reduced sense of masculinity after TC, however the impact of TC on masculinity remains person dependent. Further research using validated masculinity measures is required to uncover psycho-social variables that may account for whether and how meaning is made between TC and its treatment and any subsequent impact on perceived masculinity. Such factors may better support these men in life beyond cancer.

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KEYWORDS

cancer, masculinity, oncology, orchiectomy, psycho-oncology, psychology, qualitative, survivorship, systematic review, testicular neoplasm

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1 | BACKGROUND

In 2020, 74,458 men worldwide were diagnosed with testicular cancer (TC), accounting for 0.4% of all cancer in men.¹ Whilst a comparatively low incidence to other cancers, TC is the second most common cancer in young men aged 20–39 years.² TC is characterised by enlarged, hard swelling, affecting one (or rarely, both) testicles.³ According to the European Association Urology TC guidelines,⁴ orchiectomy (i.e., testicle removal) is the standard mainstay of treatment. Due to treatment advances including the introduction of cisplatin-based chemotherapy, TC has a 98% 5-year survival rate.⁵ As such, focussing on quality of life and survivorship is particularly important for men living beyond TC.⁶

For young adults, parallel life events including career disruption and financial insecurity at this formative life stage can complicate long term cancer outcomes.⁷ Indeed, for young adults, the suspension of social connection, employment, and independence associated with cancer can significantly impair wellbeing.⁷ Younger age at cancer diagnosis is further associated with greater unmet needs⁸ and overall psychological distress.⁹ Young men (aged 18–24) also face unique, gendered social determinants that correlate with poorer mental health outcomes including poor health service access and engagement, stigma, masculinity and cultural expectations.¹⁰ For men with TC, survivorship issues that can impair wellbeing include above average levels of anxiety and fear of cancer recurrence and depression.^{11,12} Psychological distress for men with TC has also been shown to be long-lasting, with 20% of men meeting clinical cut-offs for emotional problems 7–10 years after treatment and psychosocial morbidity present in men with TC and partners 5 years after diagnosis.^{13,14} This year, TC was shown to have the highest cumulative burden for depression and the highest psychiatric disorder burden overall compared to 25 other cancers.¹⁵ In a recent review, the role of cancer-related masculine threat (i.e., the perception that cancer is inconsistent with masculine gender) following TC was implicated in some men's heightened levels of depression and anxiety.¹⁶

Masculinity may be of specific importance within the TC context. Biological theories of masculinity suggest that anatomy is a 'verification' of gender¹⁷ and thus an altered or damaged reproductive system can have deleterious impacts on one's sense of their 'manhood'.¹⁸ As testicles have historically been characterised as symbols of strength, courage, and overall masculinity, orchiectomy may influence how men with TC perceive and define themselves.

Importantly, one's sense of masculinity is made up of a diverse set of pressures to conform to certain gendered norms and behaviours. These exist on a relative hierarchy of plural masculinities that often coalesce and contradict but reliably place able-bodied, white, heterosexual men in positions of power over others.^{19,20} This dominant expression of masculinity, termed 'traditional' masculinity,²¹ privileges norms like stoicism, toughness, self-reliance and invulnerability. These factors are well known to impact survivorship outcomes in men with cancer, including poor rehabilitation uptake, 'playing down' side effects from cancer and impaired social, functional and psychological wellbeing.^{22–25} These prevailing masculine

ideals directly contradict with the sickness, frailty, vulnerability and physical and financial dependence commonly associated with cancer.²⁶ The relationship between masculinity and men's wellbeing with cancer is not static, and instead is complex and constantly shifting throughout the various stages of the cancer trajectory from diagnosis to treatment to survivorship. For example, men conforming to traditional masculine norms *before* prostate cancer, being disabled from upholding glorified roles around sexual performance, physical strength and being a 'breadwinner' by their cancer can lead to ongoing self-esteem and body image issues, rumination and distress.¹⁸ Beyond cancer, men with inadequate partner support and post-treatment sexual dysfunction experienced a sense of diminished masculinity as well as low self-esteem, creating barriers to open sexual communication with their partner.²⁷

Whilst the topic of masculinity has been explored in other male cancers (predominantly prostate cancer), in comparison a small body of literature has examined the impact of TC on masculinity and the current findings are mixed.^{28,29} In one study, a perceived reduced masculinity was associated with negative adjustment to cancer and depressive symptoms in men with TC.³⁰ In qualitative research, men have described perceived diminished masculinity (e.g., being physically vulnerable) as an obstacle to thriving in life beyond cancer.²⁸ Men with TC who demonstrated restricted emotionality and perceived social constraints on the discussion of cancer were associated with depressive symptoms.³¹ However, results vary, at times demonstrating that men report transient or little impact to perceived masculinity from TC and its treatment²⁹ or alternatively describing a sense of strength and success having survived TC.²⁸

It is unknown why some men feel a reduced sense of masculinity after TC diagnosis and treatment, whereas others report short-term or no impact. So far, the literature on TC and impacted masculinity suggests that a minority of men experience changes in masculinity. However potential factors that confer risk or resilience to impacted masculinity after TC are largely unknown.

1.1 | Aims

The purpose of this review was to synthesise the literature on the topic of masculinity and TC and investigate the relative impact of TC on the men's view of their masculinity.

Further aims of this review were to explore correlates of changes to masculinity and investigate whether there are common variables across the literature that may be associated with perceived diminished masculinity due to TC and its treatment.

2 | METHOD

2.1 | Methodology

The current review was prospectively registered (PROSPERO CRD42020185649) and adheres to Preferred Reporting Items for

Systematic Reviews and Meta-Analyses (PRISMA) guidelines³² and the Enhancing transparency in reporting the synthesis of qualitative research (ENTREQ) guidelines.³³

2.2 | Search strategy & article selection

Both quantitative and qualitative studies were included across four electronic databases (MEDline, Psycinfo, Cinahl Plus and Scopus) searched from inception until April 2022. The search strategy devised was adapted for each of the electronic databases using Subject Headings (known as MeSH) where possible and free text, supplemented by hand searching references of recent articles. Complete search terms for all databases are in Appendix A.

Inclusion criteria were any study containing (1) men diagnosed with TC, and (2) any stage of disease, and (3) were an empirical article (i.e., not a book chapter, review, commentary piece), and (4) quantitative measurement of masculinity or qualitative discussion about masculinity in the results. Due to the expected small body of literature, no date exclusions were placed on the article search. Articles were limited to human studies in the English language. Conference abstracts and other systematic reviews were excluded.

Two reviewers (VD & BW) independently screened title and abstracts of all articles potentially relevant to the topic of masculinity and TC and excluded articles based on criteria. A third reviewer (JW) resolved conflicts of initial screenings. Those considered potentially relevant were included in full text review, with the same reviewing process applied to full text screening. Any articles not clearly eligible or ineligible for inclusion after evaluation by the third reviewer (JW) were brought to the researchers for discussion.

2.3 | Data collection

Data extraction was facilitated through Covidence, a systematic review web-based application to streamline coding and extraction. The data extracted from each of the selected articles included: location of study, study aim, study design, sample size and characteristics, measures used, the overall key findings, and the strengths and limitations of the study (Table 1).

2.4 | Quality assessment tool

A methodological assessment of the quality of the articles selected was undertaken based on the Joanna Briggs Institute Critical Appraisal (2020)³⁴ tools by two independent reviewers (VD & BW) with a third review resolving conflicts (JW). Using these tools, articles were evaluated and classified as either good ($\geq 80\%$ of criteria met), fair (50%–79% of criteria met) or poor ($\leq 50\%$ of criteria met) quality. The 'checklist for analytical cross-sectional studies' was used for

quantitative articles (Appendix B) and the 'checklist for qualitative research' was used for qualitative articles (Appendix C).

2.5 | Data analysis

Due to the expected heterogeneity of study designs and measures, narrative synthesis was deemed the most appropriate method to collate the literature. After extraction, articles were grouped by study design (quantitative or qualitative) to investigate masculinity. For the quantitative masculinity results, means and percentages were obtained where possible, and results were grouped into themes depending on the type of measures used to investigate masculinity. For the qualitative masculinity articles, results were predominantly extracted from the Results/Discussion sections. Thematic analysis was undertaken to synthesise the qualitative studies.³⁵ Using line by line coding, 'descriptive' themes about masculinity were created with further development into 'analytical' themes to make meaningful interpretations of the results.

3 | RESULTS

3.1 | Study selection

The search strategy generated 6464 articles as potentially relevant to the topic of TC and masculinity. Covidence automatically removed 1812 duplicate articles. Two reviewers (VD & BW) screened the title and abstracts of the 4652 articles exported into Covidence. After all screening processes were completed (see Figure 1, PRISMA flow-chart), 24 articles were included in the systematic review.

3.2 | Data quality

Twenty-four articles (10 quantitative and 14 qualitative) were rated for data quality. Three studies contained both quantitative and qualitative results that are reported across both domains in this review, however were rated as qualitative given most of the masculinity results in these studies were qualitative.^{36–38} Twelve articles were rated as Good quality, 10 articles were rated as Fair quality, and two articles was rated as Poor quality. Notably, only two of the 14 qualitative articles had statements locating the researcher culturally or theoretically. Ten of the 14 qualitative articles did not have a clear philosophical perspective linked to the research methodology.

3.3 | Quantitative masculinity results

There was a total of 10 quantitative studies with sample sizes ranging from 39 to 567 (total *N* across studies 2229 men). Most studies^{39–42} had a high proportion (between 55% and 87.6%) of men in a relationship.

TABLE 1 Systematic review study characteristics^a

Ref #	Author (year)	Study quality ^b	Study location	Study design ^c	Sample size	Ethnicity	Age (years) ^e	Treatment received	Masculinity data ^g
34	Rossen (2012)	Good	Denmark	Quant	N = 401		46.6	Orchiectomy (surveillance) 50% Chemo 25% Radio 12% RPLND ^f 13%	Single item about feeling less masculine
35	Smith (2016)	Good	Australia	Quant	N = 244	Born in Australia (81%) Other (19%)	34.9 (10.0) [16–69]	Orchiectomy (surveillance) 23% Chemo 37% Radio 21% Chemo + Radio + further surgery 19%	Single item about feeling less masculine
25	Wang (2020)	Good	United States	Quant	N = 171	White (45%) Hispanic/Latino (34.5%) Asian (7%) Other/mixed (13%)	25.2 (3.3) [18–29]	Orchiectomy (surveillance) 100% Chemo = 53%	Validated measure of masculinity
36	Wortel (2015)	Fair	Netherlands	Quant, longitudinal at 3-time points ^d	N = 161		36 [18–70]	Orchiectomy (surveillance) 100%	Body image questionnaire developed for the study
33	Fossa (1996)	Fair	Norway	Quant	N = 206	British (48%) Norwegian (52%)	Age at orchiectomy: Median 31 [17–57]	Orchiectomy (surveillance) 42% Chemo 12% Radio 46%	Single item about reduced self-image administered to participants and doctors.
32	Cassileth (1987)	Fair	United States	Quant	N = 39	White (95%) Other (5%)	41 [22–67]		Two items rating self-view and other's view of masculinity
31	Sheppard (2001)	Poor	United Kingdom	Quant; Qual	N = 25 (quant) N = 6 (qual)	Caucasian (96%) Asian (1%)	32.18 (5.15) [21–39]	Orchiectomy (surveillance) 20% Radio/Chemo 36% BEP Chemo 44%	Quant: EORTC-QLQ-TC30 Qual: General theme: Body image, support, sexual functioning
	Petrella (2020)		Canada	Quant; Qual	N = 11	92% white	32.3 [15–39]	Orchiectomy (surveillance) 90% Chemo 72.7% Radio 36% RPLND 9% Stem cell transplant 9%	Quant: Surveyed for their preferences for a sport-based supportive care intervention. Qual: Three core themes: "The developmental disruption," "the connectedness conflict," and "the way back to normal."

TABLE 1 (Continued)

Ref #	Author (year)	Study quality ^b	Study location	Study design ^c	Sample size	Ethnicity	Age (years) ^e	Treatment received	Masculinity data ^g
	Krouwel (2021)		Netherlands	Quant	N = 201		44.2 [23–74]	Orchiectomy (surveillance) 99.5% Chemo 47.8% Radio 13.4% RPLND 10.4%	Reproductive concern scale
	Smith (2020)		Australia	Quant	N = 39		37.1		EORTC-QLQ-TC26
	Yamashita (2021)		Japan	Quant	N = 567		43 [20–79]	Chemo 70.2% RPLND 38.1%	EORTC-QLQ-TC26
	Yamashita (2021)		Japan	Quant	N = 200		43 [22–74]	Chemo 72% Radio 6% RPLND 41%	EORTC-QLQ-TC26
46	Saab (2014)	Good	Lebanon	Qual	N = 8	Lebanese (100%)	41 [32–50]	Orchiectomy (surveillance) 25% Chemo 63% Radio 13%	General theme: changes since cancer (relationships, sexual functioning, fertility, self-perception)
45	Matheson (2016)	Good	United Kingdom	Qual, longitudinal questionnaire at 2 time points	N = 32	White British (94%) Asian British (6%)	34 [22–44]	Orchiectomy (surveillance) 33% Surgery + Chemo and/or radiotherapy 67%	Specific theme: grounded theory about positive and negative adjustment to cancer
40	Gurevich (2004)	Good	Canada	Qual	N = 40		36.03 (10.35) [17–62]	Unilateral orchiectomy 75% Bilateral orchiectomy 25%	Specific theme: discourse of precarious masculinity and link between anatomy and experience
41	MacDonald (2002)	Good	Canada	Qual	N = 18		[18–35]		No specific theme but relevant quotes about masculinity identified
24	Brodsky (1995)	Good	United States	Qual	N = 11	White (100%)	35		Specific theme: changes in self due to cancer
38	Kristjanson (2006)	Good	Australia	Qual	N = 32		> 16 years		No specific theme but relevant quotes about masculinity identified
30	Shen (2016)	Fair	Canada	Qual	N = 13		[22–52]		Specific theme: adjusting to survivorship
42	Mason (2004)	Fair	United Kingdom	Qual	N = 10		34.4 [28–44]	Chemo 60% Radio 20%	Specific theme: help-seeking for testicular cancer

(Continues)

TABLE 1 (Continued)

Ref #	Author (year)	Study quality ^b	Study location	Study design ^c	Sample size	Ethnicity	Age (years) ^e	Treatment received	Masculinity data ^f
39	Chapple (2004a)	Fair	United Kingdom	Qual	N = 45	White British (43%) Canadian (1%) Former Czech Republic (1%)	[20–55]		Specific theme: decision to have a prosthesis & relationship to masculinity
44	Chapple (2004b)	Fair	United Kingdom	Qual	N = 45	White (100%)	<60 years		Specific theme: humour to cope with testicular cancer

^aAny data not available is left as missing.

^bStudy quality was summarised as Good, Fair, or Poor. Full ratings are in Appendices B & C.

^cUnless otherwise specified, Quant indicates a quantitative, cross-sectional design (e.g., a single questionnaire) and Qual indicates a qualitative interview design.

^dBaseline questionnaire reported only.

^eAge is shown in years given as M (SD) [Range] unless indicated otherwise.

^fRetroperitoneal lymph node dissection.

^gQuantitative masculinity data was recorded from the results section of each article. For qualitative articles, themes and quotes relevant to masculinity were captured.

3.3.1 | Single item measure of masculinity

Seven studies asked participants in a single item measure if they felt less masculine because of TC and its treatment.^{37,41–46} Five studies used the European Organization for Research and Treatment of Cancer QOL questionnaire (4 using EORTC QLQ-26, 1 using EORTC QLQ-30) that contains a single item about masculinity (i.e., “*have you felt less masculine as a result of your disease or treatment?*”[Version 26 in the past week]), with responses ranging from 1 = *Not at all* to 4 = *Very much*. These studies demonstrated a range of 12%–30% of men feeling less masculine.^{37,42–44} One of these studies reported those who underwent retroperitoneal lymph node dissection (RPLND) reported greater impairment to self-reported masculinity.⁴³ However, another study compared self-reported reduced masculinity to TC treatment types with no statistical difference.⁴⁴ The study with the lowest percentage of men impacted (12%) contained the lowest sample size ($n = 25$) and required all participants to be in a committed heterosexual relationship.³⁷ The final study compared the EORTC-QLQ from baseline to follow-up following intervention (e-TC), with mean scores ranging from 27.77 to 29.82 suggesting the average response was around “A little bit”.⁴⁵

Two studies contained different single-item measures of masculinity and contained sample sizes of 201 and 401.^{41,46} One study asked participants if they felt less masculine as a result of their reproductive problems (*Not at all* to *Very Much*), with 15.5% reporting an impact.⁴⁶ Rossen et al.⁴¹ demonstrated significant associations with changes in body image and sexual dysfunction independently to self-reported reduced masculinity, suggesting a possible impact of physical appearance and function correlating with a greater impact to masculinity.⁴¹

3.3.2 | Scale ratings of masculinity

Two studies investigated masculinity in men with TC using study specific scales.^{39,40} One study asked men with TC and a healthy control sample to rate themselves on a scale of masculinity and on the same scale how they thought others viewed them. Men with TC rated themselves high in their sense of masculinity and slightly higher than the healthy control on each of these scales, however the difference between populations was a mean of 0.15–0.16 (range 1 = *very feminine*; to 5 = *very masculine*). However, in another study 206 Norwegian and British men rated themselves on average 1.3–1.4 (range 1 = *not at all*; to 4 = *very much*) about the extent to which they felt their self-image as a man had reduced, indicating minimal impact.⁴⁰ Participants and doctors were also asked to rate the importance of quality-of-life issues, including “Body image/male self-esteem”. Men with TC ranked body image/male self-esteem at 2.7 (range 1 = *least important*; to 8 = *most important*), though doctors overestimated body image/male self-esteem as their answers almost doubled this mean importance (5.2).

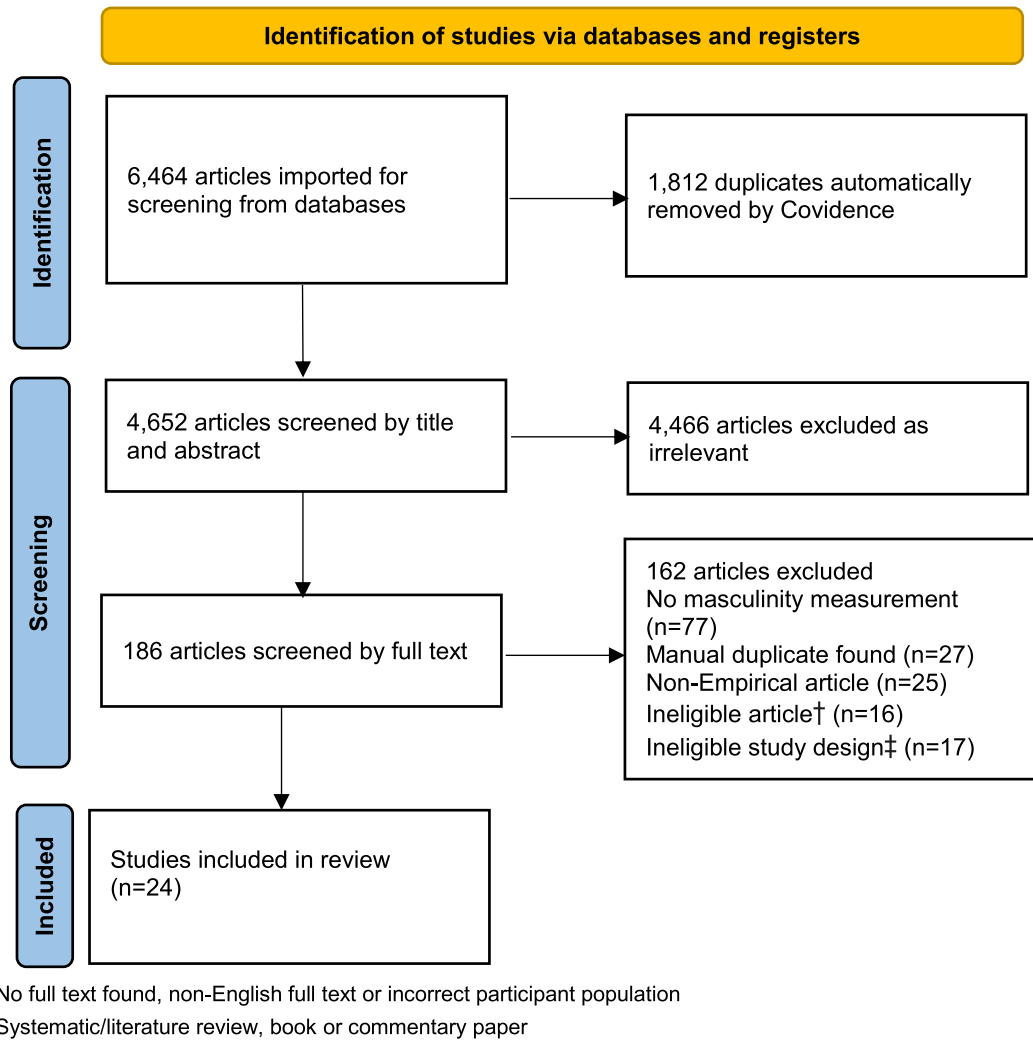


FIGURE 1 PRISMA flowchart of the screening and identification process of papers included in this systematic review

3.3.3 | Correlates of masculinity

Two studies examined correlates of altered perceptions of masculinity.^{30,47} Wang and Hoyt³⁰ found that cancer-related masculine threat in a sample of younger men ($M_{age} = 25$, 18–29 years) was significantly related to worse adjustment to cancer. This study also found that a strong relationship between cancer-related masculine threat, negative affect and depressive symptoms. However, this effect was buffered by finding benefit from the experience of cancer, such that greater benefit finding attenuated the relationship between cancer-related masculine threat and a negative affective state.

One study reported that in a sample of 161 men, 19% of participants had concerns about dressing in front of others,⁴⁷ suggesting some men grapple with vulnerability after TC and its treatment. Age and sexual problems with partners were negatively correlated with concerns about undressing in front of other men, suggesting younger men may be at a greater risk for a reduced sense of masculinity. Interestingly, none of the participants who opted for a prosthesis reported sexual, body image, or undressing (in the presence of others) concerns.⁴⁷

3.4 | Qualitative masculinity results

There was a total of 14 qualitative articles with sample sizes ranging from 6 to 121 (total sample size = 370). Synthesising the qualitative articles resulted in the emergence of three themes 1) Testicle loss and masculinity, 2) The impact of relationships and 3) Coping in a masculine way, that are described below.

3.4.1 | Theme one: Testicle loss and masculinity

Six of the 14 qualitative articles reported at least some men felt a negative relationship between the loss of a testicle and masculine identity.^{37,48–52} For the men that felt their masculinity was in some way threatened, losing a testicle was symbolic of losing a part of their identity and feeling incomplete.^{48–52} Feelings of inadequacy and emasculation were present^{28,35} “it’s just the part about being a man and the man having that ability to, and also losing part of that is like losing a part of yourself”.⁴⁸ Men who had opted for a prosthesis described wanting to “feel whole again” and feel “like a man”.⁵⁰

Six of the 14 qualitative studies reflected that participants tended to conceal themselves in front of other men and potential romantic interests, feeling embarrassed or anxious about revealing the loss of their testicle.^{37,50–54} Assumptions were made that other men “don't want to hear it”⁵¹ and men avoided situations that would place them in a position of vulnerability (e.g., locker rooms),^{37,50,54} suggesting possible impact of shame and stigma about the possibility of discussing with others. One man also stated that another cancer, such as bowel cancer would be more acceptable to discuss with others, because TC was “different, a little touchy subject” and was afraid of “people bugging me”.⁵² Three studies contained participants who had undergone bilateral orchiectomy, meaning both testicles were removed as part of treatment.^{51,54,55} These participants reported significant distress that resulted in embarrassment, concealment, and avoidance behaviours.

However, other participants felt little relationship between testicle loss and their masculinity.^{50,51,56} In one study, a participant described that “being a man is so much more than having two testicles” and that TC and its treatment did not change their own perceptions of their masculinity.⁵¹ These men recognised masculinity beyond their reproductive organs, though were reflective about this relationship, and how it might differ for some men “I think if my whole identity had just been in one little testicle I would have been crushed” and “I don't define my masculinity by a couple of ounces of tissue”.⁵¹ One study reported that when asked directly, none of the participants reported feeling less masculine in any way.²⁹ All participants in this study were at least 3 years posttreatment and mean age of participants was 35 years, which may suggest men feel their masculinity is restored in life beyond cancer.

One study found infertility was viewed as the threat to masculinity as opposed to testicle loss.⁵⁷ Schover and von Eschenbach⁵⁴ reported that men who were infertile felt they were “of little use” and would have rather kept the cancer than go through life as they do now. In this study, all participants had undergone a RPLND that is related to additional concerns including fertility, scarring and sexual dysfunction. Two studies contained participants who reported the effects of chemotherapy (e.g., weight loss, alopecia, sickness) were a more significant threat to confidence in sexual relationships and identity than the loss of a testicle^{54,56} and for one participant created guilt about sexual encounters with his wife.⁵⁴

3.4.2 | Theme two: The impact of relationships

Six of the 14 qualitative articles described how the experience of TC and masculinity was influenced by one's relationship status.^{37,48,52,54,56,57} These studies described how men felt that being single did or would have made the experience of TC particularly difficult. Single participants expressed concerns and uncertainty about the idea of explaining testicle loss to a new romantic partner⁵² and in an older study restrained themselves from creating relationships altogether.⁵⁴ Feeling unsure of oneself, feeling guilty about what they have to offer to prospective partners (i.e., being “damaged

goods”), fearing rejection and feeling as if testicle loss was a barrier to connection were all worries participants held,^{37,38,48,53,57} indicating a sense of diminished masculinity (e.g., reduced strength, sexual prowess) when considering future sexual encounters.

Three studies enquired about participants sexuality.^{51,53,54} In one of these studies, conducted in 1984, participants reported worries about the links between TC and being gay, as well as explaining lack of semen to prospective partners.⁵⁴ In another study, that focused on factors around help-seeking for TC, a single participant initially thought TC might be a sexually transmitted infection (STI) and anticipated judgement from doctors.⁵³

Participants that were already married or partnered and those with children felt they “didn't have anything to prove” in comparison to single men.⁵⁶ Achieving these milestones appeared to serve as anchors to masculine security. Partnered participants in one study⁴⁸ felt cancer had brought their relationship closer, compared to unpartnered men who felt they were “damaged”. However, this was not true for all single participants. Matheson et al.⁵⁶ reported single participants felt optimistic about the future of potential partnership, describing confidence that diminished any worries. Outside of inherent confidence, it is unknown what contributed to these men being unaffected by testicle loss.

3.4.3 | Theme three: Coping in a masculine way

Rigidity in masculine values and remaining stoic were associated with worse adjustment both quantitatively and qualitatively.^{30,56} Men felt “pressure to say, yeah, you're fine”⁵⁶ and in one study described that being “weak” and vulnerable was okay for women, but for a man it was “admitting defeat”.⁵³ Men also struggled with their own view of themselves, feeling pressure to conform to masculine norms including being strong, a provider and survivor, and feeling pressure to ‘suck it up’ and not need others' help.^{36,49,53} In one study⁵⁶ men were interviewed at two time points, and those that were flexible in adherence to masculine values (e.g., emotional disclosure, seeking support) had fared better than those who demonstrated stoicism and rigidity (e.g., maintaining a ‘false’ positive front, concealing feelings from family and friends). In another study, one man described waiting until his doctor had left the room to cry despite his doctor advising him he was “allowed to show some emotion”.⁵⁵ Two studies also described a desire to conform to the role of ‘protector’ and avoid being perceived as ‘sick’, that included shielding family from “bad news”, supporting parents (over themselves) and concealing attendance at follow-up appointments.^{38,57}

One study also discussed the role of humour as a way of coping with cancer in a masculine way.⁵⁵ Having a good sense of humour served to diffuse tension, increase comradery, and divert attention away from the difficulty of cancer. The application of humour was utilised in healthcare settings (e.g., on the ward with other men and with nurses), at workplaces (to ‘lighten’ the situation and prevent awkwardness) and with friends, to ensure others treated them as the same person (i.e., avoid being treated as a “charity” case). However,

some participants further described jokes as only appropriate from trusted friends and family and that other people using humour was insensitive. In another study, within a theme labelled as "too proud for pity", men described acting in ways to ensure that they were not "felt sorry for", including 'controlling' their emotions to maintain their image as self-reliant and proud and avoiding help-seeking and disclosure of TC.

In one study with Lebanese men, seeking support directly challenged masculine identity and cultural masculine norms.⁵⁷ Another study demonstrated that younger men with TC (<40 years) compared to older men (>40 years) had less knowledge and were offered less material about support and in turn felt continual worry and frustration about their health status in life after cancer.³⁶ Many men in this study felt that their oncologist did not have time to have the "right conversations".³⁶ Men in one study⁵³ felt that accessing information was "embarrassing" explained by "showing everybody else that you've got something wrong". Hobbies, including reading, fixing cars, and work, were additionally used as coping mechanisms to keep busy. These were described as 'health anchors' that served to help men feel physically active and engaged in interests.⁴⁹ Men who did not obtain support felt they would have benefited from a mentor to quell fears of a threatened masculinity and normalise help-seeking and foster increased connection.⁵⁶ Three studies showed men strongly valued informal over professional support, either through "mateship" or from men with lived experience of TC.^{38,49,56}

4 | DISCUSSION

The findings of this review indicated that in quantitative research 12%–30% of men report experiencing a reduced sense of masculinity attributed to TC and its treatment. Single men, without children were at a greater risk for masculinity-related psychological sequelae, consistent with other research in men with TC.^{11,58} These men held fears about what they had to offer, and some dwelled on the potential for rejection and embarrassment from prospective partners. The qualitative results indicated that men who hold testicles as symbolic of masculinity tend to be those most affected. A flexible approach to one's own masculinity, as opposed to rigid conformity to traditional ideals enabled positive adjustment and coping with TC,⁵⁶ consistent with previous literature demonstrating the negative impacts of the pressure to endorse masculine norms and on poorer mental health outcomes in men.^{59,60} Sexual dysfunction and chemotherapy were associated with emasculation, largely related to feeling 'weak' and the inability to perform sexually, conflicting with traditional masculine norms.²⁶ This is consistent with prostate cancer research, where a third of men reported feeling diminished masculinity due to treatment, which was significantly related to sexual dysfunction.⁶¹ Younger age was also identified as a potential risk factors for feeling emasculated from TC and its treatment, though this is largely true for all psychological sequelae from cancer⁶ and not all young men with TC were affected.

A potentially more important consideration unearthed in this review is that masculine changes (e.g., feeling incomplete) and the psychological sequelae that follows may depend on the personal values and relationships an individual holds about masculinity, testicles and coping with cancer. The *meaning* of losing a testicle, as identified by the individual's perception may moderate the impact the testicle loss has. This may be indicative of pre-existing masculine beliefs (i.e., biological theory) as men who compared the loss of a testicle to loss of masculinity were likely to experience distress. For other men, losing a testicle meant that these men made assumptions about how others might judge them that compounded their own sense of inadequacy and shame. Moreover, these feelings permeated to other settings, including worries about potential romantic relationships,^{52,54} feeling embarrassed and emasculated in front of other men,⁵¹ and feeling a need to be 'strong' in the face of coping with cancer.^{36,49,53} Men who had opted for a prosthesis were less impacted and indicated a desire to have masculinity 'restored'.

For many men, major life events that occurred before diagnosis, including being partnered and being a father, were protective factors for masculine security. This may be further supporting Smith and colleagues⁴² findings that demonstrated a strong correlation between social support and wellbeing and coping in men with TC. Extrapolating to masculinity, it is possible that having a relationship moderates a reduced sense of masculinity. However, only one study contained a standardised measure to assess masculinity.³⁰ This is consistent with other TC research, where being single was associated with lower self-esteem and lower mental health⁶² and in a recent review demonstrating partnered men with children adjusted more positively to life beyond cancer.⁶³ Investigation is further needed into whether the percentage of men that are experiencing changes in masculinity are also those that are unpartnered.

The earliest five papers^{29,37,39,40,54} dated between the years of 1987–2001 demonstrated little impact of TC to masculinity and reported that fears were generally secondary to the fear of death. One variable that may be worth considering is the approval of cisplatin-based chemotherapy in the late 1970s,² that increased TC survival rates from 10% to 85%. It is plausible that men were newly grateful to survive the disease in the first instance than consider the psychological sequelae from TC. There was also some evidence of a discrepancy in psychological distress between older and newer study.^{39,42} Extensive scholarship and theorising in the past 2 decades may explain why our understanding of masculinity and the role of masculinity has improved. Literature has moved from singular, reductive conceptions of masculinity to complex and hierarchical plural masculinities that situate each man's gender socialisation as a fluid relational process across time and place.¹⁹

Future research should also consider the emerging positive psychology/positive masculinity model (PPMM) that focuses on leveraging men's strengths to encourage healthy masculine identity constructions and the beneficial aspects of masculinity.⁶⁴ These methods have been shown to increase engagement in suicide mental health promotions, a priority area for improving men's health.⁶⁵ However, capturing and utilising masculine positivity is still emerging

in the literature.^{66,67} Considering the pluralities of masculinity that are culture and context dependent, research using contemporary measurement of masculinities are a key priority. Wong's Inventory of subjective masculinity experiences (ISME⁶⁸) as well as Oliffe's Intentions Masculine Health-related Values Scale (IHRMVS)⁶⁹ are two suggestions that allow for a strengths-based measurement and analysis of masculinities.

In keeping with masculine norms, men most often wished for informal support through other men with TC.^{49,56} Some men experienced frustration at being left without information on who and how to connect with others to alleviate their concerns.³⁶ Some men still felt pressure to cope with cancer in a way that was consistent with adhering to masculine norms, creating an expectation to be self-reliant and stoic. It's likely then that these men need support for feeling emasculated that upholds their desire for independence and control in an informal setting that allows them to feel comfortable.

4.1 | Clinical implications

This systematic review demonstrated that overall, a small proportion of men with TC experience changes to their perceived masculinity. Nonetheless, younger men, single men without children and men who adhere strongly to traditional masculine norms may be at a greater risk for what are often distressing perceived changes to masculinity that impair coping with and beyond cancer. As potential risk factors for negative adjustment to cancer, using collaborative approaches to engage men in positive masculinity models that leverage men's strengths and counteract stereotypes may encourage flexibility in adherence to masculine norms that could further work to reduce distress. Various support groups and infrastructure are available to support men with TC. For example, Movember (<https://au.movember.com/mens-health/testicular-cancer>) are a global men's health organisation that provide online support and resources for men with TC, including connecting them with trained 'guides' who are men who have experienced TC.

Moreover, recent prostate cancer research demonstrated increasing health knowledge for the purpose of maintaining bodily control, engaging in support groups and continuing gendered familial roles supported the maintenance of perceived masculinity.⁷⁰ Whilst this has not been evaluated in the TC population, for all men, clear conversations about life beyond cancer and information and referrals to connect with others should be included as part of treatment for TC. Health care providers are in prime position to discuss services with men with TC, however being attuned to and anticipating men's treatment needs and recognising patterns of masculine behaviour men's needs are key to men's engagement.⁷¹

This review also demonstrated discrepancies between doctors' and patients' perceptions of masculinity and that men were hesitant to show emotion or ask for information from their medical team. However, most studies in this review did not discuss the role of medical influence and service providers for men with TC and how this is related to masculinity and coping with cancer. It is important that

future studies both enquire about how these settings influenced their experience of cancer, and that measurements such as patient reported outcomes are always completed by patients rather than clinicians. Recommendations have been made previously about ensuring survivorship care planning is a standard component in TC management, also based on discrepancies between patients' and care providers' expectations.⁷² Survivorship care plans that encourage the protection and maintenance of perceived masculinity and supporting psychological flexibility may be particularly useful.

The strengths of this review include following best practice guidelines for systematic reviews, including prospective registration with PROSPERO, and reporting aligned with both PRISMA and ENTREQ guidelines. Further, expanded search terms were utilised so that there was minimal chance of missing relevant articles to the topic. Finally, abstract and title and full text screening were conducted independently by two coders, as were the quality of article ratings.

4.2 | Study limitations

The review also had limitations. Whilst every effort was given to obtain all literature pertaining to the topic, there is the possibility that research articles were missed. Further, in the quantitative literature only one study utilised a standardised measure of masculinity, meaning there are limitations in the reporting of significance and power of masculinity results. Researcher bias may have influenced the synthesis of qualitative studies. Whilst comprehensive analysis of results and conclusions were undertaken, a single researcher extracted themes and their own perspectives could have influenced the description of these themes. Whilst several studies considered the impact to masculinity, many did not investigate the participant's definition of masculinity and as such the authors are also unable to comment on differing views of the meaning of masculinity.

There were also broader limitations related to the assessment and understanding of masculinity and TC. As a construct, masculinity is complex and quantitative questionnaires can be narrow and carry stereotypical assumptions about the pressures that men face. Multiple masculinities are widely recognised, that vary by culture, relational comparison, social roles and time.¹⁹ Many of the studies within this review were cross-sectional in nature, and did not consider broader contextual factors (e.g., employment) that would have given more confidence in whether perceived impacted masculinity was due to TC or other causes. Moreover, many studies were conducted in high-income countries (e.g., Australia and Canada) indicating the potential for reduced diversity in patient populations. Considering demonstrated racial, ethnical and class disparities in cancer survival rates including men with TC,⁷³ future investigation in this area could consider minority populations.

Future research should be to consider and control for social and cultural influences that may influence masculinity in men with TC.

Only three studies investigated sexual identity and to our knowledge no study asked individuals if they identified as a man. Further, links between sexual diversity and masculinity are not

understood. As an improvement for research in this area, sexual and gender identity should be considered when investigating the experience of TC and masculinity.

4.3 | Conclusion

In conclusion, this systematic review demonstrated some men experience a reduced sense of masculinity as a result of TC and its treatment. Underlying vulnerabilities to distress may also include those that hold meaning to the relationship between testicle loss and masculinity and those that are single and without children at the time of diagnosis. However, these predisposing variables do not result in distress for all men with TC. Further research is needed using validated masculinity measures to improve the quality of the current literature on the topic. Future research in this area should also aim to investigate what psychological factors may work to explain the differentiation or susceptibilities to whether men with TC are impacted or not in their sense of masculine self. Understanding these risk factors could inform the prevention of psychological distress in men with TC.

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CONFLICTS OF INTEREST

The authors have no conflict of interests to report.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analysed in this study.

ORCID

Victoria Dax  <https://orcid.org/0000-0003-4004-1221>

Jeremy Lewin  <https://orcid.org/0000-0002-4305-117X>

Rebecca Wallace  <https://orcid.org/0000-0001-8351-4231>

Joshua F. Wiley  <https://orcid.org/0000-0002-0271-6702>

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APPENDIX A

Search terms from each database

PsycInfo search run 21/04/2022

((testicular cancer or testicular neoplasm or testicular seminoma or testicular*) adj3 cancer) or testes*) AND (masculinit*) OR ((self adj1 image) or (self adj1 concept) or (body adj1 image) or (self adj1 perception)) OR ((psychosexual adj1 development or psychosexual or (gender adj1 identit*) or gender* or psychosocial or sexual* or (sexual adj1 identit*) or psycholog* OR emotion* or (emotional adj1 regulation) or (psychological adj1 distress) or experience* or perception* or perceive* or response* or well-being or impact or accept* or adjust*) OR ((psychological* or emotion*) ad4 (adjust* or distress*)) OR ((men* or man* or masc*) adj3 (role* or norm* or identit*) OR (maleness or manly or fertilit*) OR (masc* adj1 norm) OR (masculin* and ("threat" or norm)) OR ((supportive adj1w care) or (quality adj1 life))

MEDline search run 21/04/2022

1. Testicular Neoplasms/
2. Masculinity/
3. ((self adj1 image) or (self adj1 concept) or (body adj1 image) or (self adj1 perception)).mp. [mp = title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
4. ((psychosexual adj1 development) or psychosexual or (gender adj1 identit*) or gender* or psychosocial or sexual* or (sexual adj1 identit*) or psycholog*).mp. [mp = title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
5. emotion*.mp. or (emotional.mp. adj1 regulation/) or (psychological.mp. adj1 distress/) or experience*.mp. or perception*.mp. or perceive*.mp. or well being.mp. or impact.mp. or accept*.mp. or adjust*.mp. [mp = title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]

6. ((psychological* or emotion*) adj4 (adjust* or distress*)).mp.
7. ((men* or man* or masc*) adj3 (role* or norm* or identit*)).mp.
8. (maleness or manly or fertili*).mp.
9. (masc* adj1 norm).mp.
10. (masculin* and (threat or norm)).mp.
11. ((supportive adj1 care) or (quality adj1 life)).mp.
12. Gender.mp. adj1 Identity/[mp = title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
13. 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12
14. 1 and 13
15. Limit 14 to (English language and humans)

"Human") OR EXCLUDE (EXACTKEYWORD , "Breast Cancer") OR EXCLUDE (EXACTKEYWORD , "Lung Cancer") OR EXCLUDE (EXACTKEYWORD , "Ovary Cancer") OR EXCLUDE (EXACTKEYWORD , "Nonhodgkin Lymphoma") OR EXCLUDE (EXACTKEYWORD , "Leukemia") OR EXCLUDE (EXACTKEYWORD , "Lymphoma") OR EXCLUDE (EXACTKEYWORD , "Kidney Cancer") OR EXCLUDE (EXACTKEYWORD , "Stomach Cancer") OR EXCLUDE (EXACTKEYWORD , "Pancreas Cancer") OR EXCLUDE (EXACTKEYWORD , "Colorectal Cancer") OR EXCLUDE (EXACTKEYWORD , "Animals") OR EXCLUDE (EXACTKEYWORD , "Thyroid Cancer") OR EXCLUDE (EXACTKEYWORD , "Colon Cancer") OR EXCLUDE (EXACTKEYWORD , "Embryonal Carcinoma") OR EXCLUDE (EXACTKEYWORD , "Esophagus Cancer")) AND (EXCLUDE (DOCTYPE , "cp")

CINAHL plus search run 21/04/2022

Scopus search run 21/04/2022

(TITLE-ABS ("testicular cancer" OR "testicular neoplasm" OR "cancer of testes" OR "test?s cancer" OR "testic* cancer")) AND ((TITLE-ABS (emotion*) OR (sexual AND identit*) OR (sexual*) OR ("psychosexual development") OR (psychosocial) OR (psychosexual))) OR (TITLE-ABS (masculinit*)) OR (TITLE-ABS ((gender*))) OR (body AND image) OR (self AND image) OR (masculin* AND threat OR norm) OR (self AND concept)) OR (TITLE-ABS ((psychological* OR emotion*) W/3 (adjust* OR distress*))) OR (TITLE-ABS ((experience* OR perception* OR perceive* OR response* OR well-being OR impact OR accept* OR adjust*) OR (self AND perception))) OR (TITLE-ABS ((emotion AND regulation) OR (maleness OR manly) OR ((men* OR man* OR masc*) W/2 ("norm*" OR "identit*" OR "role*")) OR (gender AND identit*) OR (sexual AND identit*) OR (psychologic*) OR (emotion*))) OR (TITLE-ABS ((quality AND of AND life) OR (psychosexual) OR (supportive AND care) OR (experience*) OR (maleness) OR (emotion AND regulation))) OR (fertilit*) AND (LIMIT-TO (LANGUAGE , "English"))) AND (LIMIT-TO (EXACTKEYWORD ,

1. (MH "Testicular Neoplasms")
2. (MH "Masculinity")
3. "self image" or "self-image" or "self concept" or "self-concept" or "body image" or "self-perception" or "self perception"
4. "psychosexual development" or "psychosexual" or "gender identit*" or "gender*" or "psychosocial" or "sexual*" or "sexual identit*" or "psychologic*"
5. "emotion*" or "emotional regulation" or "psychological distress" or "experience*" or "perception*" or "perceive*" or "response*" or "well-being" or "impact" or "accept*" or "adjust*"
6. ("psychological*" or "emotion*") N3 ("adjust*" or "distress*")
7. ("men*" or "man*" or "masc*") N2 ("role*" or "norm*" or "identit*")
8. "maleness" or "manly" or fertilit*
9. "masc*" N1 "norm"
10. "masculin*" and ("threat" or "norm")
11. "supportive care" or "quality of life"
12. S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11
13. S1 AND S12

APPENDIX B

QUANTITATIVE QUALITY RATINGS USING JOANNA BRIGGS 'CHECKLIST FOR ANALYTICAL CROSS-SECTIONAL STUDIES'

Ref #	Author (Year)	Total	1. Were the criteria for inclusion in the sample clearly defined?	2. Were the study subjects and the setting described in detail?	3. Was the exposure measured in a valid and reliable way?	4. Were objective standard criteria used for measurement of the condition?	5. Were confounding factors identified?	6. Were strategies to deal with confounding factors stated?	7. Were the outcomes measured in a valid and reliable way?	8. Was appropriate statistical analysis used?
39	Cassileth (1987)	6	✓	✓	✓	✓	✗	✗	✓	✓
40	Fossa (1996)	6	✓	✓	✓	✓	✗	✗	✓	✓
46	Krouwel (2021)	5	✓	✓	✓	✓	✗	?	✗	✓
41	Rossen (2012)	7	✓	✓	✓	✓	✓	✓	✗	✓
42	Smith (2016)	8	✓	✓	✓	✓	✓	✓	✓	✓
45	Smith (2020)	6	✓	✓	✓	✓	?	?	✓	✓
30	Wang (2020)	8	✓	✓	✓	✓	✓	✓	✓	✓
47	Wortel (2015)	6	✓	✓	✓	✓	✗	✗	✓	✓
43	Yamashita (2021a)	7	✓	✓	✓	✓	✓	?	✓	✓
44	Yamashita (2021b)	7	✓	✓	✓	✓	✓	?	✓	✓

APPENDIX C

QUALITATIVE QUALITY RATINGS USING JOANNA BRIGGS 'CHECKLIST FOR QUALITATIVE RESEARCH'

Ref #		Total	1. Is there congruity between the stated philosophical perspective and the research methodology ?	2. Is there congruity between the research methodology and the research question or objectives?	3. Is there congruity between the research methodology and the methods used to collect data?	4. Is there congruity between the research methodology and the representation and analysis of data?	5. Is there congruity between the research methodology and the interpretation of results?	6. Is there a statement locating the researcher culturally or theoretically?	7. Is the influence of the researcher on the research, and vice-versa, addressed?	8. Are participants, and their voices, adequately represented?	9. Is the research ethical according to current criteria or, for recent studies, and is there evidence of ethical approval by an appropriate body?	10. Do the conclusions drawn in the research report flow from the analysis, or interpretation, of the data?
29	Brodsky (1995)	8	?	✓	✓	✓	✓	x	✓	✓	✓	✓
48	Carpentier (2011)	7	?	✓	✓	✓	✓	x	x	✓	✓	✓
50	Chapple (2004a)	7	?	✓	✓	✓	✓	x	x	✓	✓	✓
55	Chapple (2004b)	7	?	✓	✓	✓	✓	x	x	✓	✓	✓
51	Gurevich (2004)	9	✓	✓	✓	✓	✓	✓	x	✓	✓	✓
49	Kristjanson (2006)	8	?	✓	✓	✓	✓	x	✓	✓	✓	✓
52	MacDonald (2002)	9	✓	✓	✓	✓	✓	x	✓	✓	✓	✓
53	Mason (2004)	6	?	✓	✓	✓	✓	x	x	✓	x	✓
56	Matheson (2016)	8	?	✓	✓	✓	✓	x	✓	✓	✓	✓
38	Petrella (2020)	9	✓	✓	✓	✓	✓	✓	x	✓	✓	✓
57	Saab (2014)	9	✓	✓	✓	✓	✓	x	✓	✓	✓	✓
54	Schover (1984)	3	?	?	✓	✓	✓	x	x	x	x	x
37	Sheppard (2001)	5	?	✓	✓	✓	✓	x	x	x	x	✓
36	Shen (2016)	7	?	✓	✓	✓	✓	x	x	✓	✓	✓