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Exercise Preferences Among Men With Prostate Cancer Receiving Androgen-Deprivation Therapy

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Purpose/Objectives: To investigate acceptability of and preferences for physical activity participation in men receiving androgen-deprivation therapy (ADT) for prostate cancer, to identify influencing clinical and demographic factors, and to determine the percentage meeting national exercise guidelines.

Design: Cross-sectional, descriptive.

Setting: Ambulatory care clinic of a large medical center.

Sample: 135 men receiving ADT.

Methods: A structured interview with a systematic procedure was used to elicit preferences for physical activity.

Main Research Variables: Exercise preferences and acceptability; evidence-based exercise intervention.

Findings: Participants expressed high levels of acceptability of and willingness to participate in aerobic (64% and 79%) and muscle-strengthening (79% and 81%) programs. Preferences were expressed for muscle-strengthening activities performed at home, either alone or in the company of a family member. Flexible, spontaneous, and self-paced programs were preferred. Significant associations were identified for distance, age, obesity, duration of ADT, and meeting American College of Sports Medicine (ACSM) and American Heart Association (AHA) guidelines. Nineteen percent of the study population met the guidelines for weekly physical activity.

Conclusions: High levels of expressed acceptance of and willingness to participate in physical activity programs as well as the small number of participants meeting ACSM and AHA guidelines suggest feasibility of and support the need for the development of exercise programs in this population.

Implications for Nursing: Incorporating patient preferences and evidence-based practice is integral to providing high-quality patient-centered care and is the foundation for appropriate intervention programs. Insight from this study will facilitate the design of programs that better reflect actual preferences of prostate cancer survivors.

Knowledge Translation: ADT-induced changes in body composition are believed to contribute to a reduction in insulin sensitivity and dyslipidemia that contribute to increased cardiovascular risk profile. Exercise has the potential to mitigate the harmful effects of ADT.

About a third of the 2 million prostate cancer survivors in the United States receive androgen-deprivation therapy (ADT) (Michaelson et al., 2008), not only as adjuvant treatment for early, localized prostate cancer, but as treatment for recurrent prostate cancer. Strong evidence shows an association between ADT and adverse changes in body composition and osteoporosis, as well as an increased risk of insulin resistance, diabetes, and cardiovascular disease (Basaria et al., 2002; Basaria, Muller, Carducci, Egan, & Dobs, 2006; Braga-Basaria et al., 2006).

A growing body of evidence supports the integration of physical activity as an intervention that may reverse or at least mitigate the adverse changes associated with ADT (Galvão, Taaffe, Spry, Joseph, & Newton, 2009; Galvão, Taaffe, Spry, & Newton, 2007). Correspondingly, the detrimental effects of physical inactivity are equally recognized. A meta-analysis conducted by Qaseem et al. (2008) identified physical inactivity as a significant risk factor for osteoporosis.

Although incorporation of physical activity has received widespread endorsement from a number of professional societies, such as the National Osteoporosis Foundation (2013), the American College of Sports Medicine (ACSM) and American Heart Association (AHA) (Nelson et al., 2007), the American Diabetes Association (Funnell et al., 2010), and the National Cholesterol Education Program–Adult Treatment Panel III (Grundy, Brewer, Cleeman, Smith, & Lenfant, 2004), evidence suggests that recommended goals for physical activity are not being met among cancer survivors. A meta review of 65 exercise studies was conducted to evaluate study uptake, completion, and adherence among patients with cancer (Maddocks, Mockett, & Wilcock, 2009). The findings indicate that about two-thirds of patients accepted an offer for an exercise intervention, and only half completed the exercise program. The authors concluded that exercise programs must be

modified to increase acceptability. However, prostate cancer survivor preferences for physical activity are unknown. Therefore, the purpose of this study was to investigate the acceptability of and preferences for physical activity participation in men who receive ADT as treatment for prostate cancer.

Background

Adverse Effects

The adverse effects of ADT on quality of life (QOL), bone mineral density (BMD), lipid profiles, and body composition have been well documented in numerous studies comparing men who receive ADT with those who are ADT-naive. Basaria et al. (2002) found men on ADT demonstrated significantly lower BMD, higher fat mass, reduced upper body strength, poorer sexual function, and lower QOL scores than men who were ADT-naive. In another study with similar comparison groups, men receiving ADT demonstrated significantly higher body mass index (BMI), lower total and free testosterone, and a higher prevalence of metabolic syndrome than men who did not receive ADT (Braga-Basaria et al., 2006). Men receiving ADT had significantly reduced upper and lower body muscle strength and impaired functional performance when compared with healthy age-matched controls (Galvão, Taaffe, Spry, Joseph, Turner, et al., 2009). Although controversy exists regarding the link among ADT use, acute myocardial infarction, and cardiovascular mortality (Alibhai et al., 2009; Levine et al., 2010), ADT-induced changes in body composition are believed to provoke a reduction in insulin sensitivity and dyslipidemia that contributes to the increased cardiovascular risk profile (Levine et al., 2010).

Insulin Resistance and Cardiovascular Risk

Several studies provide evidence of the association among ADT reception, insulin resistance, and cardiovascular risk. Those receiving ADT for at least 12 months demonstrated a higher BMI, as well as increased glucose, insulin, and leptin levels. These findings indicate an increased likelihood for the development of insulin resistance and hyperglycemia, both of which are risk factors for cardiovascular disease, secondary to ADT (Basaria et al., 2006). Similarly, Keating, O'Malley, and Smith (2006) demonstrated use of gonadotropin-releasing hormone agonist, a medication used with ADT, to be associated with increased risk of diabetes, coronary heart disease, myocardial infarction, and sudden cardiac death. Saigal et al. (2007), in a retrospective review of more than 22,000 patient records, found a 20% increased risk of serious cardiovascular morbidity in men receiving ADT when compared to similar men not receiving ADT.

Diabetes: Additional evidence of the impact of ADT on the development of diabetes is found in a large study examining adverse outcomes (Lage, Barber, & Markus, 2007). Unadjusted data from this study found a greater incidence of diabetes in men who received ADT. Controlling for demographic characteristics, general health, comorbidities, and use of statins, men who received ADT had a significantly higher risk of being diagnosed with diabetes within one year. The link between ADT and diabetes was again documented in a large study undertaken by Alibhai et al. (2009). More than 19,000 men receiving ADT were matched with a cohort of men with prostate cancer who had never received ADT. Continuous ADT was associated with an increased risk of the development of diabetes. In addition to the effects of ADT on diabetes, equally dramatic effects on BMD have been found.

Osteoporosis: ADT has been identified as a strong predictor of osteoporosis and fracture (Qaseem et al., 2008), a finding endorsed by the National Osteoporosis Foundation (2013). Malcolm et al. (2007) conducted a retrospective review of medical records of 395 men who received ADT and found that ADT duration was significantly correlated with both the presence of osteoporosis and fracture incidence. In addition, osteoporosis was independently predictive of fracture incidence. Smith et al. (2005) provided support in their multivariate analyses which indicated that gonadotropin-releasing hormone agonist therapy independently predicted fracture risk, and longer duration of therapy conferred greater fracture risk. The risk of fractures is further compounded by ADT-induced changes in strength and muscle mass, impairing functional performance, and subsequently increasing the risk of falls in this population.

Physical Activity Benefits

The benefits of physical activity on body composition, insulin resistance, diabetes, cardiovascular risk, and osteoporosis are well documented (Galvão et al., 2007; Galvão, Taaffe, Spry, Joseph, & Newton, 2009). A comprehensive review of clinical trials incorporating physical exercise in patients with prostate cancer receiving active treatment of ADT found that resistance exercise offered a multitude of beneficial effects in countering the adverse side effect profile engendered by ADT (Galvão et al., 2007). A later review focused on the adverse cardiovascular and metabolic complications of ADT and supported the beneficial effects of exercise on morbidity and mortality (Galvão, Taaffe, Spry, Joseph, & Newton, 2009).

Current research protocols have been designed to evaluate the impact of exercise on parameters adversely affected by ADT (e.g., aerobic and resistance modalities; delivery, whether home, clinic, or community gym; duration of program) (Culos-Reed, Robinson, Lau,

O'Connor, & Keats, 2007; Galvão et al., 2006, 2008; Galvão, Spry, et al., 2009; Galvão, Taaffe, Spry, Joseph, & Newton, 2010; Kapur, Windsor, & McCowan, 2010; Mustian et al., 2009; Schneider, Hsieh, Sprod, Carter, & Hayward, 2007; Segal et al., 2009). The studies, however, were designed without any consideration for patient preferences, which affect recruitment, adherence, attrition, and, thus, outcomes, as well as external and internal validity of the study (Preference Collaborative Review Group, 2008; Swift & Callahan, 2009). Participants with a preference for a specific treatment option may not enroll in the study, fearing randomization to the nonpreferred treatment group. This has an effect on external validity in that the accrued sample may not be representative of the target population. Participants who are randomized to their preferred treatment option may exhibit increased motivation and compliance with the treatment program and be less likely to discontinue treatment (Preference Collaborative Review Group 2008; Swift & Callahan, 2009). In a parallel fashion, participants randomized to their nonpreferred treatment may exhibit resentful demoralization, less motivation, and treatment compliance, and may be more likely to drop out of treatment (Preference Collaborative Review Group, 2008). The incorporation of patient preferences on engagement, adherence, satisfaction, and outcomes cannot be underestimated (Sidani, Epstein, Bootzin, Moritz, & Miranda, 2009). Incorporating patient preferences may be instrumental in increasing adherence given the unique needs of specific cancer survivor populations (Karvinen et al., 2006; Rogers, Malone, et al., 2009; Rogers, Markwell, Verhulst, McAuley, & Courneya, 2009; Stevinson et al., 2009; Vallance, Courneya, Jones, & Reiman, 2006).

Strength and Physical Function

In a study by Galvão et al. (2010), improvements in muscle mass, strength, physical function, and balance were demonstrated in 29 hypogonadal men randomized to a combined program of aerobic and resistance exercise when compared with those receiving usual care (i.e., no attention to exercise) (n = 28). Of the original 97 men referred to the study and assessed for eligibility, 10 refused to participate, 19 had other commitments, and 11 were excluded based on other criteria.

Beneficial effects of a progressive resistance training program on muscle strength and endurance were documented in a small study (N = 10) conducted by Galvão et al. (2006). Of the 91 participants contacted for Galvão et al.'s (2006) study, reasons for not participating included a lack of interest (n = 6), being unable to train for 20 weeks (n = 3), and being too busy (n = 4). Sixty-eight were excluded based on other criteria. A small pilot study by Hansen, Dechet, Porucznik, and LaStayo (2009) (N = 16) determined that eccentric resistance exercise was well tolerated in men with prostate cancer and led to improvements in strength and functional mobility. Eccentric training is the lengthening phase of muscle movement when the muscles stretch to accommodate resistance; an example of this is lowering of the weight after a bicep curl. The 16 participants were recruited from Huntsman Cancer Institute in Utah during an 18-month period; only 10 of the 16 men completed the 12-week study because of time constraints and travel cost (Hansen et al., 2009). The authors of the current article believe that the inclusion of preferences in the development of exercise programs would greatly increase engagement and commitment in this population.

Improvements in cardiorespiratory fitness and self-reported physical function in prostate cancer survivors were noted after participation in a home-based walking intervention (Griffith et al., 2009). In another study by Mustian et al. (2009), improvements in strength and aerobic capacity, along with QOL and cancer-related fatigue, were demonstrated in men and women undergoing radiation therapy for prostate or breast cancer randomized to a home-based aerobic and resistance exercise intervention. High adherence rates were demonstrated.

Segal et al. (2009) conducted a randomized, controlled trial evaluating QOL, fatigue, aerobic fitness, upper and lower body strength, and triglycerides in men undergoing radiation therapy with or without ADT. Improvements in fatigue were evident in both aerobic exercise and resistance training groups; resistance training had additional benefits for QOL, strength, triglycerides, and body fat. The median adherence rate for this 24-week intervention was 85%. Of the 325 potential participants approached in the three-year period, only 121 men were successfully recruited; 204 men refused participation, with 113 men giving no reason for refusal.

Szymlek-Gay, Richards, and Egan (2011), in a review of physical activity among cancer survivors, attributed the low adherence to physical activity interventions and low number of survivors meeting recommended activity levels as an indication that programs do not reflect survivors' preferences.

Bone mineral density: In a study by Laino (2007), of the benefits of exercise on BMD, men on ADT randomized to an exercise program for eight to nine weeks (consisting of a 20–30 minute walk five to six days per week) or usual care demonstrated an increase in bone mass (0.48%) compared with a loss of 2.14% in sedentary men.

An evaluation of the health behaviors of older prostate cancer survivors (conducted to determine suitability for inclusion in a later study) determined a mean weekly exercise duration (moderate to vigorous intensity) of 77.7 minutes per week, falling well below the 150-minute aerobic activity recommended by the ACSM and AHA (Nelson et al., 2007). Blanchard, Courneya, and Stein's (2008) findings from more than 9,000 cancer survivors are consistent with Nelson et al.'s (2007)

conclusions: Few cancer survivors are meeting physical activity recommendations.

To the authors' knowledge, no published literature exists that describes preferences for physical activity in men with prostate cancer receiving ADT. Therefore, the purpose of this study was to investigate the acceptability of and preferences for physical activity participation in male veterans who receive ADT as treatment for prostate cancer. A secondary purpose of the study was to identify salient clinical and demographic factors that may influence preferences for and acceptability of physical activity. The study also sought to determine the percentage of participants who met current national ACSM and AHA exercise guidelines (Nelson et al., 2007).

Methods

Design

A cross-sectional study with convenience sampling using structured interviews and medical chart review was used to describe the acceptability of and preferences for evidence-based exercise interventions. The inclusion criteria were ADT in the form of goserelin acetate (a synthetic gonadotropin-releasing hormone analog), ability to understand English, and willingness to participate. No exclusion criteria existed.

Procedures

The study was approved by the institutional review board of the Carl T. Hayden VA Medical Center in Arizona. Participants were recruited at the time of their scheduled visit by clinic nurses who briefly described the study and invited participation. Patients who expressed interest in the study were introduced to a member of the research staff who explained the study. After informed consent was obtained, data collection ensued. Prior to conducting the interviews, the principal investigator trained the research assistant through observation of principal investigator-conducted interviews, which was followed by principal investigator-observation of research assistant-conducted interviews until competency was established. Medical chart reviews were conducted by the principal investigator.

Data Collection

Demographic information was collected via interview and included age, race and ethnicity, marital status, employment status, education, and distance of residence from the medical center.

Clinical characteristics were abstracted from the patient electronic health records and included BMI, stage of cancer, duration of ADT, and indication for ADT (e.g., primary therapy, concurrent with radiation therapy, metastatic disease, biochemical relapse).

Exercise preferences and exercise activity were solicited via a structured interview conducted by the research assistant. A systematic procedure was used to elicit preferences, as described by Sidani, Epstein, and Miranda (2006), to extend the understanding of physical activity to the study population. Accordingly, evidence-based treatment options were presented, items assessing perception of acceptability were assessed, and preferences were solicited.

Each interview began with a description of an evidence-based aerobic physical activity program as well as examples of aerobic activities and of a program. The narrative included duration, frequency, and intensity of an aerobic physical activity program as well as a discussion of the effectiveness, risks, and side effects inherent in participation. Perceptions were elicited regarding acceptability, effectiveness in improving fitness (both short and long term), and overall physical function, severity of side effects, and ability and willingness to follow the program. Participants were asked to rate their perceptions using a five-point Likert-type scale. In a parallel fashion, a muscle-strengthening program was described. For each of the evidence-based physical activity programs (aerobic or muscle strengthening), the researchers also inquired about preferences for format, delivery and location, frequency and duration, scheduling, and method of instruction. In addition, participants were asked to describe their current activity level. The interview questions were modeled on the Godin Leisure-Time Exercise Questionnaire (Jacobs, Ainsworth, Hartman, & Leon, 1993). After a description of exercise intensity (strenuous, moderate, and mild), participants were asked to quantify the number and duration of exercise sessions per week within each category of exercise intensity. Participants also were asked to identify the frequency within the prior seven days in which they engaged in activity long enough to work up a sweat.

Analysis Plan

Descriptive statistics were used to examine the demographic and clinical characteristics of the participants. Investigating the acceptability of and preferences for physical activity was described by calculating descriptive statistics, including frequency distributions and percentiles, for the participants' perceptions of acceptability, effectiveness in improving fitness (both short and long term), and overall physical function and willingness to follow recommendations for both the aerobic and muscle-strengthening program. Descriptive statistics were used to calculate preferences for format, delivery and location, and frequency and duration. Identifying salient clinical and demographic factors that may influence preferences was accomplished by evaluating associations between exercise preferences and acceptability and demographic characteristics (e.g., distance of

residence from medical center, partner status, age, race and ethnicity, education, employment), or clinical factors (e.g., BMI, exercise behavior). Measures of exercise preferences included program preference (e.g., aerobic, muscle strengthening, combined), willingness to participate, acceptability, location, desire for companionship, intensity, structure and duration of activity, length of program, and method of instruction. These associations were tested with chi-square statistics or Fisher's exact test, as appropriate. To further examine potential associations between demographic and clinical variables and preferences, a series of logistic regression models were used. All variables were dichotomized to ensure adequate numbers of participants per cell and to maximize statistical power. Dichotomization was based on the median or clinically relevant cut-points, balancing clinical relevance against the enhanced statistical power provided by dichotomization at the median. Responses were categorized into two or more levels, as appropriate to the distribution of responses. The relationship between BMI and duration of ADT, BMI, and exercise behavior also was explored. Determining the percentage of participants in the study who met current ACSM and AHA guidelines was done by analysis of responses to the structured interview regarding exercise activity. Duration of exercise within each intensity level (total exercise, strenuous plus moderate, strenuous, moderate, and mild) was summed across activities to determine the percentage of participants meeting ACSM and AHA exercise guidelines (at least 150 minutes of moderate to strenuous intensity exercise per week).

Results

Data were collected with 135 men from March 2011 through June 2011. The mean age of participants in the study was 72 (SD = 9.3) years, and the mean BMI was 29.2 (SD = 5.1) (see Table 1). Expressed preferences for location, companionship, intensity, structure, supervision, and duration of exercise program were similar for both aerobic and muscle-strengthening programs. Participants most frequently expressed a preference for exercising at home and alone. They preferred programs that were moderate intensity, unscheduled, unsupervised, and self-paced.

Relationships between patient characteristics and exercise preferences were explored using chi-square analysis. Selected demographic and clinical factors of interest were age, obesity, education, partner status, employment, distance of residence from medical center, duration of ADT, and meeting ACSM and AHA guidelines. Selected exercise preferences included program, location, structure, intensity, and companionship. The only significant associations identified were for distance, age, obesity, duration of ADT, and meeting ACSM and AHA guidelines. Greater distance from the medical center was associated with higher preference to participate in an aerobic ($p < 0.04$) or muscle-strengthening ($p < 0.03$) physical activity program at home, and to prefer muscle strengthening alone rather than with others ($p < 0.015$). Participants older than 71 years tended to prefer a muscle-strengthening program alone rather than with

Table 1. Demographic Characteristics (N = 135)

Characteristic	$\bar{X}$	SD
Age (years)	72	9.27
Duration of ADT (months)	22	28
Body mass index (kg/m²)	29.2	5.12
Distance from Veterans Affairs (miles)	32.5	42.21
Characteristic	**n**	**%**
Age (years)		
Younger than 71	62	46
Older than 71	73	54
Marital status		
Married or partnered	78	58
Single	57	42
Employment status		
Full-time	11	8
Part-time	13	10
Unemployed	111	82
Race		
Caucasian	106	79
African American	25	19
Other	4	3
Ethnicity		
Hispanic	12	9
Non-Hispanic	123	91
Years of education		
Less than 12	49	36
Greater than or equal to 12	86	64
Indication for ADT therapy		
Primary therapy[a]	13	10
Concurrent with radiation therapy	25	19
Metastatic diseasea	29	21
Biochemical relapse	67	50
Patient preference	1	1
Duration of ADT in months		
Less than 12	63	47
Greater than or equal to 12	70	52
Missing data	2	1
Body mass index (kg/m²)		
Less than 25	25	19
25–29.9	51	38
Greater than 30	54	40
Missing data	5	4
Distance from Veterans Affairs (miles)		
Less than 20	61	45
Greater than or equal to 20	74	55
Minutes of exercise per week (moderate and strenuous)		
Less than 150	109	81
Greater than or equal to 150	26	19

[a] Participants satisfying two categories (i.e., primary therapy for metastatic disease)

ADT—androgen-deprivation therapy

Note. Because of rounding, not all percentages total 100.

others ($p < 0.051$). BMI in the nonobese range ($p < 0.03$), duration of ADT greater than 12 months ($p < 0.05$), and meeting ACSM and AHA exercise guidelines ($p < 0.06$) were associated with preference for a muscle-strengthening program of moderate intensity over programs of greater or less intensity.

Table 2 shows the acceptability of and preference for aerobic and muscle-strengthening exercise programs, and Table 3 shows participants' interest in exercise programs. Factors associated with willingness to participate in and acceptability of aerobic or muscle-strengthening programs were explored with chi-square analysis and logistic regression models to account for several factors simultaneously. Men educated beyond high school were more likely to be willing to perform aerobic exercise (chi-square, $p < 0.04$). Employed men were more likely to find aerobic exercise acceptable (Fisher's exact test, $p < 0.04$) and were more likely to be willing to perform muscle-strengthening exercise (Fisher's exact test, $p < 0.05$). The authors did not find any demographic or clinical factors that were associated with acceptability of muscle-strengthening exercise. Acceptability and willingness to participate were highly associated for both aerobic (Fisher's exact test, $p < 0.0001$) and muscle-strengthening (chi-square, $p < 0.0001$) programs.

Nineteen percent of the study population (n = 26) met ACSM and AHA guidelines for weekly physical activity (150 minutes of moderate or vigorous-intensity exercise). Fifty-seven percent (n = 77) of the sample rarely or never exercised with enough intensity to build up a sweat. No significant associations were found between obesity and meeting ACSM and AHA guidelines (chi-square, $p > 0.05$) or between obesity and duration of ADT (chi-square, $p > 0.05$).

Discussion

This study explored the acceptability of and preferences for physical activity participation in men who receive ADT as treatment for prostate cancer. The researchers sought to identify demographic or clinical characteristics associated with preferences and acceptability for physical activity. In addition, current exercise behaviors were evaluated. Participants in the study expressed preferences for muscle-strengthening activities that were performed at home, either alone or in the company of a family member. Preferences were for flexible, spontaneous, and self-paced programs. The high levels of expressed acceptance of and willingness to participate in physical activity programs coupled with the small numbers currently meeting ACSM and AHA guidelines (n = 26, 19%) suggests feasibility of and supports the need for the development of exercise programs tailored to the preferences of this population.

Table 2. Exercise Program Preferences (N = 135)

	Aerobic		Muscle Strengthening	
Preference	**n**	**%**	**n**	**%**
Acceptability				
Not at all	49	36	28	21
Somewhat	13	10	15	11
Acceptable	19	14	20	15
Very acceptable	15	11	24	18
Very much acceptable	39	29	48	36
Willingness to follow				
Not at all	28	21	25	19
Somewhat willing	19	14	23	17
Willing	25	19	24	18
Very willing	20	15	18	13
Very much willing	39	29	44	33
Missing data	4	3	1	1
Perceived effectiveness improving fitness short term				
Not at all	16	12	9	7
Somewhat	10	7	14	10
Acceptable	15	11	30	22
Very acceptable	29	21	30	22
Very much acceptable	58	43	47	35
Unknown	7	5	4	3
Not interested	–	–	1	1
Perceived effectiveness improving fitness long term				
Not at all	14	10	9	7
Somewhat	8	6	7	5
Acceptable	16	12	14	10
Very acceptable	22	16	33	24
Very much acceptable	68	50	68	50
Unknown or missing	7	5	4	3
Perceived effectiveness improving function				
Not at all	18	13	11	8
Somewhat	8	6	8	6
Acceptable	24	18	20	15
Very acceptable	28	21	32	24
Very much acceptable	54	40	59	44
Unknown or missing	3	2	4	3
Not interested	–	–	1	1
Perceived severity of side effects				
Not at all	37	27	42	31
Somewhat	28	21	26	19
Acceptable	25	19	36	27
Very acceptable	21	16	14	10
Very much acceptable	20	15	15	11
Unknown or missing	4	3	2	1
Perceived ease of program				
Not at all	31	23	22	16
Somewhat	20	15	23	17
Acceptable	27	20	28	21
Very acceptable	28	21	29	21
Very much acceptable	24	18	32	24
Unknown or missing	5	4	1	1

(Continued on the next page)

[a] Participants could choose multiple responses.

Note. Because of rounding, not all percentages total 100.

Table 2. Exercise Program Preferences (N = 135) *(Continued)*

Preference	Aerobic n	Aerobic %	Muscle Strengthening n	Muscle Strengthening %
Companionship[a]				
Alone	50	37	58	43
With family or friend	31	23	28	21
Group	32	24	31	23
No preference	14	10	11	8
Other	6	4	6	4
Not interested	1	1	1	1
Location[a]				
Home	73	52	76	55
Community fitness center	26	19	29	21
Hospital-based center	17	12	19	14
No preference	21	15	14	10
Not interested	3	2	1	1
Intensity of program				
Light	41	30	36	27
Moderate	75	56	86	64
Vigorous	10	7	7	5
Not interested	7	5	4	3
Missing data	2	1	2	1
Structure of program				
Scheduled	53	39	56	41
Unscheduled	73	54	75	56
Not interested	4	3	1	1
No Preference	2	1	1	1
Missing data	3	2	2	1
Supervision preference				
Supervised	47	35	50	37
Unsupervised	77	57	79	59
No preference	4	3	3	2
Not interested	4	3	1	1
Missing data	3	2	2	1
Variability of activity				
Different activity	76	56	85	63
Same activity	43	32	38	28
No preference	6	4	5	4
Not interested	4	3	2	1
Missing data	6	4	5	4
Activity preference[a]				
Walking	86	64	–	–
Jogging	6	4	–	–
Biking	52	39	–	–
Swimming	42	31	–	–
Weight machines	–	–	58	43
Free weights	–	–	47	35
Exercise bands	–	–	17	13
Calisthenics	–	–	27	20
Duration of program				
Less than 12 weeks	71	53	65	48
12 weeks or more	56	41	63	47
Missing data	8	6	7	5

[a] Participants could choose multiple responses.

Note. Because of rounding, not all percentages total 100.

More than twice as many men expressed a preference for a muscle-strengthening program as compared with an aerobic program. This preference for resistance exercise may reflect a gender-based difference. A disproportionate amount of information exists on exercise preferences in female cancer survivors (Griffith et al., 2009) that indicates an overwhelming preference for aerobic exercise as opposed to resistance (Karvinen et al., 2006; Rogers et al., 2009; Stevinson et al., 2009). Because the literature is largely silent on exercise preferences among men, whether this pattern would consistently be repeated is unknown. Of note, a greater percentage of participants perceived a lack of effectiveness on short-term, long-term, and functional capacity from aerobic as compared to muscle-strengthening programs.

Home was identified as the most frequently preferred location for either aerobic or muscle-strengthening programs, mirroring the findings of several other physical activity preference studies (Jones et al., 2007; Karvinen, Courneya, Venner, & North, 2007; Karvinen et al., 2006; Rogers, Markwell, et al., 2009; Stevinson et al., 2009; Vallance et al., 2006). Not surprisingly, greater distance from the medical center was associated with greater preference to exercise at home. Accordingly, to maximally encourage participation, programs should accommodate preferences for performing exercise at home.

Prostate cancer survivors in this study did not consistently endorse any single activity in either the aerobic or muscle-strengthening category, preferring a variety of exercises. This was consistent with their identified preferences for spontaneous, flexible, self-paced, and varied activities for aerobic and muscle-strengthening programs.

The current study's findings are clinically significant given the implications of obesity, insulin-resistant diabetes, and cardiovascular disease. Although no significant associations were observed between meeting the ACSM and AHA guidelines and obesity in this study, the overall inactivity of the study population increases the risk of future weight gain. The extant literature is not conclusive, but evidence exists that shows a link between obesity and prostate cancer recurrence. Freedland et al. (2004) demonstrated an association between obesity and higher-grade tumors and higher biochemical failure rates in 1,106 men after radical prostatectomy. Amling et al. (2004) noted an association between obesity and higher-grade cancer and higher recurrence rates after radical prostatectomy in a retrospective multi-institutional study of 3,162 men. Similarly, in a prospective analysis of prostate cancer mortality in 287,760 men, Wright et al. (2007) associated higher BMI and adult weight gain with increased risk of dying from prostate cancer.

Most of the published literature concerning exercise preferences has been based on responses to self-administered surveys. The interview process used in this study has both strengths and weaknesses. The give and take of the interview process was more likely

Table 3. Program Interest (N = 135)

Preference	n	%
Program preference		
Aerobic	24	18
Muscle strengthening	53	39
Both	30	22
Neither or not interested	15	11
No preference	12	9
Missing data	1	1
Combined program interest		
Yes	64	47
No	69	51
Missing data	2	1
Perceived ability to exercise		
Yes	107	79
No	16	12
Unknown	1	1
Missing data	11	8

Note. Because of rounding, not all percentages total 100.

to ensure that participants gained a better understanding of each question prior to response. However, this often resulted in a rather lengthy discussion, subjecting the findings to responder fatigue. In addition, this study may have inadvertently introduced a bias because each interview began with a description of the aerobic exercise program. The responses may be somewhat biased by perceived social desirability of activity, possibly explaining the lack of association between meeting ACSM and AHA exercise requirements and obesity. However, acceptability and willingness to participate were highly associated with aerobic and muscle-strengthening programs, providing support for validity of the interview process. Consistency also was demonstrated with positive responses to perceptions of effectiveness, severity of side effects, and ease of participation. The stated desire for unstructured, unsupervised activity choices is consistent with stated preferences for a variety of activities within each program modality.

Implications for Nursing

A large and ever-increasing body of evidence exists that supports the incorporation of exercise programs in the care of men receiving ADT for prostate cancer. Exercise has the potential to reverse, or at least mitigate, the harmful effects of ADT and can improve strength, physical function, BMD, and QOL. The recruitment and adherence issues noted underscore the importance of considering preferences in the design of interventions. The current study identified acceptability of and preferences for exercise, which are important considerations prior to the development of an intervention.

The current study has demonstrated the feasibility of accessing patient preferences and interests in physical activity as a prerequisite to program design. The incorporation of patient preferences and evidence-based practice is integral to providing high-quality patient-centered care and is the foundation for appropriate intervention programs. Such integration enhances the likelihood that the interventions delivered are both effective and acceptable. Insight from this study will facilitate the design of programs that better reflect the actual preferences of prostate cancer survivors, which will engender greater likelihood for completion of exercise programs. The marriage of patient-centered approaches with evidence-based interventions may enhance adherence and motivation and mitigate, in part, the deleterious side-effect profile engendered by ADT and enhance QOL in this large population of prostate cancer survivors. Oncology nurses participate in all aspects of patient care, from the provision of direct physical care and assessment to research, education, and counseling. Nurses can be pivotal in the movement to make physical exercise programs a standard of care for patients with prostate cancer receiving ADT.

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