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The Role of Exercise on Masculinity, Body Image, and Quality of Life in Men with Prostate Cancer. A Mixed Methods Study.

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The Role of Exercise on Masculinity, Body Image, and Quality of Life in Men with Prostate
Cancer. A Mixed Methods Study.

by

David Michael Langelier

A THESIS

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Abstract

Early research supports exercise in its role to improve masculinity and body image changes that may result from treatment; however, studies to date have largely examined limited treatment groups (i.e., those receiving androgen deprivation therapy) and did not include men from across the exercise spectrum. Following a systematic review of the literature, we implemented a mixed methodology approach to gather both quantitative and qualitative information surrounding men's sense of masculinity, body image and quality of life in prostate cancer survivors with analysis based on degree of exercise participation. Participants included prostate cancer patients undergoing more diverse treatment protocols and aimed to include men from across the exercise spectrum, from active to inactive. Males completed a set of psychosocial surveys with a sub-selection of men from both groups participating in semi-structured, one-on-one interviews with the primary author. Aerobically active men demonstrated higher masculinity, and quality of life scores regardless of prior androgen deprivation treatment. Emergent themes relating to masculinity and exercise could be classified based upon the primary coping mechanisms of competition, control, rationalization, social connectedness, acceptance, optimism, and withdrawal. The results of these studies support the benefit of exercise on masculinity and quality of life regardless of their prior treatment; however, there did appear to be differences in the coping strategies and motivational factors behind the coping strategies based on exercise level. By understanding the relative value men place on masculinity and body image based on their activity level and the degree to which men feel exercise influences these traits, clinician-researchers may be able to individualize exercise programming and provide education to increase exercise participation amongst both groups.

Keywords: physical activity, masculinity, motivation, prostatic neoplasms, self concept

Preface

Chapter 3 of this thesis has been published as Langelier, D.M., Cormie, P., Bridel, W., Grant, C., Albinati, N., Shank, J., Daun, J.T., Fung, T.S., Davey, C., Culos-Reed, S.N. *Perceptions of masculinity & body image in men with prostate cancer: the role of exercise*. *Supportive Care in Cancer*. 2018. 26(10): 3379-3388.

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As I take this opportunity to reflect on this thesis it's easy to see how many influential people have contributed to this work and helped me along this journey. First, I would like to thank my incredible supervisor, Dr. Nicole Culos-Reed. With what started as a simple presentation from you to our resident group during my residency I had little appreciation at the time for how much it would change my life. Us working together has truly been the spark to ignite my passion for helping cancer survivors and specifically finding ways to integrate exercise into standard cancer care. Nicole, you have always had your door open, put up with my unnecessarily long emails, challenged my assertions to help push my research limits and understanding, and demonstrated to me how research can be used to translate relevant findings into real-world practice. I cannot wait to continue collaborating, and building capacity alongside your team to better the lives of survivors and their families. To Dr. Christopher Grant, you have always been the voice of realism, and practicality. Thank you for being my support, an incredible physician role model and confidant, and an excellent 'President' to us all. To Dr. William Bridel, thank you for the guidance, allowing me to hold onto your books on masculinity for outrageous periods of time, and your unique sociological perspective. It really has been such a pleasure getting to collaborate with you. To Dr. Prue Cormie, the opportunity to learn from one of the titans of cancer and exercise has been a surreal experience. Thank you for your perspective, and willingness to help shape my research goals even from half way around the world.

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Third, to my husband, Robert Luini. When I came home and asked about doing a Master's in the final two years of my residency you stood by my crazy idea. Not once did you complain while I pursued this dream. You are my rock, my everything. I love you. I promise no PhD for at least one year.

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Last and certainly not least to my mother and father. This last few years has been fraught with challenges but I think despite this turbulence we have come out stronger as a family. You have both always been my main cheerleaders and the Cus D'Amato to my Mike Tyson. Thank you for being in my corner no matter what and for all the love and support you have shown me.

Dedication

This work is dedicated to the men living, surviving and thriving with prostate cancer. I will continuously strive to bring your troubles to light and improve the challenges you face.

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List of Symbols, Abbreviations and Nomenclature

Abbreviation	Definition
ADT	Androgen deprivation therapy
HREBA	Health Research Ethics Board of Alberta
CC	Cancer Committee
PSA	Prostate specific antigen
LSI	Godin's Leisure Score Index
GLTEQ	Godin and Shephard Leisure Time Exercise Questionnaire
ACSM	American College of Sports Medicine
MSES	Masculine Self-esteem scale
PAQ	Personal Attributes Questionnaire
M subscale	Masculine subscale
F subscale	Feminine subscale
MF subscale	Masculine-Feminine subscale
BIS	Body image scale
FACT-P	Functional Assessment of Cancer Therapy – Prostate (Version 4)
FACT-G	Functional Assessment of Cancer Therapy – General Scale
TOI	Trial Outcome Index within the FACT-P
DML	David Michael Langelier
AD	Adrijana D'Silva
JS	Jena Shank
CG	Christopher Grant
WB	William Bridel
PC	Prue Cormie
NCR	Nicole Culos-Reed
NA	Natalia Albinati
JTD	Julia Teresa Daun
CD	Colin Davey
TSF	Tak S. Fung
AMSTAR	Assessing the Methodological Quality of Systematic Reviews
MeSH	Medical Subject Headings
ACSM	American College of Sports Medicine
QoL	Quality of Life
NCCN	National Comprehensive Cancer Network
RCT	Randomized Controlled Trial
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta Analyses

CHAPTER 1: INTRODUCTION AND LITERATURE REVIEW

Epidemiology

Prostate cancer is one of the most common cancers affecting men worldwide (Fitzmaurice et al., 2017). In the United States, there are over three million prostate cancer survivors, with a similar per-capita prevalence rate observed in Canada (Canadian Cancer Society, 2017; DeSantis et al., 2014; Miller et al., 2016). The number of men who will develop prostate cancer is expected to steadily rise in the near future, due to the aging baby-boomer generation as well as the increased number of men undergoing prostate cancer surveillance and testing (Wallner et al., 2012). The rising population of men with prostate cancer and their associated treatment-related morbidities represent a significant burden on future health care delivery (Grover et al., 2000).

Prostate Cancer Treatment

Treatment for prostate cancer is dependent upon a number of interrelated variables, including tumor burden, stage, risk of disease progression, patient comorbidity, life-expectancy and patient preference (Skolarus, 2018). Additional details on prostate cancer staging can be found in Appendix A. In men with local or very low risk disease, active surveillance with serial monitoring is typically recommended (National Comprehensive Cancer Network [NCCN], 2013). This approach is favorable, as it prevents unnecessary side effects that result from invasive treatments. In fact, many men with prostate cancer will not experience disease progression and may thus remain asymptomatic, eventually dying from other non-cancer related causes (Newschaffer, Otani, McDonald, & Penberthy, 2000; Riihimaki, Thomsen, Brandt,

Sundquist, & Hemminki, 2011). However, some men with early stage prostate cancer may still elect for treatment, primarily due to fear of cancer progression or leaving curable disease untreated (Zeliadt et al., 2006).

In patients with local disease but at higher risk of progression, the use of surgical prostatectomy is often seen as first line treatment. This can be performed robotically with minimally invasive techniques or with larger ‘radical’ resections which may or may not include removal of regional lymph nodes (National Comprehensive Cancer Network [NCCN], 2013). Surgical excision can result in urinary dysfunction (e.g., stress incontinence, urinary frequency, and dysuria), penile changes including shortening of the penis (Garcia & Brock, 2010) and sexuality changes including erectile and orgasmic dysfunction (Braun et al., 2014; Choi, Nelson, Stasi, & Mulhall, 2007; Fenner, 2011; Fujita, Landis, McNeil, & Pavlovich, 2009). Erectile dysfunction is the most common side effect in men undergoing surgical prostatectomy and can persist for years following treatment (Barocas et al., 2017; Donovan et al., 2016).

Adjuvant radiation therapy often follows surgery (Skolarus, 2018). This can be administered externally (i.e., from outside the body) or from within the body (i.e., brachytherapy; Skolarus, 2018). Radiation toxicities often worsen previously experienced side effects and can be experienced immediately or evolve years following treatment (Dearnaley et al., 1999; Schultheiss et al., 1997). Men with prior radiation therapy have higher levels of gastrointestinal, urinary, sexual and cutaneous related disorders and/or disfigurements compared to radiation naïve individuals (Michaelson et al., 2008).

Finally, advanced disease which often involves extension of tumor cells into the lymphatic system, or disease which has traveled to distant tissues such as bone, often includes androgen deprivation therapy (ADT) with or without adjuvant chemotherapy (Klein, 2018). ADT

is a type of hormonal treatment directly inhibiting the production of testosterone from the testis. In normal circumstances, prostate cancer cells respond to testosterone with proliferation; therefore, by chemically castrating the male and reducing his testosterone levels, treatment directly inhibits prostate cancer growth and spread (Sharifi, Gulley, & Dahut, 2005).

Early effects of ADT can result in body composition changes (e.g., decreased penile or testicular size, female pattern breast development, or loss of other secondary sex characteristics such as male pattern hair; Reese, 2011; Wassersug & Oliffe, 2009), vasomotor symptoms such as hot flashes (Michaelson et al., 2008) and increased symptoms of fatigue (Shahinian, Kuo, Freeman, & Goodwin, 2006). In men experiencing these urinary or sexual side effects, their relative risk of developing depression, anxiety and suicidal thoughts are much higher when compared to age-matched controls (Carlsson et al., 2013; Korfage, Essink-Bot, Janssens, Schroder, & de Koning, 2006). Late effects of ADT have also been correlated to a higher incidences of cardiovascular disease (Levine et al., 2010), diabetes and osteoporotic fractures (Michaelson et al., 2008).

Overall, regardless of treatment protocols, prostate cancer patients may experience significant physical, emotional and psychological changes throughout their survivorship. Any combination of these side effects may change how men experience their masculinity and body image.

Masculinity and Body Image issues in Prostate Cancer

The strata of men predominantly affected by prostate cancer (i.e., those 65 years and older) have been socialized to ascribe to dominant or traditional masculine norms (Cecil, McCaughan, & Parahoo, 2010). These norms dictate how 'masculine' men should look, think,

feel and act (Burns & Mahalik, 2007; Oliffe, 2005) and have been socially constructed based on their interactions with teachers, parents and media. Value is often placed on classically male traits such as independence, emotional withdrawal, sexual potency, self-reliance, competitiveness and control (Helmreich, Spence, & Wilhelm, 1981; Zaidler, Manne, Nelson, Mulhall, & Kissane, 2012). As prostate cancer diagnosis and its treatments frequently result in sexual dysfunction, increased adiposity, body feminization and psychological distress, a patient's masculinity can be undermined by treatment (Cecil et al., 2010; Fergus, Gray, & Fitch, 2002). Specifically, the male's appearance and/or their capabilities are no longer synonymous with the socially acceptable form of masculinity. These identity changes have been linked to profound reductions in quality of life (Cormie, Chambers, et al., 2014; Cormie, Newton, Taaffe, Spry, & Galvao, 2013) and mental distress (Cormie et al., 2016). Body image is another essential contributor to a male's sense of masculinity. When physical changes to the body become incongruent with a patient's perception of what man should look like, reductions in quality of life can occur (Cash, Jakatdar, & Williams, 2004).

Exercise in Prostate Cancer

One potential solution for body image and masculinity concerns is exercise. Exercise has substantial evidence supporting its positive effects on the mental and physical well-being, including measures of quality of life, in men with prostate cancer (Baumann, Zopf, & Bloch, 2012; Culos-Reed et al., 2010; Galvao, Taaffe, Spry, Joseph, & Newton, 2010; Gardner, Livingston, & Fraser, 2014; Keogh & MacLeod, 2012). Exercise intervention studies have also shown positive body composition changes in men with prostate cancer, and these body changes

can be consistent with a return to the idealized masculine phenotype (Galvao et al., 2010; Segal et al., 2009).

Although some studies to date have examined masculinity in genitourinary cancers (Burns & Mahalik, 2007, 2008; Chapple & Ziebland, 2002; Gray, Fitch, Fergus, Mykhalovskiy, & Church, 2002; Oliffe, 2005, 2006; Wall & Kristjanson, 2005) few have looked at exercise as a form of treatment to restore masculinity specifically in prostate cancer patients (Bourke et al., 2012; Bruun et al., 2014; Cormie, Turner, Kaczmarek, Drake, & Chambers, 2015; Hamilton, Chambers, Legg, Oliffe, & Cormie, 2015; Kronenwetter et al., 2005; Martin, Bulsara, Battaglini, Hands, & Naumann, 2015). In the studies that examined exercise as a way to treat masculinity, most were exclusive to patients on ADT and were not inclusive of patients receiving other combinations of treatment. Additionally, all participants within prior studies were engaged in an exercise intervention. A study examining masculinity, body image and quality of life issues has not yet been performed in men who meet and are failing to meet exercise guidelines. There has also been no study that has attempted to directly compare the expressions of masculinity, body image and quality of life between men who are more or less active.

Rationale

Interventions promoting exercise have been increasingly used during cancer treatments, and higher levels of exercise have a number of physical and psychological benefits that can positively impact the quality of life for cancer survivors. Unfortunately, cancer and exercise research to date has largely excluded the unique challenges faced by prostate cancer patients (e.g., reductions in self-perception of masculinity, body image and quality of life), or focused on those receiving ADT.

While literature exists on masculinity and body image in patients receiving ADT who exercise (Bourke et al., 2012; Bruun et al., 2014; Cormie, Galvao, et al., 2015; Hamilton et al., 2015), it may not reflect how different these experiences are in a more diversely treated population. In addition, there has been little work to understand the role or importance of exercise for perceptions of masculinity or body image in those who are more or less active. Taking a mixed methods approach to understanding the relationship between exercise levels, patient reported outcomes including quality of life and masculinity will provide new information that can be used to enhance the cancer journey for men with prostate cancer.

Therefore, the purpose of the present work was to examine masculinity, body image and quality of life in a more diversely treated population of men with prostate cancer, and specifically determine if the expressions of masculinity, body image and quality of life differed in those men who were meeting or not meeting exercise guidelines. This research occurred in three phases. The first included a systematic review of the qualitative exercise and prostate cancer literature, to determine what specific exercise programs have been implemented in prostate cancer patients and their relative effect on masculinity, body image and personal identity (refer to Chapter 2). The second phase used standardized questionnaires to explore how scores of masculinity, body image and quality of life may differ in men who were more or less active (refer to Chapter 3). The third phase sought to explore the experience of both active and inactive men using interviews. The aim of this phase was to better understand the relationship active and inactive men have with exercise and how it might be similar or different in the experience of their own masculinity, body image or quality of life (refer to Chapter 4). Finally, we attempted to look across the quantitative and qualitative data to provide suggestions on how clinicians and

researchers may create behaviour change to both groups of men, help both engage with the established benefits of exercise and make recommendations on the direction for future research.

Definition of Terms

1. *Masculinity* - Coherence of one's identity as derived from valued male norms, these traits may include: self-reliance, potency, competitiveness, control, capacity to be a provider, restraint from showing dependence or emotion and vulnerability (Zaider et al., 2012). Additionally, masculinity is felt to be a social construction, and certain behaviors or illnesses can shift power relations and reduce a man's status in masculine hierarchies, lending itself to masculinity being a fluid construct (Chapple & Ziebland, 2002).
2. *Body image* – the dynamic perception of one's own bodily appearance, function and sensations as well as feelings associated with this perception. This occurs largely on a subconscious level and is normally regulated by the condition of the body (Dropkin, 1999). Body image is not isolated to physicality. It encompasses the person as a whole including social expression, functional status, cognitive and emotional features as perceived by that individual.
3. *Quality of Life* - the dynamic perception of one's own physical, social and psychological function as well as the perception of disease- or treatment-related symptoms (Dropkin, 1999).

Statement of contribution

Chapter 1 – Introduction and Literature Review

DML wrote and reviewed the chapter; NCR reviewed the content and provided writing and review support.

Chapter 2 – Systematic Review Manuscript

All authors contributed to this work and authorship of this manuscript. DML planned, conducted the search, analyzed the results, wrote and reviewed the manuscript; AD and JS conducted the search, analyzed the results, provided writing content and reviewed the manuscript; CG conducted the search, assisted with the analysis, wrote and reviewed the manuscript; WB and PC provided writing and review support; and NCR coordinated the idea, reviewed the analysis and provided writing and review support.

Chapter 3 – Quantitative Explorations Manuscript

All authors contributed to this work and authorship of the manuscript. DML planned, collected, analyzed the results, wrote and reviewed the manuscript. PC, WB, CG providing writing guidance and reviewed the manuscript. NA, JS, JTD, CD, assisted with chart reviews, data entry, and reviewed the manuscript. TFS assisted with statistical analysis. NCR coordinated the idea, reviewed the analysis and provided writing review support.

Chapter 4 – Qualitative Explorations Manuscript

All authors contributed to this work and authorship of the manuscript. DML designed, conducted the interviews, transcribed the reports, coded the data, analyzed the coded material, wrote and reviewed the manuscript. CJ provided dual coding, helped with analysis of the data and provided feedback on the final report. PC, WB, CG, providing writing guidance and

reviewed the manuscript. NCR coordinated the idea, reviewed the analysis and provided writing review support.

Chapter 5 – Conclusion

DML wrote and reviewed the chapter; NCR reviewed the content and provided writing and review support.

CHAPTER 2: SYSTEMATIC REVIEW MANUSCRIPT

Langelier, D.M., D'Silva, A., Shank, J., Grant, C., Bridel, W., Cormie, P., Culos-Reed, S.N.

(2018). *Exercise Interventions and their Effect on Masculinity, Body Image, and Personal Identity in Prostate Cancer – A Systematic Qualitative Review*. Manuscript submitted October 26, 2018; under review at Psycho-Oncology.

Abstract

Objective: Men with prostate cancer face various body composition and psychosocial challenges following diagnosis. Movement-based interventions such as exercise may represent novel strategies to improve these important biopsychosocial changes. This systematic qualitative review aimed to examine the various exercise interventions and their effect on male perception of masculinity, body image and personal identity.

Methods: A systematic search of the electronic databases including Medline, EMBASE, SocINDEX, CINAHL, PubMed, PsychInfo, Academic Search Complete, SPORTDiscus and LGBT Life was conducted in July 2017 and repeated in August 2018. Eligible studies included qualitative works examining psychosocial outcomes of masculinity, body image or personal identity within an exercise intervention. Thematic content analysis allowed for qualitative synthesis across numerous studies.

Results: Six studies met eligibility criteria for inclusion. Three interventions used multimodal aerobic and resistance training, one incorporated aerobic exercise through football practice and one utilized a home-based aerobic plus yoga program. Exercise was implicated to improve masculinity through creation of a safe community, allowed for refocusing on valued male traits, provided a source of distraction and offered a means of establishing control over one's illness. Exercise also facilitated a process of self-reflection secondary to changes in physique and helped to re-establish male self-efficacy.

Conclusions: Regardless of cancer stage, treatment status, or prior androgen deprivation therapy exposure, both aerobic or aerobic and resistance training exerted positive effects on perceived feelings of masculinity, body image and personal identity. Future research is needed to establish exercise dosing guidelines for men facing masculinity and body image issues.

Background

Prostate cancer remains the third leading cause of cancer-related death in American men, with an estimated 1 in 7 diagnosed and 1 in 39 dying from the disease (American Cancer Society, 2017). While the vast majority of men diagnosed with prostate cancer will not die from prostate cancer, survivors are often left with a myriad of physical, emotional and social consequences (McGinty et al., 2014). These side effects include fatigue (Moyad, 2005), urinary or bowel incontinence (Carter, Bryant-Lukosius, DiCenso, Blythe, & Neville, 2011; MacDonald, Fink, Huckabay, Monga, & Wilt, 2007), increased adiposity (Cormie, Newton, Taaffe, Spry, Joseph, et al., 2013) and reductions in physical fitness (Baumann et al., 2012). Arguably, one of the most disabling side effects identified by prostate cancer survivors is the loss or shift in how men experience or conceptualize their masculinity (Arrington, 2003; Cushman, Phillips, & Wassersug, 2010; Hedestig, Sandman, Tomic, & Widmark, 2005).

Changes in perceptions of masculinity have been described as a complex process resulting from a combination of sexual dysfunction (e.g., low libido, impotence, shortened penis), characteristic body changes compatible with the female archetype (e.g., gynaecomastia, loss of male pattern hair, sarcopenia) and emotional or behavioral changes (e.g., loss of control, emergence of help-seeking behaviors and emotional transparency; Cormie, Newton, Taaffe, Spry, & Galvao, 2013). Along with other changes, these may serve to undermine males' previously held masculine values and result in increased levels of psychological distress (Cecil et al., 2010; Fergus et al., 2002).

Research relating to masculinity changes has found that many prostate cancer survivors seek to restore their masculinity through a focus on physical appearance and participating in activities which facilitate demonstration of control over their illness (Cormie et al., 2016).

Therefore, activities which promote body awareness and facilitate control, such as aerobic and resistance training, have become increasingly recognized for their established effect on improving body composition and their potential role to improve perceptions of masculinity, body image and personal identity (Cormie, Newton, Taaffe, Spry, Joseph, et al., 2013; Mareschal et al., 2017).

To date, numerous randomized controlled trials (RCT) have attempted to capture and quantify masculinity, body image and personal identity changes experienced by men with prostate cancer (Bjerre et al., 2016; Cormie, Galvao, et al., 2015; Cormie, Newton, Taaffe, Spry, Joseph, et al., 2013; Gaskin, Craike, Mohebbi, Courneya, & Livingston, 2017; Livingston et al., 2015). Studies examining masculinity have often extrapolated their claims from assessments of erectile dysfunction (Ben-Josef, Wileyto, Chen, & Vapiwala, 2016; S. K. Chambers, Chung, Wittert, & Hyde, 2017a), levels of sexual activity, intimacy or function (Cormie, Galvao, et al., 2015; Cormie, Newton, Taaffe, Spry, Joseph, et al., 2013; Dahn et al., 2005; Gaskin et al., 2017; Gaskin et al., 2016; Livingston et al., 2015; Lyons, Winters-Stone, Bennett, & Beer, 2016; Mareschal et al., 2017; Skinner et al., 2016), or perceptions of one's masculine self-esteem (Mareschal et al., 2017). There thus exists significant heterogeneity across studies on what constitutes masculinity, and to date most studies examining changes in masculinity have assessed men receiving androgen deprivation therapy (ADT; Bjerre et al., 2016; Cormie, Galvao, et al., 2015; Cormie, Newton, Taaffe, Spry, Joseph, et al., 2013). Additionally, the measurement tools currently used by psychosocial researchers have been designed to capture more 'traditional' interpretations of masculinity and therefore may not account for sociocultural variations in how masculinity can be expressed (S. K. Chambers et al., 2017a).

To address these limitations in the work to date, qualitative studies offer the unique opportunity for men to express their understanding of masculinity and provide insight into how exercise interventions may influence masculinity, body image changes and personal identity. Specifically, within the exercise literature, qualitative studies examining the psychosocial issues of masculinity, body image and personal identity have often taken place within an ongoing exercise RCT (Bourke et al., 2012; Bruun et al., 2014; Hamilton et al., 2015; Kronenwetter et al., 2005), reflecting various types or intensities of exercise. Understanding how masculinity, body image and personal identity are expressed across different exercise modalities may offer additional insight into whether specific exercise prescriptions may offer superior benefits over one another.

Aims and objectives

The objective of this systematic review was to summarize the impact of various exercise interventions on the psychosocial domains of masculinity, body image and personal identity in prostate cancer patients. Specifically, this review reports on (1) which exercise programs have been examined in prostate cancer patients, (2) the relative effects of specific exercise characteristics (e.g., type, frequency, timing) on the specified psychosocial domains, (3) the quality within the available studies and (4) the current gaps in the literature.

Methods

This systematic review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA; Moher, Liberati, Tetzlaff, & Altman, 2009) and the AMSTAR tool for assessing methodological quality of systematic reviews (Shea et al., 2017).

Search strategy

Prior to the start of this review, a preliminary search was performed to identify any similar reviews on the topic. It was established that no relevant reviews on the research question had been registered or published. A systematic search across nine electronic databases from their earliest available dates (Medline, CINAHL, EMBASE, PubMed, PsychInfo, Academic Search Complete, SocIndex, SPORTDiscus, and LGBT Life with Full Text) was carried out from July 14, 2017 to July 16, 2017. The search was developed and tested through an iterative process including two authors (DML and NCR) and an experienced medical librarian.

The search strategy used a wide range of controlled vocabulary (MeSH terms) and keywords transferable across all databases. Vocabulary and syntax were adjusted for database requirements; and keywords were truncated to broaden results. Keywords included “prostate neoplasm* OR prostate cancer* AND male identit* OR gender identit* OR gender role* OR gender script* OR masculin* OR manhood OR macho OR self esteem* OR self perception OR body image* OR body represent* OR body schema AND physical activit* OR physical exercise* OR exercise* OR athletic* OR calisthenics OR interval train* OR resistance train* OR yoga OR pilate* OR stretching OR martial art* OR tai chi OR movement.” No publication type or date restrictions were applied, but results were restricted to English language. Additionally, the reference lists of eligible studies were reviewed to identify any additional studies not captured in the original search strategy, including reviews, systematic reviews or meta-analyses.

Study eligibility criteria

Studies were eligible if they were: written in English; published in peer-reviewed journals as original research; included prostate cancer patients as the primary population or provided separate subgroup analysis in mixed cancer diagnoses; included interventions incorporating exercise outside the context of conventional rehabilitation or physical therapy; and, examined at least one psychosocial domain of masculinity, body image or personal identity. This review focused on qualitative studies but considered mixed methods research if prostate specific results could be extracted. Studies were excluded if they were: quantitative only; editorials; opinion pieces; abstracts without full text; conference proceedings; guidelines; dissertations; reviews; and, systematic reviews or meta-analysis. Studies failing to include both an exercise intervention and at least one of the psychosocial outcomes of interest were excluded.

Article selection

The study selection process is outlined in Figure 2-1. All title and abstracts were randomly assigned to two members of the research team (DML, AD, JS, or CG) who performed independent screening using the study eligibility criteria. In studies resulting in a discrepancy for inclusion, a third author (NCR) resolved any discrepancies. Full text versions of the relevant studies were evaluated by the first three authors (DML, AD, and JS). Consensus was required for inclusion in this review.

Nearing completion of this review, the systematic search was repeated (August 18, 2018) to identify any additional publications. The search yielded no additional articles meeting inclusion criteria.

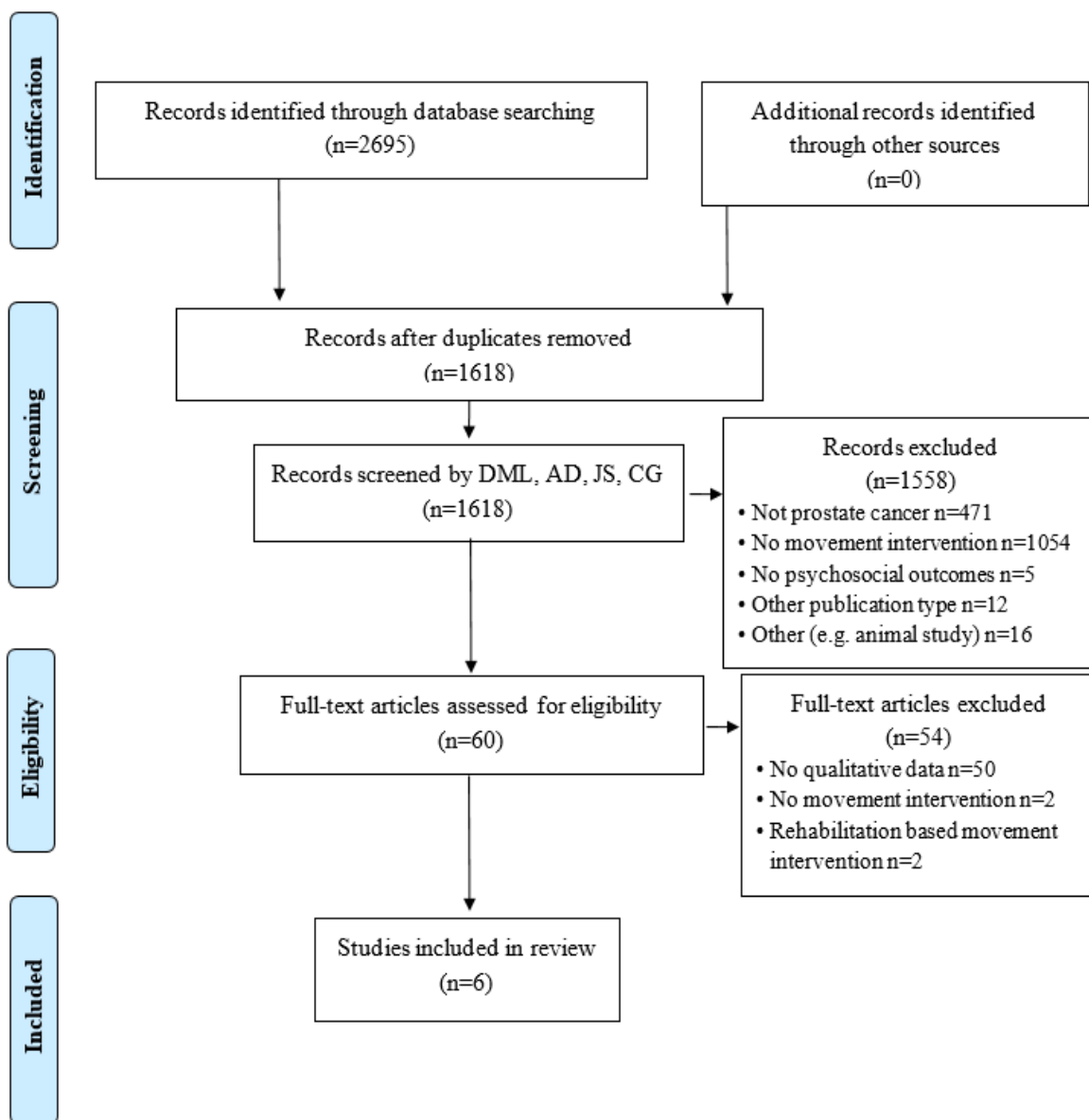


Figure 2-1. Preferred Reporting Items for Systematic Reviews and Meta Analysis (PRISMA) of selection process with reasons for exclusion.

Data collection process

Data extracted from each individual study are listed in Figure 2-2. Collected data were entered, combined and stored in an excel spreadsheet. Where available, parent studies from which the qualitative samples were drawn were used when demographic or exercise characteristics were insufficient. In cases of missing data, corresponding authors were contacted.

As the studies contained within this review were qualitative in nature, a content analysis was undertaken. This allowed qualitative data and themes to be extracted, compared and systematically distilled across multiple studies (Liamputtong & Serry, 2013; Noblit & Dwight, 1988). Authors (DML, AD, and JS) independently read the articles in depth, then met to discuss which data or author inferences from the text were directly applicable to the psychosocial outcomes of interest (i.e., masculinity, body image, personal identity). Any statement corresponding exclusively to a co-intervention (e.g., dietary advice, meditation) beyond exercise interventions were not included to ensure data represented participant views of exercise strategies. Qualitative data supporting the psychosocial outcomes of interest can be found in Table 2-4.

<p>Study Details:</p> <ul style="list-style-type: none">• First author• Year of publication• Country <p>Participants:</p> <ul style="list-style-type: none">• Age (i.e., mean or range)• Ethnicity• Cancer stage• Treatment• Sample size <p>Exercise Intervention Specifics:</p> <ul style="list-style-type: none">• Mode of movement delivery• Type of movement• Frequency• Intensity• Time• Program length• Progression• Co-Interventions <p>Study Characteristics:</p> <ul style="list-style-type: none">• Type of study from which qualitative sample was drawn (i.e. RCT)• Stated aims• Methodological framework <p>Qualitative Results & Themes:</p> <ul style="list-style-type: none">• Masculinity• Body image• Sense of self / personal identity
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Figure 2-2. Extracted data items from each article included within the systematic review.

Quality appraisal

Methodological quality was assessed according to the Critical Appraisal Skills Program (CASP; Critical Appraisal Skills Programme, 2017). This tool assesses the usefulness of studies through 10 screening questions. (I) Was there a clear statement of the aims? (II) Is the qualitative methodology appropriate? (III) Was the research design appropriate to address the aims? (IV) Was the recruitment strategy appropriate to the aims? (V) Was the data collected in a way that addressed the issue? (VI) Has the relationship between research and participants been adequately considered? (VII) Have ethical issues been taken into consideration? (VIII) Was the data analysis sufficiently rigorous? (IX) Is there a clear statement of findings? (X) How valuable is the research? Studies were independently screened and scored (0-10) by three researchers (DML, AD, and JS). Discrepant scores were resolved through discussion and consensus. All studies were judged to be high quality (scores of 8-10) and were subsequently included in the final analysis (Table 2-1). Major methodological issues within the included studies were inadequate explanation of the researcher-participant relationship and how this may have influenced conclusions or inadequate explanation of the rigorousness of the data analysis.

Table 2-1. *Methodological Quality Within Available Studies*

Author, year	Criteria										Total
	I	II	III	IV	V	VI	VII	VIII	IX	X	
Cormie et al., 2015	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	9/10
Martin et al., 2015	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	9/10
Hamilton et al., 2015	Y	Y	Y	N	Y	N	Y	Y	Y	Y	8/10
Bruun et al., 2014	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	10/10
Bourke et al., 2012	Y	Y	Y	Y	Y	N	Y	N	Y	Y	8/10
Kronenwetter et al., 2005	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	9/10

Note. Scores: 1-5/10 low quality; 6-7/10 medium quality; 8-10/10 high quality; Y, yes met criteria; N, no did not meet criteria. Taken from the Critical Appraisal Skills Program for Qualitative Studies (Critical Appraisal Skills Programme, 2017)

Results

The original full search yielded 2695 articles. EndNote X8 was used to identify and remove internal and external duplicates which the primary author then verified. Across all databases, 76 internal, and 1001 external duplicates were removed, leaving 1618 for initial screening by title, abstract, or full text. At the end of the review, 6 studies met eligibility criteria and agreement between reviewers was 100% (see Figure 2-1).

Study characteristics

In the studies eligible for review, four were sub-studies within an ongoing RCT (Bourke et al., 2012; Bruun et al., 2014; Hamilton et al., 2015; Kronenwetter et al., 2005) and two were

stand-alone qualitative studies (Cormie, Turner, et al., 2015; Martin et al., 2015). Data were collected by either focus group (Bourke et al., 2012; Bruun et al., 2014; Martin et al., 2015) or individual semi-structured interviews (Cormie, Turner, et al., 2015; Hamilton et al., 2015; Kronenwetter et al., 2005). One study gathered additional data through participant observations during recreational football (Bruun et al., 2014). Studies ranged from n = 11-26 participants.

Study participants

A total of n = 105 men with prostate cancer participated across eligible studies. Both early (Kronenwetter et al., 2005; Martin et al., 2015) and advanced (Bourke et al., 2012; Bruun et al., 2014) stage disease were represented, with two studies not reporting these demographic details (Cormie, Turner, et al., 2015; Hamilton et al., 2015). Four studies involved participants actively on ADT (Bourke et al., 2012; Bruun et al., 2014; Cormie, Turner, et al., 2015; Hamilton et al., 2015), one involved men undergoing watchful waiting (Kronenwetter et al., 2005) and one included patient's post-surgery and/or chemo radiation treatment (Martin et al., 2015).

Study intervention

Table 2-2 illustrates the extracted details from the eligible movement based interventions using the FITT principle. This widely accepted technique of reporting exercise describes the frequency (F), intensity (I), type (T) and timing (T), allowing for appropriate analysis and comparison across the exercise interventions (Winters-Stone, Neil, & Campbell, 2014). Aerobic and/or resistance training were prescribed across all studies. Three studies examined aerobic and resistance training (Bourke et al., 2012; Hamilton et al., 2015; Martin et al., 2015), one utilized aerobic activity with European football or North American soccer (Bruun et al., 2014) and one

supplemented a home-based walking program with gentle yoga (Kronenwetter et al., 2005). Forms of aerobic exercise included walking, cycling, rowing, stairs, arm ergometer, cardio boxing, hydrotherapy, football and yoga. Resistance training included free or body weight supported exercises targeting large muscle groups. All but one of the interventions were supervised by an exercise specialist (Bourke et al., 2012; Bruun et al., 2014; Cormie, Turner, et al., 2015; Hamilton et al., 2015; Martin et al., 2015). Programs ranged from 8-weeks to 1-year with a majority of the programs 12-weeks in duration (Bourke et al., 2012; Bruun et al., 2014; Cormie, Turner, et al., 2015; Hamilton et al., 2015). Two studies incorporated dietary recommendations within the exercise program (Bourke et al., 2012; Kronenwetter et al., 2005), one included complimentary therapies such as breathing or meditation (Kronenwetter et al., 2005) and one involved weekly group psychotherapy (Martin et al., 2015).

Table 2-2. *Description of Exercise Interventions in Reviewed Studies*

Author, year, location	Participants	Study characteristics, aim(s), and framework	Exercise prescription (F.I.T.T)	Co-intervention
Cormie <i>et al</i> , 2015 Australia	N = 12 Age: 75.3 ± 4.5 years Ethnicity: NR Cancer type: Prostate Stage: NR Treatments: current (n = 7) and prior (n = 5) ADT	Primary qualitative study Interview type: individual, semi-structured interviews Time: during intervention Aim(s): Provide in-depth description of experience within supervised exercise in men with prostate cancer. Identify critical elements for participant engagement Framework: Interpretative phenomenological framework to capture lived experience	<ul style="list-style-type: none"> • Delivery mode: Supervised, clinic-based, group exercise program • Type: NR • Frequency: 2 days/week • Intensity: NR • Time: 60 min • Length: At least 12 weeks • Progression: NR 	None
Martin <i>et al</i> , 2015 United States	N = 11 Age: NR Ethnicity: NR Cancer type: Prostate, Breast Stage: 1, 2 or 3 Treatments: completed all planned surgery,	Primary qualitative study Interview type: focus groups (analysis inclusive of only prostate cancer patients) Time: 1-week post-intervention	<ul style="list-style-type: none"> • Delivery mode: Supervised group based program (individualized) • Type: <ul style="list-style-type: none"> ○ <u>Aerobic</u>: walking outside, stairs, treadmill, stationary bicycle, elliptical, rower, arm crank, cardio boxing, hydrotherapy class ○ <u>Resistance</u>: body weight, free weights, resistance machines ○ <u>Static stretching</u> 	Supportive group psychotherapy 1 day/week for 90 min

	chemotherapy, and/or radiation therapy	Aim(s): NR Framework: Interpretative phenomenological analysis with ideographic focus within the psychological domains	<ul style="list-style-type: none"> • Frequency: 3 days/week • Intensity: Moderate, RPE 12 • Time: <ul style="list-style-type: none"> ○ <u>Aerobic:</u> 20-30 min ○ <u>Resistance:</u> 20-30 min ○ <u>Stretching:</u> 10 min • Length: 8 weeks • Progression: Light resistance (RPE 6-10), with gradually progression to higher intensities (RPE 13-15) 	
Hamilton <i>et al</i> , 2015 Australia	N = 18 Age: 63.1 ± 3.8 years Ethnicity: NR Cancer type: Prostate Stage: NR Treatments: prostatectomy, radiation, and/or ADT for ≤ 12 months	Sub study from RCT (analysis inclusive of exercise (n = 11) and usual care (n = 7) participants) Interview type: individual, semi-structured telephone interviews Time: NR Aim(s): Explore the impact of ADT on men's sexuality and the effect of exercise on this experience Framework: Social constructionism epistemology with theoretical perspectives of identity and paradigms of lived body. Thematic analysis	<ul style="list-style-type: none"> • Delivery mode: Supervised, group program with self-directed home program • Type: <ul style="list-style-type: none"> ○ <u>Aerobic:</u> walking, jogging, treadmill, cross-trainer, cycling, rowing, stationary ergometer ○ <u>Resistance:</u> leg press, leg extension, leg curl, calf raise, chest press, latissimus pull down, bicep curl, triceps extension • Frequency: 2 days/week • Intensity: <ul style="list-style-type: none"> ○ <u>Aerobic:</u> 70-85% HRM or moderate to high ○ <u>Resistance:</u> 60-85% 1RM or moderate to high • Time: <ul style="list-style-type: none"> ○ <u>Aerobic:</u> 60 min ○ <u>Resistance:</u> 1-4 sets of 6-12 repetitions targeting 8 large muscle groups • Length: 12 weeks 	None

			<ul style="list-style-type: none"> • Progression: Increase resistance by 5-10% for next set/training session if worked past max repetitions 	
Bruun <i>et al</i> , 2014 Denmark	<p>N = 26 Age: 67.1 (range: 58-74) years Ethnicity: NR Cancer type: Prostate Stage: Locally advanced or disseminated Treatments: On ADT ≥ 6 months</p>	<p>Sub study within RCT and prior pilot study (analysis inclusive of exercise group only)</p> <p>Interview type: focus groups + participant observations (20 hours)</p> <p>Time: during intervention</p> <p>Aim(s): Gain understanding of recreational football as a team and interaction-oriented health promotion activity in men with prostate cancer. To explore men's beliefs and experiences related to football participation and to explore men's behaviors and interactions during football</p> <p>Framework: Framework analysis, ethnographic approach with the intention to enable collective constructions of meaning and realities</p>	<ul style="list-style-type: none"> • Delivery mode: Supervised outdoor program • Type: <ul style="list-style-type: none"> ○ Aerobic: recreational football/soccer including drills and competitive matches • Frequency: <ul style="list-style-type: none"> ○ Weeks 1-8: 2 days/week ○ Weeks 9-12: 1 day/week • Intensity Low intensity • Time: <ul style="list-style-type: none"> ○ Week 1-4: 45 min ○ Week 5-12: 60 min • Length: 12 weeks • Progression: NR 	None

		detached from participant perspective		
Bourke <i>et al</i> , 2012 United Kingdom	N = 12 Age: NR Ethnicity: NR Cancer type: Prostate Stage: T3, T4 (advanced) Treatments: On ADT ≥ 6 months	Sub study from RCT (analysis inclusive of exercise group only) Interview type: focus groups Time: 3-6 months' post intervention Aim(s): Qualitative evaluation of pragmatic supervised exercise program in combination with dietary advice in men with advanced prostate cancer on ADT. Motivations, barriers, specifics of the program, social supports and program recommendations explored Framework: Thematic analysis with constant comparisons	<ul style="list-style-type: none"> • Delivery mode: Supervised tapered program supplemented with aerobic self-directed home program • Type: <ul style="list-style-type: none"> ○ <u>Aerobic</u>: walking, cycling, gym ○ <u>Resistance</u>: body weight, free weights • Frequency: <ul style="list-style-type: none"> ○ Weeks 1-6: 2 days/week ○ Weeks 7-12: 1 day/week • Intensity: <ul style="list-style-type: none"> ○ <u>Aerobic</u>: 55-85% HRM or 11-15 RPE (fairly light to hard) ○ <u>Resistance</u>: NR • Time: <ul style="list-style-type: none"> ○ <u>Aerobic</u>: 30 min + home target of 150min/week ○ <u>Resistance</u>: 2-4 sets targeting large muscle groups • Length: 12 weeks • Progression: Increased emphasis of home program after 6 weeks 	Nutritional counselling (i.e. reduce saturated fats, reduced refined carbohydrates, increase fiber) and health eating seminars
Kronenwetter <i>et al</i> , 2005 United States	N = 26 Age: 67 (range: 50-85) years Ethnicity: >90% Caucasian Cancer type: Prostate	Sub study from RCT Interview type: individual, semi structured interviews Time: NR	<ul style="list-style-type: none"> • Delivery mode: Unsupervised, home program • Type: <ul style="list-style-type: none"> ○ <u>Aerobic</u>: walking ○ <u>Other</u>: yoga based stretching within stress management practices • Frequency: 	Vegan diet, stress management including breathing, meditation,

Stage: T1, T2 (early disease)
Treatments: watchful waiting

Aim(s): Examine the psychological, emotional, spiritual, and social reactions to diagnosis or early stage prostate cancer and how participation in the prostate cancer lifestyle trial may have changed these domains

Framework: NR

- Aerobic: 6 days/week
- Yoga: Daily
- **Intensity:**
 - Aerobic: moderate
 - Yoga: gentle
- **Time:**
 - Aerobic: 30 min
 - Other: 60 min
- **Length**: 12 months
- **Progression**: None

imagery, progressive relaxation and group support (60 min/week)

Note. F.I.T.T, Frequency, Intensity, Type, Time; HRM, heart rate maximum (age predicted); RPE, Rated Perceived Exertion (Borg Scale); NR, not reported; 1RM, one repetition maximum; ADT, androgen deprivation therapy; RCT, randomized controlled trial

Synthesis of results

Following content analysis, six subthemes within the psychosocial domains of masculinity, body image and personal identity emerged in direct reference to exercise (see Table 2-3). (1) Exercise programs fostered a shared sense of masculinity through community and safety; (2) exercise placed a focus on valued male traits; (3) exercise provided distraction; (4) exercise restored control; (5) exercise facilitated self-reflection through changes in physique; and (6) self-efficacy could be re-defined through exercise. Additional qualitative data supporting the psychosocial outcomes of interest are represented in Table 2-4.

1. Exercise programs fostered a shared sense of masculinity through community and safety.

A significant finding from all studies was that exercise had the ability to construct a new community for men with prostate cancer. This community came with an established set of internally recognized values, trust and feelings of group cohesion (Kronenwetter et al., 2005; Martin et al., 2015). The camaraderie felt between men did not appear to be linked to any specific exercise (i.e., aerobic or resistance) or delivery mode (i.e., home or group based exercise; Bruun et al., 2014; Cormie, Turner, et al., 2015; Hamilton et al., 2015; Martin et al., 2015). Even in the home yoga plus aerobic program (Kronenwetter et al., 2005), participants continued to describe a sense of interconnectedness and belonging similar to the supervised clinic programs. Two studies noted that this sense of shared community could even extend beyond the conventional exercise classroom into participant's everyday lives (Bourke et al., 2012; Cormie, Turner, et al., 2015).

Across all studies, exercise interventions appeared to give men with prostate cancer permission to speak openly and honestly about private concerns without compromising their

masculinity. For some, this shared sense of community functioned to break down masculine barriers and inherent stoicisms (Bruun et al., 2014; Cormie, Turner, et al., 2015). In the study by Bruun (2014) men utilized the locker room setting to share spontaneous and frank details about their disease or treatment (Bruun et al., 2014). The authors concluded that football may have been an inherently masculine activity affording participants the opportunity for shared catharsis without threatening their own internal masculine concept. Similarly, Hamilton (2015) proposed that their combined aerobic and resistance program may have fostered an environment helping to normalize sexual or body image changes (Hamilton et al., 2015). This normalization process may have allowed men with similar concerns to view sexual or body image changes as external to their own masculinity. This may have served to protect other essential aspects of their masculine identity. The use of humor was also highlighted as assisting men to safely express their masculinity without ridicule (Cormie, Turner, et al., 2015; Hamilton et al., 2015). For example, one gentleman in the study by Hamilton (2015) made light of his characteristically feminine changes; he was quoted as saying "...I said well how has it affected you? He said umm oh I keep wanting to make cakes all the time. It was kind of like a jocular way of describing it you know" (Hamilton et al., 2015, p.137).

Interestingly, Bourke (2012) reported that this sense of masculinity community required program exclusivity (Bourke et al., 2012). Men pointed to their need to feel safe and be surrounded by similar prostate cancer patients in order to express their feelings fully. These results are similar amongst other studies in this review, pointing to the importance of having like-minded individuals to promote a collective mentality and sense of community trust (Bruun et al., 2014; Cormie, Turner, et al., 2015; Hamilton et al., 2015; Martin et al., 2015). In those playing recreational football, men pointed to their shared experience of contact sport and common goal

for victory as essential components to their sense of community, “brother’ism” and masculinity (Bruun et al., 2014).

2. *Exercise placed a focus on valued male traits*

Men viewed exercise as a directed conduit to improved masculine identity following the aftermath of treatment. The exercise programs allowed men to set goals and have a sense of personal achievement when goals were reached. Furthermore, participants described an internal competitive spirit that was fostered within a trial-based design (Bourke et al., 2012). Specifically, studies measuring anthropomorphic data (e.g., body mass index or skin fold thickness) as part of a larger RCT provided objective, modifiable aspects of their body for the men to focus their efforts and measure their gains (Bruun et al., 2014; Cormie, Turner, et al., 2015; Martin et al., 2015).

In the home based yoga and aerobic program, the authors did not report on whether anthropomorphic details were collected, nor was goal setting or goal attainment reported (Hamilton et al., 2015). Cormie (2015) also did not incorporate body specific measurements, but men in this study did endorse statements of achievement attributable through exercise (Cormie, Turner, et al., 2015). Specifically, participants highlighted observed physical capabilities such as the amount of weight they could push as interpretations of improved masculinity and health. Another important finding from a majority of authors were the connections between exercise participation and feelings of increased energy (Bourke et al., 2012; Bruun et al., 2014; Hamilton et al., 2015) and physical strength (Bourke et al., 2012; Bruun et al., 2014). Moreover, these improvements in strength and energy appeared to represent a way to become more productive in their home lives (Bourke et al., 2012; Bruun et al., 2014; Hamilton et al., 2015). For example, in

those men engaging in recreational football, exercise was expressed as a crucial reason they were able to preserve their functionality. These functional improvements were then perceived by men as an indication of whether they could adequately provide for their families as a husband or father figure (Bruun et al., 2014). Exercise was also observed to represent embodiment of an ‘action oriented’ attitude to health (Cormie, Turner, et al., 2015), or instilled a sense of responsibility (Martin et al., 2015).

3. Exercise provided distraction

In three of the studies exercise helped men escape disease related concerns such as fear of cancer progression or awareness of one’s own mortality (Bourke et al., 2012; Bruun et al., 2014; Hamilton et al., 2015). Exercise may have helped re-define masculine priorities by distracting men from attributes lost (i.e., libido, erectile dysfunction) while drawing attention to the benefits gained (i.e., longevity, preserved family relationships; Hamilton et al., 2015). There did not appear to be a significant difference between the studies with exercise programs that included subthemes of distraction (Bourke et al., 2012; Bruun et al., 2014; Hamilton et al., 2015) from those that did not (Cormie, Turner, et al., 2015; Kronenwetter et al., 2005; Martin et al., 2015). However, two of the three studies failing to report on this subtheme also included group psychotherapy or support (Kronenwetter et al., 2005; Martin et al., 2015).

4. Exercise restored control

The relationship between exercise and control was universally reported in all studies and exercise interventions. However, the ways that men internalized or defined this sense of control through exercise differed from study to study. In some men, exercise offered hope and optimism

giving them control over their future forward perspective (Cormie, Turner, et al., 2015; Kronenwetter et al., 2005; Martin et al., 2015). In other studies, control was expressed as a sense of responsibility from agreeing to participate in exercise classes (Bruun et al., 2014) or resulted from belief that exercise improved sexual function or masculine identity (Hamilton et al., 2015).

5. Exercise facilitated self-reflection through changes in physique

Five of the studies directly reported improvements in male body image associated with exercise program (Bourke et al., 2012; Bruun et al., 2014; Cormie, Turner, et al., 2015; Hamilton et al., 2015; Martin et al., 2015). In the studies reporting this outcome, men tended to associate physical changes (e.g., muscularity, increased strength, reduced obesity) with improved masculinity (Bruun et al., 2014; Cormie, Turner, et al., 2015) or identity (Bourke et al., 2012; Bruun et al., 2014; Martin et al., 2015). In some cases, men opted to express their masculine gains by describing loss of feminine body changes (Bruun et al., 2014; Hamilton et al., 2015). Interestingly, in the unsupervised home yoga and aerobic program, statements concerning body image were not explicitly mentioned. This study only included men with early disease participating in watchful waiting (Kronenwetter et al., 2005).

6. Self-efficacy could be re-defined through exercise

Participation in any one of the exercise programs resulted in a wide range of identity changes. For some, exercise provided a boost in confidence and helped to re-establish a new identity (Cormie, Turner, et al., 2015; Martin et al., 2015). For others exercise elevated mood, reduced depression and gave men a restored capacity to deal with stress (Bourke et al., 2012;

Hamilton et al., 2015). In all studies, the accumulation of these changes appears to increase a man's self-efficacy and beliefs in his own ability to succeed.

Table 2-3. *Subthemes Identified Across Eligible Studies*

Theme	Subtheme	Cormie <i>et al</i> , 2015	Martin <i>et</i> <i>al</i> , 2015	Hamilton <i>et al</i> , 2015	Bruun <i>et</i> <i>al</i> , 2014	Bourke <i>et al</i> , 2012	Kronenwetter <i>et al</i> , 2005
Masculinity	M1 Exercise programs fostered a shared sense of masculinity through community and safety	✓	✓	✓	✓	✓	✓
	M2 Exercise placed a focus on valued male traits	✓	✓	✓	✓	✓	
	M3 Exercise provided distraction			✓	✓	✓	
	M4 Exercise restored control	✓	✓	✓	✓	✓	✓
Body Image	B1 Exercise facilitated self-reflection through changes in physique	✓	✓	✓	✓	✓	
Personal Identity	P1 Self-efficacy could be redefined through exercise	✓	✓	✓	✓	✓	✓

Note. M1, Masculine theme 1; M2, Masculine theme 2; M3, Masculine theme 3; M4, Masculine theme 4; BI, Body image theme; PI, Personal identity theme 1.

Table 2-4. *Extracted Statements Supportive of Themes and Subthemes within Included Exercise Studies*

Author, year	Qualitative results within domains of masculinity, body image, and identity
Cormie <i>et al</i> , 2015	<p>Masculinity</p> <p>M1 Exercise fostered a safe environment allowing a shared sense of support through discussions about male concerns and exchanging factual information Men expressed their masculinity through humor, jokes, and lighthearted banter Exercise facilitated an environment which broke down barriers created by stoic tendencies Exercise restored a sense of camaraderie which even extended for some men outside exercise classes Exercise was felt to represent a shared masculine activity requiring some degree of physical prowess</p> <p>M2 Men felt empowered by exercise which occurred through learning from exercise physiologists and become more competent with their exercise routine Exercise program allowed for sense of personal achievement Exercise promoted action oriented behaviors</p> <p>M4 Exercise helped men become future oriented and desire to engage in everyday life Exercise allowed self to think more positively about things Exercise provided a sense of cancer control</p> <p>Body Image</p> <p>B1 Exercise made men feel fitter, stronger, leaner and more muscular. This was felt to increase physical capability</p> <p>Personal Identity</p> <p>P1 Exercise demonstrated specific capabilities which could extend outside the classroom/fitness class Exercise improved overall subjective health Exercise increased self-efficacy Exercise increased participant confidence in for other activities</p>
Martin <i>et al</i> , 2015	<p>Masculinity</p> <p>M1 Exercise allowed for shared experiences and permission to speak about issues Exercise fostered a collective mentality requiring team participation felt to be inherently masculine Exercise provided a sense of camaraderie Exercise provided permission to share and engage in mental benefits. Encouraged talking within groups Exercise facilitated a sense of mutual aid, trust, and group cohesion</p> <p>M2 Exercise was a means to increase manliness Exercise provided a sense of responsibility to continue exercise after program completion Men felt that the combination of exercise and supportive group psychotherapy could help them regain a sense of their own masculinity</p> <p>M4 Program helped to provide participants with confidence and hope Program assisted in dealing with life issues, restoring control and hope, and kick starting a healthier life Exercise increased control over health and their identity</p>

	<p>Body Image</p> <p>B1 Exercise improved physical fitness which was responsible for their overall health Exercise combatted obesity which can improve body image Sexuality and self-identity combined to create their notion of manliness</p> <p>Personal Identity</p> <p>P1 Exercise helped redefine or accept a new identity within prostate cancer Exercise improved participant wellbeing Exercise improved sense of self and protected participants from low self-esteem Exercise helped psychological stress and facilitated coping</p>
Hamilton <i>et al.</i> , 2015	<p>Masculinity</p> <p>M1 Connecting with men in familiar masculine activities allowed demonstration of maintained physical performance and prowess Exercise provided permission to discuss private issues (eg., ADT and its effect on the body) Exercise helped establish or reformulate new masculine norms through peer connectedness and camaraderie Exercise allowed for men to share experiences using masculine humor. This helped to normalize changes to their sexuality as being outside their masculinity Participants in the exercise class were like-minded which fostered a positive atmosphere</p> <p>M2 Exercise helped facilitated acceptance of their sexual identity and coping. This acceptance was interpreted as a personal achievement Exercise rekindled masculine vigor through improved energy levels and affect. This allowed to facilitate reengagement with masculine tasks and hobbies they previously enjoyed. Reinstated capacity to cope with life stress and workplace stressors Exercise helped to decrease stress and increase or sustain productivity</p> <p>M3 Exercise helped to shift participant focus away from their lost masculinity (e.g. decreased libido, erectile dysfunction, penis shrinkage, mood swings, hot flashes and inability to ejaculate) Exercise helped reestablish masculine priorities by changing their importance (e.g. focusing on family, friends and longevity versus prior priorities of penetrative sex)</p> <p>M4 Exercise helped gain a sense of control over their sexual well-being Exercise improved motivation to continue the program as they felt it directly contributed to increased sexual desire, improved body image and increased quality of semi-hard erections</p> <p>Body Image</p> <p>B1 Participants viewed exercise as a way to directly reduce the body feminization from ADT Exercise was seen as a way to improve body image and subsequently masculinity</p> <p>Personal Identity</p> <p>P1 Exercise participation represent a masculine behavior corresponded to improvements in masculine self-esteem Exercise reduced feelings of depression Group exercise allowed men to compare their situation to others. This often corresponded to improved self-esteem viewing others as worse off</p>

Bruun *et al*,
2014

Masculinity

- M1 Group format of exercise drills and football matches gave opportunity for man-talk and camaraderie (secure, frank, and spontaneous discussions on disease and treatment) without challenging masculine values
Post exercise discussions and locker room talk allowed expression of concern for their health without threatening their masculine identity
Football gave participants permission to express their feeling and stress, and also provided an escape from disease related concerns
Positive aspects of competition (scoring points, playing contact sport) with a common goal for victory were essential to increased interdependency and brotherism
- M2 Exercise format within a trial allowed for pre- post-testing motivating men by tracking their progress
Form of exercise (tackling and scoring goals) allowed men to exert themselves physically and act like men
Exercise program challenged men's physicality but men expressed appreciation over the feelings of natural exhaustion and healthy fatigue
Exercise training supported men's desire to preserve their role as husbands or fathers within the family
Participants viewed football players as healthy, strong and competitive therefore by participating they were able to recover aspects of their masculine dignity
The benefits from exercise (physical improvements and increased functionality) were viewed as transferable outside football into everyday life
- M4 Exercise was viewed as a mean to regain control and a sense of responsibility without assuming the patient role

Body Image

- B1 Exercise resulted in positive body change (e.g. strength, energy) which improved body image and sense of masculinity
Body image changes from exercise (e.g. reduced weight, increased strength) drew admiration and positive comments from family and friends which confirmed their own feelings

Personal Identity

- P1 Weight gait, strength loss, and reduced functionality contributed significantly to participants lost identity but exercise helped to re-establish their sense of self
Football was an opportunity to get back to exercise and counteract feelings of lost initiative and self-determination
Exercise made participants feel rational about their disease
Exercise provided valuable feedback about their body and their body awareness
Exercise was attributed to an increased sense of self-reliance and independence

Bourke *et al*,
2012

Masculinity

- M1 Exercise created a "shared sense of masculinity" secondary to the program being exclusively male
Exercise allowed men with chauvinistic values to feel safe and confident whilst sharing feelings in a group of similar individuals
- M2 The program's success relied heavily on men feeling they were individually benefiting from the program versus a focus on helping others. The masculine benefits associated with exercise (i.e. strength changes, weight loss) were expressed as visible reminders of the program thus making it worthwhile for them to continue
Exercise was used to reduce fear of cancer progression
Participants expressed improvements in endurance and strength, traits associated as inherently masculine
Exercise programs allow men to set and achieve personal goals facilitating an internal competitive atmosphere
- M3 Exercise was a means of distraction allowing men to escape their own mortality
- M4 Exercise reduced anxiety by providing means of control

	Body Image
B1	Combined dietary advice and exercise created positive views about body image, specifically reductions in weight were essential for body image improvements Changes to physique contributed to improved self-reported physical well-being
	Personal Identity
P1	Exercise improved mood Exercise improved psychological well-being Increased sense of confidence directly attributed to exercise Sense of self was achieved through personal exercise goal attainment

Kronenwetter <i>et al</i> , 2005	Masculinity
M1	The program fostered community belonging through informed support, socialization, connection to others, shared activities, and a shared sense of belonging Exercise facilitated improvements in self-perceived emotional availability without compromising masculine values
M4	Exercise contributed to optimism, hope, a fighting spirit, and decreased anxiety (mentioned in 23/26 participants) Exercise program allowed for sense of control and gave deeper meaning to participants
	Personal Identity
P1	Exercise was associated with increased quality of life Exercise resulted in decreased perceived stress Increased energy

Note. ADT, androgen deprivation therapy; M1, masculine theme 1; M2, masculine theme 2; M3, masculine theme 3; M4, masculine theme 4; B1, body image theme 1; P1, personal identity theme 1

Discussion

To our knowledge, this is the first systematic review of qualitative studies to examine the effect of various exercise interventions on the psychosocial domains of masculinity, body image and personal identity in men with prostate cancer. The primary finding from this review was that no particular exercise intervention was superior over another in terms of potential for positive impact on general masculinity, body image and personal identity expression. However, this review suggests certain subthemes within masculinity and body image may be more tightly associated with certain FITT characteristics.

The way in which exercise was delivered (i.e., home, group, supervised) provides valuable insight into how exercise delivery may facilitate expression of particular masculine themes. This review suggests that supervised group exercise programs allow men to foster traditional masculine characteristics (i.e., being strong, independent, self-reliant) through communal but still competitive strength and aerobic training. This, in turn, fosters re-establishment of pre-cancer masculine roles and self-identity. It follows that masculine traits can be enhanced within a group structure, presumably because this provides the opportunity for social comparison. In support of this notion, the home program within this systematic review failed to include themes of valued male traits (Kronenwetter et al., 2005). While the lack of findings in this one study may at least in part be supportive of group exercise being superior, a great deal of caution is required with interpretation of a single study. In the case of the home program, only men with early stage prostate cancer undergoing watchful waiting were included. The men in this study presumably had a lower burden of disease and thus a lessened sense of lost masculinity. This is consistent with what is known from advanced disease and men treated with ADT, where more significant body composition changes including feminization and sexual

dysfunction can occur (Cormie, Galvao, et al., 2015). Another equally important consideration is whether the study aims and design in the home program were powered to capture themes of valued male traits.

The second issue for consideration is the mode of exercise. All exercise interventions in this review included an aerobic component and three also included resistance training (Bourke et al., 2012; Hamilton et al., 2015; Martin et al., 2015). As improvements in masculinity were expressed universally across all studies, this may suggest that aerobic activity is a stronger determinant of masculinity than resistance based programming. This theory is supported by a recent cross-sectional study which demonstrated significantly higher scores of masculinity when men achieved recommended levels of aerobic exercise (≥ 150 minutes of moderate to vigorous exercise) compared to those achieving recommended levels of resistance exercise (≥ 2 days per week; Langelier, Cormie, et al., 2018).

Due to the low number of included studies in this review ($n = 6$), assessment of thematic strengths between exercise types was not feasible. However, in the studies that included resistance training in addition to aerobic exercise, there did not appear to be a substantial difference in how men expressed their psychosocial themes compared to aerobic only programs. Additionally, no qualitative studies assessing psychosocial themes of masculinity, body image and personal identity have been performed in resistance-only programs. Further research is thus necessary before the implications of exercise type on issues of masculinity can be appropriately established.

Currently the American College of Sports Medicine (ACSM) recommends that survivors should strive for the same volume and intensity of exercise as the general population, and should include aerobic, resistance and flexibility training (Schmitz et al., 2010). The fact that most

programs were not frequent or long enough to solely achieve the aerobic exercise guidelines suggest that exercise benefits to masculinity, personal identity and body image may also be obtained at lower thresholds of activity. Only two studies in this review instructed patients to supplement their group training with home-based aerobic activity; however, it is unclear whether recommended levels of activity were obtained (Bourke et al., 2012; Hamilton et al., 2015).

Overall there was a high level of agreement of masculine themes identified from these various qualitative studies. This strengthens previous exercise and masculinity theories (Bourke et al., 2012; Bruun et al., 2014; Cormie, Turner, et al., 2015; Craike, Livingston, & Botti, 2011; Hamilton et al., 2015; Keogh, Patel, MacLeod, & Masters, 2013; Martin et al., 2015) and provides credibility to the emergent subthemes developed in this review. Across all exercise interventions, a sense of community was created. Although the precise mechanism and prerequisites required for men to tap into these communities remains unclear, this review suggests the process may include a combination of exclusive male-only programming, or creation of an exercise environment fostering humor and shared stories (Bruun et al., 2014; Cormie, Turner, et al., 2015; Hamilton et al., 2015). For some men, group aerobic and/or resistance training represented an activity requiring a certain degree of physical prowess. For them, exercise programs represented a connection to manliness (Cormie, Turner, et al., 2015; Hamilton et al., 2015). As such, participation in exercise may have allowed men within these studies to demonstrate their maintained physical performance, thereby preserving their sense of masculinity (Hamilton et al., 2015). Overall this shared sense of community spirit is similar to what has been observed in other tumor specific exercise programs such as yoga for breast cancer survivors (Galantino et al., 2012) and children's cancer camps for pediatric patients (Laing & Moules, 2014).

Finally, another important finding from this review was that exercise programs may provide community building from the process of introducing individuals to one another. Kronenwetter (2005) demonstrated that a home-based exercise intervention, where the only means of interaction were supportive counseling sessions, still enabled men to establish a sense of interconnectedness (Kronenwetter et al., 2005). This supports exercise as an important community engagement tool, offering the opportunity for male connectedness and the ability for men to express concern about their health without threatening their masculine identity (Bruun et al., 2014; Cormie et al., 2016).

Conclusion

This systematic qualitative review is the first to examine the psychosocial domains of masculinity, body image and personal identity within exercise interventions for men with prostate cancer. This review found that regardless of tumor stage, prior treatment status, or exposure to ADT, either aerobic with or without resistance training can exert positive effects on masculinity and personal identity. Exercise appears to improve masculinity through creation of a safe community, allows for a refocusing of attention on new or different masculine traits, provides a sense of distraction from mortality or treatment side-effects and offers a means of re-establishing control. In terms of body image, visible changes from exercise appeared directly linked to perceived functional capabilities, masculinity and overall health. Improvements in body image were restricted to supervised, group based activity and within patients receiving or having completed treatments. Lastly, exercise appears to improve personal identity through self-efficacy and appreciation of one's capabilities.

Study limitations and strengths

A number of methodological limitations and strengths are associated with this review. Among the limitations is the significant heterogeneity observed across the exercise interventions. The differences between the exercise prescriptions make it challenging to directly compare each intervention and their relative effects on the psychosocial domains of masculinity, body image and personal identity. Second, as it often exists in psychosocial research, the constructs of masculinity, body image and personal identity are multidimensional. These domains often vary across sociocultural factors, and are influenced by gender, sexuality, relationship status and prior experiences. The small number of studies in the current qualitative review limits our ability to make inferences on the basis of any number of these variables. Finally, the study of masculinity, body image and personal identity poses significant reporting challenges. As this review relied heavily upon authors identifying masculinity, body image and personal identity in their respective studies, not all relevant studies may have been included.

Strengths of this review included the varied populations of men with prostate cancer (ranging from watchful waiting to men with advanced disease on ADT), the comparison of masculinity, body image and personal identity themes across various exercise programs, and the synthesis of how exercise characteristics may individually contribute to expressions of these psychosocial themes. Overall, by understanding the relative values men placed on various expressions of masculinity, body image or personal identity, clinicians and researchers can begin to prescribe more tailored exercise programming based on interest.

Clinical and research implications

It is clear that prostate cancer and its treatments negatively effect masculinity, body image and a man's sense of personal identity. While this review supports the impacts of exercise are all positive, levels of exercise are not improving without direct intervention (Langelier, Cormie, et al., 2018). This highlights the need to address established exercise barriers and preferences. This review provides cautious optimism to the clinicians and researchers that perhaps by understanding and appealing to male masculinities, body image changes and personal identity issues, it may offer the unique opportunity to acknowledge masculinity preferences within an exercise program. Exercise interventions offer a promising solution to address complex psychosocial issues, over and above the already established physical benefits (Gardner et al., 2014). The findings from this review have specific implications for the future implementation and planning of prostate cancer specific exercise programing. First, current results suggest aerobic exercise may be a necessary component to address psychosocial distress and issues of masculinity specifically. However, the small number of studies, and none on resistance training alone, necessitate further research to address this gap. Additionally, specific research is needed to determine whether their masculinity can be further enhanced within a combined resistance plus aerobic program versus aerobic program alone. Second, exercise programs should purposefully include baseline anthropometric data in men who value masculine traits of strength, power and improved capabilities. The ability for men to track their progress may serve to improve their masculine ideals. Future research assessing masculinity and body image concerns should include qualitative measures as this technique offers the unique opportunity for men to express their own understanding of masculinity, body image and personal identity beyond quantitative surveys which are classically designed to capture more 'traditional' interpretations of masculinity.

Finally, further research is necessary to help establish optimal dosing of exercise to achieve maximum psychosocial benefit with regards to masculinity, and thereby enhance overall quality of life.

Addendum

This chapter has been reformatted from its original version for inclusion in this thesis. Content remains unchanged but original supplementary appendices meant to be found online have been included within the main text to provide further detail to the reader.

CHAPTER 3: QUANTITATIVE EXPLORATION MANUSCRIPT

Langelier, D.M., Cormie, P., Bridel, W., Grant, C., Albinati, N., Shank, J., Daun, J.T., Fung, T.S., Davey, C., Culos-Reed, S.N. *Perceptions of Masculinity & Body Image in Men with Prostate Cancer: The Role of Exercise*. Supportive Care in Cancer. 2018. 26(10): 3379-3388.

Abstract

Purpose: The goal of this study was to explore the association between levels of exercise and patterns of masculinity, body image and quality of life in men undergoing diverse treatment protocols for prostate cancer.

Methods: Fifty men with prostate cancer (aged 42 – 86) completed self-report measures. Self-reported measures included: the Godin Leisure Time Exercise Questionnaire (GLTEQ), Masculine Self-esteem Scale (MSES), Personal Attributes Questionnaire (PAQ), Body Image Scale (BIS) and the Functional Assessment of Cancer Therapy – Prostate (FACT-P).

Masculinity, body image and quality of life scores were compared between men obtaining recommended levels of exercise (aerobic or resistance) and those not obtaining recommended level of exercise. Secondary outcomes included the association between masculinity, body image and quality of life scores as they relate to exercise levels.

Results: There were significantly higher scores of masculinity ($p < 0.01$), physical wellbeing ($p < 0.05$), prostate cancer specific wellbeing ($p < 0.05$) and overall quality of life ($p < 0.05$) in those obtaining at least 150 minutes of moderate to vigorous aerobic exercise. In the 48% of men who had never received androgen deprivation therapy significantly higher levels of masculinity, body image and quality of life were observed in those meeting aerobic guidelines.

Conclusions: Whether treatment includes androgen deprivation or not, men who participate in higher levels of aerobic exercise report higher levels of masculinity, improved body image and quality of life than those who are inactive. Future longitudinal research is required evaluating exercise level and its effect on masculinity and body image.

Introduction

Prostate cancer is one of the most frequently diagnosed malignancies in men 65 years and older affecting one in seven Canadian men (Burns & Mahalik, 2007; Gardner et al., 2014).

According to Statistics Canada the sector of the Canadian population aged 65 and over is rapidly growing (Statistics Canada, 2017). This represents a significant future economic and health care delivery burden, as the prevalence of prostate cancer, its treatment impacts, and associated morbidities are expected to rise.

Various treatments for prostate cancer exist including active surveillance, surgical prostatectomy, radiotherapy, brachytherapy, chemotherapy and hormonal therapy. Regardless of treatment choice, many men experience debilitating side effects from prostate cancer and its treatments. Fatigue (Moyad, 2005), pain (Carter et al., 2011), urinary or bowel incontinence (Carter et al., 2011; MacDonald et al., 2007), poor mental health (McGinty et al., 2014) and reductions in quality of life (Baumann et al., 2012) are increasingly prevalent in men with prostate cancer compared to age-matched controls (McGinty et al., 2014). However, arguably one of the most debilitating and prevalent side effects identified by men with prostate cancer is the emasculating effects of prostate cancer treatment (Cushman et al., 2010).

As prostate cancer and its treatment frequently result in sexual dysfunction, urinary incontinence, increased adiposity, body feminization, and psychological distress, the patient's masculinity is undermined (Cecil et al., 2010; Fergus et al., 2002). No longer is men's appraisal of their appearance and/or capabilities synonymous with the 'traditional' form of masculinity. These identity changes have been linked to significant reductions in quality of life (Cormie, Chambers, et al., 2014; Cormie, Newton, Taaffe, Spry, & Galvao, 2013) and increased mental distress (Cormie et al., 2016). Given these negative impacts on men, there is need to consider

potential interventions to diminish the negative side effects of treatment. One of the most meaningful interventions is exercise, which has abundant evidence in prostate cancer as an effective means at alleviating side effects and enhancing quality of life (Baumann et al., 2012; Cormie, Galvao, et al., 2015; Cormie, Newton, Taaffe, Spry, Joseph, et al., 2013; Culos-Reed et al., 2010; Galvao et al., 2010; Gardner et al., 2014; Keogh & MacLeod, 2012).

Numerous randomized controlled trials have also demonstrated that exercise in patients with prostate cancer results in positive body composition changes (Cormie, Galvao, et al., 2015; Galvao et al., 2010; Galvao, Taaffe, Spry, & Newton, 2007; Segal et al., 2009). Many of these changes are again consistent with the idealized masculine phenotype including reduced central adiposity and maintained muscle mass. When physical changes to the body become incongruent with a patient's perception of what man should look like, reductions in quality of life occur (Cash et al., 2004). In a study by Levy and Cartwright (2015) older men who experienced physically apparent changes (i.e. hot flushes, penis shortening and gynecomastia) felt their identity had been lost and reported feelings of demasculinization, self-loathing and reduced self-esteem (Levy & Cartwright, 2015).

Although many studies have examined threats to masculinity in genitourinary cancers (Burns & Mahalik, 2007, 2008; Chapple & Ziebland, 2002; Gray et al., 2002; Oliffe, 2005, 2006; Wall & Kristjanson, 2005), very few studies have looked specifically at exercise as a treatment modality to restore masculinity in prostate cancer patients. Four of these studies were qualitative investigations of a supervised, group-based exercise program (Bruun et al., 2014; Cormie, Chambers, et al., 2014; Cormie, Turner, et al., 2015; Hamilton et al., 2015). Three of the four studies were conducted exclusively on patients treated with androgen deprivation therapy (ADT), and all three were conducted prospectively throughout an ongoing exercise trial (Bruun et al.,

2014; Cormie, Chambers, et al., 2014; Hamilton et al., 2015). None of these studies measured specific exercise levels or compared those meeting or not meeting exercise guidelines. These qualitative studies suggest that masculinity is positively influenced with participation in an exercise intervention (Bruun et al., 2014; Cormie, Chambers, et al., 2014; Cormie, Turner, et al., 2015). This occurs through (1) improved physical changes such as increased muscle mass which was consistent with contemporary masculine norms, (2) increased camaraderie because of shared impairments or a common goal of ‘battling cancer’, (3) an increased sense of control over their wellbeing and (4) improved sexual functioning.

There is a clear need for clinicians and researchers to appropriately screen patients with validated questionnaires and provide solutions to men experiencing compromised masculinity and body image following treatment. To date there has not been a study implementing validated psychosocial questionnaires with specific links to exercise levels in patients with prostate cancer undergoing diverse treatment protocols, beyond treatment with ADT. Thus, the purpose of the present study was to provide a broader exploration of this intersection of masculinity, body image and quality of life in men with prostate cancer who reporting varying exercise levels and to examine this association with validated questionnaires currently available to clinicians.

Methods

Participants

This study was approved by The University of Calgary Health Research Ethics Board of Alberta (HREBA) – Cancer Committee (CC). A total of 50 men from southern Alberta participated in the cross sectional study. Participants were included if they had histologically confirmed adenocarcinoma of the prostate (regardless of stage), and had a minimum 6-month

duration of disease. As study materials were only available in English, participants were excluded if they could not read and understand English or were unable to provide informed consent.

Study design and procedure

Participants were recruited from February 2016 to June 2017. This included patient self-selection to advertisements in wellness areas, through email to men in existing prostate exercise or education programs, and from direct nurse or clinician referral at follow-up visits. Participants were screened for eligibility by confirming their pathologic diagnosis and duration of disease with their electronic or paper health record. Once enrolled, an electronic link to questionnaires was provided or a hard copy was made available to those who wished to receive questionnaires in this format or for whom access to Internet was limited.

Measures

Participants completed questionnaires assessing demographic information, masculine values, body image, quality of life and physical activity levels. Physician verified records were reviewed to extract disease and treatment specific details in addition to the self-reported demographics.

Demographics. Demographic information collected included age, date of birth, marital status, education level, employment status, ethnicity, and sexual orientation. Please see Appendix B for a copy of the demographic survey administered to participants. Medical information included cancer diagnosis (i.e., date of diagnosis, stage, histologic Gleason score, prostate specific antigen (PSA) at diagnosis and at time of survey, co-morbidities, treatments to date and

current treatment plan). Cancer stage, Gleason score and PSA levels were used as markers of disease activity with higher values corresponding to increased cancer aggression. Details of the extracted medical information from the electronic and / or paper medical record can be found in Appendix C. The Charlson Comorbidity Index was also calculated based on the presence of various co-morbidities reflecting the relative burden of both cancer and non-cancer comorbidities. Please see Appendix D for additional details on the criteria and grading scale within the Charlson Comorbidity Index.

Physical activity. The Godin's Leisure Score Index (LSI) of the Godin and Shephard Leisure Time Exercise Questionnaire (GLTEQ) was used to assess current exercise levels (see Appendix E). This 3-item questionnaire is designed to assess frequency and duration of mild, moderate and strenuous physical activity within a typical week (Godin & Shephard, 1985). Participants meeting greater than or equal to 150 minutes of moderate to vigorous/strenuous aerobic activity, or greater than or equal to 2 days of resistance training were considered physically active according to the ACSM Guidelines (Schmitz et al., 2010).

Masculinity. The Masculine Self-esteem scale (MSES) developed by Clark, Bokhour, Inui, Silliman and Talcott (2003) is specifically used for prostate cancer patients (see Appendix F); it includes eight questions assessing masculinity appraisal using a 4-point Likert scale and has good reliability (Cronbach alpha 0.91). This questionnaire includes physical, and mental components associated with negative evaluations of oneself with respect to masculinity. Lower scores indicate more desirable quality of life. In this study, the MSES demonstrated excellent reliability (Cronbach alpha 0.94, n = 8).

The Personal Attributes Questionnaire (PAQ) originally developed by Helmreich, Spence and Wilhelm (1981) labels constructs of masculinity and femininity along a continuum. The

PAQ, in its short form, is a 24-item self-reported questionnaire of expressiveness with questions graded on a 5-point Likert scale. It is composed of three equal subscales: “M subscale” measuring self-assertiveness, and instrumental characteristics, “F subscale” measuring interpersonal oriented characteristics and expressive behaviour and “MF subscale” reflecting personality traits which are desirable to varying degrees dependent on the sex response. Composite scores of 0 – 32 were calculated with higher scores relating to stronger masculine or feminine values in the M and F subscales respectively. Both M and F subscales have acceptable reliability (Cronbach alpha 0.72 and 0.75 respectively). Only the M and F subscales were used for classifying participants as masculine, feminine. Overall, participants were deemed masculine with high M (>24) and low F (<21) scores; and feminine with low M (<23) and high F (>22) scores. In this study, the PAQ demonstrated acceptable reliability in both the masculine (Cronbach alpha 0.75, n = 8) and feminine subscales (Cronbach alpha 0.80, n = 8).

Body image. The body image scale (BIS) developed by Hopwood, Fletcher, Lee, and Al Ghazal, (2001) is a short, cancer specific, ten-item scale used to assess a participant’s perception of their appearance (see Appendix G). This scale has high reliability (Cronbach alpha 0.93; Hopwood et al., 2001). This questionnaire makes use of affective items (e.g., feel less masculine, feeling less attractive), behavioural items (e.g., find it difficult to look in the mirror) and cognitive items (e.g., satisfaction with appearance) to interrogate an individual’s degree of symptoms/distress related to body image. The original BIS included an item asking participants about the dissatisfaction of their surgical scar, and as this may not universally relate to prostate cancer patients, this item was excluded. The nine item scores were summed to produce an overall score for each patient (0-27). Higher scores represent increasing symptoms or distress. The reliability of the BIS within this study was good (Cronbach alpha 0.87, n = 9).

Quality of life. Developed by Cella, Nichol, Eton, Nelson and Mulani (1993) the Functional Assessment of Cancer Therapy – Prostate (FACT-P) Version 4 is a 39-item questionnaire and includes the 27 general questions from the Functional Assessment of Cancer Therapy – General Scale (FACT-G) and 12 supplementary questions addressing prostate specific issues. The FACT-G provides assessment on physical, social/family, emotional and functional well-being. The combined domains of physical, functional and prostate cancer specific comprise the Trial Outcome Index (TOI). This is a sensitive measure for change within the FACT-P and is a common clinical endpoint. The clinically meaningful change in the TOI is 5-9 and 6-10 overall (Cella, Nichol, Eton, Nelson, & Mulani, 2009). Each component scale is rated on a 5-point Likert scale which can be combined for a total FACT-TOI score of 0-104, FACT-G score of 0-108 and FACT-P score of 0-156, with higher scores representing better quality of life. This measure is widely used for clinical and research purposes and all subscales have demonstrated satisfactory reliability (Cronbach alpha 0.69 – 0.89; Esper et al., 1997). In this study, the Cronbach alphas of the physical (0.83, $n = 7$), social (0.77, $n = 7$), emotional (0.65, $n = 6$), functional (0.86, $n = 7$) and prostate cancer specific (0.70, $n = 12$) were acceptable.

Statistical analysis

Sample size was based on a preliminary power calculation using G*Power 3.0.10. to ensure sufficient power to detect differences in physical activity levels, body image or masculinity indices. Using the Pearson model to detect a moderate correlation ($r = 0.3$) between variables, a sample of 64 subjects would provide 80% power at an alpha of 0.05 for two tailed tests.

Data analysis was conducted with SPSS Version 22.0. Descriptive statistics were conducted to characterize the demographic and medical characteristics of the whole sample, as well as subgroups based on those meeting or not meeting aerobic (≥ 150 minutes and < 150 minutes respectively) or resistance activity (≥ 2 days/week and < 2 days/week respectively) guidelines. Statistical differences between the subgroups were assessed with a two-tailed independent t test and chi-square test for categorical variables.

A Pearson product-moment correlation was conducted to investigate the association between levels of physical activity, masculinity indices, body image and quality of life scores. Strengths of association were deemed small, moderate, or strong with < 0.3 , 0.3 to < 0.5 and > 0.5 respectively. All significance tests were two-sided with significance set at an $\alpha = 0.05$.

Results

Participant characteristics

A total of 50 men were recruited before the study was terminated due to personnel and time constraints. Of the 50 male participants, 20 men met aerobic guidelines for sufficient aerobic activity and 30 men did not. The mean age was 65.5 ± 8.5 and the average time since diagnosis was 4 years 4 months (with a range of 6 months to > 19 years). A majority of the men were married (84%), non-Hispanic white or euro American (92%), retired (60%) and heterosexual (82%) (Table 3-1).

Table 3-1. *Baseline Demographics and Clinical Characteristics of Participants (N = 50)*

Characteristic	Total	Above Aerobic Guidelines^a (n = 20)	Below Aerobic Guidelines^b (n = 30)	p
		Mean \pm SD or n(%)		
Age (years)	65.5 \pm 8.5	65.4 \pm 9.0	65.6 \pm 8.2	0.95
Charlson Comorbidity Index^c	5.9 \pm 2.5	5.5 \pm 2.7	6.3 \pm 2.3	0.30
Education				0.26
High School	9 (18)	5 (25)	4 (13.3)	
University	27 (54)	8 (40)	19 (63.4)	
Graduate	14 (28)	7 (35)	7 (23.3)	
Marital status				1.00
Married	42 (84)	17 (85)	25 (83.3)	
Unattached	8 (16)	3 (15)	5 (16.6)	
Ethnicity				0.23
Non-Hispanic White / Euro American	46 (92)	18 (90)	28 (93.3)	
Latino / Hispanic American	2 (4)	2 (10)	0 (0)	
East Asian / Indian American	1 (2)	0 (0)	1 (3.3)	

Middle Eastern / Arab	1 (2)	0 (0)	1 (3.3)	
American				
Employment				0.26
Full time	11 (22)	5 (25)	6 (20)	
Part-time	5 (10)	4 (20)	1 (3.3)	
Retired	30 (60)	10 (50)	20 (66.6)	
Disability	3 (6)	1 (5)	2 (6.7)	
Sexual orientation				0.94
Heterosexual	41 (82)	16 (80)	25 (83.3)	
Homosexual	7 (14)	3 (15)	4 (13.3)	
Undisclosed	2 (4)	1 (5)	1 (3.3)	
Time since diagnosis (months)	52.5 ± 57.7	48.4 ± 56.2	55.3 ± 59.5	0.69
Cancer stage				0.36
1	1 (2)	1 (5)	0 (0)	
2a	7 (14)	3 (15)	4 (13.3)	
2b	17 (34)	7 (35)	10 (33.3)	
3	15 (30)	7 (35)	8 (26.7)	
4	8 (16)	1 (5)	7 (23.3)	
Gleason score	7.5 ± 0.8	7.2 ± 0.6 ^d	7.7 ± 0.9 ^e	0.01*
PSA level	14.5 ± 50.7	3.4 ± 5.4	21.9 ± 64.6	0.22
Previous prostatectomy	46 (92)	20 (100)	26 (86.7)	0.09

Time since prostatectomy (months)	33.8 ± 41.9	40.1 ± 49.2	28.9 ± 35.6	0.37
Previous radiation	14 (28)	5 (25)	9 (30)	0.70
Time since radiation (months)	95.7 ± 85.5	61.0 ± 69.1	115.0 ± 91.2	0.27
Previous chemotherapy	8 (16)	1 (5)	7 (23.3)	0.08
Duration of chemotherapy (months)	21.0 ± 25.9	36.0 ± 0.0	18.9 ± 27.2	0.58
ADT exposure	26 (52)	9 (45)	17 (56.7)	0.42
Duration of ADT (months)	46.5 ± 46.5	45.8 ± 39.9	46.8 ± 50.8	0.96

Note. ^aAbove Aerobic Guidelines, ≥ 150 minutes/week of physical activity, ^bBelow Aerobic Guidelines, < 150 minutes/week of physical activity, ^cCharlson Comorbidity Index, ^ddata unavailable n = 1, ^edata unavailable n = 3, * significant at $\alpha = 0.05$ level

Medical characteristics were not statistically different between subgroups apart from their Gleason score (7.2 ± 0.6 and 7.7 ± 0.9 for active and inactive respectively). Otherwise, half of the participants had regional disease (stages 1 – 2b), and nearly half had local spread or distal metastasis (stages 3-4). In terms of treatment to date, a majority of patients underwent prostatectomy (92%), ADT (52%), chemotherapy (16%) and/or radiation therapy (28%).

Physical activity and indices of masculinity

The mean masculinity scores as assessed by the PAQ were significantly higher in those meeting aerobic guidelines (22.85 ± 4.48) compared to those not meeting guidelines (19.27 ± 5.19 ; see Table 3-2), and were moderately positively correlated ($r = 0.414$, $p = 0.03$; see Table 3-4).

There were no significant differences in MSES and PAQ scores in those meeting or not meeting resistance exercise guidelines (Table 3-3). Additionally, our study found no association between levels of resistance based physical activity on masculinity self-esteem ($r = -0.142$, $p \leq 0.292$) or masculinity scores in the PAQ ($r = 0.101$, $p = 0.484$). There was a moderate, negative association between feminine scores on the PAQ and masculinity ($r = -0.322$, $p < 0.05$).

Table 3-2. *Masculinity, Body Image and Health Related Quality of Life in Aerobically Active and Inactive Men with Prostate Cancer (N = 50)*

	Above Aerobic Guidelines^a (n = 20)	Below Aerobic Guidelines^b (n = 30)		
	Mean (SD)		t (df)	p
PAQ^c				
Masculinity	22.85 (4.48)	19.27 (5.19)	-2.52 (48)	0.015*
Femininity	20.30 (5.58)	21.90 (4.92)	1.07 (48)	0.29
MSES^d	17.65 (18.20)	19.79 (17.16)	0.42 (48)	0.68
BIS^e	5.95 (4.90)	8.76 (5.77)	1.79 (48)	0.79
FACT-P^f				
Physical well-being	24.4 (2.58)	21.5 (5.78)	-2.41 (43.073)	0.02*
Social well-being	20.4 (5.54)	18.98 (5.00)	-0.975 (48)	0.33
Emotional well-being	17.1 (6.32)	16.5 (5.19)	-0.335 (48)	0.72
Functional well-being	20.3 (7.11)	17.68 (6.27)	-1.398 (48)	0.17
Prostate cancer specific	35.17 (5.22)	31.43 (6.7)	-2.102 (48)	0.041*
TOI	79.75 (13.21)	70.9 (16.65)	-1.992 (48)	0.049*
FACT-G	82.3 (17.47)	75.17 (18.78)	-1.352 (48)	0.18
Overall	117.3 (22.1)	106.83 (24.6)	-1.534 (48)	0.13

Note. SD, standard deviation; df, degrees of freedom; ^aAbove Aerobic Guidelines, ≥ 150 minutes/week of aerobic physical activity, ^bBelow Aerobic Guidelines, < 150 minutes/week of aerobic physical activity, ^cHigher scores represent stronger trait representation, ^dHigher scores represent lower self-esteem and higher psychosocial distress, ^eHigher scores indicate poor body

image and higher levels of psychosocial distress, ^fHigher scores indicate better health related quality of life, *significant at $p < 0.05$

Table 3-3. *Masculinity, Body Image and Health Related Quality of Life in Men Meeting and Not Meeting Resistance Activity Guidelines (N = 50)*

	Above Resistance Guidelines^a (n = 18)	Below Resistance Guidelines^b (n = 32)		
	Mean (SD)		t (df)	p
PAQ^c				
Masculinity	21.11 (5.14)	20.46 (5.28)	-0.417 (48)	0.68
Femininity	22.05 (5.10)	20.81 (5.27)	-0.809 (48)	0.42
MSES^d	20.3 (16.5)	18.16 (18.14)	-0.415 (48)	0.68
BIS^e	8.88 (6.51)	6.93 (4.92)	-1.195 (48)	0.24
FACT-P^f				
Physical well-being	22.50 (4.60)	22.75 (5.19)	0.170 (48)	0.87
Social well-being	20.27 (5.09)	19.16 (5.33)	-0.718 (48)	0.48
Emotional well-being	17.0 (4.04)	16.61 (6.39)	-0.232 (48)	0.82
Functional well-being	20.78 (5.77)	17.60 (6.90)	-1.639 (48)	0.11
Prostate cancer specific	33.7 (6.05)	32.46 (6.56)	-0.677 (48)	0.50
TOI	76.8 (14.21)	73.09 (16.7)	-0.798 (48)	0.43
FACT-G	80.55 (16.3)	76.59 (19.6)	-0.726 (48)	0.47
Overall	114.11 (21.6)	109.28 (25.36)	-0.680 (48)	0.50

Note. SD, standard deviation; df, degrees of freedom; ^aAbove Resistance Guidelines, ≥ 2 days/week of resistance training, ^bBelow Resistance Guidelines, < 2 days/week of resistance training, ^cHigher scores represent stronger trait representation, ^dHigher scores represent lower self-esteem and higher psychosocial distress, ^eHigher scores indicate poor body image and higher levels of psychosocial distress, ^fHigher scores indicate better health related quality of life, *significant at $p < 0.05$

Table 3-4. *Pearson's Correlations of Levels of Aerobic and Resistance Based Activity with Indices of Masculinity, Body Image and Health Related Quality of Life (N = 50)*

	1	2	3	4	5	6	7	8	9	10	11	12
1. Aerobic activity												
2. Resistance activity	-.040											
3. Masculinity (MSES)	-.152	-.142										
4. PAQ masculine	.414**	.101	.072									
5. PAQ feminine	0.071	.135	-.322*	.270								
6. Body image	-.275*	.092	.688**	-.043	-.240							
7. Physical well-being	.335**	.109	-.520**	.224	.044	-.588**						
8. Social well-being	.210	.201	-.612**	.058	.295*	-.437**	.338**					
9. Emotional well-being	.114	.194	-.599**	.057	.121	-.445**	.613**	.478**				
10. Functional well-being	.323*	.280*	-.448**	.248	.083	-.397**	.520**	.583**	.708**			
11. Prostate specific well-being	.358**	.225	-.619**	.204	.224	-.593**	.775**	.623**	.602**	.675**		
12 Quality of Life	.303*	.227	-.649**	.121	.118	-.565**	.768**	.689**	.818**	.848**	.885**	

Note. Aerobic and resistance activity reported in minutes per week. *p < 0.05. **p < 0.01.

Physical activity and body image

There were no statistically significant differences in either the aerobic or resistance groups in terms of their BIS scores; however, there was a small, negative association between levels of physical activity and body image scores ($r = -0.275$, $p = 0.05$). No association was observed with levels of resistance activity ($r = -0.142$, $p = 0.326$). BIS and MSES scores were strongly positively correlated ($r = .688$, $p < 0.01$).

Physical activity and disease specific quality of life

There was a statistically and clinically significant improvement in FACT-P mean TOI scores in the above aerobic guideline group (79.8 ± 13.2) compared to the below guideline group (70.9 ± 16.7). Additionally, there was a moderate, positive association between levels of physical activity and overall health related quality of life as measured by the FACT-P questionnaire ($r = 0.303$, $p < 0.05$).

FACT-P subdomain analysis revealed higher indices of mean physical well-being (24.4 ± 2.58) and prostate cancer specific well-being (35.17 ± 5.22) in the active participants compared to those who were inactive (physical well-being, 21.5 ± 5.78 ; prostate cancer specific well-being, 31.43 ± 6.7).

Resistance activity levels were only associated with a small improvement in functional well-being ($r = 0.280$, $p \leq 0.049$), however overall health related quality of life was not associated with resistance activity levels ($r = 0.227$, $p = 0.113$).

Discussion

This study examined the intersection of exercise and patterns of masculinity, body image and quality of life. Results revealed that (1) men who were aerobically active had higher levels of self-reported masculinity than those who were inactive; (2) aerobic activity level was associated with improved body image; (3) masculinity was strongly associated with physicality (body image); (4) active men had improved quality of life (as measured by the Trial Outcome Index and select physical and prostate cancer specific subscales); and (5) resistance activity failed to demonstrate any significant association with masculinity, body image or quality of life.

To our knowledge, this is the first study exploring how perceptions of masculinity and body image may differ based on self-reported exercise levels in a diverse prostate cancer population, including men who have not received ADT. Masculinity scores were higher in men who performed at least 150 minutes of moderate to vigorous aerobic exercise than those who were inactive. In addition, femininity scores tended to be higher in inactive patients, and these higher femininity scores were strongly associated with worsened body image and masculine self-esteem. Using validated questionnaires our findings are supportive of previous qualitative studies that have found men attribute much of their masculinity to their outward physical appearance (Cormie, Galvao, et al., 2015; Cormie, Newton, Taaffe, Spry, & Galvao, 2013; Fergus et al., 2002; Gannon, Guerro-Blanco, Patel, & Abel, 2010; Hamilton et al., 2015; Keilani et al., 2017).

There has been extensive evidence demonstrating the deleterious effects from ADT on both body composition and masculine identity (Cormie et al., 2016; Hamilton et al., 2015; Keogh & MacLeod, 2012; Keogh et al., 2013). However, in this study nearly half of our male participants (48%) had never received ADT and secondary post-hoc analysis (excluding those with exposure to ADT) continued to demonstrate statistically significant associations between

exercise, body image and quality of life. This supports the notion that negative body image and demasculinization extend beyond those treated with ADT.

Contrary to previous research was the lack of association between resistance training and patterns of masculinity and body image. In those participating in recommended level of resistance activity (≥ 2 days/week), no improvements were seen in masculinity or body image scores. This was unexpected given that resistance-based training is often highly associated with masculine behavior (Keogh et al., 2013), and body composition changes associated with resistance training are often synonymous with masculinity (Hamilton et al., 2015; Harrington, Jones, & Badger, 2009). Although this study was not designed to explore the differences between resistance and aerobic exercise, there are a number of potential explanations for our findings. First, a form of social comparison may be occurring, whereby men engaging in resistance training within facilities may be comparing themselves to younger, more athletic men, thereby reducing the perception of self-improvement following resistance exercise. Research examining the impact of the environment on perceptions of body image may be insightful and speak to the need to deliver prostate cancer specific programming. Second, resistance exercises following treatment for prostate cancer may provoke disease specific complications (e.g., urinary incontinence) that may act as a physical reminder of their lost masculinity. These changes may be less severe or distressing in aerobic exercise. This speaks to the need to ensure men are provided safe exercise instruction by trained exercise professionals to ensure that potential benefits are maximized and risks minimized. Finally, those who participated in resistance activities may have a different perception of their masculinity that our current questionnaires are not detecting. Further studies are required to investigate this discrepancy between aerobic and resistance exercise.

Limitations, strengths and future directions

Due to the cross-sectional nature of the current study, the inferred effect of aerobic activity on masculine values is only one potential explanation. It is possible that levels of masculinity in fact dictated the degree to which patients participated in exercise instead of exercise dictating masculinity or body image. Additionally, despite accounting for the wide range of baseline characteristics, it is possible those meeting aerobic exercise guidelines differed by some other psychosocial factor that contributed to their sense of masculinity. This uncontrolled factor may have affected their resilience to prostate cancer treatment and led to sustained or increased exercise behavior. Future longitudinal studies investigating changes in masculinity, body image and quality of life over time, and in relation to an exercise intervention will address this issue.

Additionally, self-reported measures for exercise were used, however more objective measures of exercise could reduce recall bias and increase the accuracy of the associations. Finally, some of the null findings associated with masculine self-esteem and body image are likely attributable to our limited sample size. Our study was terminated early due to study personnel and time restrictions thereby reducing the detection of small differences between active and inactive subgroups. Lastly, our sample was relatively young, well educated, heterosexual and predominantly White. Therefore, future studies should include a more diverse, representative sample.

Despite the limitations, the study has several strengths. First, we sampled a diverse treatment group that expands on the previous work examining men on active ADT. Our study showed similar negative body image and masculinity issues regardless of ADT therapy or not,

therefore, these body image and masculinity issues may be universal across treatment protocols. Second, we implemented validated masculinity and body image questionnaires in an area that has predominantly been explored qualitatively.

Overall, results support the positive association between masculinity and aerobic exercise. Future research must continue to investigate these relationships within a prospective exercise intervention, with the goal of enhancing quality of life in men with prostate cancer.

Conclusion

This is the first quantitative study examining the associations between masculinity, body image, and quality of life based on levels of exercise in men with prostate cancer who have received a broad range of treatments. Men achieving the ACSM's recommendations of 150 minutes of moderate to vigorous activity were strongly associated with improved masculinity scores, trends toward improved body image, and improved health related quality of life. As masculinity and body image issues are nearly universal amongst survivors and extend beyond those treated with ADT, exercise remains an important, widely available intervention to address demasculinization and body image issues that face men with prostate cancer.

Addendum

This chapter has been reformatted from its original version for inclusion in the thesis. Content remains unchanged but supplementary appendices have been included to provide further detail to the reader.

CHAPTER 4: QUALITATIVE EXPLORATION MANUSCRIPT

Langelier, D.M., Jackson, C., Cormie, P., Bridel, W., Grant, C., Culos-Reed, S.N. *Masculinity and Body Image Experiences of Men with Prostate Cancer – A Qualitative Investigation on the Role of Exercise Levels*. University of Calgary. Calgary, Canada.

To be submitted to the Journal of Psychosocial Oncology.

Abstract

Purpose: Prostate cancer can result in a shift in the way men perceive their masculinity following treatment. Despite the growing interest in exercise as a unique treatment strategy to address masculinity concerns, there is insufficient information available from men across the exercise continuum (from active to inactive), and from men receiving all forms of treatment (androgen deprivation therapy and not) on how exercise might influence self-perceptions of masculinity.

Design: Following a survey collecting demographics and levels of exercise, n = 15 semi-structured, in-depth interviews were conducted with men living with prostate cancer. This qualitative study used a grounded theory approach to data analysis, examining masculinity issues in men obtaining guideline levels of aerobic and/or resistance activity (active men) and compared them against men unable to achieve guideline levels of aerobic and resistance exercise (inactive men).

Findings: One overarching theme emerged related to exercise levels and masculinity, coping strategies. Relevant subthemes included: (1) tapping into competition, (2) re-establishing control, (3) using rationalization strategies, (4) maintaining social connections, (5) acceptance, (6) optimism and (7) withdrawal. There were several differences in how often and which particular coping strategies were used by active and inactive men.

Interpretation: Findings highlight the various coping strategies and the motivations for their use in both active and inactive men with prostate cancer as they attempt to cope with changes to their self-perceived masculinity. Future research is required to examine these coping strategies prospectively and in a more heterogeneous group of men with prostate cancer.

Introduction

Improvements in the detection and treatment of prostate cancer have led to an increasing number of men living with the ill-effects of treatment (American Cancer Society, 2017; Canadian Cancer Society, 2017). These side effects are numerous and can include dramatic physical, emotional, and social changes to both the body and the mind. This combination of cancer-related impairments extending from diagnosis throughout survivorship can shift the way men conceptualize their masculine identity (Carter et al., 2011; MacDonald et al., 2007; Moyad, 2005). Perhaps even more importantly, these perceived shifts to a males perception of their masculinity have been expressed by some survivors to be some of the most challenging side-effects experienced (Cushman et al., 2010).

Masculinity is a complex construct, and has been described as the interaction of numerous biopsychosocial factors (Zaider et al., 2012). In those men at highest risk of developing prostate cancer (i.e., those over the age of 65), many grew up ascribing to traditional masculine norms or a form of ‘hegemonic masculinity’ (Cecil et al., 2010). Hegemonic masculinity is a term used to describe a dominant form of masculinity strived for by many men in contemporary society (Wall & Kristjanson, 2005) and this often dictates how ‘masculine’ men should look, think, feel and act (Burns & Mahalik, 2007; Oliffe, 2005). The basis of this theory is that masculinity in part is constructed and built upon men’s social interactions. This hegemonic masculinity strictly emphasizes traits of independence, emotional withdrawal, competitiveness, control and restraint from showing dependence or vulnerability, while also instructing men to portray a body image consistent with sexual potency, muscularity and functionality to be a provider (Chambers et al., 2013; Helmreich et al., 1981; Zaider et al., 2012). As prostate cancer treatment often results in increased levels of fatigue (Velthuis, Agasi-Idenburg, Aufdemkampe,

& Wittink, 2010), hair loss, increased fat mass, development of breast enlargement (Portenoy et al., 1994) and erectile dysfunction (Chambers et al., 2017a), men ascribing to hegemonic traits may suffer significant distress and reductions in quality of life (Chambers, Chung, Wittert, & Hyde, 2017b). In some prostate cancer studies, men report a desire to reconstruct or return to pre-morbid masculinity levels when traits of sexuality, control or independence have been lost (Gannon et al., 2010; Spindelov, Eli Joubert, Lee, & Fairhurst, 2018).

Another important and inseparable component within masculinity is body image. Perceptions of negative changes to the body have been highly associated with diminished quality of life in prostate cancer survivors (Cecil et al., 2010; Fergus et al., 2002; Langelier, Cormie, et al., 2018). In a study by Levy and Cartwright (2015), older men who experienced perceived feminine changes to their bodies (i.e., hot flushes, penile shortening and female pattern breast development) felt their personal identity had been lost and reported significant reductions in masculinity, increased levels of self-loathing and reductions in self-esteem (Levy & Cartwright, 2015). Similar findings were observed in a study by Langelier (2018), demonstrating a significant correlation between lower masculinity scores and poorer body image (Langelier, Cormie, et al., 2018). These findings are supportive of the notion that when physical changes to the body become incongruent with a patient's perception of what a 'man' should look like, reductions in masculinity and quality of life can occur (Cash et al., 2004; Elliott, Latini, Walker, Wassersug, & Robinson, 2010).

Given these reductions in quality of life associated with changes to masculinity and body image, there is a need to consider potential interventions to reduce the negative impacts of treatment and address masculinity and body image concerns. One such intervention is exercise. Initial evidence suggests exercise plays a considerable role in improving sexual dysfunction and

many indices of body composition (Cormie, Galvao, et al., 2015; Cormie, Galvao, et al., 2014; Galvao et al., 2010; Keogh & MacLeod, 2012). Several qualitative studies have also examined masculinity issues in prostate cancer survivors currently enrolled in ongoing exercise trials (Bourke et al., 2012; Bruun et al., 2014; Cormie, Turner, et al., 2015; Hamilton et al., 2015; Kronenwetter et al., 2005; Martin et al., 2015). Results from these studies suggest exercise may exert a positive effect on masculinity through: (1) increased levels of camaraderie secondary to shared sense of impairment or a common goal of ‘battling cancer;’ (2) providing an environment focusing on valued male traits; (3) providing distraction from ones own mortality or impairment; (4) increasing participant sense of control; (5) improving body composition thereby re-establishing similarity between idealized masculine phenotype and what they see in the mirror; and (6) re-establishing a belief in their ability to succeed or develop a new identity (Bruun et al., 2014; Cormie, Chambers, et al., 2014; Cormie, Turner, et al., 2015).

However, most of this research has focused on men undergoing androgen deprivation therapy (ADT), due to its deleterious effects on body composition and masculinity (Cormie, Galvao, et al., 2015; Culos-Reed et al., 2010; Galvao et al., 2007; Gardner et al., 2014). Trials have also focused on men who are currently exercising in terms of body image, masculinity, and quality of life, and no studies have employed a qualitative approach. There is thus a need to consider men who undergo other treatment options for prostate cancer, as well as men across the exercise spectrum, ranging from inactive to active.

The present exploratory study used interviews with men with prostate cancer as a first step to understand the intersection between masculinity, and levels of exercise. We specifically recruited two distinct participant groups based on exercise levels (i.e., those meeting either aerobic or resistance exercise and those failing to meet either guideline), as we were interested in

whether the attitudes and/or perceptions of men as they relate to their masculinity or body image may differ based on whether or not they were achieving recommended exercise levels.

Methods

This study was approved by The University of Calgary Health Research Ethics Board of Alberta (HREBA) – Cancer Committee (CC). Both written and verbal consent were obtained prior to participation in the written surveys and interviews.

Participants

This qualitative study formed part of a larger cross sectional study examining the differences in masculinity, body image and quality of life scores between men meeting or not meeting aerobic or resistance exercise guidelines (primary outcome), and the strength of these associations based on exercise levels (secondary outcome; Langelier, Cormie, et al., 2018). In summary, all eligible participants to this qualitative sub-study had histologically confirmed adenocarcinoma of the prostate, had experienced a minimum six-month duration of disease, were fluent in English and indicated on their preliminary questionnaires that they were willing to participate in an interview.

Participants with self-reported exercise levels above and below guideline levels of aerobic and resistance activity were recruited. As it remains unknown whether either aerobic or resistance exercise may be a stronger determinant to a male's perception of their masculinity; men achieving guideline levels of either aerobic or resistance exercise were classified as 'active' (Cormie et al., 2016; Langelier, D'Silva, et al., 2018). This classification technique allowed for a general comparison between men achieving guidelines levels of exercise in at least one of the

aerobic or resistance domains to the other group of men unable to reach either aerobic or resistance guidelines. Therefore, if men were able to achieve guideline levels of either aerobic or resistance activity (i.e., ≥ 150 minutes of moderate-to-vigorous aerobic exercise or ≥ 2 days/week of resistance exercise respectively) then they were considered 'active'. Men exercising at levels below aerobic and resistance thresholds were considered 'inactive' (Schmitz et al., 2010).

The modified Godin Leisure Score Index (LSI) from the Godin Leisure Time Exercise Questionnaire (GLTEQ) was the self-reported measure used to assess the frequency and duration of mild, moderate and strenuous aerobic exercise within a typical week (Godin & Shephard, 1985), and an additional question assessing frequency of resistance exercise was added to understand if resistance activity levels contributed to masculinity. The modified GLTEQ with inclusion of a resistance measure has been widely used in prostate cancer populations and corresponds to the recommended levels of physical activity as established by the American College of Sports Medicine (ACSM; Schmitz et al., 2010).

Procedure

As stated previously, this qualitative sub-study formed part of a larger cross-sectional study (see Chapter 3; Langelier, Cormie, et al., 2018). Recruitment to the larger study occurred through patient self-referral from advertisements in wellness areas or ongoing prostate cancer exercise programs, as well as through direct oncology physician and nurse referral within outpatient prostate cancer clinics. Participants were recruited to the qualitative sub-study from February 2016 to June 2017 after indicating on the initial surveys that they would like to participate in an interview.

A stratified purposeful technique was initially planned in order to capture information-rich cases of survivors meeting either aerobic and/or resistance guidelines, and survivors not meeting either guideline. A sample size of 10 from each category was anticipated to reach data saturation. However, of the 50 male participants from the larger cross-sectional study, only 19 agreed to an interview, therefore all participants expressing an interest were invited to participate. During the study, three interviewees failed to return both phone and electronic mail messages and one failed to attend both an initial and rescheduled interview. No reasons were provided. Thus, 15 one-on-one interviews were conducted, with 14 conducted face-to-face in a private location at the University of Calgary, and one completed over the phone for a participant who lived outside of the city.

Interviews were designed to explore the relationships between masculinity, body image and quality of life with specific reference to exercise levels and their relationship with exercise. The interview consisted of a semi-structured, in-depth interview with open-ended prompts designed to encourage discussion between the participant and the interviewer and to ensure all topics were thoroughly explored with each participant. The interview guide (see Appendix H) was pilot tested with one additional voluntary participant excluded from the analysis. The interviewer had flexibility in the order of topics covered based on participant response. Questions were informed by prior research and the clinical expertise of the first and last author. Interview prompts and follow up questions were used to gain a deeper understanding of four main areas: (1) the role, interest level, and type of physical activity; For example ‘Can you tell me about your physical activity level?’, ‘How does physical activity affect your sense of self?’, (2) specific body image changes associated with prostate cancer and how these relate to masculinity and exercise levels; For example ‘How has prostate cancer or treatment changed your body?’, ‘How

do these changes affect your masculinity?’ and ‘Does participation in exercise effect your body image?’; (3) how perception of masculinity may have changed throughout survivorship; For example ‘Has treatment changed what it means to be a man?’, ‘how has this effected your masculine identity?’ and ‘how does exercise influence your masculinity now?’; and (4) how these specific concepts of body image, masculinity and exercise intersect with one another to influence quality of life; For example ‘In what ways do you think body image and masculinity are important to quality of life?’.

The first author (DML), a medical doctor and trained researcher with experience interviewing oncology patients, conducted all interviews. Additional training including a workshop and practice role-play with a senior researcher with extensive experience in qualitative and focus group interviews. No relationship or prior interaction existed between the interviewer and the participants prior to the study; however, the motivation to better understand the role of exercise on masculinity, body image and quality of life was explicitly shared with participants at the beginning of the interview.

Interviews were audio recorded, de-identified and transcribed verbatim. Each interview was approximately 60 minutes in duration. The first author verified the accuracy of all transcripts, and transcripts were supplemented with additional field notes made at the time of the interview to capture key points and provide cues or follow-up prompts.

Participant checking occurred at two points. The first occurred upon completion of the transcript. Participants were asked to provide any additional insight and had the opportunity to strike comments from the record. Four participants provided additional insight and no statements were removed. The second opportunity for participant checking occurred after coding.

Participant feedback was encouraged on the developed set of codes, coder interpretation and

criteria. Out of the fifteen participants who received their transcripts, three provided feedback that helped inform coder terminology.

Analysis

Data analyses for the demographic details were conducted with SPSS Version 22.0. Descriptive statistics identified the demographic and medical characteristics of the sample, as well as subgroups based on those meeting aerobic and/or resistance guidelines or not meeting either set of guidelines (active and inactive groups respectively). Statistical differences between the subgroups were assessed with either a two-tailed independent t test or because of the small sample sizes, Fishers Exact test for categorical variables. All significance tests were two-sided with significance set at an $\alpha = 0.05$.

The qualitative study drew upon the principles of grounded theory with influences from a social constructionism framework. Consistent with the grounded theory approach to qualitative data (Strauss & Corbin, 1990), the coding process was entirely exploratory with no predetermined codes established at the onset of analysis. Transcribed data were individually coded by the first and second authors line-by-line in an analysis software (NVivo; QSR International Pty Ltd, 2014) to reduce the data into manageable, meaningful and well-defined concepts.

Both coders utilized a ‘constant comparisons’ method to identify the unique concepts, hierarchical categories, and overarching themes that emerged from the data. Once coded, both coders met to check these themes against one another and agree upon specific terminology, criteria and placement within the hierarchy. This process was iterative in nature and occurred

several times until agreement was achieved. In the case where the first and second authors were unable to come to a consensus, the last author (NCR) assisted in making a decision.

At the conclusion of this process, a table was created depicting the number of participants and the number of times themes were mentioned between active and inactive exercise groups. Participant quotations were included to help illustrate major and minor themes emergent from the data. Overall, three researchers (DML, CJ, NCR) felt there was consistency amongst the themes emergent from the active and inactive groups and agreed upon the observed differences between active and inactive groups.

Rigor and Quality

Rigor and quality of the study were addressed in two ways. Trustworthiness and transparency of the data were ensured by the first and the second author independently scrutinizing and coding the transcripts. This reduced bias, ensured multiple perspectives were represented and allowed for interpretations to remain grounded in the data. Lastly, multiple quotations were provided as direct evidence of the comprehensiveness of the data.

Results

Sample Description.

Table 4-1 depicts the demographic data of active and inactive participants. Of the 15 participants, $n = 10$ met criteria to be considered active and $n = 5$ did not. The sample as a whole was in keeping with the average age of prostate cancer at the time of diagnosis ($M = 64.9$, $SD = 9.5$). A majority of the men were Caucasian (100%), married (86.4%), heterosexual (93.3%) and had at least a university level education (86.7%). In men who were considered active, half

were still participating in gainful employment with the remainder being retired (40%) or on disability (10%). Men who were inactive based on aerobic and resistance guidelines were all retired (100%).

Medical characteristics including time since diagnosis, $t(13) = 1.62$, $p = 0.13$, comorbidity burden, $t(13) = 0.24$, $p = 0.81$, and prostate specific antigen levels at the time of participation, $t(13) = 1.01$, $p = 0.33$ were not statistically different between subgroups. There were no significant differences between active and inactive men in terms of prior treatments; all men had undergone a prostatectomy (100%, $p = 1.00$, two tailed Fisher's exact test), over half had received ADT (53%, $p = 0.28$, two tailed Fisher's exact test) and only a few had received either radiation (33%, $p = 1.00$, two tailed Fisher's exact test) or chemotherapy (27%, $p = 0.56$, two tailed Fisher's exact test).

In men meeting at least one of the aerobic or resistance exercise guidelines (i.e., active participants), the average volume of moderate-to-vigorous aerobic activity was significantly higher, $t(10.63) = -3.14$, $p = 0.01$, compared to inactive men. Similarly, a significant higher volume of resistance exercise, $t(13) = -2.24$, $p = 0.04$, was observed in active men compared to those who were inactive. The volume of mild aerobic activity did not differ significantly between the active and inactive subgroups $t(11.07) = -1.86$, $p = 0.09$. Figure 4-1 illustrates the distribution of participants based on their participation of aerobic and resistance exercise with respect to aerobic and resistance guidelines (x and y axis respectively; Schmitz et al., 2010).

Table 4-1. Sociodemographic and Medical Characteristics of Interview Participants (N = 15)

Patient Characteristic	Total	Active^a (n = 10)	Inactive^b (n = 5)	p
Age (mean, SD, range)	64.9 ± 9.5 (42 - 78)	63.5 ± 9.3 (42 - 74)	67.8 ± 10.4 (53 - 78)	0.43
Moderate to vigorous aerobic exercise / week (mean, SD, range)	214 ± 196.3 (0 - 660)	285.6 ± 205.2 (0 - 660)	72.0 ± 45.5 (0 - 120)	0.01*
Mild aerobic exercise / week (mean, SD)	119.0 ± 116.7 (0 - 315)	147.0 ± 134.3 (0 - 315)	63.0 ± 34.2 (30 - 120)	0.90
Resistance exercise (days/week) (mean, SD, range)	1.7 ± 1.76 (0 - 6)	2.3 ± 1.8 (0 - 6)	0.40 ± 0.55 (0 - 1)	0.04*
Charlson Comorbidity Index^c (mean, SD)	5.13 ± 2.90	5.00 ± 3.43	5.40 ± 1.67	0.81
Prostate Specific Antigen (mean, SD)	5.5 ± 9.1	3.8 ± 7.0	8.9 ± 12.7	0.33
Education (n, %)				0.83
High School	2 (13.4)	2 (20)	0 (0)	
University	7 (46.7)	4 (40)	3 (60)	
Graduate	6 (40)	4 (40)	2 (40)	
Marital status (n, %)				0.28

Married	13 (86.4)	9 (90)	4 (80)	
Single^d	2 (13.4)	1 (10)	1 (20)	
Ethnicity (n, %)				1.00
Caucasian / Euro American	15 (100)	10 (100)	5 (100)	
Employment (n, %)				0.17
Full time	2 (13.3)	2 (20)	0 (0)	
Part-time	3 (20)	3 (30)	0 (0)	
Retired	9 (60)	4 (40)	5 (100)	
Disability	1 (6.7)	1 (10)	0 (0)	
Sexual orientation (n, %)				1.00
Heterosexual	14 (93.3)	9 (90)	5 (100)	
Homosexual	1 (6.7)	1 (10)	0 (0)	
Time since diagnosis in months (mean, SD)	59.1 ± 60.0	42.0 ± 47.0	93.2 ± 77.5	0.13
Cancer stage (n, %)				0.80
1	1 (6.7)	1 (10)	0 (0)	
2a	4 (26.7)	2 (20)	2 (40)	
2b	3 (20)	2 (20)	1 (20)	
3	5 (33.3)	4 (40)	1 (20)	
4	2 (13.3)	1 (10)	1 (20)	
Previous Treatment				
Prostatectomy	15 (100)	10 (100)	5 (100)	1.00

Radiation	5 (33.3)	3 (30)	2 (40)	1.00
Chemotherapy	4 (26.7)	2 (20)	2 (40)	0.56
Androgen deprivation therapy	8 (53.3)	4 (40)	4 (80)	0.28

Note. ^aMeeting aerobic (≥ 150 minutes/week of moderate to vigorous exercise) and/or resistance (≥ 2 days/week of resistance exercise) guidelines; ^bFailing to meet guideline levels of both aerobic and resistance activity; ^cCharlson Comorbidity Index; ^dIncludes divorced and single men; *significant at $\alpha = 0.05$ level



Figure 4-1. Distribution of participants based on their participation in aerobic (x-axis) and resistance (y-axis) activity based upon the American College of Sports Medicine's recommendations for health adults.

Note. P, Participant; A, minutes of aerobic activity; R, days/week of resistance activity; Green region, men classified as active based upon meeting guidelines levels of aerobic and/or resistance activity; Red region, men classified as inactive based upon failing to meet both aerobic and resistance guideline levels of activity.

Qualitative Themes

Findings from active and inactive participant interviews revealed a single overarching theme, coping strategies. Subthemes within coping strategies included: the ability for men to (1) tap into competition, (2) re-establish control, (3) remain connected to others, (4) rationalize their thoughts, (5) accept their new reality, (6) maintain optimism and (7) withdraw from social circles. The different subthemes represented the various ways men used or understood the role of exercise as a way to cope with their self-perceived masculinity changes. Throughout the interview, specific questioning and probing occurred as coping strategies emerged to ensure men were attributing specific coping strategies to their exercise habits and self-perceived masculinity.

Table 4-2 depicts the emergent subthemes utilized by active and inactive men with prostate cancer, and illustrates the number of participants and the number of times subthemes were mentioned. Overall, there appeared to be a difference between active and inactive men in which coping strategies were used and how they were specifically put into practice. These similarities and differences are highlighted below.

Table 4-2. *Theme Expression by Active (Meeting Aerobic and/or Resistance Exercise Guidelines) and Inactive (Failing to Meet either Aerobic and Resistance Guidelines) Men with Prostate Cancer by Number of Participants and Number of Times Mentioned (N = 15)*

	Active Men (n = 10)		Inactive Men (n = 5)	
	Number of Participants	Number of Times Mentioned	Number of Participants	Number of Times Mentioned
Coping Strategies				
Tapping into Competition				
Internally focused	10	19	0	0
Externally focused	6	21	0	0
Control				
Active participation	9	62	3	16
Knowledge seeking	1	5	5	33
Learned resilience	7	19	1	2
Structure	6	13	0	0
Social Connectedness				

Becoming a leader/teacher/role model	9	29	2	8
Embracing femininity	6	10	3	7
Upward and downward social comparisons	10	13	5	16
Rationalization				
Attribute impairment to aging	6	16	5	26
Attribute dysfunction to diagnosis or treatment	10	16	5	15
Blame on partner	5	6	3	7
Acceptance	10	27	5	18
Optimism	10	29	1	3
Withdrawal	0	0	3	11

1. Tapping into competition. The ability for survivors to compete within themselves or to compete against other survivors appeared to be a major coping strategy for active men who were meeting aerobic and/or resistance exercise guidelines. Competition occurred either intrinsically from ‘an internal fire’, or externally from setting new goals through observation of their peers. Instead of tapping into competition, inactive men failing to meet both aerobic and resistance guidelines tended to utilize strategies of rationalization and social connectedness more extensively.

1.1 Internally focused competition. Active men were observed to have an overwhelming internal drive to improve their general well-being with exercise. One participant stated,

“I asked them: how long to heal? They gave me...well, they said a year. And I said: well, that’s totally unacceptable. And then they said: you know, at six months, you should start noticing the difference. So, they say six months, I say six weeks.” (P14, Active)

It was also observed that active men often intentionally set personal exercise goals beyond those measured by qualified exercise professionals. For active men, setting personal exercise goals helped to ignite competition from within. These goals were often subjective, and measured off the participant’s personal barometer of their own capabilities. One man said,

“when I’ve done a good workout I feel like I’ve lifted what I can lift, I’ve pushed what I can push, I’ve gone the extent that I want to go with cardio, I just feel good.” (P5, Active)

For many active men, especially those participating in a supervised exercise program, the personal goals were often beyond what was to be measured by the research team. However, men participating in exercise classes also celebrated visible and measurable gains that were often incorporated by the research team to measure participant fitness and functional outcomes. Specifically, ratings of fatigue, degree of flexibility and being able to lift more weight or run longer represented an internal achievement. This was especially the case when traits perceived as inherently masculine had been lost. Exercise seemed to be appreciated by active men as the tool that could be used to actualize these improvements in function. Additionally, this internal sense of competition achieved through exercise progression required no other male participants to be present. These improvements were celebrated internally. One articulated this by stating,

“I gained, even in the first 12 weeks... six centimetres on my reach, so just by loosening up hamstrings. Small measurable gains [are] important. One last run, lasting an hour longer. (P13, Active)

Similar findings of internally motivated competition were not observed amongst the interviews with inactive men.

1.2 Externally focused competition. Externally focused competition was observed when men began comparing themselves to others in order to set personal goals. Like internal competition, this externally focused competitive spirit was observed exclusively in active men meeting either set of exercise guidelines. Active men were frequently reporting a struggle post-treatment to establish new and realistic exercise goals. It appeared that by observing physically

active peers with prostate cancer exercise, the participant could increase their own exercise levels by visualizing competing alongside or against their peers. One man had said,

“I’m always competitive, yes, even though I shouldn’t be, but if there’s someone in my age group with prostate cancer, if I’m going to run against them, I will try and keep up to them.” (P15, Active)

By allowing active men to tap into their competitive spirit within their social circle, men appeared to be able to draw upon their masculine competitiveness. Another man said,

“for the fact that it’s slightly competitive makes it masculine, if you can do it, I’m sure as hell going to try and do it.” (P12, Active)

By tapping into external competition, prostate cancer survivors were able to successfully improve their sense of coping and increase their feelings of masculinity. Overall, tapping into competitiveness (either internally or externally) as a primary coping strategy, was evident only in active men.

2. Control. The ability for men to re-establish control after prostate cancer was an important and predominant coping strategy. For active men, this appeared to occur through active participation in their own care; appreciating their resilience and ability to recover from side-effects; and through ‘structured or regimented’ activities like exercise. These strategies to re-establish control differed in men who were inactive. Inactive men attempted to re-establish control primarily by focusing on the intellectual aspects of their disease. This occurred through knowledge seeking behaviors above all else. Inactive men also appeared to have different

motivations for being active and demonstrated a different understanding of the potential roles exercise could play to improve wellness.

2.1 Active participation. Exercise was observed as a way men could actively participate in their health and improve feelings of masculinity. In active men, participation in exercise was frequently expressed as a way they could participate in the ‘battle against cancer’ or actively resist the side effects imposed upon them by treatment. One participant stated,

“I feel like I’m beating it by doing what I’m doing and as long as I keep doing [exercise], I’m going to keep beating it. I think that has a big impact on how you feel and I think, beating the cancer, that what I feel like I’m doing by keeping up with [exercise].” (P15, Active)

Physically active men had clearly established a connection between exercise participation and control. Men were motivated to exercise because they viewed it as one of the few modifiable variables in the treatment of their disease completely under their discretion. One gentleman expressed this sentiment by stating,

“I worry about the things that I can control, things like physical activity, like the fact that I don’t smoke, like my diet, physical activity and exercise you know, all those, that whole list of controllable things. I can’t control my age. I can’t control my gender. I can’t control my genetic stream. So, I deal with what I can” (P5, Active)

Active participation in exercise was strongly motivated by the desire to maintain or restore physical functioning, which contributed to improvements in self-perceived masculinity. Active participation via exercise appeared to provide sense of purpose and control over their situation. One participant said,

“Off the top of my head, probably exercise mainly for taking back or holding onto what the cancer took from me. You have to worker harder to hold onto what remains. That makes me feel empowered for, as a man.” (P₃, Active)

Exercise was a source of masculine empowerment for many active men and was frequently recognized by the active group to improve independence, such that there was less reliance on family, they could restore their role as the provider for their partner and could contribute once again to the household duties. One gentleman articulated this well by saying,

“I get fatigued at the end of the day, but what I’m findings is I have less of those days. So I can work hard all day now and still sit down and have dinner, go for a walk after, water the grass, do some gardening, shovel some snow. Whatever it is, I still have a little bit of energy left over at the end of the day.”

(P₁₃, Active)

For this man, exercise had translated into functionally relevant improvements to his levels of fatigue. These reductions in fatigue allowed him to participate in the social moments with his wife and begin to contribute to household duties that were previously his responsibility as the

‘man’. Another gentleman who was meeting guideline levels of both aerobic and resistance activity similarly stated,

“That’s why I exercise as hard as I do, and you know, it’s really interesting a few years ago, subsequent to diagnosis and treatment, my granddaughter was learning how to ride a bike. We’d gotten her a bike. So I was running up and down the playground with her holding onto the bike as she was riding, learning how to ride and I said to my wife, [] if I wasn’t in the condition that I was in I wouldn’t have been able to do that. To have able to do things with your grandkids is just so important and that’s why I aspire to an active lifestyle.” (P5, Active)

Active men appeared to have an easier time recognizing the full range of extractable benefits from active participation in exercise. These included improvements in fatigue, functionality, endurance, independence and a general feeling of improved quality of life.

Finally, it was important for men who were exercising above guideline levels to not merely engage passively with treatments (i.e., taking medications, or choosing between various treatments options such as surgery) but to do something physical as part of their active therapy participation. One participant stated,

“Keeping a bit more fit makes you feel good and makes you feel like you, that you are in control more than just relying on the pill from the doctors or something. You’re doing something, something to stay healthy”

(P7, Active)

In men participating below guidelines levels of aerobic exercise, ‘active’ participation in treatment appeared more restricted to participation in decision-making and participation in knowledge seeking behaviors. These strategies required no physical activity on behalf of the participant. Such treatment decisions included choosing their form of treatment (e.g., radical prostatectomy versus robotic) or deciding to escalate treatment because of the inherent feeling that they must ‘do something’ (e.g., pushing their oncologist for surgery in low-risk disease). By participating actively in their treatment decisions, men could often forgo physical activity but still feel they were actively directing their health care. One man had stated,

“I said to [the urologist], number one, get the cancer, that’s my priority, number two lets hope the incontinence is not too bad...you can’t be prepared for the downsides but certainly treatment decisions you can take the bull by the horns.” (P₈, Inactive)

Although ‘active participation’ in the inactive male often took the form of treatment decision making, this was not universally the case. Some inactive men understood the importance of exercise but it appeared that the full range of benefits were often not fully realized or not stated within the interview. Inactive men often acknowledged they should be participating in higher levels of exercise, acknowledging benefits of increased longevity, improvements in healing and improvements in comorbidities (e.g., heart disease, osteoarthritis etc...). For example, two inactive men stated,

“Its just a longevity thing. It keeps me doing [exercise]. I think you can live longer with it” (P₈, Inactive)

“Exercise stops your bone from – what’s that called, osteoporosis?” (P₂, Inactive)

The motivation behind exercise in these inactive men also appeared to be different than motivations observed in our active participants. For inactive men, motivation for exercise appeared to stem primarily from external sources of pressure (e.g., physicians or family), or to provide distraction from their side effects. One participant said,

“Exercise is a great way to just get out of the house and walk away from things. If I’m going to cry, which is an uncomfortable and uncharacteristic thing to do. When you’ve never reacted like this before. Either sitting in another room or going out is the best, it’s the best option” (P₁₀, Inactive)

Overall, although what constituted ‘active’ participation differed between men on both sides of the exercise continuum, it appeared essential for all men in the coping process to feel they were contributing in some way to their cancer treatment. This active form of participation aided in the survivor’s overall sense of control, and it was through this control that feelings of self-perceived masculinity were enhanced.

2.2 Knowledge Seeking. The most common way inactive men re-established their sense of control from prostate cancer was through knowledge seeking behaviours. Men described an internal pressure to become knowledgeable about their illness through activities such as attending support groups; reading books, magazines, or surfing the internet; and by tracking their prostate specific antigen (PSA).

“before the operation, and even after the operation, but primarily before the operation, I went to all the information sessions, to learn about my health, the diet, attitude, and all of that.” (P₂, Inactive)

In addition, PSA testing was overwhelmingly felt by inactive men to represent one of the pillars to the foundation of their control. Empowered with the knowledge of their PSA values, inactive men felt they were able to then ‘actively’ participate in their health and contributing to treatment decision-making. Two participants had stated,

“then his PSA started going up; what does that mean? Well, it means that there’s prostate cancer cells that have metastasized and they’re going someone in the body. If you don’t have your PSA done regularly how do you know what going on?” (P₈, Inactive)

“It’s control. I don’t want to have cancer, and if that means having a regular PSA subsequent to my prostatectomy, then so be it.” (P₂, Inactive)

Overall for inactive men, this subtheme of knowledge seeking appeared to stem from the mentality that it is “better to know”. PSA knowledge and surveillance in addition to becoming personal prostate cancer experts contributed the most to the inactive male’s overall sense of control and subsequently this made them feel more masculine.

2.3 Learned Resilience. Resiliency was observed more frequently in active vs inactive men. For these men, resilience embodied the capacity to remain rooted in their pre-cancer

functioning. Active men often expressed this with statements on maintaining employment. One man said,

“For me, mentally that was my fight. I wasn’t going to let [cancer] take over my life, so I just went to work... This way I was still maintaining some control over my life as I saw it then. (P13, Active)

Active men also appeared to tap into the mental benefits of exercise easier than inactive men. They created a connection between exercise and their ability to maintain employment. One man shared this connection by saying,

“If you’re getting someone on a fitness program before, its going to help them deal with stress, and to think more logically” (P13, Active)

While exercise capacity appeared to be threatened by changes to the body, exercise also provided the chance for recovery from these changes. By observing improvements in their health following exercise, positive coping and resiliency were increased. One participant said,

*“I’d tell myself forget that, you can do it, just keep doing it. I run hills, I’m up to 8 hills now for my training, and the first couple of hills, they were buggers to run. And now I just tell myself when I go to stop and walk up part of it, I’m going no! You can do it! Just convince yourself you can do it
(P15, Active)*

Exercise appeared to provide the environment for men who were active to maintain their resilience. This resilience contributed to an increase sense of control over their illness.

2.4 Structure. Exercise represented a structured activity. It occurs over a particular period of time, involves specific movements, and requires certain technique. Expressions of structure contributed to an increased sense of control and appeared exclusively in aerobically active men. This desire for structure was represented well by one man who said,

“So when I exercise. I put, P, for plan, the resistance, the number of repetitions, the number of sets and then, A, the actual what I did...its only an hour, but it’s three hours of exercise a week, plus an hour or yoga, so I’m four hours a week of scheduled exercise.” (P13, Active)

Structure, a regimented program, and protected scheduling all appeared to represent a form of control to many aerobically active men with prostate cancer. The same was not expressed in men who met resistance guidelines, nor in inactive men.

3. Social Connectedness. In order to cope with prostate cancer, active and inactive men began to establish new social networks or attempted to re-define previous ones. Relationships observed included those with family, friends or peers. In general, it was observed that men who were meeting exercise guidelines expressed more statements supportive of building social relationships than men who were inactive. Social connections commonly took the form of leadership positions; upward and downward social comparisons in order to provide a frame of reference for their impairments; and using feminine attributes gained from treatment as a way to tap into different social networks.

3.1 Becoming a leader/teacher/role model. The most common reaction for men after developing prostate cancer was to experience a shift in their identity, role or perception of their

masculinity. Men on either side of the exercise spectrum were observed re-evaluating their involvement in activities. Men tended to gravitate towards roles that emphasized traits of leadership, teaching or becoming a role model. For active men, leadership activities were often easily found within exercise programming. One participant said,

“I’ve coached people, I’ve run running groups and stuff and that’s why I was participating in [exercise] too. I can help people if they have a problem with [exercise] and prostate cancer. If you are a good example, then people learn from that” (P15, Active)

In inactive men, becoming a leader often took the form of advocacy work or leadership positions within support groups. Interestingly, in those men not meeting exercise guidelines, some stated their administrative position were the result of connections initially made through exercise. Although following the exercise intervention, these inactive men failed to maintain exercise levels sufficient enough to be considered active at the time of our study, the exercise appeared to have functioned as an important community engagement tool at the time. For example, one inactive man became the lead of a provincial organization secondary to connections made through exercise programming. He expressed this by saying,

“So we advocate for men and prostate cancer and, of course, we have monthly meetings every second Tuesday so I started to go to those, and I knew one of the participants there and so I ended up getting on the board of directors.”
(P8, Inactive).

Inactive men who had never previously participated in a formal exercise program also expressed achievement by mentoring newly diagnosed males. The capacity to offer wisdom and provide encouragement helped expand their social network, create a feeling of purpose and improve coping. One man said,

“I’ve had radiation ten years ago plus some, but for people coming in who’ve just been diagnosed in the last few weeks, they’re looking for support just like I had previously. (P9, Inactive)”

Overall, becoming a leader, teacher or role model appeared to help create a sense of purpose. This occurred for both active and inactive men although participation for active men in exercise programming appeared to offer substantial opportunities for this process to occur naturally. Additionally, the emergence of a new leadership role was felt by most men to represent a new way to contribute, and this led to improvements in self-perceived masculinity.

3.2 Embracing Femininity. For both active and inactive men, the appearance of feminine body change and increased emotionality were initially an unwelcome occurrence. There did not appear to be a major difference in how active and inactive men embraced this new femininity with respect to exercise. However, for men who were accustomed to traditionally ‘masculine’ resistance training, participation in activities like yoga represented openness and an opportunity to explore new activities and accept classically ‘femininity’ sport. One active man only meeting resistance guidelines reflected on his experience within a yoga program by saying,

“I’ve become more open to these sorts of things...going into the showers after class, there’s still a lot of guys there that have just been up in the gym pumping iron and doing whatever we do up there, and we come in with our yoga mats, and you can see some of them are inquisitive, like, what are these guys doing?...and then we explain we’re in this prostate cancer group...and [we say] you guys really need to go to yoga” (P4, Active)

In other men, femininity was embraced or justified by viewing their emotionality as strength. This often occurred through interactions and prioritizing family. One participant found coaching his kid’s hockey games helpful to increase his self-perceived masculinity by staying connected to a sport he felt a masculine connection to. Although he was no longer participating himself, he found his kid’s participation in hockey emotional at times. He stated,

“I have emotional sort of victories now, [such as] when kids do things that make me proud or happy.” (P7, Active)

It appeared that in response to developing feminine attributes (such as increased emotionality), both active and inactive men often made a conscious decision to embrace body image and perceived masculinity changes. Embracing changes to their masculine identity through social connections such as those obtained through participation in exercise programs, helped to improve men’s sense of control over their situation.

3.3 Upward and Downward Social Comparisons. Social comparisons were a subtheme observed across all participants within the active and inactive groups. The ability for a man with prostate cancer to directly compare themselves to someone else allowed them to appreciate their

own health and condition. This subtheme within social connectedness differed from external competition (i.e., tapping into competitiveness) because it did not result in a man trying to obtain a tangible goal or outcome. Men used upward and downward social comparisons within social networks merely to justify and cope with their level of impairment (e.g., limited exercise tolerance or incontinence). Two participants using this coping strategy stated,

“Five pads! And I’m saying, geez, if that were me I’d be up talking to one of the urologists saying, saying listen...my god.... I’m lucky in that regard”

(P8, Inactive).

“I used to use my sickness as an excuse for staying still. Didn’t really appreciate I’d feel better till I played pick up hockey with another man, he has stage 4 prostate cancer” (P7, Active)

Men also often found comparisons through different social circles including observations of peers, other family or friends with health conditions and from comparing themselves to younger generations. One gentleman said,

“I work down at the Y and some of the guys are older than me or as old as I am, and you see them and they got breasts too. They don’t have the cancer. I’ve got the cancer, so seeing those changes to [my body] doesn’t bother me

much.” (P15, Active).

The opportunities for upward and downward social comparison did not appear to be the initiating factor for exercise participation in active men. Instead, the benefit was realized following

participation and was an unanticipated benefit from exercise. Additionally, in active men, exercise facilities appeared to provide a venue for this upward and downward social comparison to take place.

Overall, this comparison process appeared to occur naturally and spontaneously once men were exposed to one another. By measuring another man's disability and comparing it to their own, men were able to feel better about their situation. Self-evaluating their physical, emotional, or functional impairments as being less severe led to enhanced feelings of masculinity, body image and enhanced coping.

4. Rationalization. Secondary to the side effects of treatment, one of the main coping strategies observed amongst men with prostate cancer was rationalization. Rationalization often involved men making excuses or attempting to 'rationalize' their feelings and/or impairments to convince themselves that their problems are tolerable or were the fault of someone else. Many of these problems were directly connected to their self-perceived masculine identity. The most common ways rationalization were observed in this study included: placing blame on the natural ageing process; mentally separating their side effects from their identity; and attributing relationship changes to the faults of their partner. Nearly all forms of rationalization were observed more frequently in inactive men compared to those obtaining guideline levels aerobic and/or resistance exercise.

4.1 Attributing impairment to aging. Blaming impairments as part of the natural aging process was observed most frequently in inactive men then those meeting exercise guidelines. Men seemed to convince themselves that body image and masculinity change would have been

an inevitable process should they have lived long enough. For example, two men explained away their body changes with rationalization by stating,

“masculinity is part of [body] image, I would say for somebody in my age category that’s a non-issue. If I were in my teens, ... my 20’s and 30’s and so on, image would be important.” (P8, Inactive)

“I do feel like less of a man but my body’s not working the way it used to, and I equate that to my medical history and to my age.” (P1, Inactive)

Out of the eight men who met aerobic guidelines, four were observed to make excuses based on age. However, a key difference was they used age as an excuse to convince themselves it was not possible to achieve further performance gains even with further increases to their activity level. One participant said,

“you get to a certain age, its hard to change what you got”
(P14, Active)

The four men exercising over 300 minutes/week did not mention age in the context of rationalization.

One aerobically active man also drew upon the coping strategy of social comparisons in order to justify his activity level as sufficient. He did this through comparison to other men his age.

“you look at somebody and you ask them at my age, can you do any push-ups?”

No! So even if I can't, can't get exercise more, its okay I guess.”

(P₁₂, Active)

Overall, it appeared that aerobically active men blamed age in order to feel validated that their impairments had not improved or that they had experience limited exercise progression. Blaming dysfunction on the aging process had therefore contributed to the rationalization process and allowed men to cope with their situation and justify their masculinity.

4.2 Attributing dysfunction to diagnosis or treatment. When experiencing side effects of prostate cancer, some men were able to disassociate their masculine identity from the complications. Both active and inactive men expressed this particular coping strategy. This disassociation appeared to protect parts of their identity and was observed to occur through the creation of a mental divide between their identity and the treatment side effects (e.g., feeling ill, having scars, becoming incontinent). One man said,

“I was warned I would be leaking for a while, this allowed me to separate it and have no, no bearing on my masculinity whatsoever. What I did at night, I wore shorts and a tee shirt to bed, and I sometimes leaked in the bed, or wet the bed, so I went out and I bought a pad, and I slept on the pad. At my age I shouldn't be pissing the bed, but [my wife and I] both knew why I was doing it, so in that sense it wasn't a problem.” (P₁, Inactive).

One of the men meeting guidelines described his disassociation from the side effects of cancer as a form of compartmentalizing his impairments. This allowed him to avoid dealing with his impairments directly. He said,

“I tend to compartmentalise, okay. Something happens to me, fine, it’s happened, it goes there and I don’t worry about it again, okay. My cardiac event, the first one it happened. Second one my prostatectomy and I can’t get an erection. But compartmentalise, put it aside, get on with life to the fullest extent. I have a tattoo on this arm. It’s got a sun on it because that’s my disposition, a sunny disposition.” (P5, Active)

Men being instructed on what to expect with treatment was an important pre-requisite for separating themselves from their side effects. This way, the men could understand why they were experiencing certain symptoms, feel not ‘at-fault’ for experiencing them and preserve their sense of masculine identity. There did not appear to be any significant differences in the ways active or inactive men performed this mental separation. Overall, attributing certain impairments to the prostate cancer or treatment without taking ownership of the side effects personally, allowed men to engage in rationalization strategies and successfully cope.

4.3 Blame on Partner. Placing blame on the partner was a common rationalization strategy observed amongst active and inactive men equally. Men often pointed to their partner’s ill health, age, or menopause as the primary reasons their sexual relationship had changed. This occurred even after acknowledging the negative changes impacting their own sexuality, masculinity and body image (i.e., poor erectile quality, reduced libido). One participant stated,

“My wife had already started early menopause, so we were just sort of, so [my erection] wasn’t a big threat to our sex life.” (P₂, Inactive)

This blame was not unique to heterosexual couples. One young (age = 42), homosexual participant also attributed blame based on his boyfriend’s very similar age (age = 47) for their diminished sex-life. This man said,

“He’s five and half years older than me. And so he’s noticing a decline in his physical desire” (P₇, Active).

By men inferring their partner was disinterested in sex it seemed to relieve a major part of their sexual anxiety and reduce masculine threat. Additionally, men appeared to believe that by honoring their partner’s ‘wishes’ they were being supportive. Therefore, the blame placed on the partner for the male’s impairments helped rationalize their situation and facilitated coping while improving their self-perceived masculinity.

5. Acceptance. Acceptance represented an individual’s assent to the uncomfortable reality of living with prostate cancer. Every individual in this study, regardless of their aerobic or resistance exercise levels, made explicit statements about accepting their situation. It appeared that this process of acceptance was critical for men to stabilize their feelings of masculinity loss and face their fear of their own mortality. One man said,

“I do feel like less of a man but have learned to be comfortable in my own skin. I’ve become less embarrassed about having had cancer, it may come back, I realize that. And when it does I’ll probably be very sad for a while, but I’m going to have to move on after that. Exercise can, it can help.” (P1, Active)

Acceptance involved men recognizing some impairments were permanent. Men often did not attempt to resist these impairments from treatment because the ‘alternative (i.e., death) could be worse’. Resisting treatment to preserve masculinity was observed as too high a cost for both active and inactive men. A participant stated,

“You’re bloated, I couldn’t lose the weight that I’d put on. A lot of it was just fluid so I was very puffy but looked at it, here, this is part of the treatment. The alternative was way worse. So I had the mental attitude that this was the lesser of two evils.” (P13, Active).

When men accepted their situation they often required a shift in their priorities to accept new personality traits as more valuable. For all men across the exercise spectrum, they tended to prioritize items like family and friends. This shift was observed as positive change for many men, and in retrospect many were thankful for prostate cancer creating closer bonds with loved ones and changing their perspective. One man said,

“All things considered, I am a richer person for [getting prostate cancer]. I’m not complaining that I have it. In terms of a new sense of priority in terms of who is important to me.” (P₇, Active)

Acceptance represented one of the most numerous coping strategies expressed by all men in this study. Without attempting to change their situation and by shifting priorities, men acknowledged a different part of their identity, which was appreciated as masculine and valued.

6. Optimism. Optimism represented the hope and confidence that the future was going to be positive. This coping strategy was observed amongst all active men. In the one inactive man expressing traits of optimism, he was exercising 120 minutes aerobically with resistance training once per week (P₆). All other inactive participants did not mention optimism as a primary coping strategy realized through exercise.

Exercise appeared to facilitate optimism by providing hope for the future, instilling a sense of courage, providing self-sufficiency, and providing a safe environment to share stories and laughter at mutual impairments. One participant with metastatic disease acknowledged the life-sustaining benefits from exercise. In order to continue experiencing these benefits he felt obligated to continue exercising. He stated,

“I wake up in the morning and a lot of times I think to myself, wow, I’ve got another one. I’ve got another day ahead of me, and it make me feel pretty good. I’m more inclined to want to go for a bike ride now.” (P₁₁, Active)

Men who exercised to guideline levels were aware of their body changes and also experienced feelings of self-consciousness. The act of exercising however, made aerobically

active men feel less dependent on others for validation because they were participating in activities that let them become self-sufficient. One of these men articulated this by stating,

“Well, the shrinkage there, and my nuts have gone like raisins. But when I go to the gym, when I’m in the shower I feel a bit more conscious of letting it all hang out the way I used to do sort of thing, but I’ve taken the approach now, I try, I just don’t give a shit. I’ve got my sweat on in the gym and it’s the reasons I can do what I do, I’m going to have a shower no matter what.”

(P5, Active)

Another important strategy for feeling optimistic about the future was humour. Two men had said,

“The running joke – in hindsight we can joke about it – is the fact that I didn’t shit my bed [after sex] because I have troubles with incontinence.”

(P12, Active)

“I’ve been joking with [my wife] about the end of April when I start producing testosterone again so she’d better watch out, and she and I just laugh.”

(P3, Active)

The use of humour required an environment that supported discussion. For the one man exercising below guideline levels of aerobic and resistance exercise, this tended to occur in support groups or with a mentor. In men participating in exercises classes (which was often the

case for the men meeting guideline levels of exercise), the class itself was sufficient to encourage these discussions. One gentleman participating in an exercise class stated,

“Everyone had a wonderful sense of humour. We often tried to make the instructor blush with our comments. It was a delight to go [to the exercise class]. I just felt I had to have a sense of humour, to me life is not worth living if you can’t smile.” (P₁₅, Active).

Whether it was through the use of humour or choosing to focus on the future, the use of optimism as a main coping strategy was used amongst all active men and only one inactive participant. This coping strategy aided men’s feelings of improved masculinity and body image secondary to exercise.

7. *Withdrawal.* Withdrawal was a coping strategy used only in some inactive men failing to meet guideline levels of both aerobic and resistance exercise (P₂, P₉, P₁₀). Withdrawal appeared to be a more ‘extreme’ coping strategy that included isolation from family, friends, and doctors. By avoiding people, men using this coping strategy were able to avoid painful thoughts and feelings. Withdrawal differed from rationalization strategies because men didn’t attempt to just ‘wall off’ their side effects or compartmentalize things; instead, men tended to isolate themselves. The isolation and self-withdrawal from loved ones was a coping strategy used amongst a few men who were less active. For one participant, loss of independence, changes in his body, and the traits he had reported previously as ‘masculine’ were so negative, so he didn’t share his diagnosis with anyone, including his wife.

“It’s a shock to have everything change, that’s dramatic, it’s going to effect your life so negatively. So I guess that’s just how I reacted.”

(P₁₀, Inactive).

Discussion

This study aimed to explore in greater detail and in a treatment diverse group of individuals the way men may perceive their masculinity based on levels of exercise. When men described exercise as it relates to self-perception of their masculinity or body image, the overarching theme which emerged was coping strategies. This theme of coping had within it seven identified subthemes representing the various ways active and inactive men attempted to cope with treatment-related changes that impact their masculinity. These subthemes included: (1) the ability for men to tap into competition; (2) re-establish control by participating actively in their care, seeking knowledge, maintaining resilience, or finding activities which provided structure; (3) establishing social connections with others by becoming a leader, embracing feminine changes, or using social connectedness to measure disability against others; (4) rationalizing changes to their masculinity and body image by attributing dysfunction to aging, an alternative diagnosis/treatment or by blaming their partner to avoid negative self-perceptions; (5) accepting their condition; (6) finding optimism in the face of illness and (7) withdrawing from others. These various coping strategies were reported differently by participants in light of obtaining recommended levels of aerobic and/or resistance exercise (i.e., active participants) or failing to meet either set of guidelines (i.e., inactive participants).

In active men, dominant coping strategies of control through active participation, acceptance, optimism, competition and leadership were observed. Whereas in inactive men, control through knowledge seeking, rationalization, acceptance and withdrawal techniques were more frequently mentioned.

The feeling of control over the circumstance of living with prostate cancer and its impairments appeared to contribute substantially to a male's appraisal of his own masculinity. Previous studies have also reported control as a commonly employed coping strategy (Bourke et al., 2012; Bruun et al., 2014; Cormie, Galvao, et al., 2015; Hamilton et al., 2015; Kronenwetter et al., 2005; Martin et al., 2015; Pascoe & Edvardsson, 2016; Spindelov et al., 2018). For physically active men, control was motivated by taking an active participatory role in their health. This was motivated by improving physical functioning, independence and striving for retention of previous masculine roles. For inactive men, knowledge seeking was observed as the primary means of establishing control. Although prior studies have examined the association between control and improved masculinity, this study suggests a connection exists between exercise levels and particular control coping strategies. This suggests that levels of exercise and the type of coping strategy related to control may dictate whether patients use knowledge seeking, or whether they will participate in cancer management through changes to their diet, attending medical appointments or increasing levels of exercise (Maliski, Rivera, Connor, Lopez, & Litwin, 2008).

The use of rationalization strategies to cope with impairments secondary to prostate cancer was another way men attempted to maintain their self-perceived masculine identity. Rationalizing impairments has previously been identified as an important coping mechanism in

men with prostate cancer, based on its ability to allow participants to reframe how their symptoms are viewed (Spendelow et al., 2018). Although a few previous studies have reported associations between rationalization techniques and prostate cancer coping, no study has attempted to link levels of exercise to the various expressions of rationalization. In the current work, inactive men justified impairments as part of the natural aging process, as inevitable, or as related to another chronic illness (e.g., reduced exercise capacity secondary to cardiac disease). In active men, while some chose to endorse similar feelings as the inactive men, some chose to use rationalization to excuse their inability to achieve further exercise goals or physical gains. Overall, this coping strategy is consistent with findings from prior studies suggesting rationalization and re-framing can reduce threat to self-perceived masculinity and may be associated with improved psychological outcomes (Appleton et al., 2015; Dieperink, Wagner, Hansen, & Hansen, 2013; Gannon et al., 2010; Hamilton et al., 2015; Maliski et al., 2008).

Acceptance and optimism are well known coping strategies used by men with prostate cancer (Pascoe & Edvardsson, 2016; Spendelow et al., 2018). Whereas acceptance was used by both groups in this study, expressions classified as optimistic were observed more frequently in men achieving guidelines levels of at least one form of exercise. In a study by Pascoe et al (2016), acceptance was found to provide the strongest individual benefit to prostate cancer patients. Patients seem to employ this strategy in circumstances when the side-effects they are experiencing are felt to be unmodifiable. In other studies, the process of acceptance and optimism have been associated with significant psychological improvements (Pascoe & Edvardsson, 2016; Spendelow et al., 2018).

Overall, the result of this study are important, as the effect of exercises on self-perceived masculinity and body image are hypothesized to extend beyond previously established body composition changes; and survivors differing in their level of exercise may have distinct coping strategies with unique motivations contributing to their self-perceived masculinity.

Limitations, strengths and future directions

There are several limitations of the present study that must be noted. Despite including a more diverse treatment group including both men on and off ADT, the sample of men in our study was relatively homogenous in terms of ethnicity, sexual orientation, educational merits, and marital status. Additionally, there was a relatively small number of men comprising the inactive group ($n = 5$) compared to those achieving guideline levels of either aerobic or resistance exercise ($n = 10$). These factors may limit the generalizability of our findings to the prostate cancer population at large.

This study also chose to combine men meeting either aerobic or resistance guidelines into a single ‘active’ group. The literature remains unclear about the relative impact of either form of exercise on perceptions of masculinity, thus future research must continue to explore the impact of aerobic or resistance training (or a combination) on perceptions of masculinity. Our study found that that there was similar use of coping strategies amongst all active men, regardless of type of activity. This supports the methodological consideration of combining the men in our study into a single ‘active’ group. These findings are also similar to other aerobic plus resistance exercise programs showing increased scores of masculinity (Cormie et al., 2016). On the other hand, in an earlier study by our authors (see Chapter 3) examining the link between

masculinity and exercise quantitatively, aerobic exercise was found to significantly increase masculinity scores with no significant improvement found in the resistance group (Langelier, Cormie, et al., 2018). Therefore, future studies including a larger sample of men meeting resistance only guidelines, aerobic only guidelines, and combined aerobic and resistance exercise guidelines are necessary to help explore the relationship of exercise on self-perceived masculinity and body image and whether one of these modalities may be more influential to self-perceived masculinity.

Additionally, due to the cross-sectional nature of this study, the ability to evaluate cause and effect relationships between exercise and enacted coping strategies should be cautioned. Future qualitative studies examining masculinity issues prospectively in a pre- post-trial format could offer significant insight into how coping strategies may change or remain stable in men participating in various amounts of exercise. Future prospective trials may also assist researchers in determining whether exercise can influence coping strategies or whether it's the underlying coping strategy which influences exercise levels.

Another important consideration when interpreting findings from this study is that men participating did so knowing ahead of time questions surrounding masculinity and exercise habits were going to be investigated. Therefore, men participating in this study may differ in their experiences compared to men choosing not to participate and may not be fully representative of all prostate cancer survivors. Finally, our results are exclusive of partners or family whose insight on masculinity changes in their loved one may have led to a fuller understanding of masculinity and exercise phenomena in prostate cancer survivors.

Despite some of the limitations, our pre-experimental study also has several strengths. First, our study was inclusive of men on and off ADT supporting masculinity issues across the treatment spectrum. No previous work has included men outside of those on ADT when examining the relationship between exercise and masculinity. Second, as no study has directly contrasted masculinity issues in men based upon their exercise levels, this study represents a novel contribution to the field. This preliminary study suggests men meeting at least one of the aerobic or resistance guidelines can be motivated to participate or stay involved with exercise. This may occur by appealing to active participation, competition or facilitating leadership opportunities. This differed from inactive men where exercise may have been appreciated in a much narrower sense but could be motivated by physicians or family members and by appealing to exercises effect on longevity or improving other health conditions. Additionally, by understanding the differences between how active and inactive men view exercise as it directly relates to masculinity, these results have the potential to provide impactful programming recommendations which may alter how exercises is presented or delivered differently to active and inactive men by clinicians and researchers.

Implications for Practice

One of the current challenges facing clinicians and researchers is trying to increase exercise participation in all men with prostate cancer. Understanding how men are attempting to cope with perceived masculinity changes and how various coping strategies might be predictably used based on activity levels could provide the opportunity for tailored interventions or

counseling to increase exercise behavior in both active and inactive men by appealing to specific aspects of a man's masculinity.

Specifically, in men who are meeting exercise guidelines, masculinity appears to be positively connected to competition, leadership found through sport, or through the benefits of exercise on cancer control. Clinicians can reinforce exercise participation in physically active men by specifically pointing out community programs that may foster or appeal to these specific masculine traits. For example, encouraging participation in prostate cancer sporting groups (i.e., recreational football) or participating in exercise trials that are purposefully measuring anthropomorphic details (i.e., skin fold thickness, degree of flexibility, one repetition maximum) may increase exercise participation by appealing to masculine sport or promoting body changes appreciated as inherently masculine.

An alternative approach is for the physician not only to assess the patient based upon his current exercise level but to try and identify his particular coping strategy. Empowering the clinician with these two pieces of information could enhance his or her ability to provide effective motivational counseling through statements such as “based upon other men who are physically active, some men find exercise programs which are competitive can be helpful for changes to their masculinity.”

A similar approach to increasing exercise participation could be used in inactive men. First, the importance of physician-to-patient education and providing a clear exercise prescription appears more valuable to inactive men compared to the active men in terms of increasing motivation to exercise. Explicit statements from the physician to exercise may be able to shift the way inactive men ‘participate actively’ by actually exercising versus using treatment

decisions. Second, appealing to masculinity through knowledge seeking strategies, providing an environment where comparisons to other men can occur, and educating patients on the role of exercise in longevity, increasing general health and improving comorbidities may draw upon inactive male coping strategies. A recent review supports exercise benefits for prostate cancer survivors, including on recurrence and survival (Cormie, Zopf, Zhang, & Schmitz, 2017).

Understanding the coping strategies commonly employed by inactive men may allow for motivational counseling to appear in this group as well. This might look like: “Based upon other men who are less active like yourself, some men may exercise more if they knew exercise had the potential to improve your survival or help with your knee osteoarthritis.” Other statements appealing to coping strategies of social comparisons in inactive men might include “Based upon other men who are less active like yourself, participating in exercise programs can allow for you to see other inactive men similar to yourself starting to move more. This can help to put some of the challenges you are experiencing into context.”

Conclusion

This is the first qualitative study to compare the relationship between exercise and self-perceptions of masculinity between men meeting and failing to meet aerobic and resistance exercise guidelines as set out by the ACSM (Schmitz et al., 2010). This study concluded that men use various coping strategies to help deal with changes in masculine identity differently if they are obtaining recommended levels of exercise versus not. Active men tend to use exercise to enhance masculinity through competition, maintaining control, and staying optimistic.

Additionally, physically active men also appeared to appreciate exercise for its ability to restore

function, independence and contribute actively to their prostate cancer treatment. This study also highlights that inactive men tend to appreciate a narrower spectrum of benefits they expect to receive from increasing exercise participation, resulting in higher use of rationalization and withdrawal as primary coping strategies. There is need for future prospective studies on masculine coping, and the incorporation of physical activity measures within qualitative studies examining psychosocial outcomes of masculinity.

CHAPTER 5: CONCLUSION

This preliminary research addressed issues of self-perceived masculinity and body image changes in men with prostate cancer across the exercise continuum, and included men undergoing more diverse treatment options. Following a systematic review of the literature, a mixed methodology approach was used. The systematic review examined self-perceived masculinity and body image issues within available exercise interventions, finding exercise programs could foster a shared sense of masculinity through community and safety, place a focus on valued male traits, provide distraction, restore control, improve body image and improve self-efficacy. The quantitative study focused on measuring psychosocial traits of masculinity, body image and quality of life in a sample of active and inactive men with prostate cancer. The results demonstrated that significantly higher scores of masculinity and quality of life were achieved in men obtaining the recommended levels of aerobic exercise. Lastly, the qualitative interviews with active and inactive men helped us understand how men used various coping strategies to deal with self-perceived masculinity and body image changes, and how these strategies may be related to exercise levels. These strategies included: tapping into competition, re-establishing control, using rationalization, maintaining social connections, acceptance, optimism and withdrawal. By understanding the differences in how often and which particular coping strategies were used by active and inactive men this provided valuable information on potential programming recommendations to increase exercise participation amongst both groups of men.

Knowledge Translation and Future Directions

Armed with the understanding that self-perceived masculinity, body image and quality of life can be effected by prostate cancer treatment; it is important for clinician-researchers to find ways to measure these important psychosocial variables. Currently, tools available to measure masculinity are limited by strict categories that attributes must be either completely masculine or feminine. Tools including the masculine self-esteem score or the personality attributes questionnaire used in this study are purposefully designed to capture traditional or hegemonic forms of masculinity. Our qualitative findings are supportive of prior research that not all men value traditional forms of masculinity, and some men may encounter a shift in the way they appreciate their masculinity following prostate cancer diagnosis, towards acceptance of more classically feminine attributes. Additionally, the findings within this preliminary work suggest coping strategies play an important part in how men perceive their masculinity, and coping strategies may be influenced by levels of exercise. Therefore, it may be more important for surveys to incorporate open text fields when attempting to capture masculinity data. This would allow men to interpret masculinity within their own understanding, without being forced to dichotomize traits into masculine or feminine. Additionally, as this was the first study to link levels of exercise to coping strategies within men with prostate cancer, future studies incorporating validated measures of illness coping (e.g., Benefit Finding Scale or Brief COPE) could provide valuable insight into the relationship between particular coping styles, masculinity and exercise participation. Understanding both the coping strategy and whether the patient is active or inactive could help the clinician provide more tailored motivational counselling for health behaviour change.

One of the main limitations within the present research is the lack of causality between exercise levels and perceptions of masculinity, body image or coping strategies. Along with incorporating validated measures of coping, future studies would benefit from a prospective design including pre- and post-qualitative interview to determine how self-perceived masculinity and coping may change in a supervised exercise setting. Additionally, more research is needed to help establish the optimal dosing of aerobic or resistance exercise and whether one exercise modality (i.e., aerobic or resistance) may be more appropriate depending on whether patients are using particular coping strategies, or endorse particular masculine attributes as more important.

In conclusion, this work supports masculinity issues in men receiving all forms of cancer treatment (including ADT or not) and also suggests masculinity, body image and quality of life can be improved for both active and inactive men with increased levels of exercise.

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APPENDICES

Appendix A

Table A. 1. *Prostate Cancer Staging Manual*

Stage	Stage grouping	Stage description
I	T1, N0, M0 Gleason score 6 or less PSA less than 10	<p>The doctor can't feel the tumor or see it with an imaging test such as transrectal ultrasound (it was either found during a transurethral resection or was diagnosed by needle biopsy done for a high PSA) [T1]. The cancer is still within the prostate and has not spread to nearby lymph nodes [N0] or elsewhere in the body [M0]. The Gleason score is 6 or less and the PSA level is less than 10.</p>
	OR	
	T2a, N0, M0 Gleason score 6 or less PSA less than 10	<p>The tumor can be felt by digital rectal exam or seen with imaging such as transrectal ultrasound and is in one half or less of only one side (left or right) of the prostate [T2a]. The cancer is still within the prostate and has not spread to nearby lymph nodes [N0] or elsewhere in the body [M0]. The Gleason score is 6 or less and the PSA level is less than 10.</p>
IIA	T1, N0, M0 Gleason score of 7 PSA less than 20	<p>The doctor can't feel the tumor or see it with imaging such as transrectal ultrasound (it was either found during a transurethral resection or was diagnosed by needle biopsy done for a high PSA level) [T1]. The cancer has not spread to nearby lymph nodes [N0] or elsewhere in the body</p>

		[M0]. The tumor has a Gleason score of 7. The PSA level is less than 20.
	OR	
	T1, N0, M0 Gleason score of 6 or less PSA at least 10 but less than 20	<p>The doctor can't feel the tumor or see it with imaging such as transrectal ultrasound (it was either found during a transurethral resection or was diagnosed by needle biopsy done for a high PSA) [T1]. The cancer has not spread to nearby lymph nodes [N0] or elsewhere in the body [M0].</p> <p>The tumor has a Gleason score of 6 or less. The PSA level is at least 10 but less than 20.</p>
	OR	
	T2a or T2b, N0, M0 Gleason score of 7 or less PSA less than 20	<p>The tumor can be felt by digital rectal exam or seen with imaging such as transrectal ultrasound and is in only one side of the prostate [T2a or T2b]. The cancer has not spread to nearby lymph nodes [N0] or elsewhere in the body [M0]. It has a Gleason score of 7 or less. The PSA level is less than 20.</p>
IIB	T2c, N0, M0 Any Gleason score Any PSA	<p>The tumor can be felt by digital rectal exam or seen with imaging such as transrectal ultrasound and is in both sides of the prostate [T2c]. The cancer has not spread to nearby lymph nodes [N0] or elsewhere in the body [M0]. The tumor can have any Gleason score and the PSA can be any value.</p>

	OR	
	T1 or T2, N0, M0 Any Gleason score PSA of 20 or more	<p>The cancer has not yet spread outside the prostate. It may (or may not) be felt by digital rectal exam or seen with imaging such as transrectal ultrasound [T1 or T2]. The cancer has not spread to nearby lymph nodes [N0] or elsewhere in the body [M0]. The tumor can have any Gleason score. The PSA level is at least 20.</p>
	OR	
	T1 or T2, N0, M0 Gleason score of 8 or higher Any PSA	<p>The cancer has not yet spread outside the prostate. It may (or may not) be felt by digital rectal exam or seen with imaging such as transrectal ultrasound [T1 or T2]. The cancer has not spread to nearby lymph nodes [N0] or elsewhere in the body [M0]. The Gleason score is 8 or higher. The PSA can be any value.</p>
III:	T3, N0, M0 Any Gleason score Any PSA	<p>The cancer has grown outside the prostate and may have spread to the seminal vesicles [T3], but it has not spread to nearby lymph nodes [N0] or elsewhere in the body [M0]. The tumor can have any Gleason score and the PSA can be any value.</p>
IV	T4, N0, M0 Any Gleason score Any PSA	<p>The cancer has grown into tissues next to the prostate (other than the seminal vesicles), such as the urethral sphincter (muscle that helps control urination), rectum, bladder, and/or the wall of the pelvis [T4]. The cancer has not spread to nearby lymph nodes [N0] or elsewhere in the</p>

		body [M0]. The tumor can have any Gleason score and the PSA can be any value.
	OR	
	Any T, N1, M0 Any Gleason score Any PSA	<p>The tumor may or may not be growing into tissues near the prostate [any T]. The cancer has spread to nearby lymph nodes [N1] but has not spread elsewhere in the body [M0]. The tumor can have any Gleason score and the PSA can be any value.</p>
	OR	
	Any T, any N, M1 Any Gleason score Any PSA	<p>The cancer may or may not be growing into tissues near the prostate [any T] and may or may not have spread to nearby lymph nodes [any N]. It has spread to other, more distant sites in the body [M1]. The tumor can have any Gleason score and the PSA can be any value.</p>

Note. Reprinted from AJCC Cancer Staging Manual. 7th Edition. By American Joint Committee on Cancer, Prostate. Copyright 2010 by Springer.

Appendix B

DEMOGRAPHICS

Please answer in relation to your **CURRENT** status:

*Please check only **one** option. If you do not wish to answer a question, please skip and go to the next question. All information provided will be kept anonymous and confidential.*

1. Age: _____

2. Gender:

Male:

Trans

3. Education Level (please check highest level attained):

Some high school:

Completed high school:

Some university/ College:

Completed University/ College:

Some OR completed Grad school:

4. Marital status:

Married/ common law:

Divorced/ separated:

Widowed:

Single:

Other:

5. Employment Status:

Full-time:	<input type="checkbox"/>
Homemaker:	<input type="checkbox"/>
Retired:	<input type="checkbox"/>
Part-time:	<input type="checkbox"/>
Unemployed:	<input type="checkbox"/>
Disability/ sick leave:	<input type="checkbox"/>

6. Which of the following best represents your racial or ethnic heritage:

Non-Hispanic White or Euro-American:	<input type="checkbox"/>
Black, Afro-Caribbean or African American:	<input type="checkbox"/>
Latino or Hispanic American:	<input type="checkbox"/>
East Asian or Indian American:	<input type="checkbox"/>
Middle Eastern or Arab American:	<input type="checkbox"/>
Native American or Aboriginal:	<input type="checkbox"/>
Other:	<input type="checkbox"/>

If Other: _____

7. Sexual Orientation:

Heterosexual:	<input type="checkbox"/>
Homosexual:	<input type="checkbox"/>
Bisexual:	

Figure B. 1. The demographics questionnaire administered to participants

Appendix C

Table C. 1. *Form for the Extracted Data Items of Each Participant from their Electronic and/or Paper Medical Record*

Medical Characteristic	
1. Age at time of survey (months)	$(\text{date of survey}) - (\text{date of birth}) = \text{age}$
2. Age at diagnosis (months)	$(\text{date of diagnosis}) - (\text{date of birth}) = \text{age}$
3. Time since Diagnosis (months)	$(\text{date of survey}) - (\text{date of diagnosis}) = \text{age}$
*Must be at least 6 months	
4. Gleason score (reported as X + X = X) on biopsy	
5. Prostate specific antigen level a. At diagnosis b. At time of survey	
6. Cancer stage	(See Table A. 1. from Appendix A.)
7. Previous treatments a. Prostatectomy Time since treatment (months)	Yes / No; Date _____

<p>b. Radiation</p> <p>Time since treatment (months)</p> <p>c. Chemotherapy</p> <p>Time since treatment (months)</p> <p>d. Hormonal therapy</p> <p><u>Duration</u> of treatment (months)</p>	<p>(survey date) – (date of surgery)</p> <p>Yes / No; Date _____</p> <p>(survey date) – (radiation comp. date)</p> <p>Yes / No; Date _____</p> <p>(survey date) – (chemo comp. date)</p> <p>If previous / interrupted exposure date(s):</p> <p>(survey date) – (hormone start date)</p> <p>If previous / interrupted exposure date(s):</p>
<p>8. Current treatment</p>	<p>List:</p>

9. Burden of comorbidities	(Based upon the Charlson Comorbidity Index calculation, see additional Appendix D)

Note. Date calculations checked using <https://www.timeanddate.com/date/duration.html>
Determination of the patient's cancer grade based upon the American Cancer Society Prostate Cancer Stages Tool (see Table A.1. from Appendix A). Burden of comorbidity assessed by score on Charlson Comorbidity Index [see Table D. 1. from Appendix D)

Appendix D

Table 3. Weighted index of comorbidity

Assigned weights for diseases	Conditions
1	Myocardial infarct Congestive heart failure Peripheral vascular disease Cerebrovascular disease Dementia Chronic pulmonary disease Connective tissue disease Ulcer disease Mild liver disease Diabetes
2	Hemiplegia Moderate or severe renal disease Diabetes with end organ damage Any tumor Leukemia Lymphoma
3	Moderate or severe liver disease
6	Metastatic solid tumor AIDS

Assigned weights for each condition that a patient has. The total equals the score. Example: chronic pulmonary (1) and lymphoma (2) = total score (3).

Figure D. 1. The Charlson Comorbidity Index used by study personnel to calculate burden of comorbidities and overall health.

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Appendix E

GODIN LEISURE TIME EXERCISE QUESTIONNAIRE

We would like you to recall your *average weekly exercise* over the *past month*. How many times per week on average did you do the following kinds of exercise over the past month?

When answering these questions please remember to:

Consider your average *weekly exercise* over the past month

Only count exercise sessions that lasted *15 minutes or longer* in duration

Only count exercise that was done during free time (i.e. do not include occupation or housework)

Note the main difference between the three categories is the intensity of the exercise

Write the average frequency on the first line and the average duration on the second line

STRENUOUS EXERCISE (Heart beats rapidly, sweating)

(e.g., running, jogging, hockey, soccer, squash, cross country skiing, judo, roller skating, vigorous swimming, vigorous long distance bicycling, vigorous aerobic dance classes, heavy weight training)

In an average week I was involved in strenuous exercise _____ times/week for an average duration of _____ minutes/each session.

MODERATE EXERCISE (Not exhausting, light perspiration)

(e.g., fast walking, baseball, tennis, easy bicycling, volleyball, badminton, easy swimming, alpine skiing, popular and folk dancing)

In an average week I was involved in moderate exercise _____ times/week for an average duration of _____ minutes/each session.

MILD EXERCISE (Minimal effort, no perspiration)

(e.g., easy walking, yoga, archery, fishing, bowling, lawn bowling, shuffleboard, horseshoes, golf, snowmobiling)

In an average week I was involved in mild exercise _____ times/week for an average duration of _____ minutes/each session.

RESISTANCE TRAINING EXERCISE

(e.g. exercises with dumbbells, body weight, bands such as squats, bicep curls, etc.)

In an average week I perform resistance training activities _____ times/ week for an average duration of _____ minutes/session.

Figure E. 1. The modified Godin and Shephard Leisure Time Exercise Questionnaire (GLTEQ) administered to participants.

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Appendix F

Masculine Self-Esteem Scale

In this questionnaire you will be asked about any changes that may have resulted from your disease or treatment. Please read each item carefully, and fill in the circle that best represents the way you have been feeling about yourself during the past week.

		Not at all	A little	Quite a bit	Very much
1	I feel as if I am no longer a whole man	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	I feel like I've lost part of my manhood	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3	I'm not the man I used to be	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4	I feel that others think that I'm not the man I used to be	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5	I feel weak and small	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6	I worry about being compared unfavourably to other men	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7	I feel I have been too emotional	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8	It's hard to think things through coolly and logically	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Figure F. 1. The Masculine Self-Esteem Scale (MSES) questionnaire administered to participants.

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Appendix G

Body Image Scale

In this questionnaire you will be asked how you feel about your appearance, and about any changes that may have resulted from your disease or treatment. Please read each item carefully, and fill in the circle that best represents the way you have been feeling about yourself during the past week.

		Not at all	A little	Quite a bit	Very much
1	Have you been feeling self-conscious about your appearance?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	Have you felt <u>less</u> physically attractive as a result of your disease or treatment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3	Have you been dissatisfied with your appearance when dressed?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4	Have you been feeling less masculine as a result of your disease or treatment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5	Do you find it difficult to look at yourself naked?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6	Have you been feeling less sexually attractive as a result of your disease or treatment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7	Do you avoid people because of the way you feel about your appearance?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8	Have you been feeling the treatment has left your body less whole	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9	Have you felt dissatisfied with your body?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Figure G. 1. The body image scale (BIS) administered to participants.

Appendix H



SEMI-STRUCTURED INTERVIEW GUIDE

INTRODUCTION/RE-ESTABLISH CONSENT

- Welcome and thank the participant
- Outlines purpose of interview/focus group (i.e. to better understand the role of exercise on masculinity, body image and quality of life from men who are more or less active)
- Finally, all comments are welcome and appreciated. There are no wrong answers and you can refuse to answer any or all questions. Also if you are feeling unwell at any time, please let us know and we can make sure you get back to the unit/bathroom/home
- Remind participants that interviews audio-recorded and any information (including names, occupations) that could link your comments to you will be removed. You may see me writing a few notes as you are speaking this is merely to remind me to ask you questions on things you may have said so I do not need to interrupt you
- Remind participant that they can refrain from answering any questions and can end the interview at any time without repercussion.
- Check participants wish to proceed (re-establish consent).

GUIDE

1. First we will focus on **physical activity**.
 - a. Can you tell me about your physical activity level?
 - i. Can you elaborate on how physical activity affects your sense of self or who you are?
 - ii. What is the role of physical activity in your cancer treatment?
 - iii. What role does physical activity play in your health if any?
 - iv. Can you describe what types of programs you are in?
 - v. What draws you to these programs?
2. Next we will focus on **body image**
 - i. Can you describe how prostate cancer or treatment has changed your body either for the better or worse?
 - ii. What is body image to you?
 - iii. Do any of these physical changes make you feel more or less masculine?
 - iv. What aspects of body image are the most important to you? Why?
 - v. Does participation in physical activity affect your body image?

3. Next, I'd like to hear your thoughts on how **masculinity** plays into all this.
 - a. Can you tell me how prostate cancer and its treatment have changed what it means to be a man?
 - b. What is masculinity to you?
 - c. Have any of the side effects affected your masculinity? Your identity?
 - d. Can you describe how important or unimportant it is for you to stay masculine while living with prostate cancer?
 - e. How does physical activity affect your masculinity?
4. Finally, I'd like to hear about your **quality of life**.
 - a. What is quality of life to you?
 - b. Has prostate cancer affected any of these?
 - c. In what ways do you think body image is important to quality of life if at all?
 - d. In what ways is masculinity important to quality of life if at all?
 - e. What role does physical activity play in quality of life, if any?
5. Do you have any other comments?

CONCLUSION

- Thank participant for participation.
- Remind participant that transcripts will be provided to them for feedback. They can strike statements, modify or add anything they wish.
- They will also be asked to provide feedback once interpretations are made from the data if they should choose to participate in that process.
- Re-establish consent for sending transcripts to patients through their email.

Figure H. 1. The semi-structured interview guide administered to participants

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Physical Medicine & Rehabilitation

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