THE DEVELOPMENT AND ASSESSMENT OF A PHYSICAL ACTIVITY INTERVENTION FOR CANCER SURVIVORS

by

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ABSTRACT

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Endometrial cancer (EC) is one of the most common forms of cancer among women, and the rate of disease is expected to increase significantly in the next several years. Ethnically diverse EC survivors may be at increased risk for comorbidities or cancer recurrence because of lower physical activity participation and higher rates of obesity.

A systematic review of physical activity interventions for overweight and obese female cancer survivors was conducted. The first study was a cross-sectional study, which assessed the differences between 62 active and inactive Bronx EC survivors for body mass index (BMI), quality of life and physical activity behavioral variables. The second study of this dissertation was a wait-list controlled trial for 28 obese to determine the feasibility of a 12-week physical activity intervention in this population.

The primary findings from the systematic review were that center-based physical activity interventions were feasible and led to an increase in physical activity for overweight and obese female cancer survivors.

The first study found that 65% of the sample was obese, and 47% reported being physically active. The Active group reported significantly higher quality of life of the Functional Assessment of Cancer Therapy – Endometrial questionnaire (FACT-En: 154 ± 13 vs. 145 ± 20, $d=0.57$, $p<0.05$), compared to the Insufficiently Active group. BMI was 3.3 $kg \bullet m^{-2}$ lower in the active group ($d=0.40$, $p=0.057$). The active group also reported higher walking self-efficacy, barrier self-efficacy and outcome expectations ($p<0.05$).

In the third study, adherence to the physical activity intervention was 60%, and the dropout rate was modest, indicating that the intervention was feasible. Participants who completed the program had significantly greater increase in six-minute walk test distance (+22 meters) and quality of life (+10 points) compared to the control $p<0.05$).

These studies show that this population has an elevated need for physical activity interventions that can promote the adoption of physical activity. Physically active EC survivors have better health and employ in more behavioral processes than their Insufficiently Active counterparts. A 12-week physical activity intervention was feasible and supports the potential effectiveness of a physical activity interventions

DEDICATION

This dissertation is dedicated to the memory of my grandmother, Sally Work Franks, who was rightfully hard to impress. I hope that she would have been proud of me for this one.

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Chapter I

INTRODUCTION

Statement of the Problem

Over 800,000 women were diagnosed with cancer in 2014 in the United States, and there are approximately 7.6 million women currently living with a history cancer (American Cancer Society, 2015). Endometrial cancer (EC), which is a cancer of the cells lining the uterine corpus, is the 4th leading type of cancer in women, with an estimated 52,600 new diagnoses (6.5% of all female cancers) each year. Because of early detection and treatment, EC is the 7th leading cause of cancer deaths (3% of all female cancer deaths). Approximately 5% of living cancer survivors were initially treated for endometrial cancer, with the majority being 65-84 years old (Altekruse et al., 2009). Several studies have found that both obesity (Zhang et al., 2013) and inadequate physical activity (Moore, Gierach, Schatzkin, & Matthews, 2010) increase the risk of developing EC by 30-50%.

Although abdominal obesity and physical inactivity are risk factors for EC, and cancer diagnosis is often thought of as a "teachable moment," cross-sectional investigations found that less than 20-35% (Basen-Engquist et al., 2009; Beesley, Eakin, Janda, & Battistutta, 2008) of endometrial cancer (EC) survivors achieved the American College of Sports Medicine (ACSM) guidelines for physical activity (Garber et al., 2011) and that over 70% were overweight or obese (Beesley et al., 2008; Courneya et al., 2005;

Mayer et al., 2007), with up to 50% being obese (Basen-Engquist et al., 2009). Furthermore, endometrial cancer survivors are the least physically active out of all cancer survivor groups, with only ~33% being regularly active, compared to 45% for all cancer survivors, and 53% for respondents without a history of cancer (Mayer et al., 2007).

Quality of life and fatigue outcomes were significantly better in EC survivors who achieved ACSM physical activity guidelines or had normal body mass index (BMI) (Courneya et al., 2005; Fader, Frasure, Gil, Berger, & von Gruenigen, 2012). Although the rate of survival from EC may be as high as 96%, survivors are likely to have metabolic syndrome and be physically inactive, greatly increasing their risk of developing other related diseases such as cardiovascular disease, diabetes, and osteoarthritis, leading to greater risk of morbidity and mortality (von Gruenigen et al., 2011). Furthermore, obesity in women exacerbates the age-related decrease in physical function (Villareal et al., 2011), causing decreased quality of life and earlier onset of frailty (Blaum, Xue, Michelon, Semba, & Fried, 2005).

Because inadequate physical activity is a major risk factors for developing EC (Voskuil, Monninkhof, Elias, Vlems, & van Leeuwen, 2007), and most survivors maintain their inactive lifestyles, thereby further increasing their morbidity, it is imperative that effective interventions be developed to increase physical activity in this group (Kwon, Hou, & Wang, 2012). However, there is currently a paucity of data examining best practices for achieving these results among endometrial cancer survivors. A 6-month behavioral intervention based on social cognitive theory effected mild to moderate improvements in body weight, physical activity and quality of life (von Gruenigen et al., 2008; von Gruenigen et al., 2009), whereas a 12-week home-based

physical activity intervention led to a small improvement in fatigue, but not in physical activity or quality of life (Donnelly et al., 2011).

Behavioral theory-based interventions, which focus on lifestyle factors, but do not include formal physical activity classes may be effective, but have relatively small effect sizes (Rogers et al., 2009; von Gruenigen et al., 2008; von Gruenigen et al., 2009). A *comprehensive physical activity and behavior change intervention* that results in meaningful effects, as have been shown to work with breast cancer survivors (Courneya et al., 2003; Milne, Wallman, Gordon, & Courneya, 2008), should be combined with a behavioral theory-based intervention (Basen-Engquist et al., 2011) to maximize the benefits of an intervention while promoting long-term maintenance of physical activity.

The data from the previously mentioned cross-sectional studies of endometrial cancer survivors (Basen-Engquist et al., 2009; Beesley et al., 2008; Courneya et al., 2005) were from primarily non-Hispanic white, relatively educated and affluent women. Hispanic and non-Hispanic black women with endometrial cancer are ~50% more likely to be obese than non-Hispanic white women (Setiawan et al., 2007). Although Hispanic and non-Hispanic black women are less likely (0.63 - 0.76 incidence rate) to be diagnosed with endometrial cancer (Setiawan et al., 2007) than Caucasian women, non-Hispanic black women have an 80% higher mortality rate than Caucasian women, caused in part by a higher rate of comorbid conditions such as obesity and inactivity (Allard & Maxwell, 2009).

Hispanic and non-Hispanic black women from underserved communities may also have several environmental barriers to exercise, including higher crime rates and lack of access to large local parks (Cutts, Darby, Boone, & Brewis, 2009). The American

Cancer Society estimates that the number of premature cancer deaths could be reduced by 37% by eliminating economic and racial disparities (American Cancer Society, 2012). Because physical inactivity and metabolic syndrome increase the risk for developing cardiovascular disease, diabetes, osteoarthritis, and EC recurrence (Rosato et al., 2011), underserved, ethnically diverse EC survivors may have a greater disease risk compared with non-Hispanic white women. More research needs to be done to determine the characteristics of underserved diverse endometrial cancer survivors to develop better evidence-based interventions.

The magnitude of physiological and psychological benefits gained from physical activity interventions is closely correlated to adherence to the program (Irwin et al., 2009; Moadel et al., 2007; van Gool et al., 2006). Several studies have been conducted to clarify the major factors that determine the relative level of participant adherence to physical activity interventions. Among studies of cancer survivors, analyses conducted by questionnaire (Karvinen et al., 2007; McGuire, Waltman, & Zimmerman, 2011; Ott et al., 2004; Sherman, Heard, & Cavanagh, 2010) revealed that self-efficacy, social support, feedback, and using cognitive processes are positively related to physical activity intervention adherence. Although these quantitative data are useful during the initial stages of developing an intervention, more in-depth qualitative assessments may be more valuable for accurately describing the complexities of adherence to behavior change interventions (Banning, 2009).

Few studies have qualitatively assessed multiethnic experiences during, or following, an exercise intervention (Chiang, Seman, Belza, & Tsai, 2008; Dunn, 2008; Wilbur et al., 2009). Several database searches revealed just one qualitative study for

(breast) cancer survivors following a physical activity intervention (Crane-Okada et al., 2012). However, low-adherence participants were not interviewed, thereby adding a significant amount of dropout bias to the resulting discussions. A semi-structured qualitative assessment should be conducted following a physical activity behavioral intervention for ethnically diverse endometrial cancer survivors to better determine the facilitators and barriers to adherence, so that future interventions can maximize adherence.

More research is needed to evaluate the characteristics of ethnically diverse endometrial cancer survivors, as well as to develop and evaluate culturally tailored physical activity behavioral interventions.

Significance of the Series

The Chapter II systematic review found that theoretically based physical activity interventions are effective in promoting physical activity for obese female cancer survivors, provided that the interventions included a center-based component. The cross-sectional analysis found in Chapter III is the first to evaluate the physical activity motivational and behavioral characteristics of ethnically diverse endometrial cancer survivors. The findings were compared to similar previous studies utilizing primarily affluent, educated non-Hispanic white survivors to evaluate differences between the groups, and guide future research in this area. The intervention described in Chapter IV studied the feasibility of a comprehensive physical activity behavioral intervention on ethnically diverse endometrial cancer survivors.

Overview

Chapter II describes a systematic review of theory-based physical activity interventions for obese female cancer survivors. Chapter III describes a cross-sectional analysis of the demographic, anthropometric and physical activity behavioral characteristics of an ethnically diverse endometrial cancer survivor population. The physical activity behavior intervention, which consisted of wait-list controlled 12-week physical activity intervention for endometrial cancer survivors in the Bronx, is described in Chapter IV. Adherence, physical activity, physical function, body composition, quality of life, and qualitative interviews were assessed to determine the feasibility and of such a program in an underserved, ethnically diverse population.

Specific Aims and Hypotheses

Study 1 (Chapter III)

Specific Aim 1. Describe the demographic, anthropometric, physical activity and quality of life characteristics of a diverse population of endometrial cancer survivors.

Specific Aim 2. Determine whether self-reported physically active participants had higher quality of life, and lower BMI than Insufficiently Active participants.

Hypothesis. Physically active participants will have lower Body Mass Index and higher Quality of Life compared to physical inactive participants.

Specific Aim 3. Evaluate self-efficacy, outcome expectations, social support, and self-regulation for active and Insufficiently Active participants.

Study 2 (Chapter IV)

Specific Aim 1. Evaluate the feasibility of a 12-week physical activity intervention for ethnically diverse endometrial cancer survivors.

Specific Aim 2. Determine whether the 12-week physical activity intervention would improve physical activity, waist circumference, quality of life, and physical function.

Hypothesis. The 12-week physical activity intervention will lead to increased Yale Physical Activity Survey Summary Index and Energy Expenditure scores, decreased waist circumference, increased FACT-En scores, increased 6-minute walk test distance and more chair stands in 30 seconds.

Specific Aim 3. Evaluate changes in self-efficacy, outcome expectations, social support, and self-regulation during the 12-week physical activity intervention.

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Chapter II

THE EFFECTS OF THEORY-BASED BEHAVIORAL INTERVENTIONS ON PHYSICAL ACTIVITY AMONG OVERWEIGHT AND OBESE FEMALE CANCER SURVIVORS. A SYSTEMATIC REVIEW OF RANDOMIZED CONTROLLED TRIALS.

Abstract

Objectives: Determine whether theory-based physical activity interventions for overweight and obese female cancer survivors lead to an increase in physical activity.

Methods: This systematic review examined randomized controlled trials analyzing the impact of theory based physical activity interventions on overweight and obese female cancer survivors through August 2014. Searches of 4 different electronic databases revealed six articles that met the inclusion criteria.

Results: The intervention protocols varied greatly. Interventions that included a center-based component observed increased physical activity, whereas those that were solely home-based did not. Only one intervention measured behavioral variables associated with the theory-based intervention, and that study found no change. Retention and adherence were high in all studies.

Conclusion: Theory-based physical activity interventions are feasible for overweight and obese female cancer survivors. Interventions that include a center-based component lead

to increased physical activity. Future studies should evaluate behavioral variables to learn more about the associated processes of change.

Introduction

There are approximately 14.5 million cancer survivors living in the United States as of January 2014, and it is expected that there will be 4 million more in the next ten years (DeSantis et al., 2014). Breast and endometrial cancer survivors account for nearly 50% of all female cancer survivors, and more than 25% of all cancer survivors. Observational evidence suggests that physical activity may reduce the risk of breast (Chlebowski, 2013) and endometrial cancers (Cust, 2011) and may improve the treatment outcomes for breast cancer survivors (Chlebowski, 2013). The effects of physical activity on endometrial cancer survivorship have not yet been established (Gil & von Gruenigen, 2011), but appear promising (von Gruenigen et al., 2012).

Although cancer is often described as a "teachable moment" (Sabiston, Brunet, Vallance, & Meterissian, 2014) and physical activity appears to be of significant benefit to female cancer survivors, there is no difference in physical activity between breast cancer survivors and non-cancer controls, and endometrial cancer survivors are actually *less* physically active than non-cancer controls (Kwon, Hou, & Wang, 2012). Only 20-60% of female cancer survivors report meeting the aerobic physical activity recommendations (Kwon et al., 2012; Mason et al., 2013).

Although the benefits of physical activity for cancer survivors are clear, and cancer survivors have relatively high adherence to exercise interventions, physical activity prescriptions are not a uniform part of the standard of care for female cancer

survivors (Hayes, Johansson, Alfano, & Schmitz, 2011). Furthermore, female cancer survivors may also avoid physical activity participation due to low self-efficacy and lack of enjoyment from physical activity, among other factors (Spector, Battaglini, & Groff, 2013). It is vital, therefore, to determine effective behavioral interventions to increase physical activity among female cancer survivors.

A review of ten behavioral interventions for female breast cancer survivors through July 2012 indicated that these interventions may be an effective method for increasing physical activity (Short, James, Stacey, & Plotnikoff, 2013). Among female cancer survivors, overweight and obesity has been associated with up to 47% less physical activity (Loprinzi, Lee, & Cardinal, 2013; Paxton et al., 2012), and low exercise self-efficacy (Pinto et al., 2002). Furthermore, obese women have also been shown exhibit different social cognitive theory-based health behavior patterns compared to lean controls (Dressler & Smith, 2013). Therefore, the focus of this systematic review is to determine whether theory-based physical activity interventions for overweight and obese female cancer survivors, regardless of cancer site, lead to an increase in physical activity.

Methods

This review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines (Liberati et al., 2009).

Literature Search

Comprehensive searches of The Cumulative Index to Nursing and Allied Health (CINAHL), psycINFO, PubMed, and Web of Science databases were used to identify relevant English-language articles. The keywords used for the searches are detailed in

Supplemental File 1. For example, using the Pubmed database, an advanced Boolean search was conducted using (Cancer AND Survivor) AND (Intervention OR Program) AND (Randomized Controlled Trial) AND (Physical Activity OR Walking OR Exercise OR Sedentary). The reference lists of qualifying articles were also searched for non-indexed research sources.

Inclusion Criteria

To be included in the systematic review, studies must have met the following criteria: 1) randomized controlled trial published through August 2014; 2) administered a theory-based intervention aimed at increasing physical activity behaviors; 3) at least 90% of the participants being female cancer survivors (all sites), or presented physical activity results for men and women separately*;* 4) have a mean BMI among women of ≥ 30 kg•m^{-2}; 5) assessed physical activity before and after the intervention; and 6) written in the English language. Studies were excluded from the systematic review if the participants had any condition at baseline unrelated to the cancer that may have influenced response to the intervention.

Study Selection Process

The titles and abstracts of articles retrieved through the searches were preliminarily screened to assess inclusion. Articles were immediately excluded if it was clear that they did not meet the inclusion criteria described above, or if they were duplicates from previous searches. The full-text articles of the articles that passed the initial screening were further analyzed to determine whether they met the inclusion criteria. For flow diagram, see Figure 1 (PRISMA Flow chart).

Data Extraction & Quality Assessment

Bibliographic information (authors, title, publication year), sample characteristics (age, BMI), intervention (type, frequency, duration, length), intervention theoretical framework (Social Cognitive Theory, Theory of Planned Behavior, etc.), behavioral constructs incorporated (barrier identification, self-talk, goal setting), and subjective and/or objective physical activity outcome measures were extracted. In case of missing data, study authors were contacted whenever possible. Each included study was assessed for quality using an adapted version of previously developed criteria (Hind & Burrows, 2007), which scores studies on a scale of 7-21 (See Table 1).

Results

Participant characteristics

Six randomized controlled trials met the eligibility criteria, and were analyzed in this systematic review (Figure 1). Three of the studies assessed the impact of behavioral interventions on breast cancer survivors only (Demark-Wahnefried et al., 2014; Rogers et al., 2013; Rogers et al., 2009), two on endometrial cancer survivors (V. E. von Gruenigen et al., 2008; V. von Gruenigen et al., 2012b), and one utilized primarily breast cancer survivors and some colorectal cancer survivors (Ligibel et al., 2012). Each of the studies included only female participants except for the study that included some colorectal cancer survivors, in which 92% of the participants were women (Ligibel et al., 2012). The mean age of participants in the included studies ranged from 52 to 61 years and mean BMI ranged from 30.9 to 43.5 $kg \bullet m^{-2}$. Participants were primarily non-Hispanic white (74% - 100%).

Intervention characteristics

The duration, delivery method and frequency of the interventions varied greatly between studies. The interventions lasted either 12 weeks (Rogers et al., 2013; Rogers et al., 2009), 16 weeks (Ligibel et al., 2012), 6 months (V. E. von Gruenigen et al., 2008; V. von Gruenigen et al., 2012b) or 1 year (Demark-Wahnefried et al., 2014). Three of the studies attempted to improve diet and physical activity (Demark-Wahnefried et al., 2014; V. E. von Gruenigen et al., 2008; V. von Gruenigen et al., 2012b), whereas the others focused exclusively on physical activity behaviors. Two of the interventions were entirely home-based, one using print materials sent every 2 months (Demark-Wahnefried et al., 2014), and the other using near-weekly 30-45 minute telephone calls (Ligibel et al., 2012). The other four studies administered interventions through a combination of home-based and center-based activities at least weekly during the first 6 weeks, and then biweekly until the intervention endpoint.

Two of the studies incorporated exercise classes during the first six weeks of the intervention (Rogers et al., 2013; Rogers et al., 2009), and four of the studies distributed activity monitors to increase motivation (Demark-Wahnefried et al., 2014; Ligibel et al., 2012; V. E. von Gruenigen et al., 2008; V. von Gruenigen et al., 2012b). In each case, the interventions were front-loaded, such that more behavioral counseling and/or exercise classes occurred during the first several weeks, and then tapered off towards the end of the intervention.

The control groups were given either usual care (Ligibel et al., 2012; Rogers et al., 2013; Rogers et al., 2009; V. E. von Gruenigen et al., 2008; V. von Gruenigen et al., 2012b) or standard diet and exercise materials (Demark-Wahnefried et al., 2014). All of

the included studies based their interventions on either Social Cognitive Theory (Ligibel et al., 2012; Rogers et al., 2013; Rogers et al., 2009; V. E. von Gruenigen et al., 2008; V. von Gruenigen et al., 2012b) alone, or in conjunction with the Transtheoretical model (Demark-Wahnefried et al., 2014).

Study Results

Physical activity outcomes were assessed subjectively, using the Godin leisure time index (Demark-Wahnefried et al., 2014; Rogers et al., 2009; V. E. von Gruenigen et al., 2008; V. von Gruenigen et al., 2012b) or the 7-day physical activity recall (Ligibel et al., 2012), in five of the studies. Pedometers (V. von Gruenigen et al., 2012b) or accelerometers (Demark-Wahnefried et al., 2014; Rogers et al., 2013; Rogers et al., 2009) were used to objectively measure physical activity in four of the studies.

The two studies that provided exclusively home-based behavioral interventions did not observe significant increases in the intervention groups for either subjective or objective measures (Demark-Wahnefried et al., 2014; Ligibel et al., 2012). Of the four studies that administered home-based plus center-based interventions, three observed significant improvements in subjective physical activity (V. E. von Gruenigen et al., 2008), objective physical activity (Rogers et al., 2009) or both (V. von Gruenigen et al., 2012b). Although the remaining home-based plus center-based intervention study did not observe a significant improvement, the effect size was large (d=0.76).

Adherence and retention were relatively high in each of the included studies. The criteria for adherence varied due to the variability of the intervention type, rendering it difficult to compare the studies, adherence ranged from 68% - 99% overall. Furthermore, retention was at least 79% in each of the studies, indicating the feasibility of these types

of physical activity interventions for overweight and obese female cancer survivors. Because each study had relatively high adherence and retention, there did not appear to be any link between adherence, retention and physical activity outcomes.

Several behavior change techniques were utilized in an attempt to increase physical activity behavior. The most common were improving record keeping or journaling (Demark-Wahnefried et al., 2014; Liberati et al., 2009; Rogers et al., 2013; Rogers et al., 2009; V. E. von Gruenigen et al., 2008; V. von Gruenigen et al., 2012b), developing perceived barrier avoidance strategies (Demark-Wahnefried et al., 2014; Ligibel et al., 2012; Rogers et al., 2013; Rogers et al., 2009), creating individualized goals (Demark-Wahnefried et al., 2014; Ligibel et al., 2012; V. E. von Gruenigen et al., 2008; V. von Gruenigen et al., 2012b), and improving time management (Rogers et al., 2013; Rogers et al., 2009). No quantitative or qualitative data was provided to evaluate the relative acceptance or benefits of any of the behavior change techniques.

Because the included studies were based on theoretical frameworks, reported changes in psychosocial variables were extracted from the results. However, five of the six included studies did not report on any of the variables related to Social Cognitive Theory. The one study that did report the results found that there was no change in self-efficacy and a non-significant *decrease* in social support (d=0.51) in the intervention group (Demark-Wahnefried et al., 2014).

Three of the studies did not include information regarding adverse events, or lack thereof (Ligibel et al., 2012; V. E. von Gruenigen et al., 2008; V. von Gruenigen et al., 2012b). The other three studies reported no adverse events (Rogers et al., 2009) and two

non-serious joint injuries/soreness related to the interventions (Demark-Wahnefried et al., 2014; Rogers et al., 2013).

Discussion

The primary finding of this systematic review was that theory-based interventions may lead to increases in physical activity among overweight and obese female cancer survivors, provided that the interventions include a substantial center-based component. Additionally, each of the studies that did not observe significant results observed small effect size increases in physical activity. While these findings are promising, the lack of reported psychosocial variables limits the interpretation regarding the underlying causes of the observed increases in physical activity.

The magnitude of the observed increases in physical activity is difficult to put in context because of the use of the Godin Leisure Time index, which does not explicitly provide a number of moderate- or vigorous-intensity physical activity minutes per week (Godin & Shephard, 1985). Estimates of intervention-related improvements in moderate- to vigorous-intensity physical activity (MVPA), based on the Godin questionnaire and accelerometry, ranged from approximately 30 – 100 minutes per week in the studies included in this systematic review. Female breast and uterine cancer survivors perform approximately 60 – 90 minutes of MVPA per week (Loprinzi, Lee, & Cardinal, 2013), such that only 60-90 minutes of additional MVPA is required to achieve the recommended volume of physical activity (Garber et al., 2011). Therefore, these interventions appear to increase physical activity enough for female breast cancer survivors to achieve the recommended MVPA per week.

Whereas the home-based interventions did not produce significant improvements in physical activity, the home-based plus center-based interventions produced significant improvements with moderate-to-large effect sizes. Future studies with overweight and obese female cancer survivors should consider utilizing these two components to maximize the benefits for the participants.

Considering that the one of the inclusion criteria for this systematic review was that the studies must be based on a theoretical framework, it was surprising to find that only one of the studies actually provided results regarding the associated psychosocial variables. Because of this absence, the interpretation of the results is limited to immediate physical activity outcomes. In addition, the single study that did provide information regarding behavioral variables related to Social Cognitive Theory found no improvement in self-efficacy, although that is a primary proposed mediator of physical activity. Future theory-based interventions should ensure that behavioral variables are measured so that the relative effectiveness of the behavioral component can be assessed.

There are a number of limitations to this systematic review that should be noted. The small number of studies, and the relatively small number of cumulative participants (N=316), limits the interpretation of the findings. Likewise, 88% of the total participants were non-Hispanic white cancer survivors, so it cannot be determine from this review whether these findings apply to more heterogeneous populations. Also, even in this small sample of studies, the physical activity interventions varied greatly, making it difficult to compare across trials, or find common factors within trials, that could inform future studies.

Although there are several limitations and a small number of studies, this review provides evidence that home-based plus center-based physical activity interventions may increase physical activity behavioral among overweight and obese female cancer survivors enough for them to achieve the recommended dose of MVPA. More studies will need to be conducted to determine the mediating factors and the most effective behavior change techniques in this population.

Table 1. Criteria and Grading of Study Quality

Criteria	**Grade**	**Description**
Randomization	1	Groups were not randomized and presence of discrepancies in baseline characteristics
	2	Groups not randomized but were well-matched
	3	Groups were randomized
Compliance to the study	1	Losses were greater than 30% or not reported
	2	Losses were between 21 and 30%
	3	Losses were 20% or less
Compliance to the intervention	1	Less than 50% or not reported
	2	Between 50 and 70%
	3	70% or greater
Behavioral intervention	1	No specific theory basis for intervention
	2	Specific intervention but subjective measure of PA
	3	Specific intervention and objective measurement of PA
Confounding variables*	1	Lack of control for confounding variables (< 3 variables)
	2	Control over some confounding variables (3-4 variables)
	3	Control over most confounding variables (5+ variables)
Duration of the trial	1	Less than 3 months
	2	3-6 months
	3	Greater than 6 months
Sample size	1	Less than 20 per group
	2	20-40 per group
	3	+ 40 per group
*Age, BMI, baseline physical activity, diet, stage at diagnosis, attention		

Table 2. Summary Table for Main Characteristics and Outcomes of Included Studies

	Sample Characteristics	Cancer Site	Study design, duration	Setting	Theoretical framework	Intervention details	Physical Activity Measure(s)	Physical Activity Outcome (Intervention vs. Control)
Demark-Wahnefried et al. (2014)	N=68 100% ♀ Age: 61.3 ± 7.4 BMI: 31.0 ± 2.6 Race: 74% White	Breast	RCT, 1 year	Home-based (print materials)	SCT, TTM	G_0: Standard diet and exercise materials, attention matched. G_1: Individual diet and exercise intervention. Print materials sent every two months to increase self-efficacy. Activity monitors distributed. G_2: Same as G_1, but diet and exercise intervention focused on achievement through mother-daughter bond.	Subjective: Godin LTE Objective: Accelerometry	Subjective: +3 MET hr/wk (NS, estimated d=0.28) Objective: +30 MVPA min/wk (NS, estimated d=0.30)
Ligibel et al. (2012)	N=59 92% ♀ Age: 53.1 ± 10.8 ‡ BMI: 31.2 ± 6.2 ‡ Race: 92% White	Breast & Colorectal	RCT, 16 weeks	Home based (telephone calls)	SCT	G_0: Usual care G_1: 10-11 semi-structured telephone calls, 30-45 minutes each, over 16 weeks to build self-efficacy for exercise behaviors. Pedometers distributed.	Subjective: 7-day Physical Activity recall questionnaire	Subjective: +2 MET hr/wk (NS, estimated d=0.25), +30 MVPA min/wk (NS, estimated d=0.31)
Rogers et al. (2009)	N=41 100% ♀ Age: 52 ± 15 ‡ BMI: 30.9 ± 8.6 ‡ Race: 93% White	Breast	RCT, 12 weeks	Center-based (group sessions, individual counseling) and home-based exercise	SCT	G_0: Usual care G_1: 6 weekly, then bi-weekly discussion groups. 12 supervised exercise sessions during the first 6 weeks. Home aerobic physical activity prescription during weeks 3-12. Three individual counseling sessions.	Subjective: Godin LTE Objective: Accelerometry	Subjective: +18 Moderate intensity minutes per week (NS, d=0.16) Objective: More activity counts (d=1.02)
Rogers et al. (2013)	N=28 100% ♀ Age: 58.0 ± 56.1 ‡ BMI: 33.9 ± 7.4 ‡ Race: 87% White	Breast	RCT, 12 weeks	Center-based (group sessions, individual counseling) and home-based exercise	SCT	G_0: Usual care G_1: 6 weekly, then bi-weekly discussion groups. 12 supervised exercise sessions during the first 6 weeks. Home aerobic and resistance training physical activity prescription during weeks 3-12. Three individual counseling sessions.	Objective: Accelerometry	Objective: +84 MVPA min/wk (NS, d=0.76)

Von Gruenigen et al. (2008)	N=45 100% ♀ Age: 54 ± 2.0 BMI: 43.5 ± 2.1 Race: 100% White	Endometrium	RCT, 6 months	Center-based (group sessions, individual counseling) and home-based exercise	SCT	G_0: Usual care G_1: 6 weekly, then bi-weekly, then monthly discussion groups. Contact by phone during "off" weeks. Pedometers distributed.	Subjective: Godin LTE	Subjective: Significantly higher Leisure score index (estimated d=0.65)
Von Gruenigen et al. (2012)	N=75 100% ♀ Age: 57.0 ± 8.6 ‡ BMI: 36.4 ± 5.5 ‡ Race: 88% White	Endometrium	RCT, 6 months	Home-based (telephone, email, newsletters) and Center-based (Group sessions, physician and dietician consults)	SCT	G_0: Usual Care G_1: 10 weekly group sessions, followed by 6 bi-weekly group sessions. Each 60-minute session focused on different behavior modifications for behavior change. Pedometers distributed. Physician consultations at 3 and 6 months.	Subjective: Godin LTE Objective: Pedometer step count	Subjective: Significantly higher Leisure score index (estimated d=0.56) Objective: Significantly higher step count (+2362 steps, estimated d=0.81)

Age (years)
BMI: Body mass index ($kg \bullet m^{-2}$)
G_0: Control group
G_1: Intervention group
SCT: Social Cognitive Theory
TTM: Transtheoretical Model
LTE: Leisure-time Exercise Questionnaire
MVPA: Moderate- and Vigorous Physical Activity
NS: Not significant
‡ Data for experimental group only

Table 3. Methodological Quality of Included Studies

Authors	Randomization	Study Compliance	Intervention Compliance	Intervention	Confounding Variables	Duration	Sample size	Total
Demark-Wahnefried, et al. (2014)	3	3	1	3	3	3	2	18
Ligibel et al. (2012)	3	2	3	2	2	2	3	15
Rogers et al. (2009)	3	3	3	3	3	2	2	19
Rogers et al. (2013)	3	3	3	3	2	2	1	17
Von Gruenigen et al. (2008)	3	2	3	2	3	2	2	17
Von Gruenigen et al. (2012)	3	3	3	3	3	2	2	19

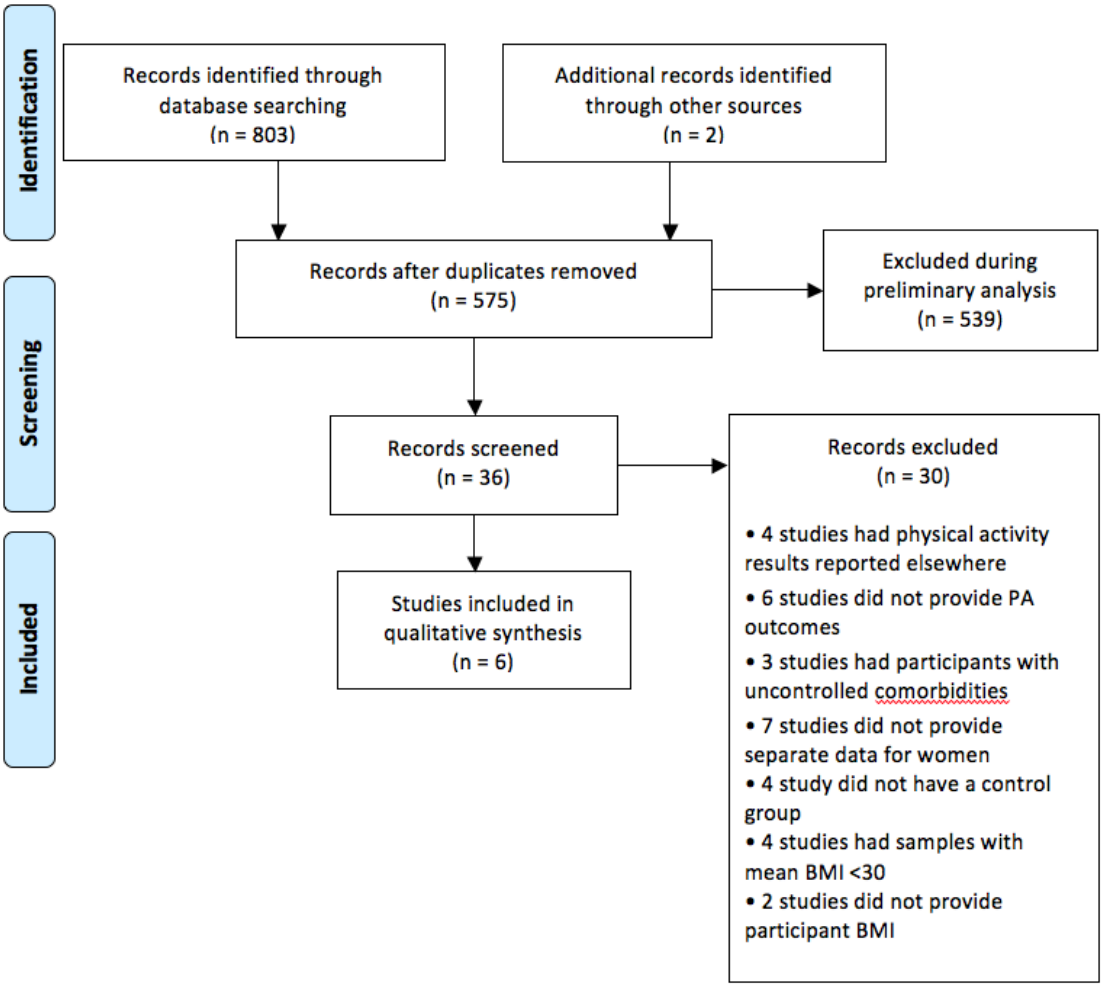

Figure 1. Study Inclusion Flow Chart

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Chapter III

PHYSICAL ACTIVITY CORRELATES AMONG ETHNICALLY DIVERSE ENDOMETRIAL CANCER SURVIVORS

Abstract

Objectives: To determine physical activity-related differences in body composition, quality of life, and behavioral variables among an ethnically diverse sample of endometrial cancer (EC) survivors.

Methods: Sixty-two endometrial cancer survivors who had been treated for 6 months-5 years prior at a tertiary care medical center in the Bronx, NY, completed questionnaires of physical activity (MVPA), body mass index (BMI), quality of life, and psychosocial characteristics based on social cognitive theory.

Results: The obesity rate was 65%, and BMI was higher (d=0.73, p=0.045) in non-Hispanic black women (37.8 ± 10.2) compared with non-Hispanic white women (31.2 ± 7.8). 47% of the entire sample reported being physically active on the Rapid Assessment of Physical Activity questionnaire. Physically active EC survivors had higher quality of life scores (*d*=0.57, p=0.016) as measured by the FACT-Endometrial, and self-reported BMI (*d*=0.40, p=0.057) for the physically active group (32.4 ± 5.6 $kg \bullet m^{-2}$) compared to the Insufficiently Active group (35.7 ± 10.2 $kg \bullet m^{-2}$). The physically active group reported higher walking self-efficacy (p=0.02), higher barrier self-efficacy (p=0.02), and more positive physical activity outcome expectations (p=0.02). However, only walking self-

efficacy was a predictor of physical activity participation (r^2=0.27, p =0.018). There were no differences in reported physical activity between ethnic groups.

Conclusion: This sample had a relatively high rate of obesity. Physically active EC survivors had lower BMI, higher quality of life, and more positive physical activity behavioral variables. These data suggest that a physical activity lifestyle intervention including physical activity behavioral education should be investigated for ethnically diverse endometrial cancer survivors.

Introduction

Endometrial cancer (EC) is the 4th leading cause of cancer among women in the United States, with over 52,000 new cases estimated in 2014 (Howlader et al., 2014). The 5-year survival rate is relatively high (~85%), such that EC is only the 8th leading cause of cancer deaths, and over 600,000 women were estimated to be living with endometrial cancer in the United States as of 2011 (Howlader et al., 2014). Although survivorship is relatively high, EC survivors are the least physically active of all cancer survivors (Mayer et al., 2007), and have very high rates of obesity (von Gruenigen, Gil, Frasure, Jenison, & Hopkins, 2005), increased risk for developing other chronic diseases such as cardiovascular disease, type II diabetes mellitus, and osteoarthritis, and a subsequent greater risk of morbidity and mortality (von Gruenigen et al., 2011).

In the general population, regular physical activity has many health benefits, which include reduced risk of cardiovascular disease, type II diabetes and some cancers (including endometrial cancer), preservation of bone and muscle mass during aging, increased quality of life and vitality, and enhanced mood (Garber et al., 2011). Similarly,

cross-sectional studies of EC survivors have shown positive associations between moderate- and vigorous-intensity physical activity, quality of life and physical function, and inverse associations with body mass index (BMI) (Basen-Engquist et al., 2009; Beesley, Eakin, Janda, & Battistutta, 2008; Courneya et al., 2005). These cross-sectional studies provide evidence for the importance of a physically active lifestyle among EC survivors.

Most of these studies of EC survivors have assessed primarily non-Hispanic white women. However, in the general population, there are well known differences in physical activity among women of various racial and ethnic groups (Moore, Harris, Carlson, Kruger, & Fulton, 2012). Ethnically diverse women, especially those with lower incomes, have poorer access to physical activity resources (Lee, Mama, Adamus-Leach, & Soltero, 2014; Turrell et al., 2010), significantly more perceived barriers to physical activity (Baruth, Sharpe, Parra-Medina, & Wilcox, 2014; Venditti et al., 2014) and they are more likely to be obese (Flegal, Carroll, Ogden, & Curtin, 2010) than non-Hispanic white women. Therefore, it is likely that the interrelationships between physical activity, body composition and quality of life in ethnically diverse women may be different than has been described in previous studies of non-Hispanic white women.

Although physical activity is an important component of post-treatment quality of life and disease risk reduction in EC survivors, very little is known about physical activity and underlying behavioral constructs of ethnically diverse endometrial cancer survivors. Since culturally tailored physical activity interventions are more effective than non-tailored interventions (Bock, Jarczok & Litaker, 2014) more information needs to be known to develop targeted interventions. Therefore, the primary aims of the current study

were to: 1) Describe the demographic, anthropometric, physical activity and quality of life characteristics of a diverse population of endometrial cancer survivors, 2) Determine whether self-reported physically active participants had higher quality of life, and lower BMI than Insufficiently Active participants, and 3) Evaluate self-efficacy, outcome expectations, social support, and self-regulation for active and Insufficiently Active participants.

Methods

This was a cross sectional observational study of adult endometrial cancer survivors. The study was conducted in accordance with the policies and procedures of the Institutional Review Boards of Albert Einstein College of Medicine and Teachers College, Columbia University. All participants gave their informed consent prior to study participation.

Participants

Eligible participants met the following inclusion criteria: (1) English-speaking, (2) adult endometrial cancer survivors who had been treated for endometrial cancer (any stage) between 6 months and 5 years prior at the University Hospital for Albert Einstein College of Medicine (AECOM) or Montefiore Medical Center (MMC), (3) grade 0-2 on the Eastern Cooperative Oncology Group for performance status, and (5) residents of Bronx, NY.

Recruitment

The recruitment flow chart can be found in Figure 1. Based on data from a study by Courneya et al. (2005), it was estimated that 63 completed questionnaires would be required to determine differences in quality of life and body mass index between physical active and insufficiently physically active groups. Assuming a 40% response rate, which was lower that that observed in the Courneya et al. study, 160 participants were randomly selected from the clinical database of eligible participants at AECOM and MMC. An advisory letter regarding the nature of the study and study administrator contact information was sent to potential participants with the option for immediate anonymous opt-out via a self-addressed stamped envelope. If the opt-out was not returned within 2 weeks, a study packet containing a cover letter, informed consent, questionnaire packet, and self-addressed stamped envelope, was mailed to eligible participants.

Several other evidence-based methods for improving postal survey success were employed (Hoddinott & Bass, 1986; McCluskey & Topping, 2011), including self-addressed stamped envelopes, hand-written addresses, and original signatures, were used in an effort to maximize response rate. Follow-up reminders were sent via mail to all non-respondents.

Because the response rate was low (11 out of 160), a second phase of recruitment commenced to receive the necessary number of completed questionnaires. Endometrial cancer survivors who had not been previously selected for the mailings, and had been treated between 6 months – 5 years prior, were approached to be part of the study while in the waiting room during their regularly scheduled gynecologic oncology visits at the MMC. If they met the other inclusion criteria, participants gave informed consent, and

completed the questionnaires in a private room while waiting for their respective appointments, or after having seen their gynecologic oncologist, with a research assistant present to review their answers.

Measures

Demographic information. Age, race, ethnicity, education level, employment, income, marital status, cancer diagnosis stage and date were obtained via self-report. Participants were asked whether they considered themselves, Hispanic or Latina, and subsequently whether their race was white, black / African-American, American Indian, Asian or other (Appendix D), as used by the United States Census Bureau.

Physical Activity. Physical activity (PA) was assessed using the Rapid Assessment of Physical Activity, which is written at a 6th grade level, and has been shown to be a valid and sensitive self-reported assessment of physical activity among older women (Topolski et al., 2006). The questionnaire asks nine questions, with images to accompany the definitions of light, moderate and vigorous PA during a normal week. The answers were used to categorize participants as active (meeting ACSM recommendations for aerobic activity) (Garber et al., 2011), or Insufficiently Active. Participants who chose either, *"I do 30 minutes or more a day of moderate physical activities, 5 or more days a week"* or *"I do 20 minutes or more a day of vigorous physical activities, 3 or more days a week"* were classified as physically active. Those who checked lower activity levels were classified as insufficiently physically active.

The Yale Physical Activity Survey (YPAS; Dipietro, Caspersen, Ostfeld, & Nadel, 1993) was also administered by the research assistant in order to determine activity-specific differences between active and Insufficiently Active groups. This second

physical activity survey was used because it provides detailed subscales regarding several different activities of daily living in order to better describe the physical activity of the sample.

Body mass index. Self-reported weight and height were used to calculate body mass index (BMI, kilograms•meters^{-2}). Participants were classified according to the standard BMI categories adopted by the National Heart, Lung, and Blood Institute (Pi-Sunyer, 1998)

Quality of life. Participant quality of life (QoL) was assessed using the Functional Assessment of Cancer Therapy-Endometrial questionnaire (FACT-En). The first four subscales assess physical (PWB), functional (FWB), emotional (EWB), and social well-being (SWB), the sum of which forms the Functional Assessment of Cancer Therapy-General (FACT-G) score (Cella et al., 1993). The sum of the FACT-G plus an additional 16-item scale to assess QoL concerns specific to endometrial cancer patients and survivors comprised the FACT-En score (Scale: 0-172), for which higher scores indicate higher quality of life.

Behavioral variables. Exercise self-efficacy was assessed using an adapted 10-item Self-Efficacy of Walking scale (McAuley, Blissmer, Katula, Duncan, & Mihalko, 2000), which asks participants how confident they are that they will be able to walk at a moderately fast pace for different time frames, ranging from 5 minutes up to 1 hour. The average score for all 10 questions is then converted to a percentage of the total possible. For example, a person who is fully confident on all of the questions would have a score of 100%. Barrier self-efficacy was assessed using the 9-item Self-Efficacy for Exercise Scale (Resnick & Jenkins, 2000), which asks participants how confident they are that

they would continue their physical activity when confronted with barriers such as a boring program or poor weather. This study used a scale of 1-5, with 5 being highly confident, so as to match the other questionnaires in the study. The score was then transformed to a scale of 0-10 as is normally reported. Self-regulation was assessed using the second version of the Behavioral Regulations in Exercise Questionnaire (BREQ-2; Markland & Tobin, 2004). Several subscales of the within the BREQ-2 correspond to behavioral components within the self-determination continuum (Deci & Ryan, 1985). The total score from the BREQ-2 comprises the Relative Autonomy Index, with higher scores indicating more intrinsic self-regulation. Social support from family and friends was assessed using the Social Support and Exercise questionnaire (Sallis, Grossman, Pinski, Patterson, & Nader, 1987). Higher scores indicate more support from family and/or friends. Outcome expectations were assessed using the 9-item Outcome Expectations for Exercise questionnaire (Resnick, Zimmerman, Orwig, Furstenberg, & Magaziner, 2001). Higher scores indicate more positive expectations as a result of exercise.

Data Analysis

All data were analyzed using SPSS Version 22.0. Differences between active and Insufficiently Active participants for categorical data were determined by analyzing chi-squared tests. Differences between active and Insufficiently Active participants for FACT-En and subscales, BMI, and behavioral variables were determined by analyzing independent samples t-tests. One-way ANOVA, with Tukey post-hoc tests, were performed to determine differences between ethnic groups. A stepwise logistic regression

was used to determine the most significant behavioral correlates of PA. Statistical significance was set *a priori* at $p \leq 0.05$.

Results

After mailing out 160 advisory letters to eligible participants, 13 opt-out letters were completed and returned, and 10 letters were returned as undeliverable. Of the 137 questionnaire packets that were subsequently mailed to the current addresses on file for the endometrial cancer survivors, only 11 were returned completed (7% response rate including the 13 participants who had opted-out). Of the 59 eligible participants who were approached by a study administrator at their regularly scheduled gynecological oncology appointments, 54 agreed to complete the questionnaires (92% response rate).

Participant characteristics are reported in Table 5. In brief, the sample was older and predominately obese. The sample was also very ethnically diverse, with nearly equal proportions of non-Hispanic white, non-Hispanic black, and Hispanic women. More than half of the women were retired.

The indicators of socioeconomic status, education and income a very diverse sample. Almost equal proportions of women had graduated high school or less (42%) as had completed college (41%). Furthermore, household income was less than $40,000 for 40% of the women, but above $80,000 for 25% of the women. Over 90% of the participants reported having been diagnosed with Stage I endometrial cancer. The average time between the beginning of cancer treatment and questionnaire completion was 2.5 (± 1.6) years.

There was a significant difference in BMI between ethnic groups (p=0.045). Post-hoc analysis showed a large effect size (Cohen's *d*=0.73) for the difference between non-Hispanic black (37.8 ± 10.2) and non-Hispanic white EC survivors (31.2 ± 7.8). Mean BMI for Hispanic participants was 33.2 ± 5.7. It is notable that no non-Hispanic black or Hispanic participants were classified as having healthy BMI between 18.5-25 $kg \bullet m^{-2}$.

Nearly 50% of the participants (29/62) reported that they met the ACSM target recommendations for moderate- or vigorous-intensity aerobic physical activity (Garber et al., 2011). Active participants were more likely to be employed (13 employed, 0 unemployed) than were Insufficiently Active participants (6 employed, 5 unemployed) (p=0.043).

There was a moderate effect size (Cohen's *d*=0.40) for the difference in BMI between Active and Insufficiently Active groups (32.4 ± 5.6 vs. 35.7 ± 10.2 $kg \bullet m^{-2}$, p=0.057). Among obese participants, 48% (10/21) of the Insufficiently Active group was categorized as Class III obesity (BMI ≥ 40.0 $kg \bullet m^{-2}$) whereas only 16% (3/19) of the Active group was classified as Class III (χ^2=5.1, p=0.08).

Quality of life (Table 7), assessed by the FACT-En, was 10 points higher for the active group (p=0.016), with a moderate effect size (*d*=0.57). The FACT-En score included a 6-point difference in the FACT-G scores (95.7 vs. 89.7, p=0.048), which has been determined to be a clinically meaningful difference (Yost & Eton, 2005). There were small but significant differences in the Social Well-being (2.2 points, p=0.046) and Functional Well-being subscales (2.2 points, p=0.038), which correspond with small effect sizes (King et al., 2010). There were no associations between quality of life and

BMI ($p>0.20$), nor were there any differences in quality of life between BMI categories ($p> 0.20$).

There were significant differences between Active and Insufficiently Active groups for several of the behavioral components assessed in this study (Table 8). Active participants reported significantly higher walking self-efficacy ($p=0.002$), better barrier self-efficacy ($p=0.022$), and more positive outcome expectations ($p=0.020$) than Insufficiently Active participants. There were no differences in family or friend support between groups ($p>0.20$).

Within the self-determination continuum (Deci & Ryan, 1985), the Active group reported significantly higher levels of Intrinsic Regulation ($p=0.001$), Identified Regulation ($p=0.002$), and Introjected Regulation ($p=0.002$) compared with the Insufficiently Active group. There were no differences in External Regulation ($p=0.14$) or Amotivation ($p>0.20$) between groups.

The logistic regression showed that only walking self-efficacy was a significant predictor of physical activity ($r^2=0.27$, $p =0.018$).

As expected, the mean YPAS activity dimensions summary index was significantly higher for the Active group than the Insufficiently Active group (48.7 ± 24.0 vs. 34.2 ± 20.8, $p=0.022$). There were no significant differences between groups for any of the individual subscales. Most of the participants reported a substantial amount (>2 hrs/week) of housework activities in the past week, such as shopping (89%), laundry (82%), light housework (93%), heavy housework (69%), food preparation (91%) and dish washing (95%), indicating a highly self-reliant sample. More than 70% of the women reported doing some kind of exercise in the past week. Brisk walking was the most

prevalent mode of exercise (62%); participants who reported doing brisk walking self-reported 192 minutes on average in the past week. Furthermore, 80% of participants reported participating in slow walking during the past week, with an average of 229 minutes per person.

Discussion

The primary aims of the current study were to determine the physical activity behaviors and correlates among an ethnically diverse sample of endometrial cancer survivors. The sample, which had almost equal percentages of non-Hispanic white, non-Hispanic black and Hispanic EC survivors, reported high levels of physical activity, yet was overwhelmingly overweight and obese. Moreover, women who reported being physically active had clinically important higher quality of life scores and were less obese. Importantly, walking self-efficacy was a significant predictor of physical activity.

To the best of our knowledge, this is the first cross-sectional study to assess the physical activity behaviors and correlates among an ethnically diverse urban sample of endometrial cancer survivors. Whereas previous studies assessing predominately non-Hispanic white endometrial cancer survivors have found between 38 -53% obesity rate (Basen-Engquist et al., 2009; Courneya et al., 2005; Karvinen et al., 2007), there was a 65% obesity rate in the current study. In comparison, 38% of women over 60 years old are obese in the United States (Ogden, Carroll, Kit, & Flegal, 2013). These findings indicate that this population of endometrial cancer survivors is at higher risk for cardiovascular disease, type II diabetes, and other obesity-related chronic diseases than

previous studies and compared to what has been previously reported on endometrial cancer survivors and the population as a whole.

In the current study, there was a moderate effect size for the 3-unit difference in BMI between the Active and Insufficiently Active groups. To put this finding in perspective, a 5-unit difference in BMI may infer a 20% difference in all-cause mortality among endometrial cancer survivors over a 5-year period (Arem et al., 2013). In a previous study of endometrial cancer survivors, Courneya et al. (2005) did not observe a difference in BMI between participants who did, or did not, meet the aerobic physical activity guidelines, although they did find that participants who met the guidelines were less likely to be overweight or obese. This difference may be attributed to the different body composition of the respective study samples. The mean BMI in our study was 34.2 $kg \bullet m^{-}2$, with nearly twice as many obese participants, and three times as many with BMI ≥ 40 compared to a study of non-Hispanic white women by Courneya et al. (2005). In the current study, roughly 60% of women with BMI's of 30-34.9 and 35-39.9, but only 25% of women with BMI ≥ 40, were classified as active. Because the current sample included more Class III obese participants, we also were able to detect a difference in BMI for Active compared to Insufficiently Active groups.

Perceived quality of life scores, as assessed by the FACT-Endometrial, were statistically and meaningfully higher in the Active group than the Inactive group. The 6-point difference between groups observed with the FACT-General scale was similar to the 5-point differences observed by Courneya et al. (2005) and Beesley et al. (2008) for Active compared to Insufficiently endometrial cancer survivors. Whereas previous studies found a negative association between quality of life and BMI (Courneya et al.,

2005), our study did not. These findings corroborate a recent report showing that the correlations between obesity and quality of life were lower among African American women than among white women (Paxton et al., 2012).

Over twice as many participants (47%) in the current study reported being considerably physically active than in previous studies (22-31%) (Basen-Engquist et al., 2009; Beesley et al., 2008; Courneya et al., 2005). There are several possible explanations for this higher than expects level of PA. The PA rate may reflect the realities of residing in a major urban environment where more transportation-related physical activity is typical (Shephard, 2008). Methodological factors may also have a contributory role, since ours was the only study that assessed physical activity in person. However, considering that 92% of the sample was overweight or obese, and that 48% of Bronx residents report performing no physical activity (Olson, Van Wye, Kerker, Thorpe, & Frieden, 2006), it is likely that this sample tended to overestimate their relative physical activity participation. Future physical activity observations and interventions with this population should include objective physical activity monitoring to provide realistic baseline measures and goals.

The physically active group reported having higher walking self-efficacy, barrier self-efficacy, more intrinsic self-regulation and stronger outcome expectations. One other study that had assessed physical activity behaviors among endometrial cancer survivors also found exercise self-efficacy to be significantly associated with exercise (Karvinen et al., 2007). Among breast cancer survivors, it has been also been shown that exercise self-efficacy, outcome expectations, and social support were associated with physical activity participation (Phillips & McAuley, 2013). Our data are consistent with previous research

in female cancer survivors and provide evidence that physically active ethnically diverse endometrial cancer survivors have similar psychosocial composition as non-Hispanic white survivors. Although several of the behavioral constructs tested were associated with physical activity, only walking self-efficacy was a significant predictor of physical activity in this sample, perhaps because walking is the most common form of exercise in this population (Rossi et al., 2015).

Barrier self-efficacy, self-determination and outcome expectations were also higher in the Active group than the Insufficiently Active group, with moderate effect sizes. Interventions aimed at improving these behavioral constructs, in addition to exercise self-efficacy, should be tested to determine whether they would mediate increased physical activity in this population.

The difference in the relative successes of the recruitment strategies should also be noted. Whereas the mailed questionnaires had a very low return rate, the in person recruitment had a very high enrollment rate. Anecdotally, many participants at the on-site recruitment expressed how their were more than willing to complete the questionnaires in order to provide the scientific community with more knowledge about this population. Future studies of similar populations should complete their surveys by approaching participants at regularly scheduled appointments.

Conclusion

Self-reported physical activity was similar to national normative values for age and gender. Physically active endometrial cancer survivors had meaningfully higher quality of life and lower BMI than insufficiently active. The findings also demonstrated

walking-self efficacy was highly predictive of physical activity participation and thus should be incorporated into physical activity interventions.

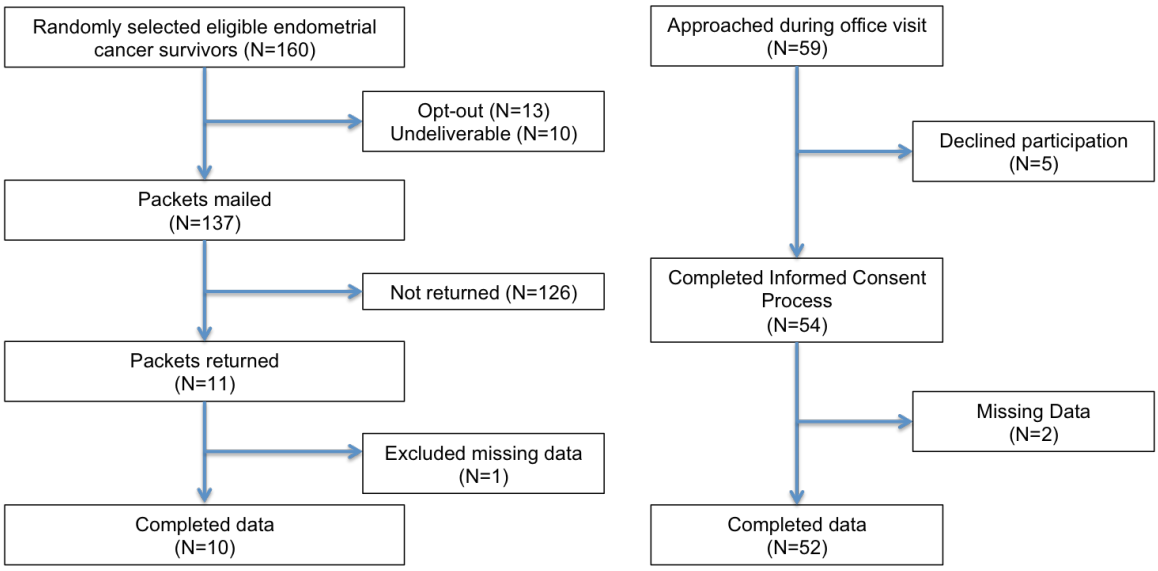

Figure 2. Participant Recruitment

Table 4. Participant Characteristics

	Frequency	Percent of Total	Mean	St. Dev.
Age (years) (N=61)			63.1	10.0
Staging at time of diagnosis (N=57)				
Stage 1	46	81%		
Stage 2	0	0%		
Stage 3	3	5%		
Unsure	8	14%		
Time Since Diagnosis (months)			30	19
Body Mass Index (N=62)($kg \cdot m^{-2}$)			34.2	8.4
Underweight	1	2%		
Healthy Weight	4	6%		
Overweight	17	27%		
Obese	40	65%		
Race/Ethnicity (N=60)				
Non-Hispanic White	19	32%		
Non-Hispanic Black	19	32%		
Hispanic	18	30%		
Other	4	7%		
Education (N=61)				

High School Graduate or less	26	42%
Some College/College Graduate	21	34%
Some Graduate School or Graduate Degree	14	23%
Employment Status (N=62)		
Retired	34	55%
On Disability	2	3%
Unemployed	5	8%
Homemaker	2	3%
Employed	19	31%
Household Income (N=55)		
< $40,000	23	42%
$40,000 – 79,999	19	35%
$80,000 or more	13	24%

Table 5. Body Mass Index, Physical activity and Quality of Life by Race/Ethnicity in Endometrial Cancer Survivors (N=62)

	Overall (N=62)	Non-Hispanic White (N=19)	Non-Hispanic Black (N=19	Hispanic (N=18)
	Column Mean (SD) or Percent of Total			
Body Mass Index ($kg \bullet m^{-2}$)	34.2 (8.4)	31.3 (7.8)	37.8 (10.2)*	33.2 (5.7)
Underweight	2%	5%	-	-
Healthy Weight	6%	21%	-	-
Overweight	27%	21%	26%	33%
Obese	65%	53%	74%	67%
Self-reported Physically Active	47%	37%	47%	50%
FACT-En (0-172)	150.0 (15.8)	145.0 (19.2)	153.6 (13.5)	151.6 (13.5)
FACT-G (0-108)	93.0 (11.2)	88.0 (13.6)	95.0 (8.8)	96.2 (9.1)

FACT-En: Functional Assessment of Cancer Therapy - Endometrial
FACT-G: Functional Assessment of Cancer Therapy - General
* Significantly different from non-Hispanic white

Table 6. Quality of Life for Active and Insufficiently Active Participants (N=62).

SCALE Subscale	Active (n=29)	Insufficiently Active (n=33)	Cohen's *d*
FACT-En (0-172)	154.2 ± 12.9*	144.7 ± 19.6	0.57
Endometrial (0-64)	58.5 ± 6.6	55.0 ± 9.0	0.44
FACT-G (0-108)	95.7 ± 9.7*	89.7 ± 12.9	0.53
Physical Well-Being (0-28)	24.9 ± 3.7	23.4 ± 5.3	0.33
Social Well-Being (0-24)	24.5 ± 4.2*	22.3 ± 4.4	0.51
Emotional Well-Being (0-28)	21.3 ± 2.5	21.2 ± 3.2	0.03
Functional Well-Being (0-28)	25.0 ± 3.4*	22.8 ± 5.0	0.51

FACT-En: Functional Assessment of Cancer Therapy - Endometrial
FACT-G: Functional Assessment of Cancer Therapy - General
* Significantly different from Insufficiently Active group ($p<0.05$)

Table 7. Behavioral Variable Scores for Active and Insufficiently Active Participants (N=62)

	Active (n=29)	Inactive (n=33)	Cohen's *d*
Walking Self-Efficacy (0-100%)	68 ± 31*	41 ± 33	0.84
Barrier Self-Efficacy (0-10)	6.5 ± 2.2*	4.7 ± 3.0	0.68
Self Regulation (RAI)	9.9 ± 6.8	6.4 ± 7.9	0.47
Social Support (20-100)	38.9 ± 17.1	38.8 ± 18.3	0.01
Outcome expectations (1-5)	3.5 ± 0.8*	3.0 ± 0.9	0.59

RAI: Relative Autonomy Index
*Significantly different from Insufficiently Active group ($p<0.05$)

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Chapter IV

FEASIBILITY OF A PHYSICAL ACTIVITY INTERVENTION FOR ETHNICALLY DIVERSE ENDOMETRIAL CANCER SURVIVORS

Abstract

Purpose**:** To determine the feasibility of a 12-week physical activity (PA) intervention guided by social cognitive theory for ethnically diverse endometrial cancer survivors and to evaluate whether such an intervention might improve physical activity behavior, physical function, waist circumference, and quality of life.

Methods**:** Out of 140 potential participants contacted via telephone, 57 did not respond, 43 declined, 6 were screened out, and 6 expressed interest but did not complete baseline testing. 28 obese endometrial cancer survivors (38% non-Hispanic black, 38% Hispanic, 19% non-Hispanic white) were placed into a PA intervention (n=13) or wait-list control (n=15). The control group subsequently completed the intervention. Group classes consisted of 30 min of behavioral counseling and a 60 min exercise program. The control group was assigned to usual care. Participants attended classes 1-2x/week and were provided with a 90 min per week at-home exercise program. Data are presented as mean ± sd.

Results: Mean age was 64 ± 8 years and Body Mass Index was 37.3 ± 6.5 $kg \bullet m^{-2}$. Of the participants who began the intervention (n=25), 15 attended 75-100% of the weeks, 4 attended 50-67%, 3 never attended, and 3 dropped out. Additionally, 12 participants

regularly attended twice per week with 86% attendance. Participants reported walking 118 ± 79 minutes per week at home. PA did not improve in the intervention group. Six-minute walk test, quality of life and walking self-efficacy improved significantly more in the intervention group compared to the control group ($p<0.05$). At the 12-week follow-up testing, only waist circumference and outcome expectations remained significantly improved ($p<0.05$)

Conclusions: About one quarter of potential participants entered into the study, demonstrating the challenges of working with this population. However, once enrolled, the drop out rate was modest and adherence was high, demonstrating the acceptability and feasibility of this PA intervention in a diverse urban population of endometrial cancer survivors. Furthermore, the results show promising effects on some outcomes that will need to be confirmed in a larger randomized control trial.

Introduction

Approximately 55,000 women will be diagnosed with endometrial cancer (EC) in 2015 (American Cancer Society, 2015), and the incidence rate is projected to increase by 50% in the United States from 2010 to 2030 (Sheikh et al., 2014). Although the 5-year survival rate is over 80%, the disease has a negative impact on quality of life and physical function, especially in obese survivors (Fader, Frasure, Gil, Berger, & von Gruenigen, 2012).

Middle-aged (40-64 yrs) EC survivors are more likely to be sedentary, and perform 45 minutes less moderate intensity physical activity (PA) per week than non-cancer counterparts (Kwon, Hou, & Wang, 2012). Furthermore, Latina and non-Hispanic

black women are more likely to be sedentary than non-Hispanic white counterparts (Center for Disease Control, 2010). The first study of this dissertation found that 65% of the participants were obese, and 53% were insufficiently active. These findings indicate that ethnically diverse female cancer survivors have elevated risk for poor quality of life, impaired physical function, cardiovascular disease and diabetes (Holmes, Chen, Feskanich, Kroenke, & Colditz, 2005; Rosato et al., 2011).

Physical activity interventions have been shown to reduce body fat and fatigue, as well as increase physical function and quality of life (Kim, Choi, & Jeong, 2013; Speck, Courneya, Masse, Duval, & Schmitz, 2010). In poorer urban environments such as many parts of the Bronx, adherence to physical activity may be relatively low due to environmental, language and societal barriers (Moadel et al., 2007; Wilbur, Chandler, Dancy, Choi, & Plonczynski, 2002), which may potentially attenuate the impact of physical activity programming in real-world settings. Tailored physical activity interventions are more effective than non-tailored interventions (Bock, Jarczok, & Litaker, 2014), and should be developed for ethnically diverse endometrial cancer survivors.

The aims of this study were to 1) Assess the feasibility of a 12-week physical activity intervention for ethnically diverse obese endometrial cancer survivors in Bronx, NY; and 2) Determine the effectiveness of the intervention on physical activity, waist circumference, physical function and quality of life; and 3) Evaluate changes in self-efficacy, outcome expectations, social support, and self-regulation during the 12-week physical activity intervention.

Methods

The methods and procedures for this study were approved by the institutional review boards of Teachers College, Columbia University and Albert Einstein School of Medicine, respectively. All participants provided informed consent prior to study initiation.

Study Overview

This study was a wait-list controlled trial. Recruitment began in February with an fixed intervention start date in April, 2014. By the date of the intervention, 20 participants had been enrolled, and they were randomized in a 2:1 ratio in the intervention (n=13) and wait-list control groups (n=7). The subsequent 8 enrolled participants were placed into the wait list control group within the subsequent 3 weeks (for Recruitment Flow Diagram, see Figure 3).

The intervention group was post-tested following the intervention, and then tested again 12 weeks later to determine sustained effects. The wait-list control group received usual care for 12 weeks followed by a post-test, which also served as their baseline prior to being enrolled in the intervention and testing schedule identical to that administered to the intervention group (Figure 2). As such, both the intervention group and wait-list control group completed the 12-week intervention.

Participants

Based on a previous physical activity intervention by von Gruenigan et al. (2008), which found an effect size of 1.02 on physical activity, it was estimated that 12 participants per group would be needed to find a difference in physical activity between

the intervention and control groups. In order to account for 2 dropouts per group, 28 obese (BMI ≥ 30) English-speaking women who had been diagnosed with endometrial cancer between 6 months and 5 years prior were recruited for this study. Participants were recruited via telephone calls to potentially eligible participants provided by gynecologic oncologists Montefiore Medical Center in Bronx, NY, and by posting flyers at surrounding cancer centers and local cancer forums. Eligible participants were cleared by their physicians for moderate- to vigorous-intensity physical activity, and agreed to attend at least weekly exercise sessions at Albert Einstein School of Medicine. Participants were excluded if they had any physical or health limitation that prevented participation in moderate-intensity physical activity, or if they were already active (regular ≥3x/week moderate- to vigorous-intensity physical activity program in the previous 3 months).

Participants who travelled via public transportation were given a $10 Metrocard to cover the cost of two round trips each time they attend two classes. Participants who drove had parking validated for free.

Theory Based Physical Activity Intervention

The 12-week physical activity intervention was guided by social cognitive theory (Bandura, 2004). The practical framework of the intervention was to decrease barriers and enhance exercise self-efficacy, and ingrain implementation intentions such that participants would become independently more physically active. Other behavioral goals were to increase social support by enhancing group interaction in class and interaction with family and friends at home, improving outcome expectations by increasing self-

monitoring of physical activity and the associated benefits, and increasing self-regulation by clarifying discussions about why the participants are active (Figure 3).

The intervention was designed to achieve those results by having participants perform physical activity in weekly exercise classes supported by physical activity in their home environment and through group counseling sessions which included strategies regarding how to increase physical activity and avoid barriers. Practical discussions allowed participants to exchange ideas and techniques that had worked for them, and to ask clarifying questions of the class instructor.

The outline for the 12-week learning sessions (Appendix H) was primarily based on the physical activity portion of the intervention by Stolley et al. (2009) with urban African-American breast cancer survivors. An introduction to developing effective goal statements and accompanying implementation intentions (Gollwitzer & Schaal, 1998) was added to the topic list in order to facilitate improvement in barrier self-efficacy. The structure of the lessons in the educational materials was based on the *Fine, Fit, and Fabulous* Bronx initiative conducted by Bronx Health REACH (2012). The written materials for the intervention (Appendix K) were developed using strategies developed for cancer survivors who are limited readers to maximize suitability for the participant pool (Doak, Doak, & Meade, 1996).

Physical Activity Intervention

Two classes were offered per week, on weekday mornings, at the fitness center on the Montefiore Medical Center campus. Each class included 30 minutes of group counseling sessions and 60 minutes of moderate- to vigorous-intensity physical activity classes, which included a 5-minute warm-up, 25 minutes of dance fitness, 20 minutes of

resistance training exercises using body weight and exercise bands, and 10 minutes of cool-down and stretching. The exercise program was based on general recommendations from an ACSM roundtable for cancer survivors (Schmitz et al., 2010) and the general ACSM guidelines (Garber et al., 2011). Participants were taught methods for increasing or decreasing the intensity of each exercise to account for individual physical improvements or impairments. Participants were also encouraged to try several of the exercises at home between classes, and report their relative success during the classroom session. Ratings of perceived exertion on a scale of 6-20 were assessed to verify the intensity of the fitness classes.

Participants were given 1-, 2-, and 3- mile walking routes from their home, and were asked to walk for least 90 minutes per week outside of class, for a total of at least 150 minutes of moderate intensity physical activity per week.

To facilitate the home-based walking program, individualized neighborhood walking routes were created by the study administrators using the http://www.mappedometer.com website. Progress was assessed using a pedometer (Yamax CW701, Yamax Inc, Japan) and adherence was monitored with activity logs (Zoellner et al., 2009). Weekly pedometer step counts and walking logs were collected weekly. Missing data was imputed in any week during which the activity log indicated full adherence for at least 5 days (Clemes & Griffiths, 2008).

Maximizing Adherence

Relative adherence to physical activity interventions has been repeatedly correlated with relative physiological and psychological improvements (Irwin et al., 2009; Milne, Wallman, Gordon, & Courneya, 2008; Moadel et al., 2007). Therefore,

several measures were taken to ensure the maximum possible adherence to the intervention. A study administrator called participants following any missed weeks to discuss her progress or barriers to continued participation. Two classes were offered weekly to increase the possibility that participants could attend at least one. Lastly, progressively more appealing incentives were distributed to participants based on class attendance (Appendix I). The incentives, which included exercise shirts, dance fitness DVDs and walking sneakers, were also designed to facilitate physical activity.

Wait-list control group

Participants randomized into the wait-list control group were given a pamphlet from the American Cancer Society indicating the importance of physical activity and improved nutrition for health outcomes. They received one follow-up call after 6 weeks to discuss their progress and reaffirm their intention to return for the follow-up assessment following 6 more weeks. Following the wait-list period and follow-up testing, control group participants were enrolled in an identical intervention as for the intervention group.

Measurements

Participants in the intervention and wait-list control groups were assessed 3 and 4 times, respectively, during the course of the study (Figure 2).

Physical Activity

Physical activity was assessed using the Yale Physical Activity Survey (YPAS) (Dipietro, Caspersen, Ostfeld, & Nadel, 1993), which was originally developed for elderly adults. The YPAS has been validated among older women in English (Harada,

Chiu, King, & Stewart, 2001) and among culturally diverse older adults (Moore et al., 2008). It also accounts for seasonal variation, which was very important in this study due to the length of the intervention.

Body composition

Height, post-urination weight, and waist circumference (Lopez de la Torre, Bellido, Soto, Carreira, & Hernandez Mijares, 2010) were assessed as indices of body composition. Waist circumference (WC) provides an indirect but effective assessment of abdominal obesity, was measured in duplicate according to the protocol described by Lopez de la Torre (2010), in which the circumference is measured at the midpoint between the last rib and the iliac crest. BMI was calculated from the height and weight data. The combination of BMI and WC has been shown to be a useful predictor hypertension, diabetes and metabolic syndrome and cardiovascular disease (Herrera et al., 2009; Janssen, Katzmarzyk, & Ross, 2002). Changes as small as 1 cm for waist circumference are associated with significantly reduced risk of diabetes mellitus and hypertension (Bombelli et al., 2011) and cardiovascular disease in women (Zyriax, Schoeffauer, Klipstein-Grobusch, Boeing, & Windler, 2011).

Physical Function

To determine the impact of the physical activity intervention on physical function, the 6-minute walk test (6MWT) (American Thoracic Society, 2002) and 30-second chair-stand (Jones, Rikli, & Beam, 1999) were administered.

Originally developed for cardiovascular disease patients, the 6MWT has been validated as a measure of cardiorespiratory function in several diseased populations. The

test has also been shown to be highly reliable and clinically significant among overweight and obese women (Beriault et al., 2009). An exhaustive review of various walk tests found the 6MWT to be more reflective of capacity for activities of daily living than any other walk test (Solway, Brooks, Lacasse, & Thomas, 2001). The 6MWT administration followed the guidelines from the American Thoracic Society (American Thoracic Society, 2002). In brief, participants were seated for 10 minutes before the test, during which time resting heart rate and blood pressure were assessed. Large orange cones were set 30.5 meters apart along a wide hallway. Participants were instructed to walk as fast as possible, circling the cones for 6 minutes. The distance was calculated from the number of completed laps multiplied by 30.5 meters, plus the remaining distance from the last lap.

At least five minutes following the completion of the 6MWT, participants completed the 30-second chair stand test (30CST). Participants began in the seated position on a chair 43cm in height. With their arms placed across their chest, participants fully stood up and sat down as many times as possible for 30 seconds. If a participant arose fully, that repetition was counted. The 30CST has been shown to be a reliable and valid measure of lower body strength and is correlated to physical activity among high functioning older adults (Jones et al., 1999).

Quality of Life

The Functional Assessment of Cancer Therapy – Endometrial Cancer (FACT-En) questionnaire were administered to assess quality of life (Cella et al., 1993). The FACT questionnaires are validated measures of physical, functional and emotional well being among cancer survivors (Cella et al., 1993). The FACT-En is comprised of 43 physical,

social, emotional, and functional questions, with an additional section of endometrial cancer specific concerns.

Social Cognitive Theory Variables

Exercise self-efficacy was assessed using an adapted 10-item Self-Efficacy of Walking scale (McAuley, Blissmer, Katula, Duncan, & Mihalko, 2000), which asks participants how confident they are that they will be able to walk at a moderately fast pace for different time frames, ranging from 5 minutes up to 1 hour. The average score for all 10 questions is then converted to a percentage of the total possible. For example, a person who is fully confident on all of the questions would have a score of 100%. Barrier self-efficacy was assessed using the 9-item Self-Efficacy for Exercise Scale (Resnick & Jenkins, 2000), which asks participants how confident they are that they would continue their physical activity when confronted with barriers such as a boring program or poor weather. This study used a scale of 1-5, with 5 being highly confident, so as to match the other questionnaires in the study. The score was then transformed to a scale of 0-10 as is normally reported. Self-regulation was assessed using the second version of the Behavioral Regulations in Exercise Questionnaire (BREQ-2; Markland & Tobin, 2004). Several subscales of the within the BREQ-2 correspond to behavioral components within the self-determination continuum (Deci & Ryan, 1985). The total score from the BREQ-2 comprises the Relative Autonomy Index, with higher scores indicating more intrinsic self-regulation. Social support from family and friends was assessed using the Social Support and Exercise questionnaire (Sallis, Grossman, Pinski, Patterson, & Nader, 1987). Higher scores indicate more support from family and/or friends. Outcome expectations were assessed using the 9-item Outcome Expectations for Exercise questionnaire

(Resnick, Zimmerman, Orwig, Furstenberg, & Magaziner, 2001). Higher scores indicate more positive expectations as a result of exercise.

Diet

If effective, the physical activity intervention will help participants think more often about their health, potentially leading them to improve their diet. In order to differentiate between changes in body composition due to physical activity or diet modification, the Latino Dietary Behaviors Questionnaire (Fernandez, Olendzki, & Rosal, 2011) was administered and included in *post-hoc* analysis as a potential covariate.

Other Questionnaires

Demographic variables, including age, education level, socioeconomic status, marital status, employment status, and ethnicity, were assessed by questionnaire. Medical variables including time since treatment, diagnosis, disease stage, treatment and other medical issues were also assessed self-reported.

Qualitative Assessment

Immediately following the post-testing, participants who had completed the intervention were asked to participant in a 30-minute individual qualitative interview. The semi-structured interviews were guided by several open-ended questions (Appendix L) adapted from previous work by Mathews et al. (Mathews et al., 2010) regarding perceived facilitators, barriers, and self-efficacy (Sander, Wilson, Izzo, Mountford, & Hayes, 2011). The interviewer was trained to follow introductory questions with probing and specifying questions, and to allow for periods of silence following answers, to gain as much detail as possible (Burgess & Whyte, 1982). Interpreting questions were also used

to clarify meaning when necessary. The transcriptions were analyzed for emergent themes using the five-step framework approach (Pope, Ziebland, & Mays, 2000).

Analysis plan

All data were analyzed using SPSS version 22. Means and standard deviations were used to express participant characteristics at baseline. Independent samples t-tests or chi-squared tests were analyzed to assess differences between groups at baseline. Because there were no significant differences between the randomized control and placed control groups for physical activity BMI, waist circumference or six-minute walk-test, or any of the behavioral variables, the data were pooled to form the control group. Mixed design ANOVA (2 groups x 2 time points) were analyzed to determine differences between the combined intervention group and the control group for the dependent variables. Independent samples t-tests of the change scores were analyzed to determine the effect size between groups.

To determine the sustained effects during the period after the 12-week intervention, one-way repeated measures ANOVA were analyzed, using the Greenhous-Geisser correction if the assumption of sphericity was violated. If the overall statistic was significant, Bonforroni post-hoc tests were analyzed to determine differences between baseline, post-test, and 12-week follow-up. Alpha level for all statistical analyses was set *a priori* at $p \leq 0.05$.

Results

Demographics

Baseline demographic data for the intervention and control groups is presented in Table 9. The sample was older (mean: 64.2 years, range: 42 – 74 years) and obese (mean BMI: 37.3, range: 30 – 54 kg•m-^{2}, with large waist circumference (mean: 44.2 cm, range: 37 – 53 cm). Sixteen participants (57%) reported being diagnosed with Stage 1 endometrial cancer; 2 participants each reported being diagnosed Stage 2, 3, and 4, respectively. Five participants (18%) were unsure of their stage. The sample was very ethnically diverse, including 10 non-Hispanic black, 10 Hispanic, 5 non-Hispanic white participants, and one Asian participant (2 did not answer).

There were no differences between the intervention and wait-list control groups at baseline for BMI, age, ethnicity, education, quality of life, or any of the physical activity behavioral variables. There was also no difference in physical activity energy expenditure using YPAS questionnaire. However, there was a significant difference in the YPAS Summary Index at baseline (p=0.016).

Feasibility

Out of 140 potential participants contacted via telephone, 57 did not respond. Of the 83 potential participants contacted, 43 declined, with the primary reasons being too busy (n=19), too painful to exercise (n=6) or unwillingness to exercise (n=5). Six women were screened out of the study for having BMI too low or being Spanish-speaking only. Six others agreed to participate, but did not attend the baseline testing session and could not

be reached to determine the reason for non-attendance. In all, out of 155 women selected for contact, 28 women were enrolled in the study (18%).

For the INT group (n=13), 8 attended 75-100% of the weeks, 2 attended 50-67%, 1 never attended, and 2 dropped out due to unrelated illness/injury. Additionally, 6 participants regularly attended twice per week with 89% attendance. Participants reported walking 103 ± 49 minutes per week at home, with 67% of the walking journals returned. Four of the women did not attend the follow-up testing session; therefore 9 women from the INT group completed both the baseline and post-testing.

For the wait-list control group (n=15), three women did not attend the follow-up testing. Therefore the control consisted of the remaining 12 participants. Two women who completed the follow-up chose not attend any of the subsequent exercise classes due to stated family commitments. Of the 10 wait-list control participants who started the exercise class, 7 attended 75-100% of the weeks, 2 attended 50-67%, and 1 dropped out after three weeks and could not be contacted to determine the reason. Six of the women regularly attended twice per week with 83% attendance. Wait-list participants reported walking 139 ± 103 minutes per week at home during the intervention. However, only 53% of the walking journals were returned.

When combined, 15 out of 25 women who started the exercise classes attended one class at least 75% of the weeks, including 13 who missed one week or less. Additionally, 12 women regularly attended twice per week for a total of 86% attendance. On average 73% of the enrolled participants who had not dropped out attended each class.

The exercise classes were designed to elicit moderate- to vigorous-intensity physical activity. Participants were asked at the end of the class to quantify their overall effort on a Borg Ratings of Perceived Exertion scale (6-20). Mean rating of perceived effort was 14.2 ± 1.1 (range: 13-16), indicating moderate intensity physical activity was achieved.

Immediate outcomes

A summary of the immediate outcomes for the control and intervention groups, respectively, is presented in Tables 10. When comparing the intervention groups to the control group, there was no main effect of time for YPAS energy expenditure, which asks about physical activity during the previous week. There was a main effect of time for the YPAS Summary Index (p=0.004), which analyzes physical activity from the previous month, however there was no interaction effect. Body mass did not change in either group, and there was no significant main effect of time for waist circumference. However, it should be noted that waist circumference decreased 5.3 ± 5.3 cm for the intervention group compared to a 2.6 ± 6.7 cm increase for the control group, indicating a large effect size (Cohen's *d*: -1.32).

There was a significant main effect of time for the six-minute walk test (p=0.007), and a significant interaction effect (p=0.013). The intervention increased their distance walked by 22.0 ± 16.7 m, compared to 1.1 ± 22.0 m for the control group (Cohen's *d*: 1.10). There was a significant main effect of time for the 30-second chair stand (p=0.006), but no difference between groups (p>0.20).

The main effect of time for the FACT-Endometrial measure of quality of life was not significant (p=0.051). There was however large effect size for the difference between

groups (Cohen's *d*: 0.86). There were significant main effects (p=0.002) and interaction effects (p=0.019) for the FACT subscale pertaining to endometrial cancer specific issues. The subscale increased by 5.5 ± 4.5 points in the intervention group and 0.8 ± 5.6 points in the control group (Cohen's *d*: 0.95).

For the behavioral variables (Table 11), there were significant effects for time for walking self-efficacy (p=0.020), and Relative Autonomy Index (p<0.001). There was a significant interaction effects for walking self-efficacy (p=0.033) but not for the RAI (p>0.20). Walking self-efficacy, which is scored on a scale of 0-100%, increased by 23 ± 30 percentage points in the intervention group, compared to 0 ± 15 percentage points in the control group (Cohen's *d*: 0.87). Although there were no significant main effects of time for barrier self-efficacy, outcome expectations or social support (p>0.20), there was a large effect size for the difference in changes in outcome expectations (Cohen's *d*: 1.09) and a small to moderate effect size for barrier self-efficacy.

Qualitative analysis

Sixteen participants were interviewed individually following their post-intervention testing session. The major themes that emerged from the interviews were: 1) Types of physical activity participants perform; 2) Primary motivations for wanting to be more physically active; 3) Primary barriers to physical activity; 4) The perceived benefits of the physical activity intervention and 5) How the intervention could be improved in the future. The primary types of physical activity were clearly walking and household chores. Dancing was also discussed by several participants buy usually after the first two. For example, one participant explained her physical activity thusly, "Going for walks, being busy around the home. Dancing, although I don't always do that." The primary

motivating factors were maintaining or improving health, being able to participate in family life (including for their dogs) and losing weight and/or inches around the waist, which often appeared to overlap, for example, "Being better able to take care of my family… my husband has certain illnesses, my son has certain illnesses, and there's a lot of pressure on me… There are some restrictions because of my weight and all of that. Being able to not have those restrictions." The overwhelming majority of participants reported weather (heat and/or cold) and pain from various injuries to be their greatest barriers to physical activity. A good example of the intersection of these two barriers was, "Cold weather. Because my joints get a little stiff. They're not painful anymore, but they get stiff so I say, 'I'm not going to do that.'"

Participants discussed several perceived benefits of the intervention. The one that came up most often was the impact of the social interactions with their peers regarding both motivating them to come to class and also being able to share with friends. One illustrative statement was, "That was the best thing for me, because at least I knew I was out and with other people twice a week. I mean, I have my grandchildren and my family, but it's not the same, so I really, really enjoyed it. I loved it, as a matter of fact." Participants also reported increased confidence ("boy, I couldn't believe that I was able to do it and really basically keep up."), enjoying wearing a pedometer to have a daily goal to strive for, and improved breathing. Participants generally wanted the program to be offered more times per week and for a longer period of time. Several participants expressed interest in adding pool workouts and many also wanted more dancing ("I think that what everyone wanted to do – the dancing – because we want the music"). Lastly,

several participants expressed that the program should have a nutritional component so that they could improve that aspect of their health as well.

Sustained outcomes

To determine whether there were sustained effects of the physical activity intervention, participants were re-tested for all of the same outcomes 12 weeks following the end of the intervention. A total of 14 participants completed all three of the testing session (8 from the immediate intervention group, 6 from the delayed intervention group), and their data are summarized in Table 12. Among these participants, there was no main effect for the YPAS Energy Expenditure measure, but there was a main effect for YPAS Summary Index ($p=0.022$). Post-hoc analysis showed that the physical activity index was higher post-intervention than at baseline ($p=0.018$), but lower at follow-up compared to the post-intervention ($p=0.001$), indicating no sustained effects.

There were no main effect for body mass ($p>0.20$), but there was a significant main effect for waist circumference ($p=0.001$). Post-hoc analysis revealed that, compared to the control (113.8 ± 13.7 cm), waist circumference was significantly lower post-intervention (108.2 ± 12.4 cm, $p=0.002$) and at follow-up (109.1 ± 11.1 cm, $p=0.017$). There were no differences between the post-intervention and follow-up measures ($p>0.20$), indicating a sustained effect of the intervention on waist circumference.

There was a significant main effect for the six-minute walk test ($p=0.002$). Post-hoc analysis revealed that there was a significant difference between the baseline (432 ± 70 m) and post-intervention (455 ± 72 m) values. There was no significant main effect for the 30-second repeated chair stand test ($p=0.12$).

For quality of life, there was not a main effect for the FACT-Endometrial scores ($p=0.11$). There was a significant main effect for the FACT Endometrial subscale ($p=0.032$). Post-hoc analysis revealed that the score was higher post-intervention (57 ± 8) compared to baseline (52 ± 8, $p=0.002$), but that there were no difference between the follow-up (53 ± 9) and baseline.

There was a significant main effect for Outcome expectations ($p=0.010$). Post hoc analysis revealed that both the post-intervention (3.6 ± 0.7, $p=0.028$) and follow-up (3.7 ± 0.6, $p=0.013$) values were higher than the baseline (3.3 ± 0.7). There was also a significant main effect for the relative autonomy index ($p=0.006$). Post-hoc analysis revealed that both the post-intervention (12.7 ± 6.0, $p=0.009$) and follow-up (11.4 ± 7.2, $p=0.050$) values were higher than the baseline (8.6 ± 7.6). There were no significant effects of time for walking self-efficacy ($p=0.06$), barrier self-efficacy ($p=0.12$) or social support ($p>0.20$).

Discussion

The primary aims of this study were to determine whether a physical activity intervention would be feasible in this population, and subsequently whether the intervention would lead to positive changes in physical activity and associated measures of health and wellness.

As expected, the participants in this study were ethnically and socioeconomically diverse. Only 36% of the sample was non-Hispanic white, over 40% of the sample earned less than $40,000 per year, and education level was evenly distributed. In comparison, previous studies regarding the effects of physical activity intervention have utilized

primarily (75-100%) non-Hispanic white samples (Basen-Engquist et al., 2014; Donnelly et al., 2011; McCarroll et al., 2015; V. E. von Gruenigen et al., 2008; V. von Gruenigen et al., 2012).

In the current study, less than 20% of potential participants eventually were enrolled in the study. The primary reasons for non-participation where that people did not return phone calls, stated that they were too busy, or were unwilling or unable to exercise. This level of participation is in line with what was experience in previous studies of endometrial cancer survivors (16-29%) (Donnelly et al., 2011; McCarroll et al., 2015; V. E. von Gruenigen et al., 2008; V. von Gruenigen et al., 2012). Of the 25 participants who started the intervention in either group, six (24%) did not complete the intervention, including three who never attended a class, and two additional women completed the intervention but did not attend the follow-up testing session. This level of drop out is higher than then 7 – 22% observed in other interventions for endometrial cancer survivors of similar or longer duration (Basen-Engquist et al., 2014; Donnelly et al., 2011; V. E. von Gruenigen et al., 2008; V. von Gruenigen et al., 2012). Adherence in the current study was defined as attending at least one class per week for 75% of the weeks. By that definition, 15 out of the 25 participants (60%) who started the physical activity program adhered. In comparison, Donnelly et al. (2011) found that 58% of participants adhered to the program 2/3 of the time, and von Gruenigen et al. (2008; 2012) found that participants attended between 73-84% of classes over 6 months. The enrollment, dropout and attendance data from the current study are within the range of past studies, indicating that this physical activity intervention was feasible for this population.

Attendance was relatively high in this study, and participants reported moderate intensity physical activity in the classes and a significant amount of walking outside of the classes. However, self-reported physical activity, as determined by the Yale Physical Activity Survey, did not increase in the intervention group compared to the control group. The systematic review in Chapter II of this dissertation found that print only interventions did not have any effect on physical activity; therefore it is unlikely that the single pamphlet distributed to the wait-list control group participants had any effect on physical activity.

Both physical activity interventions for endometrial cancer survivors by von Gruenigan et al. (2008; 2012) reported an increase in self-reported physical activity using the Godin Leisure Time Index. Basen-Engquist et al. (2014) also found an increase in physical activity over time among endometrial cancer survivors, although there was no control group for comparison. However, among other randomized, controlled, theory-based physical activity interventions for obese female cancer survivors (any site), physical activity did not increase significantly, and the estimated effect sizes were 0.16 – 0.28 (Demark-Wahnefried et al., 2014; Ligibel et al., 2012; Rogers et al., 2009). Since the primary reported physical activity by the participants in this study was walking, future studies should utilize objective measures such as accelerometry in order to substantiate the physical activity findings.

Although self-reported physical activity did not increase in the current study, participants in the intervention groups had significantly greater improvements in the six-minute walk test and improved quality of life scores. The only other comparable study to have assessed physical function (Donnelly et al., 2011) among gynecological cancer

survivors did not observe any improvement in the 12-minute walk test. The observed improvement of 22 meters is less than the reported minimally clinically important difference (MCID) of 80 meters among obese middle-aged women (Larsson & Reynisdottir, 2008).

Other interventions have also observed improved quality of life scores, including a 10-point increase for the FACT-General (Donnelly et al., 2011) and an 8-point increase in the SF-36 General (Basen-Engquist et al., 2014). The primary subscale change observed in the current study was for endometrial cancer specific issues (6 point improvement). While this is apparently meaningful, with a large effect size, it is difficult to compare these findings due to the fact that the FACT-Endometrial is seldom used. The mean improvement in the FACT-G scores, which is more widely utililzed, was 5 points higher in the intervention group than the control group, which is considered a clinically meaningful difference (Yost & Eton, 2005).

Among the behavioral variables tested in this study, only walking self-efficacy improved significantly compared to the control group. Because the intervention required a significant amount of walking, this increase may have been more of a function of the physical activity expectations of the intervention than the behavioral component of the class. However, there was also a very large effect size for the improvement in outcome expectations and a moderate effect size for the increase in barrier self-efficacy. These findings suggest that this intervention did have an effect on some of the behavioral constructs expected. Interestingly, there was a moderate negative effect size for social support, which supports the findings from the first study of this dissertation in which

there was no difference in social support between Active and Insufficiently Active groups.

The sustained outcome measures were analyzed without the benefit of the control group due to the nature of the study. In these assessments, waist circumference remained improved (-4.7 cm from baseline) 12 weeks after the end of the intervention. A decrease in waist circumference by approximately 11 cm has been associated with a 28-34% reduction in all cause mortality among older, overweight or obese women (Zhang, Rexrode, van Dam, Li, & Hu, 2008)

The primarily limitations of this study were the lack of randomized control group and the experimenter not having been blinded, which may have introduced bias into the findings. Only 20 of the 28 participants were randomized, which may have introduced some bias into sample. In order to reduce the potential for bias caused by unblinded experimenters, protocols were standardized for both groups. Furthermore, the waist circumference measurement was conducted twice by each rater, and by two raters whenever possible, which was in 51% of the tests (Intraclass correlation coefficient: 0.99). Self-reporting of time spent walking outside of class was 60%, making it difficult to fully assess the level of participation outside of class. Although the reported outcomes from this study are promising, they should be interpreted conservatively because of these limitations.

Recommendations for Future Interventions

During the recruitment phase, no participants responded to flyers that we had posted around the Montefiore Medical Center, in the Oncology offices, or left with local cancer support groups. Furthermore, out of the 140 people we attempted to contact by

phone, we were only able to reach 83. Coupled with the low return rate of the mailed questionnaires in the first study, future research with this population should focus recruitment efforts on personal communication. In the first study, the enrollment rate of personal recruitment was over 90%. In this study, 34% of the participants we spoke with enrolled in the study, which is a relatively high amount considering the amount of effort required.

Recruitment, the subsequent randomization schedule, and adherence may have been hindered by participants' travel difficulty. Although the Bronx is only one part of New York City, some participants had to take multiple busses and/or subway rides to the testing location, traveling over an hour. Future research should focus on smaller classes, with rolling admissions, at multiple locations throughout an area, to increase the reach and effectiveness of the program.

The instructor for the current program was a black Hispanic woman of Caribbean descent who grew up in New York City. Anecdotal reports suggest that participants were able to identify with her because of their shared backgrounds. The instructor reported that several of the participants confided in her about their intimate family issues, as well as endometrial cancer related issues that they had been embarrassed to discuss before the intervention, and that did not come up when this dissertation author, a non-Hispanic white male, taught the pilot intervention (Appendix B). Related studies with similar population should ensure that the intervention instructor can relate well with the study participants.

Conclusion

The relatively low enrollment in this study illustrates the difficulty of recruiting a representative sample from this population. However, the dropout rate and adherence were moderate among enrolled participants, and attendance was high among about one-half of the participants, indicating that the intervention was feasible. The outcomes for physical activity and other measures were promising, and should be confirmed with a randomized controlled trial with a larger sample size and more objective assessments.

Table 8. Participant Characteristics at Baseline

	Intervention (n=13)	Control (n=15)
Age (years)	64 (10)	65 (5)
Body Mass Index ($kg \cdot m^{-2}$)	36.7 (4.9)	37.8 (7.7)
Time Since Diagnosis (months)	32 (14)	31 (22)
Stage at Diagnosis		
Stage I	7 (54%)	9 (60%)
Stage II	1 (8%)	1 (7%)
Stage III	1 (8%)	1 (7%)
Stage IV	2 (15%)	-
Unsure	2 (15%)	3 (20%)
No Answer	-	1 (7%)
Race/Ethnicity		
Non-Hispanic Black	4 (31%)	6 (40%)
Hispanic	6 (46%)	4 (27%)
Non-Hispanic White	2 (15%)	3 (20%)
Other	1 (8%)	-
No Answer	-	2 (13%)
Education		
High School Graduate or less	4 (31%)	5 (36%)
Some College/College Graduate	7 (54%)	3 (21%)

Some Graduate School or Graduate Degree	2 (15%)	6 (43%)
Employment Status		
Retired	10 (77%)	10 (67%)
Unemployed	1 (8%)	2 (13%)
Employed	1 (8%)	1 (7%)
On disability	1 (8%)	1 (7%)
Homemaker	-	1 (7%)
Household Income		
< $40,000	6 (46%)	6 (40%)
$40,000 – 79,999	2 (15%)	2 (13%)
$80,000 or more	4 (29%)	3 (21%)
No Answer	1 (8%)	4 (27%)

Data expressed as Mean (Standard Deviation) or as Frequency (Percentage of group).
No differences between groups at baseline

Table 9. Physical Activity, Body Composition, Physical Function and Quality of Life for the Control and Interventions Groups Before and After the 12-week Intervention.

	Control (n=12)		Intervention (n=17)		Main Effect of Time	Interaction Effect	Cohen's *d*
	Baseline	Post	Baseline	Post			
Physical Activity							
YPAS EE (kcal/wk)	4860 (2900)	5324 (3512)	4663 (2307)	5507 (2976)	p>0.2	p>0.2	0.13
YPAS Summary Index	40 (21)	52 (25)	42 (25)	63 (21)	p=0.004	p>0.2	0.33
Body Composition							
Weight (kg)	97.1 (20.9)	97.4 (21.8)	94.0 (16.9)	93.4 (15.7)	p>0.2	p>0.2	-0.32
WC (cm)	111.7 (11.6)	114.2 (14.4)	113.6 (12.9)	108.4 (11.4)	p>0.2	*p=0.002*	-1.32
Physical Function							
6MWT (m)	427 (60)	428 (65)	431 (64)	453 (65)	p=0.007	*p=0.013*	1.10
Chair stands (reps)	11.2 (3.4)	12 .4 (3.2)	12.5 (3.2)	13.7 (2.7)	p=0.006	p>0.2	0.04
Quality of Life							
FACT-En	143 (15)	143 (12)	141 (14)	151 (17)	p=0.051	*p=0.031*	0.86
Endometrial Subscale	53 (6)	54 (7)	53 (8)	59 (8)	p=0.002	*p=0.019*	0.95

Data presented as Mean (Standard Deviation)
Note: Two participants did not complete the physical function tests due to knee pain.
YPAS EE: Yale Physical Activity Survey Energy Expenditure
WC: Waist Circumference
6MWT: Six-minute walk test
FACT-En: Functional Assessment of Cancer Therapy - Endometrial

Table 10. Changes in Physical Activity Behavioral Variables

	Control (n=12)		Intervention (n=17)		Main Effect of Time	Interaction Effect	Cohen's *d*
	Baseline	Post	Baseline	Post			
Walking self-efficacy (0-100%)	43 (33)	44 (35)	40 (31)	63 (31)	p=0.020	*p=0.033*	0.87
Barrier self-efficacy (0-10)	5.3 (2.5)	5.0 (3.1)	5.5 (2.5)	6.5 (2.5)	p>0.2	p>0.2	0.40
Self-Determination (RAI)	7.3 (6.0)	9.8 (6.7)	9.9 (7.5)	13.5 (5.7)	p=0.001	p>0.2	0.25
Outcome Expectations (1-5)	3.5 (0.8)	3.3 (0.8)	3.4 (0.7)	3.7 (0.6)	p>0.2	*p=0.008*	1.09
Social Support (20-100)	34.8 (12.6)	40.2 (14.1)	37.7 (14.9)	36.8 (13.0)	p>0.2	p>0.2	-0.41

Data presented as Mean (Standard Deviation)
RAI: Relative Autonomy Index

Table 11. Immediate and Sustained Effects of 12-week Physical Activity Intervention (n=14)

	Baseline	Post-Intervention	Follow-up	Overall p-value
Physical Activity				
YPAS EE (kcal/wk)	4472 (2411)	5669 (3227)	5598 (4568)	p>0.20
YPAS Summary Index	40 (26)	63* (21)	46† (17)	*p=0.022*
Body Composition				
Weight (kg)	92.0 (17.7)	91.3 (15.9)	91.2 (16.7)	p>0.20
WC (cm)	113.8 (13.7)	108.2* (12.4)	109.1* (11.1)	*p=0.001*
Physical Function				
6MWT (m)	432 (70)	455* (72)	444 (72)	*p=0.002*
Chair stands (reps)	13.5 (3.1)	14.6 (2.4)	15.0 (2.2)	p=0.12
Quality of Life				
FACT-En	141 (15)	149 (18)	142 (22)	p=0.11
Endometrial Subscale	52 (8)	57* (8)	53 (9)	*p=0.032*
Behavioral Variables				
Walking self-efficacy (0-100%)	40 (30)	58 (33)	55 (33)	p=0.06
Barrier self-efficacy (0-10)	5.0 (2.5)	6.5 (2.5)	5.0 (2.3)	p=0.12
Self-regulation (RAI)	8.6 (7.6)	12.7* (6.0)	11.4* (7.2)	*p=0.006*

Outcome Expectations (1-5)	3.3 (0.7)	3.6* (0.7)	3.7* (0.6)	*p=0.010*
Social Support (20-100)	33.8 (14.0)	38.4 (14.2)	36.5 (13.6)	p>0.20

Data presented as Mean (Standard Deviation)
Note: 6MWT n=12, Chair stands n=11 due to knee pain
YPAS EE: Yale Physical Activity Survey Energy Expenditure
WC: Waist Circumference
6MWT: Six-minute walk test
FACT-En: Functional Assessment of Cancer Therapy - Endometrial
RAI: Relative Autonomy Index
* Significantly different from baseline ($p<0.05$)
† Significantly different from post-intervention ($p<0.05$)

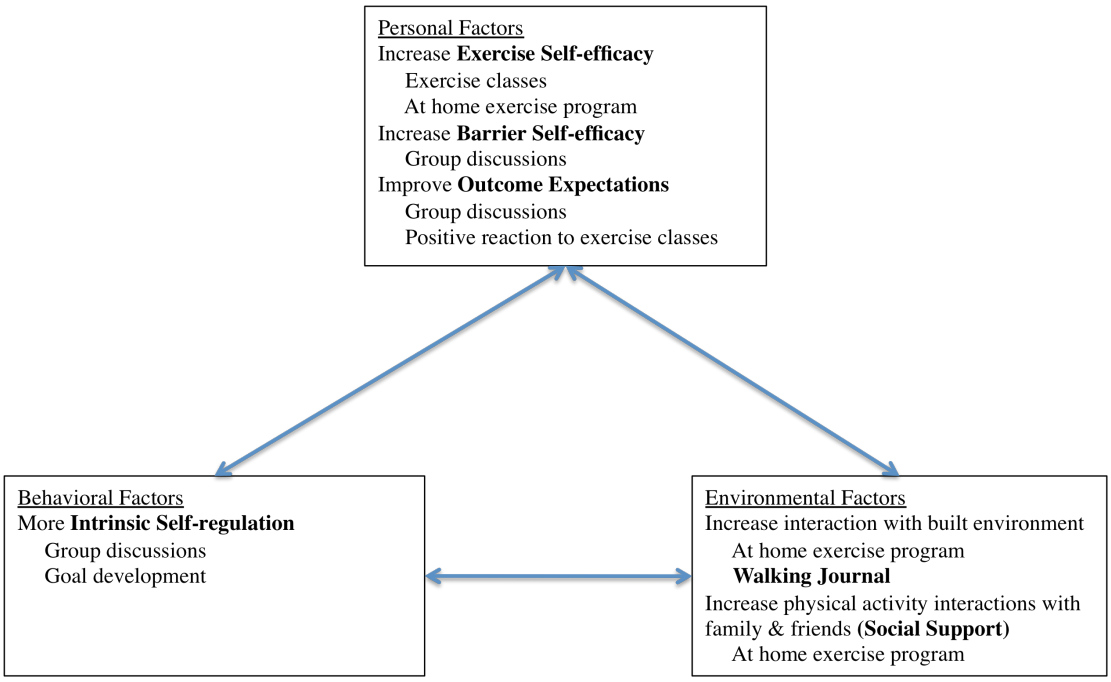

Figure 3. Theoretical Framework for Physical Activity Intervention Guided by Social Cognitive Theory.

Note: Bold denotes measured variable

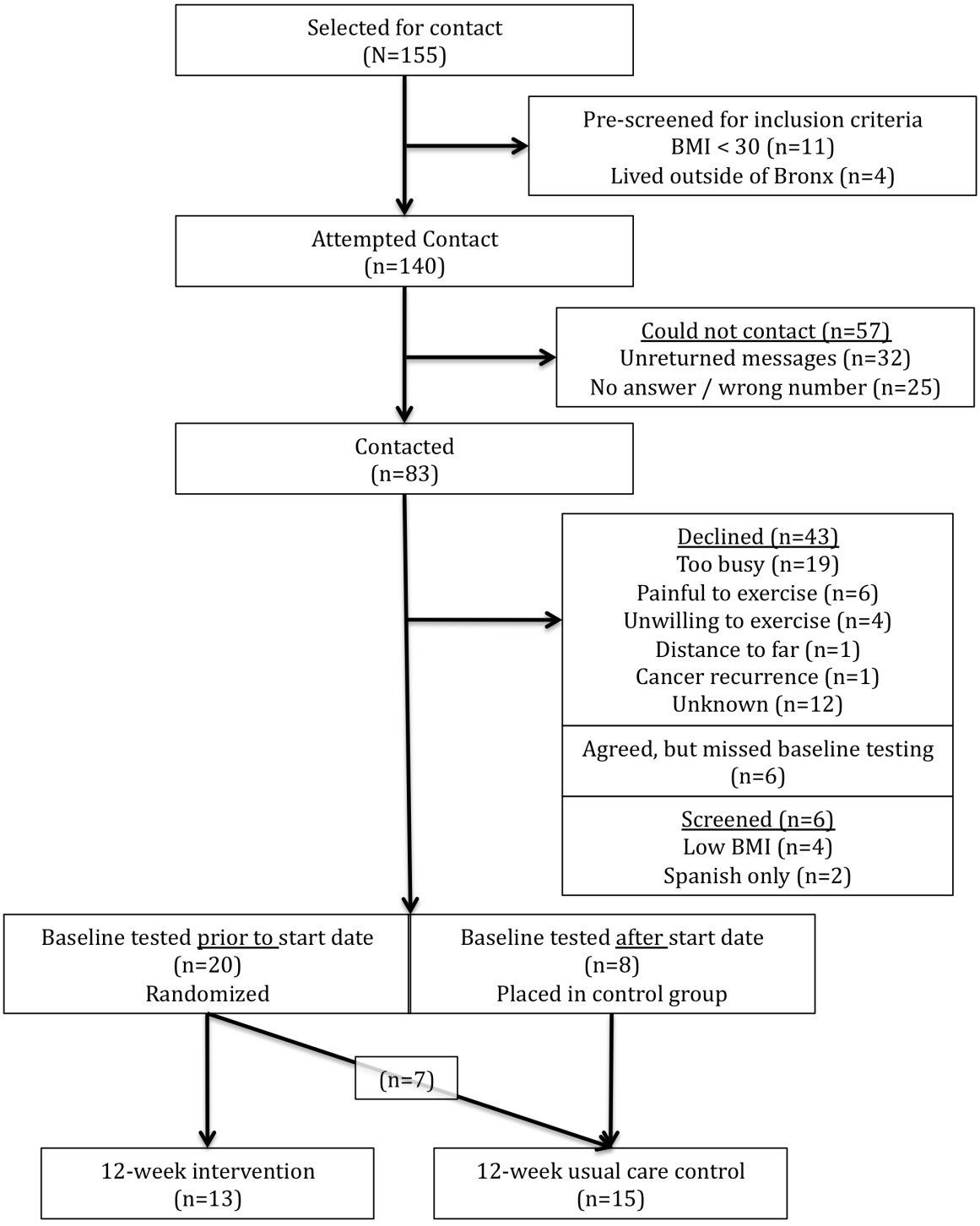

Figure 4. Participant recruitment

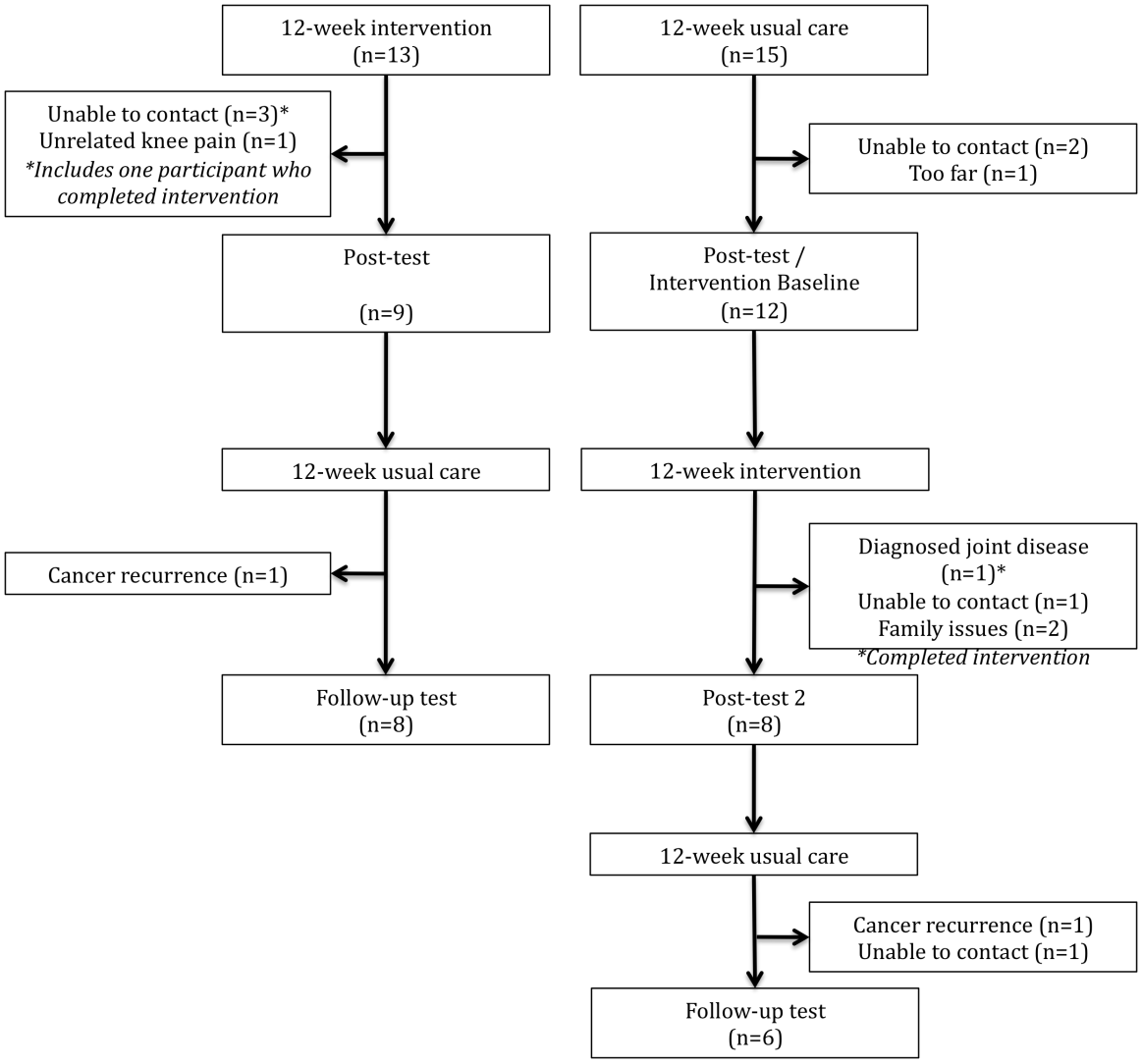

Figure 5. Participant Retention

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Appendix A

Abbreviations and Definitions

6MWT: Six minute walk test

30CST: 30-second chair stand test

ACSM: American College of Sports Medicine

BMI: Body Mass Index

EC: Endometrial cancer

FACT-En: Functional Assessment of Cancer Therapy – Endometrial

FACT-Fatigue: Functional Assessment of Cancer Therapy – Fatigue subscale

GLT: Godin Leisure Time Exercise Questionnaire

MECCC: Montefiore Einstein Center for Cancer Care

PA: Physical activity

QoL: Quality of life

SCT: Social cognitive theory

VO_2 peak: Peak oxygen uptake

WC: Waist circumference

YPAS: Yale Physical Activity Survey

Appendix B

PHYSICAL ACTIVITY FOR AN ETHNICALLY DIVERSE SAMPLE OF ENDOMETRIAL CANCER SURVIVORS: A NEEDS ASSESSMENT AND PILOT INTERVENTION

Abstract

OBJECTIVE**:** Determine the physical activity (PA) behavior, needs and preferences for underserved, ethnically diverse women with a history of endometrial cancer (EC).

METHODS: Women with a history of EC (N = 41 non-Hispanic black, 40 non-Hispanic white, 18 Hispanic) completed a needs assessment during their regular follow-up appointments at Montefiore Medical Center in Bronx, NY. An 8-week pilot PA intervention based on the results of the needs assessment was conducted with 5 endometrial cancer survivors.

RESULTS**:** Mean BMI among the 100 respondents was 34.1 ± 7.6 $kg \cdot m^{-2}$, and 66% did not exercise regularly. Self-described weight status was significantly lower than actual BMI category ($p<0.001$). Of the 86% who were interested in joining an exercise program, 95% were willing to attend at least once weekly. The primary motivations were improving health, losing weight, and feeling better physically. Despite the high interest in participation, volunteer rate was very low (8%). However, adherence to the 8-week pilot

PA intervention was high (83%), and there were no adverse events. Body weight decreased in all pilot participants.

CONCLUSION**:** These data show that ethnically diverse endometrial cancer survivors have a great need for, and are highly interested in, physical activity interventions. However, greater care needs to be taken to assess and identify barriers to increase participation in such programs.

Key Words: Endometrial cancer, Cancer survivors, Obesity, Physical activity

Introduction

Abdominal obesity and physical inactivity are primary risk factors for endometrial cancer (Lee & Oguma, 2006). Although a cancer diagnosis is often thought of as a "teachable moment," cross-sectional investigations have found that less than 35% of endometrial cancer survivors achieved the American College of Sports Medicine (ACSM) guidelines for physical activity (Garber et al., 2011) and that up to 50% were obese (Basen-Engquist et al., 2009). Endometrial cancer survivors are the least physically active out of all cancer survivor groups, with only ~33% being regularly active, compared to 45% for all cancer survivors, and 53% for respondents without a history of cancer (Mayer et al., 2007). Although the rate of survival from endometrial cancer may be as high as 96%, survivors are likely to have the risk factors for metabolic syndrome (von Gruenigen et al., 2011) and be physically inactive, greatly increasing their risk of developing other related diseases such as cardiovascular disease, diabetes, and osteoarthritis, leading to greater risk of morbidity and mortality (von Gruenigen et al., 2011). Quality-of-life and fatigue outcomes were significantly better in endometrial

cancer survivors who achieved ACSM physical activity guidelines or had normal body mass index (BMI) in cross-sectional studies (Courneya et al., 2005; Fader, Frasure, Gil, Berger, & von Gruenigen, 2012). Furthermore, obesity may be associated with higher all-cause mortality among endometrial cancer survivors (Arem & Irwin, 2013)

The impact of obesity and physical inactivity may be more pronounced among Latina and black endometrial cancer survivors, because they are approximately 50% more likely to be obese than white endometrial cancer survivors (Setiawan et al., 2007). Because physical inactivity and the metabolic syndrome increase the risk for developing cardiovascular disease, diabetes, osteoarthritis, and endometrial cancer recurrence (Rosato et al., 2011), underserved, ethnically diverse endometrial cancer survivors likely have a greater disease risk compared with white women. More research is needed to determine the health behavior practices and attitudes of underserved, ethnically diverse endometrial cancer survivors in order to develop effective evidence-based physical activity interventions.

Physical inactivity is a major risk factor for developing endometrial cancer (Voskuil, Monninkhof, Elias, Vlems, & van Leeuwen, 2007), and most survivors maintain their inactive lifestyles, thereby further increasing their morbidity. Therefore, it is imperative that effective interventions be developed to increase physical activity in this group (Kwon, Hou, & Wang, 2012). However, there is currently a paucity of data examining best practices for achieving these results among endometrial cancer survivors. This is particularly true for survivors from under-represented groups, who have an increased risk of endometrial cancer and related chronic diseases (Cardiovascular Disease, Type II Diabetes Mellitus, etc.).

The aims of this study were: 1) to identify the prevalence and patterns of physical activity behavior of ethnically diverse endometrial cancer survivors; 2) to determine the physical activity programming preferences of the sample so that a culturally-tailored physical intervention could be developed, and 3) develop a pilot physical activity intervention based on the findings from the preliminary needs analysis (aims 1 and 2).

Methods

After Institutional Review Board approval, English or Spanish-speaking women with a history of endometrial cancer who were treated at Montefiore Medical Center from May to August 2010 were invited to complete a 10-minute confidential questionnaire in the doctor's office or over the phone at a more convenient time. The study was continued until 100 surveys had been completed.

A pilot 8-week physical activity intervention was developed from data collected from the needs assessment. Recruitment was limited to endometrial cancer survivors who spoke either English or Spanish and had either opted into a physical activity interest list maintained by the oncologists at Albert Einstein College of Medicine or had previously participated in one of the Bronx Oncology Living Daily fitness/nutrition programs. All participants received clearance to participate in the moderate-intensity physical activity program from their primary care provider.

Needs Assessment

Demographic information was collected via self-report. Medical information, including height and weight for the calculation of BMI, was collected from patient medical records. An 18-item questionnaire, available in English and Spanish, containing

questions regarding exercise, diet, and smoking behaviors, was administered by in person or over the phone. Behavior change readiness and barrier self-efficacy were assessed using a survey adapted from Marcus et al. (Marcus, Selby, Niaura, & Rossi, 1992), which has shown test-retest reliability of r_s=0.78 (Marcus & Simkin, 1993), and has been validated for use with African-American adults (Blaney et al., 2012). Self-assessment of weight was assessed using a question from the Body Satisfaction Scale from Berscheid et al. (Berscheid, Walster, & Bohrnstedt, 1973), which has been show to be a reliable (Cronbach's $\alpha = 0.90$ for body image) and valid ($r = - 0.63$) measure of body image in a racially diverse sample (Petrie, Tripp, & Harvey, 2002). A question regarding reasons for wanting to participate in physical activity was adapted from a survey by Smith for cancer survivors (Smith, 1996). The remaining questions about the a) types of exercise performed regularly, b) preferred exercise programming, and e) acceptable time commitment, were developed by the authors for this study.

Physical Activity Intervention

The goals of the 8-week pilot Physical Activity Intervention were to provide fitness instruction, while developing safe and appropriate exercises for middle-aged and older cancer survivors in the Bronx, and assess their relative level of adherence. The eight consecutive weeks ran from mid-September to the mid- November. Classes were held once per week at the university recreation complex at a time and day that was determined based on input from the participants. Each 1-hour class included a warm-up, cardiovascular and resistance training with elastic bands, a cool-down and stretching. The exercise routine and musical playlist were modified weekly based on explicit participant feedback and subjective instructor assessment. Each exercise was instructed with options

for increased or decreased intensity to maximize individualization of the workouts. The windows of the exercise room were blocked using fabric sheets in order to maintain privacy for the participants.

Height, weight and blood pressure measurements were taken prior to the exercise session during the 4th and 8th (last) weeks. Height was self-reported. Weight was measured using a Detecto Mechanical Weigh Beam Scale (Webb City, MO). A physician who was not the primary care provider assessed seated resting blood pressure manually using an aneroid sphygmomanometer.

Statistics

Data were input into SPSS 22.0 for all analyses. Descriptive statistics were used to assess means and standard deviations, as well as frequencies and percentages for categorical data. A related-samples Wilcoxon Signed-Rank test was analyzed to assess differences in real and perceived body composition. Chi-squared tests were analyzed to determine differences between races/ethnicities for categorical demographic information and exercise preferences. One-way ANOVA were analyzed to determine difference between races/ethnicities for continuous data. Shapiro-Wilk tests were analyzed for normality and Levene statistics were analyzed to determine homogeneity of variances between groups.

Results

Preliminary Assessment

Descriptive characteristics of the 100 women with history of endometrial cancer from the preliminary assessment are reported in Table 1. In brief, the mean (± SD) age of

the participants was 64.4 ± 10.1 years, time from diagnosis was 85.2 ± 76.8 months (Interquartile range: 9.6 – 57.9 months), and body mass index (BMI) was 34.1 ± 7.6 $kg \bullet m^{-2}$. There were no differences in age, time from diagnosis or BMI between ethnicities (Table 1, $p>0.20$). In this sample, 41% self-identified as non-Hispanic black, 40% self-identified as non-Hispanic white, and 18% identified as Hispanic. Sixty-nine percent were raised in the United States; 24% were raised in Caribbean nations. Sixty-two percent of the respondents had graduated from high school or less, and 25% had graduated from college or more. Fifty-nine participants had been diagnosed with hypertension, 42 with hypercholesterolemia, and 33 with Type II Diabetes Mellitus. Twenty-six participants had two of the preceding conditions and another 18 had all three conditions.

Based on BMI classifications, 17% were overweight and 73% were obese, including 44% with BMI of 35 or higher. In comparison, when asked to describe their own weight status, 25% reported that they were "average or underweight", 29% indicated that they were only "slightly overweight", and 46% indicated they were "very overweight". There was a significant difference between respondents' self-reported weight status and actual BMI classification ($p<0.001$), with an average underestimation of almost ½ of a BMI classification.

The majority of participants (55%) were in either the contemplation or preparation stages of exercise behavior change (Table 2), and there were no significant difference between ethnic groups ($p>0.20$). Participants were very confident that they could overcome being in a bad mood to participate in an exercise program (65%), but

progressively less confident about overcoming lack of time (49%), poor weather (48%), being on vacation (40%), and being tired (38%) (Table 3).

Walking was overwhelmingly the top choice (54%) when participants were asked which types of vigorous exercise they typically performed. The only other answers to generate more than 10% response were aerobic classes (13%), biking (12%), and weight training (10%). Swimming, dancing, yoga, running and gardening were all mentioned by less than 5% of the respondents. Only 16% of the respondents reported belonging to a gym or fitness club. Two-thirds did not exercise regularly post diagnosis.

If a physical activity, or physical activity plus nutrition, program were offered at the Montefiore Einstein Center for Cancer Care, 66% indicated they would definitely be interested and another 20% said they might be interested. Of the 13 participants who provided reasons for not being likely to participate, the explanations were either living too far away (N=8) or not having enough time (N=5). When asked which kind of exercise program they would prefer, respondents responded the most to group classes lead by an instructor, but were also highly receptive to several other options as well (Table 4). Participants also reported a willingness to attend frequent sessions of an exercise program: 28% responded that they would attend once per week and 67% would attend 2-3 sessions per week. When asked about primary reasons for wanting to participate in an exercise program, improving overall health (48%), losing weight (26%) and feeling better physically (21%) were the most common responses. Available responses that received the least responses were improving stamina (3%), reducing recurrence (4%), being doctor recommended (4%) and feeling better emotionally (5%).

Pilot Physical Activity Program Evaluation

Sixty-six endometrial cancer survivors who had expressed interest in possibly participating in a physical activity program were asked to join the physical activity pilot program, which was offered once per week on a weekday morning for 8 weeks. Seventeen endometrial cancer survivors (26%) verbally agreed to participate, but only 5 actually attended a class. The primary stated reasons for non-participation among volunteers were either inability/unwillingness to obtain physician clearance or that the available class time was inconvenient. Because of the low enrollment, participation was opened to all female cancer survivors, and 3 non-endometrial cancer patients enrolled.

Five of the eight pilot participants were survivors of endometrial cancer, two were breast cancer survivors, and one had had chordoma. Six women with a history of cancer (4 non-Hispanic black, 2 non-Hispanic white) were able to begin the program on the first day. Two Hispanic cancer survivors joined during the 3rd and 4th weeks; they attended 2 and 1 classes, respectively. Although no compensation other than a pedometer and resistance band was offered, adherence was 83% among the 6 participants who began the program on the first week, indicating a high level of enthusiasm and commitment in this population once the initial barriers to physical activity have been overcome. There were no adverse events or injuries that precluded continued participation.

Prior to class on the 4th and 8th weeks, respectively, during the period in which the physical activity routine had been mostly stabilized, body weight and blood pressure were assessed. Mean (±SD) BMI and resting systolic blood pressure at baseline were 34.2 (±7.6 kg•m^{-2}) and 123 (± 10 mmHg, respectively). Body mass decreased by 1.0 ± 0.8 kg (95% CI: -0.3 to 2.3 kg, p=0.10),, and each of the participants lost weight (range:

0.1 – 2.2 kg). Systolic blood pressure decreased by 5 ± 10 mmHg (95% CI: -8 to 18 mmHg, p=0.10).

Discussion

The major strength of this study is that, in our knowledge, it is the first to assess the exercise behavior and preferences of ethnically diverse women with a history of endometrial cancer. The primary novel findings from this study were 1) This ethnically diverse sample of endometrial cancer survivors from Bronx, NY had much higher rates of obesity (73%) than previously reported in studies of more educated, primarily Caucasian endometrial cancer survivors, suggesting that this population may have an elevated need for a physical activity intervention to reduce chronic disease risk. 2) Endometrial cancer patients significantly underestimated their weight category pointing to a potential barrier to motivation for behavior change in this urban population. 3) Although the sample reported a strong intention to begin a physical activity program, actual participation in a weekly intervention was very low, indicating that physical activity interventions for ethnically diverse endometrial cancer survivors need to assess and identify significant barriers to exercise to be successfully adopted. 4) The physical activity intervention, which included aerobic and resistance training, was safe and effective for those participants who were able to overcome the initial barriers to exercise.

The findings of this study are different from other exercise programs for endometrial cancer in that the sample population in this study was more ethnically and socioeconomically diverse than previous reports. Only 40% of the sample was non-Hispanic White, compared to 74 - 94% in previous studies (Arem et al., 2011; Basen-

Engquist et al., 2009; Fader, Frasure, Gil, Berger, & von Gruenigen, 2011). The sample may not have been representative of the Bronx as a whole, which is 53% Hispanic, 30% non-Hispanic black and 11% non-Hispanic white, but is representative of the neighborhoods surrounding Albert Einstein College of Medicine, which contain relatively higher percentages of non-Hispanic white and black populations (Census, 2011). Education level also indicated a very socioeconomically diverse sample. There was the same percentage of respondents that had graduated from college (25%) as those who had not completed high school. The percentage that not attended any college (62%) was also much higher in this study than in other investigations of endometrial cancer survivors (26-48%) (Arem et al., 2011; Fader et al., 2011; Karvinen et al., 2006). This ethnically and socioeconomically diverse sample population was also more obese than previous studies of endometrial cancer survivors. In the current study, only 10% of respondents had a BMI < 25 and 73% of respondents were obese. In contrast, other cross-sectional surveys of endometrial cancer survivors have found 28-29 % of respondents with BMI < 25 and 38 - 54% obesity (Basen-Engquist et al., 2009; Beesley, Eakin, Janda, & Battistutta, 2008; Courneya et al., 2005; Karvinen et al., 2006).

Additionally, there was a significant difference in actual and perceived body composition, with more obese women considering themselves average or slightly overweight. This is consistent with previous studies showing that women regularly under-assess their body composition, particularly among Hispanic (Giardina et al., 2013) and non-Hispanic black (Dorsey, Eberhardt, & Ogden, 2009), older, and low socioeconomic subpopulations (Kuchler & Variyam, 2003), which is similar to the sample of this study. It has been well established that non-Hispanic black women tend to believe that women

can be attractive and healthy at overweight or obese body compositions (Giardina et al., 2013) compared to non-Hispanic white women. Since the rates of obesity are high in the Bronx, and even higher in the communities surrounding the location of the study (Census, 2011), women may underestimate their body composition because of social comparison processes. Since weight misperception is associated with reduced likelihood of following a physical activity/diet intervention (Duncan et al., 2011), future interventions for these groups should focus in part on correcting misperceptions regarding the weight-health correlation.

These findings point to the fact that endometrial cancer survivors from the Bronx are more ethnically diverse, less educated and more obese than those assessed in previous studies of endometrial cancer survivors, and thus offer a unique perspective of the lifestyle intervention needs of an underserved and high-risk cancer patient population. The only other study of endometrial cancer survivor exercise preferences, conducted by Karvinen et al. (2006), found that 42% of participants would definitely be interested in an exercise program, and another 35% might be interested. The current study found that 66% would definitely be interested and another 20% possibly interested, indicating that the population sampled in this study perceived themselves to be more ready to engage in a physical activity program. Furthermore, two-thirds of the study participants indicated an interest in attending at least two physical activity sessions per week.

Based on the findings from the preliminary assessment, a pilot physical activity intervention was developed and implemented to determine which exercises where tolerable and those that stimulated enthusiasm. To illustrate the adaptive nature of the program, hula hooping was initially included as a warm-up exercise in order to mobilize

the hips and boost morale. However, none of the participants could actually perform the exercise, leading to frustration and a temporary break in movement, so the hula-hoop was used as a prop on the floor for aerobic training. The playlist of songs was developed to cover both contemporary and more classic up-tempo songs that would engage and motivate the participants. Some samples were "I'm Not Afraid" by Jill Scott, an African-American singer, and "La Guagua" by the late Hispanic singer, Celia Cruz. Participants also submitted requests that were then added to the playlist. Adherence to the 8-week pilot intervention among those that attended the first class was 83%, which is higher than was reported (73%) during a less vigorous behavioral intervention for more educated, mostly non-Hispanic white endometrial cancer survivors (von Gruenigen et al., 2008). This is also similar to the adherence reported in another group exercise pilot conducted with breast cancer survivors (Kolden et al., 2002).

While respondents to the needs assessment reported high self-efficacy regarding common barriers to exercise, and strong interest in devoting a significant amount of time to a physical activity program, only 5 of the 66 endometrial cancer survivors who had expressed interest in a physical activity program evaluation actually attended class, indicating a significant discord between expressed and realized interest in participating in a physical activity program. The primary stated reasons for non-participation were inability or unwillingness to obtain physician clearance and inconvenience of the chosen class time. Great care should be taken in future studies to maximize the appeal while lowering the burden of physical activity programs to ethnically diverse cancer survivors because recruitment was low but adherence was high. Future interventions should offer multiple classes each week so that participants will have a choice of days and times to

attend class. Facilitative incentives such as transportation remuneration, group-branded workout gear and accessories, and gift cards to local sporting goods stores should be used to increase motivation and lower the burden of participation.

The data from the pedometers were not used because they were compromised by participant interaction with the devices. Although the pedometers were set up to assess daily and weekly walking habits, and participants were instructed to leave the pedometers closed, participants regularly opened the devices and toggled through the various modes, even resetting the data occasionally. Future studies should utilize either pedometers that are not accessible (i.e. taped shut) or accelerometer models that cannot be modified by the user.

These findings suggest that ethnically diverse endometrial cancer survivors are different in several ways relative to previously studied samples, and may have unique needs and challenges regarding physical activity interventions including higher BMI. Physical activity interventions for these groups that are based on assessments of the needs and preferences of the population for which they will be administered are feasible, provided they are convenient. Although the pilot study showed promising outcomes, a more robust scientific study of the feasibility and effectiveness of such a program should be conducted.

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Table B-1. Participant characteristics

	Percent or Mean (SD)	Non-Hispanic Black (n=41)	Non-Hispanic White (n=40)	Latina (n=18)
Age (years) (N=100)	64.4 (10.1)*	65.7 (10.4)	64.2 (10.1)	62.4 (9.6)
< 65	55%	46%	58%	67%
≥ 65	45%	54%	43%	33%
Body Mass Index (N=100)	34.1 (7.6)*	35.3 (8.4)	33.4 (8.0)	33.1 (5.0)
Underweight	1%	-	3%	-
Healthy Weight	9%	8%	13%	6%
Overweight	17%	21%	13%	18%
Moderately Obese	29%	21%	28%	42%
Severely Obese	27%	26%	31%	29%
Very Severely Obese	17%	26%	13%	6%
Education (N=52)		(n=21)	(n=18)	(n=13)
Middle School or Less	10%	5%	11%	15%
Some High School	15%	5%	11%	39%
High School Graduate	37%	38%	39%	31%
Some College	13%	24%	6%	8%
College Graduate	10%	14%	11%	-
Graduate School	15%	14%	22%	8%
Months From Diagnosis (N=95)	85 (77)*	88 (82)	77 (72)	105 (80)

Note: Education question was added after several questionnaires had been completed.
*No significant differences between ethnicities

Table B-2. Stages of Change

	Total (N=100)	Non-Hispanic Black (n=41)	Non-Hispanic White (n=40)	Latina (n=18)
Pre-contemplation	11%	5%	20%	6%
Contemplation	24%	24%	23%	28%
Preparation	31%	42%	23%	22%
Action	11%	10%	8%	22%
Maintenance	23%	20%	28%	22%

Table B-3. How confident are you that you can participate in a regular exercise program when….

	Not at all Confident	Somewhat Confident	Very Confident
You are tired (N=95)	18%	44%	38%
You are in a bad mood (N=89)	16%	19%	65%
You feel you don't have the time (N=94)	26%	26%	49%
You are on vacation (N=88)	32%	28%	40%
It is raining or snowing (N=95)	18%	34%	48%

Note: Some missing data due to refusal to answer

Table B-4. What kind of exercise program would you prefer?

	Total (N=88)	Non-Hispanic Black (n=37)	Non-Hispanic White (n=34)	Latina (n=16)
Mode				
Group class lead by an instructor	74%	73%	67%	88%
Walking group	63%	62%	63%	75%
Includes dance	62%	62%	69%	62%
Includes fitness machines	50%	46%	49%	69%
Location				
At the cancer center	64%	68%	88%	49%
At a local fitness club	58%	60%	69%	59%
Home-based instruction	54%	57%	53%	50%

Note: Some missing data due to refusal to answer.

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Appendix C

PHYSICAL ACTIVITY INTERVENTIONS FOR CANCER SURVIVORS: A NARRATIVE REVIEW

Introduction

Due to earlier detection and more advanced treatments, the number of cancer survivors is growing rapidly in the United States (Ganz, 2005). Cancer treatments, which may include surgery, chemotherapy, radiation therapy and/or hormone therapy have several side effects, including weight gain, fatigue, and decreases in the ability to perform activities of daily living and quality of life. Exercise interventions as rehabilitation for cancer survivors have increasingly been studied and have profound effects (Schmitz et al., 2010). Although the 5-year survival rate for endometrial cancer is up to 96% (American Cancer Society, 2012), few intervention studies have been conducted to determine the effects of exercise on this population. The first purpose of this literature review was to determine the efficacy of various exercise modalities on breast cancer survivors, with the assumption that the effects would be similar for endometrial cancer survivors because of similarities in age and gender. The second part of the review focused on the feasibility of administering an optimal exercise intervention to urban multi-cultural endometrial cancer survivors.

Does Exercise Improve Cancer Rehabilitation?

Aerobic exercise

Moderate intensity aerobic exercise, including brisk walking, has been shown to improve several factors associated with cancer survivors' responses to cancer treatment. Wilson et al. (Wilson, Jacobsen, & Fields, 2005) conducted a 12-week pilot study in which cancer survivors were instructed to walk at least 3 days per week for at least 20 minutes at ~50% of heart rate reserve. Thirteen of the 17 participants who started the exercise program finished the entire 12 weeks, and the adherence among the finishers was relatively high (84%). This dose of exercise, which was below the ACSM guidelines for physical activity (>150 minutes of moderate-intensity exercise per week), was sufficient to significantly increase absolute oxygen uptake at ventilatory threshold by over 15%, decrease the severity of fatigue, and increase self-reported physical functioning. Although the absence of a control group or blinding of experimenters may have biased the collection of data, the participants were motivated enough to complete the intervention experienced meaningful physiological improvements.

Thomas et al. administered a six-month aerobic exercise intervention for 35 overweight/obese, sedentary breast cancer survivors (Thomas, Alvarez-Reeves, Lu, Yu, & Irwin, 2013). The primary goal of the intervention, which included three weekly supervised exercise sessions which consisted primarily of walking and 2 home exercise sessions, was to increase physical activity to 150 minutes per week. At the end of the program, 1/3 or the women had achieved the physical activity goal, and mean moderate activity per week was 129 minutes, compared to 45 minutes per week for the usual care

control group. After six months, there were no differences in waist circumference or metabolic syndrome composite score, but there was a significant reduction in fasting blood glucose. However, when the data was stratified based on adherers (> 120 min / week of physical activity), the adherers had significantly higher HDL and metabolic syndrome composite score, along with non-significant but large improvement in waist circumference and systolic blood pressure.

In a randomized controlled trial, Courneya et al. (Courneya et al., 2003) also assessed the effects of aerobic exercise for breast cancer survivors. Participants in the exercise group cycled for 35 minutes at 70-75% of VO_2 peak three times per week for 15 weeks. Adherence was very high (98%). Following the intervention, there were significant increases in VO_2 peak (~18%) and quality of life (by 9 points on the FACT-B scale) compared to the control group. Part of the change in quality of life, however, may have been due to the additional socialization received by the exercise group. Social support without exercise has been shown to improve QoL in Latina cancer survivors (Sammarco & Konecny, 2008), so future studies should include a control and a placebo group that receives socialization but sham exercise.

A randomized controlled trial, with the results published in at least 2 articles (Irwin, Alvarez-Reeves, et al., 2009; Irwin, Varma, et al., 2009), randomly assigned breast cancer survivors into an aerobic exercise group and a control group that received standard care. The aerobic exercise group performed five 30-minute brisk walking sessions at 60-80% HR_{max} per week (Irwin, Alvarez-Reeves, et al., 2009), which meets the ACSM guidelines. After 6 months, there were no significant changes in body mass for the exercise group, as also reported previously (Courneya et al., 2003), but there was

a significant decrease in percent body fat. The magnitude of difference was greatest among older survivors who were not receiving hormone therapy. After 12 months of the intervention, there was also a significant increase in bone mineral density in the exercise group compared to the control group.

After just 6 months of the exercise intervention, insulin levels decreased in the exercise group (-7%), but increased in the usual care group (+14%), leading to a mean difference between groups after 6 months of 28% (Irwin, Varma, et al., 2009). Participants who had higher adherence, and performed greater than 120 minutes per week of exercise, were associated with greater decrease in insulin. The exercise group also experienced a significant decrease in insulin like growth factor-1 (IGF-1) concentration (-3.5%) whereas IGF-1 concentration increased in the usual care group (+5.5%), suggesting a mechanism for how aerobic exercise may reduce cancer recurrence.

Another aerobic exercise intervention for overweight and obese breast cancer survivors administered eight weeks of aerobic training that was both supervised and at-home (Guinan et al., 2013). The group increased time at target heart rate zone from 20 to 40 minutes over the course of the intervention. Compared to the usual care control, there were no improvements in physical activity, waist circumference, or any of the metabolic syndrome biomarkers except for a significant decrease in blood glucose concentration (HbA1c). As previously reported, the 10 out of 16 participants who were high adherers (>90% attendance) had reduced waist circumference and increased physical activity.

Resistance Training

Few studies have been conducted to assess the effects of resistance training alone for cancer survivors (Cramp, James, & Lambert, 2010). Katz et al. (2010) administered resistance exercises to 10 varied cancer survivors twice a week for 8 weeks. The initial workloads were relatively very light and were increased conservatively to reduce the chance for injury. Nonetheless, there was a significant increase in bench press strength (+19%), but no increase in leg strength. Body fat percentage significantly *increased* during the intervention and there was no change in quality of life score. The results indicate that this intervention may not have been sufficiently strenuous to produce meaningful changes for the cancer survivors.

A recent study compared 6 months of resistance training alone to 6 months of resistance training combined with eating prunes among breast cancer survivors (Simonavice et al., 2014). The resistance training consisted of twice weekly resistance training sessions that included two sets of 10 different exercises (5 upper body, 5 lower body) at 60-80% of 1-repetition maximum. Although no differences were observed between groups, the resistance training only group experienced significant improvements in upper body (21%) and lower body strength (22%), and there were no adverse effects on lymphedema.

The data from the controlled and randomized studies by Schmitz et al. (2005) and Ohira et al. (2006), which were collected from the same breast cancer survivors, indicate that resistance training alone may be enough to induce significant increases in quality of life strength, and lean mass, while reducing body fat percentage. Participants trained 2 times per week with a trainer for 13 weeks, and then were asked to continue the protocol

on their own for 13 more weeks. Exercise sessions consisted of nine different upper and lower body exercises. Upper body intensity was very conservative to minimize the potential for exacerbating arm lymphedema, and lower body exercises consisted of 3 sets of 8-10 repetitions. Mean adherence to this program was 92%. Bench press strength increased by 36% and leg press strength increased by 38%. Although these were significant improvements, they are relatively moderate compared to other studies with breast cancer survivors (Cheema & Gaul, 2006) considering that the participants in this study trained for 6 months.

There was a significant increase in lean body mass and significant decrease in percent body fat, leading to no change in body weight or BMI (Schmitz et al., 2005). After six months of resistance training, there was a significant increase in the underlying physical and psychosocial dimensions of QoL (Ohira et al., 2006). Furthermore, global QoL was significantly and negatively correlated to change in percent body fat, possibly indicating a link between the physiologically and psychological effectiveness of physical activity interventions.

Combined Aerobic plus Resistance Training

Cheema et al. (2006) administered an 8-week aerobic and resistance training intervention to 31 breast cancer survivors. The exercise cohort performed 15-30 minutes of aerobic exercise at 65-85% of HR_{max} 3 days per week. On two of those days, the aerobic session was preceded by 1-2 sets of 8-12 repetition maximum on10 difference exercises. Of the 27 subjects who completed the training, the adherence was over 95%.

After 8 weeks there were significant decreases in sum of skin folds (-11.7%), hip (-3.2%) and waist (-2.3%) circumferences, but no change in weight. These data confirm

that body composition, not body mass or body mass index, is a sensitive tool for partially assessing the effectiveness of a training program in cancer survivors. Peak oxygen uptake (VO_2 peak) (+6.3%) also increased significantly in just 8 weeks. Upper and lower body muscle endurance increased significantly and meaningfully (+167% and +273%, respectively). Upper and lower body strength also increased significantly and meaningfully (+36% and +51%, respectively). Lastly, QoL, assessed using the World Health Organization Quality of Life Assessment, increased significantly (+16%) after 8 weeks.

These data show rather large improvements in physical and psychological well being after only 8 weeks of a combined aerobic and resistance training intervention. However, conclusions drawn from this study must be confirmed because of the lack of control group.

A similar, but randomized and controlled, pilot study by Herrero et al. (2006), administered a combined aerobic and resistance training program to breast cancer survivors. Three times a week for 8 weeks, the ten exercise-group participants performed 20-30 minutes of cycling at 70-80% HR_{max} and 2-3 sets of 8-15 repetitions of 11 different exercises. Adherence to the training program was 83-100 percent for the eight subjects who completed the training. Following the exercise intervention, the exercise group had a significant increase in muscle mass and decrease in percent body fat, whereas body mass remained the same in both the exercise and control groups. Peak ventilation and oxygen uptake during maximal exercise increased (+2%), and upper and lower body muscular endurance significantly increased in the exercise group, whereas peak oxygen uptake actually decreased by 2% in the control group over the same amount of time. As a

functional assessment, completion time for the sit-to-stand test decreased significantly in the exercise group. These data confirm that a strenuous 8-week exercise intervention produces significant physiological and functional changes that induce functional changes in cancer survivors.

Milne et al. (2008) administered a combined aerobic and resistance training program for 12 weeks. Three times per week, participants exercised for 20 minutes at 70% of HR_{max}, then did 2 sets of 10-15 repetitions of several resistance exercises, with each session lasting approximately 1 hour. Even with such a relatively rigorous program, 58 out of 60 participants completed all 12 weeks. Although there was only a 61% adherence rate, this still represents an average of nearly two sessions per week for 12 weeks, which is a significant amount of training. Quality of life scores, measured using the Functional Assessment of Cancer Therapy-Breast (FACT-B) scale, improved by over 20 points in the exercise group, and decreased by 5 points in the wait list control group. The improvements in the exercise group remained elevated for the 12 weeks following the intervention. Exercising participants also experienced a significant increase in autonomy and intrinsic motivation (Milne et al., 2008), which were maintained for the entire 12-week post-intervention period. These results indicate that a rigorous exercise intervention increases feelings of competence and motivation among cancer survivors, and that these feelings may improve exercise behavior even after the intervention has ceased. However, the lack of socialization in the control group may also contribute to the observed differences.

Most exercise intervention studies performed with cancer survivors have lasted approximately 8-12 weeks. However, the optimal duration of an exercise intervention for

cancer survivors is still unclear and the time course of physiological changes is unknown. In a non-randomized, controlled study, Sprod et al. (2010) assessed the effects of a 3-month (n=29) and 6-month (n=68) aerobic plus resistance training intervention, respectively, on breast cancer survivors. The mode and intensity were based on patient preferences, so the intervention specifics were not clear. After 3 months, there were small increases in muscular endurance, but statistically significant changes did not occur until 6 months. This is in contrast to previous studies that have observed significant increases in muscular endurance within as little as 8 weeks (Cheema & Gaul, 2006; Herrero et al., 2006), possibly indicating that the intensity of the resistance portion of the intervention was relatively low. Time to fatigue on the treadmill during the Bruce protocol increased in both the 3-month and 6-month groups, with no difference between groups, providing evidence that 12 weeks may be sufficient for functional improvements.

The intensity of the exercise interventions is apparently very important. Valenti et al. (2008) assessed exercise duration and intensity, and quality of life via questionnaire in 212 breast cancer survivors. The researchers found that, as expected, total exercise volume was strongly associated with all aspects of the quality of life (physical, psychological, social relationships, and environmental). Interestingly, strenuous exercise was also significantly positively correlated to all aspects of quality of life, whereas moderate intensity exercise was only significantly positively correlated to the physical and environmental areas. And even in those two areas, the correlation was stronger for strenuous exercise. Furthermore, mild exercise was inversely correlated to physical, psychological and social relationship areas of quality of life. Although it would be convenient to conclude that more strenuous exercise causes greater improvements in

quality of life, this correlational study may also mean that higher quality of life leads to more strenuous exercise participation.

Light exercise

The evidence supporting the use of light exercise for cancer rehabilitation is not as strong as for more intense aerobic and/or resistance training. Mustian et al. (2006) compared the effects of 12 weeks of Tai Chi training three times per week to psychosocial support therapy for breast cancer survivors. This type of comparison is imperative for determining the effects of exercise on cancer survivors because it controls for social interaction. Although the intensity of the exercise was relatively light, there was only 68% adherence to the program, indicating that higher intensity is not responsible for low adherence to exercise programs. The exercise group experienced significant improvements in 6-minute walk time, handgrip strength and flexibility, whereas there were no changes in the psychosocial support therapy group. These results indicate a strong effect of light exercise on aerobic capacity, strength and flexibility in cancer survivors. They must be taken with caution, however, because the investigators were not blinded to the intervention and the participants in the exercise group may have tried harder due during the post- measurements due to increased expectations.

A randomized, controlled trial with a similar protocol; 12 weeks of Tai Chi, three times per week, for senior female cancer survivors also found minimal results (Campo et al., 2013). Retention rate was 86% and attendance was 81% indicating that the intervention was well accepted. However, compared to the control group, there were no improvements in physical function, health-related quality of life, or mental health.

Group exercise

It is clear that a combination of supervised aerobic and resistance training maximizes the improvements in cancer survivors. However, among most minority groups, it is not realistic to expect cancer survivors to have the money, time, or transportation to attend regularly. In fact, none of the aforementioned exercise studies recruited a significant proportion of African American or Latina participants. Group exercise interventions decrease the financial burden, while potentially increasing social interactions that accompany exercise interventions. Although group interventions do not allow for as much hands on direction as supervised interventions, exercise induced benefits have been observed.

Kolden et al. (2002) studied a single cohort group exercise intervention among breast cancer survivors (mean age = 55.3). Participants met together with an exercise specialist 3 times per week for 16 weeks for combined aerobic and resistance training. There was a 78% retention rate (40 participants out of 51 who started the program), and 88% adherence, indicating that cancer survivors are willing to commit time to a group exercise program.

In contrast to more rigorous supervised programs, body fat percentage did not decrease as a result of this intervention. However, systolic blood pressure decreased significantly (-5.5 mmHg), and VO_2 peak and strength increased significantly. Furthermore, the cohort experienced improved global QoL, functional QoL and depression scores. The data from this uncontrolled pilot study may have been biased because it did not take measurements from the women who dropped out, and it is not known how much of the improvements were due to socialization or improved activity

outside of the intervention. However, the results indicate that cancer survivors are willing to participate in group exercise sessions, and that group interventions can cause significant aerobic, strength and quality of life changes.

The dynamic of physiological and psychological changes in-group versus individual exercise prescription may be different. Whereas group exercise may facilitate greater socialization, supervised individual exercise interventions maximize exercise intensity and volume but may not maximize socialization. When developing a group intervention for cancer survivors, investigators should attempt to provide a program that is as strenuous as safely possible in a group format, while capitalizing on the social nature of the group to maximize quality of life improvements.

Basen-Engquist et al. (2006) studied a community intervention protocol for 35 breast cancer survivors compared to 25 survivors who received standard care. Participants, of whom 40% were minorities, attended 90-minute workshops once per week for 6 months to learn how to incorporate more exercise into their daily life. Adherence was 80%, but there were no differences between the two groups for time spent doing moderate or strenuous physical activity following the intervention. There were also no differences in strength, power, or hip or waist circumference, contrary to what has typically been reported for other supervised exercise interventions. Regardless, the intervention group performed significantly better on the 6-minute walk test and reported experiencing less bodily pain than the standard care group.

Since there was no difference in exercise program between groups, these data indicate that the socialization experienced during the intervention led to an improvement in the functional outcome. The interventional advice may not have inspired the increase

in physical activity that is required to cause meaningful physiological and psychological changes. Future studies should administer more strenuous exercise and teach participants how and where to perform more strenuous exercise outside of the intervention.

Endometrial Cancer Cross-sectional Analyses

Some cross-sectional studies have indicated a link between exercise and physical and emotional fitness in this population. Courneya et al. (2005) found that only 30% of the 386 endometrial cancer survivors surveyed regularly achieved the ACSM recommended volume of moderate/vigorous exercise (compared to 45% in the general population). Furthermore, 72% were overweight or obese. MANOVA analysis indicated that of the entire sample, the subset that achieved the recommended amount of exercise during the past month had significantly higher quality of life and fatigue scores. There were also significant differences in quality of life and fatigue scores depending on BMI. Normal BMI survivors had significantly better quality of life scores than severely and very severely obese, and overweight survivors had better scores than very severely obese, although it cannot be supposed that this is causative. Multiple regression analysis indicated that BMI and exercise were independently associated with quality of life, indicating that physical activity, independent of it affects on body weight, is associated with better quality of life.

Another cross-sectional analysis of 241 endometrial cancer survivors found that only 34% achieved the recommended amount of moderate-vigorous exercise and that 71% were overweight or obese (Beesley, Eakin, Janda, & Battistutta, 2008). There was also a linear positive association between amount of physical activity and QoL (Beesley

et al., 2008). In contrast to the Courneya et al. study (2005), there was no correlation between BMI and quality of life.

Yet another cross sectional study of 119 endometrial cancer survivors found that only 22% of respondents achieved the recommended amount of exercise and that 66% were overweight (16%) or obese (50%) according to BMI (Basen-Engquist et al., 2009). Furthermore, respondents who achieved the recommended quantity of exercise experienced less fatigue than those who did not achieve the recommended amount, and they experienced less pain than those who were sedentary.

The consensus from these three studies is that a disproportionate number of endometrial cancer survivors are obese, and either sedentary or inactive, indicating that they are very likely to benefit from an exercise intervention.

Physical Activity Interventions for Endometrial Cancer Survivors

To the best of my knowledge, there have been three major physical activity interventions conducted with exclusively endometrial cancer survivors. Two have administered similar randomized, controlled 6-month diet and physical activity behavioral interventions (V. E. von Gruenigen et al., 2009; V. von Gruenigen et al., 2012a) with the primary end point of weight reduction. The other administered a single arm home-based exercise intervention ((Basen-Engquist et al., 2014). Whereas the behavioral interventions led to relatively large increases in physical activity, the home-based intervention, led to only a small increase in reported physical activity. Although both von Gruenigen studies observed weight decrease the waist circumference either did not decrease or was not reported. Furthermore, only the Basen-Engquist study assessed a

functional outcome (estimated VO_2max), but they did not find any improvement. Based on these findings, we can presume that physical activity interventions may increase physical activity. However, it is unclear whether the associated change is weight is due to physical activity or dietary intervention. Furthermore, none of these studies report any behavioral variables that may have impacted the physical activity performance.

Exercise Feasibility & Adherence among Underserved, Diverse Populations

To assess the factors that influence older ethnic adults to adhere to a community exercise program, Chiang et al. (2008) conducted six focus groups with 52 older adults who have participated in a community exercise program in Seattle. Five of the focus groups were in English and 1 in Cantonese. Eighty-five percent of the sample were female and 35% were African American and 40% Chinese. One of the major qualitative themes associated with exercise adherence was language / culture. Specifically, the Chinese focus groups appreciated the opportunity to exercise with an instructor who spoke their language and incorporated cultural components into the program. Although not assessed in this study, this theme would likely also be a factor in the adherence rate among older Latinas. Another major theme was social support. All focus groups repeatedly mentioned the strong social structure of group classes, and family encouragement as reasons for continued participation. Improved physical and mental health were other major themes.

This qualitative analysis performed on an older multicultural sample from Seattle has some, but limited, applicability to the urban population in the Bronx. For example, weather was not a major theme, possibly because most participants could drive to the

location and there is rarely snow in Seattle. Conversely, most potential participants in New York City do not own cars, and may have to deal with more severe weather patterns that would be a major barrier to adherence. However, some of the themes described by Chiang et al. (2008), notably making subjects aware of the physical and mental changes that exercise provides and incorporating as much socialization and family as possible, should be included in the development of a community exercise program in for older adults in the Bronx as well.

To determine the most prevalent barriers to physical activity among older adults, Mathews et al. (2010) conducted 42 focus group sessions, including 10 with African Americans and 2 with Latinos. Among African Americans, the most common physical activity barriers were physical health problems, fear of falling, and financial cost. Latinos reported inconvenience as the most common barrier to physical activity adherence. Environment was perceived as a barrier to both African Americans and Latinos, with participants stating that it was challenging to walk in their communities because of lack of safety and inadequate surroundings (Mathews et al., 2010). In conjunction with participants, physical activity intervention administrators should develop individualized walking maps to maximize safety and access to dedicated public spaces for walking (i.e. parks, walking paths, esplanades).

The most common enabler among all ethnicities was the expectation of positive physical and mental outcomes (Mathews et al., 2010). African Americans and Latinos both also reported that access to physical activity programs and facilities was enabling, primarily because it decreases the above mentioned environmental barrier to exercise.

African-Americans also mentioned the value of social network and support developed during exercise.

Dunn et al. (2008) conducted focus group interviews with 14 older, obese African American women who had enrolled in a walking intervention study. From those discussions, the major barriers among women who did not continue with the program were excessive family demands, not enough time, and health problems. Women who continued walking mentioned that they had made the exercise (and themselves) a priority, liked the improved health, enjoyed the spiritual connection forged while walking, and were able to make a positive impact on family members. For obese older African American women, the major factors that may increase adherence are ensuring that the participants have enough time to participate, and facilitating the linkage between exercise, spirituality and family. Holding exercise sessions at local churches, and encouraging familial participation in exercise interventions could accomplish all of these factors.

Melillo et al. (2001) also collected qualitative data from 3 focus groups of primarily older, urban Puerto Ricans and Dominican Americans (total participants: 12 women, 6 men) to determine perceptions about exercise among this population. All discussions were in Spanish and English, facilitated by a bilingual, bicultural gerontological nurse. A major facilitative theme was again physical and psychological health benefits, perceived as weight loss, relaxation, clean mind, feeling capable, strong or less discomfort. Community support and resources was another major theme for facilitation of exercise. The participants also repeatedly named support, and internal and external motivation as characteristics necessary for adherence to an exercise program.

One of the major barriers to exercise was cited as fear that exercise will have a negative impact, but that it could be mitigated by supervision and advisement. Another major barrier was the sentiment that physical activity may be considered inappropriate for older Latinos.

Although these qualitative studies provide important information regarding participants' feelings about particular barriers and motivators, more prospective, quantitative research needs to be done to determine the efficacy of programs aimed at improving adherence and subsequently quality of life.

The aforementioned study by Moadel et al. (2007) administered a light yoga intervention to an urban cancer patient and survivor population in Bronx, NY (42% African American, 31% Hispanic). Out of 84 women who completed the baseline and follow-up session, 32% did not attend a single class out of the 12-week intervention, including 56% of the Latinas, but only 17% of Caucasian women. Another 17 women (16% of total sample) did not attend a single session or the follow-up. This indicates that the adherence rates observed in most cancer survivor studies may not be a reasonable expectation for multicultural populations. Furthermore, more needs to be done to reduce the socioeconomic barriers to exercise adherence among Latinas. Since women in the Moadel et al. study (2007) who had higher adherence (> 50%) also had better scores for fatigue, physical well-being and distress, it is likely that multicultural women who are able to attend exercise intervention sessions will experience similar benefits as observed in other populations.

Fernandez et al. (2008) conducted a wait-list controlled pilot trial to assess the efficacy of a lifestyle intervention for Latino and African American older adults,

administered at New York City senior centers. The 6-week intervention included counseling about exercise and diet, followed by two monthly visits to ensure adherence to the program. Interestingly, the 65 participants who agreed to participate had significantly higher blood pressure than 9 participants that did not. This may indicate that adverse health condition is a stimulus to motivate individuals to participate in an intervention. Although adherence to the educational sessions was less than 75%, systolic and diastolic blood pressure for the participants in the experimental group decreased by 14.7 and 5.4 mmHg, respectively, and the changes were maintained for the following 2 months. Within-group comparison showed that adherence to medication greatly increased and that there was an increase in the percent of participants who consumed adequate vegetables. Although this study did not directly administer an exercise intervention, it provides evidence that older, community dwelling minorities are amenable to changing their lifestyle to ameliorate a medical condition.

Wilbur et al. (2009) compared the relative impacts of a 24-week walking intervention alone (minimal treatment) with a walking intervention coupled with motivational practices (enhanced treatment) for urban African American women. Adherence for the walking sessions was 38%, but it was significantly higher in the enhanced treatment group (45%) than in the minimal treatment group (29%). There was a significant decrease in depressive symptoms in the enhanced treatment group, but no change in the minimal treatment group. These data indicate that an exercise intervention for urban African American women should include an additional motivational component to increase adherence. Furthermore, sufficient adherence to a moderate walking program may lead to a decrease in depressive symptoms.

Summary

It is evident that physical activity interventions, especially those that provide sufficient aerobic and resistance training, can improve physical and psychological health in breast cancer survivors. Those benefits will likely effect endometrial cancer survivors as well. Group exercise interventions, which may not be able to deliver as intense an exercise intervention, should be used for urban cancer survivor populations because they increase social support and reduce the cost of training. Further studies should be done to determine the best practices for increasing exercise adherence, as well as physiological and psychological effects of physical activity interventions, for ethnically diverse urban endometrial cancer survivors.

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Appendix D

QUESTIONNAIRE DATA COLLECTION FORMS

Demographic Information (Studies 1 & 2)

Participant # _____ Date_____

General Questions

1. Age: _____ years

2. Marital status:
   - ☐ Married or Common Law Partners
   - ☐ Divorced or Separated
   - ☐ Widowed
   - ☐ Never Married or Common Law Partnered
   - ☐ I choose not to answer

2. Education
   - ☐ No High School
   - ☐ Some High School
   - ☐ High School Degree
   - ☐ Some University / College
   - ☐ College Degree
   - ☐ Some Graduate School
   - ☐ Graduate Degree
   - ☐ I choose not to answer

3. Annual household income
   - ☐ < $20,000
   - ☐ $20,000 – $39,999
   - ☐ $40,000 - $59,999
   - ☐ $60,000 - $79,999
   - ☐ $80,000 - $99,999
   - ☐ >$100,000
   - ☐ I choose not to answer
   - ☐ I don't know

4. Number of people in household: _____

5. Employment status:
   - ☐ Temporarily unemployed
   - ☐ Employed (>20 hours / week)
   - ☐ Homemaker
   - ☐ On disability
   - ☐ Retired
   - ☐ I choose not to answer

6. Do you consider yourself to be Latina / Hispanic? (Mark one or more boxes)
   - ☐ No
   - ☐ Yes, Puerto Rican
   - ☐ Yes, Dominican
   - ☐ Yes, Other _____ (if checked, please fill in the blank)
   - ☐ I choose not to answer
   - ☐ I don't know

7. What is your race? (Mark one or more boxes)
   - ☐ White
   - ☐ Black / African American
   - ☐ American Indian or Alaskan Native
   - ☐ Asian
   - ☐ Other _____ (if checked, please fill in the blank)
   - ☐ I choose not to answer
   - ☐ I don't know

Cancer-related Questions:

8. What stage was your endometrial cancer when you were diagnosed?
   - ☐ Stage I
   - ☐ Stage II
   - ☐ Stage III
   - ☐ Stage IV
   - ☐ I choose not to answer
   - ☐ I don't know

9. When were you treated for endometrial cancer? _____/_____ (Month/Year)

10. Which of the following treatments did you receive? (Mark one or more boxes)
    - ☐ None
    - ☐ Surgery
    - ☐ Radiation

- ☐ Chemotherapy
- ☐ Hormone therapy
- ☐ Other _____
- ☐ I choose not to answer
- ☐ I don't know

Questions about you

11. How tall are you? _____ feet, _____ inches

12. How much do you weigh? _____ lbs

13. When was the last time you weighed yourself? _____/_____ (Month/Year)

Rapid Assessment of Physical Activity (Study #1 only)
(Topolski et al., 2006)

Rapid Assessment of Physical Activity

Physical Activities are activities where you move and increase your heart rate above its resting rate, whether you do them for pleasure, work, or transportation.

The following questions ask about the amount and intensity of physical activity you usually do. The intensity of the activity is related to the amount of energy you use to do these activities.

Examples of physical activity intensity levels:

Light activities • your heart beats slightly faster than normal • you can talk and sing	 Walking Leisurely  Stretching  Vacuuming or Light Yard Work
Moderate activities • your heart beats faster than normal • you can talk but not sing	 Fast Walking  Aerobics Class  Strength Training  Swimming Gently
Vigorous activities • your heart rate increases a lot • you can't talk or your talking is broken up by large breaths	 Stair Machine  Jogging or Running  Tennis, Racquetball, Pickleball or Badminton

How physically active are you? *(Check one answer on each line)*

			Does this accurately describe you?	
RAPA 1	1	I rarely or never do any physical activities.	Yes ☐	No ☐
	2	I do some **light** or **moderate** physical activities, but not every week.	Yes ☐	No ☐
	3	I do some **light** physical activity every week.	Yes ☐	No ☐
	4	I do **moderate** physical activities every week, but less than 30 minutes a day or 5 days a week.	Yes ☐	No ☐
	5	I do **vigorous** physical activities every week, but less than 20 minutes a day or 3 days a week.	Yes ☐	No ☐
	6	I do 30 minutes or more a day of **moderate** physical activities, 5 or more days a week.	Yes ☐	No ☐
	7	I do 20 minutes or more a day of **vigorous** physical activities, 3 or more days a week.	Yes ☐	No ☐
RAPA 2 (3 = Both 1 & 2)	1	I do activities to increase muscle **strength**, such as lifting weights or calisthenics, once a week or more.	Yes ☐	No ☐
	2	I do activities to improve **flexibility**, such as stretching or yoga, once a week or more.	Yes ☐	No ☐

ID # _____

Today's Date _____

FACT-Endometrial (Studies 1 & 2)
(Cella et al., 1998)

Below is a list of statements that other people with your illness have said are important**. Please circle or mark one number per line to indicate your response as it applies to the <u>past 7 days</u>.**

	<u>PHYSICAL WELL-BEING</u>	**Not at all**	**A little bit**	**Some-what**	**Quite a bit**	**Very much**
GP1	I have a lack of energy	0	1	2	3	4
GP2	I have nausea	0	1	2	3	4
GP3	Because of my physical condition, I have trouble meeting the needs of my family	0	1	2	3	4
GP4	I have pain	0	1	2	3	4
GP5	I am bothered by side effects of treatment	0	1	2	3	4
GP6	I feel ill	0	1	2	3	4
GP7	I am forced to spend time in bed	0	1	2	3	4
	<u>SOCIAL/FAMILY WELL-BEING</u>	**Not at all**	**A little bit**	**Some-what**	**Quite a bit**	**Very much**
GS1	I feel close to my friends	0	1	2	3	4
GS2	I get emotional support from my family	0	1	2	3	4
GS3	I get support from my friends	0	1	2	3	4
GS4	My family has accepted my illness	0	1	2	3	4
GS5	I am satisfied with family communication about my illness	0	1	2	3	4
GS6	I feel close to my partner (or the person who is my main support)	0	1	2	3	4
Q1	*Regardless of your current level of sexual activity, please answer the following question. If you prefer not to answer it, please mark this box and go to the next section.*					
GS7	I am satisfied with my sex life	0	1	2	3	4

Please circle or mark one number per line to indicate your response as it applies to the <u>past 7 days</u>.

	EMOTIONAL WELL-BEING	**Not at all**	**A little bit**	**Some-what**	**Quite a bit**	**Very much**
GE1	I feel sad	0	1	2	3	4
GE2	I am satisfied with how I am coping with my illness.....	0	1	2	3	4
GE3	I am losing hope in the fight against my illness.....	0	1	2	3	4
GE4	I feel nervous	0	1	2	3	4
GE5	I worry about dying	0	1	2	3	4
GE6	I worry that my condition will get worse	0	1	2	3	4

	FUNCTIONAL WELL-BEING	**Not at all**	**A little bit**	**Some-what**	**Quite a bit**	**Very much**
GF1	I am able to work (include work at home)	0	1	2	3	4
GF2	My work (include work at home) is fulfilling	0	1	2	3	4
GF3	I am able to enjoy life	0	1	2	3	4
GF4	I have accepted my illness	0	1	2	3	4
GF5	I am sleeping well	0	1	2	3	4
GF6	I am enjoying the things I usually do for fun.....	0	1	2	3	4
GF7	I am content with the quality of my life right now.....	0	1	2	3	4

Please circle or mark one number per line to indicate your response as it applies to the <u>past 7 days</u>.

	ADDITIONAL CONCERNS	**Not at all**	**A little bit**	**Some-what**	**Quite a bit**	**Very much**
O1	I have swelling in my stomach	0	1	2	3	4
O3	I have cramps in my stomach	0	1	2	3	4
Hep	I have discomfort or pain in my	0	1	2	3	4
ES6	I have vaginal bleeding or	0	1	2	3	4
ES4	I have vaginal discharge	0	1	2	3	4
Hep 1	I am unhappy about a change in my appearance	0	1	2	3	4
ES1	I have hot flashes	0	1	2	3	4
ES2	I have cold sweats	0	1	2	3	4
ES3	I have night sweats.....	0	1	2	3	4
HI7	I feel fatigued	0	1	2	3	4
ES8	I have pain or discomfort with	0	1	2	3	4
En1	I have trouble digesting food	0	1	2	3	4
B1	I have been short of breath.....	0	1	2	3	4
Cx6	I am bothered by constipation.....	0	1	2	3	4
BL2	I urinate more frequently than	0	1	2	3	4
En2	I have discomfort or pain in my pelvic area	0	1	2	3	4

Yale Physical Activity Survey (Studies 1 & 2)
(Dipietro, Caspersen, Ostfeld, & Nadel, 1993)

Part 1

Interviewer: (please read to participant): We are interested to learn about the types of activities which are part of your regular routine. I am going to show you lists of common types of physical activities. Please tell me how much time (in minutes or hours) you spent during the past week.

Interviewer: Show the participant Card number 1.

Activity	Time		Intensity code
	Hours	Minutes	
Work			
Shopping (eg, grocery, clothes)	_____	_____	3.5
Stair climbing while carrying a load.	_____	_____	8.5
Laundry:	_____	_____	
Unloading/ loading machine, hanging, folding only	_____	_____	3.0
Washing clothes by hand	_____	_____	4.0
Light housework: tidying, dusting, sweeping, collecting rubbish in the home, polishing, ironing.	_____	_____	3.0
Heavy housework: vacuuming, mopping, scrubbing floors and walls, moving furniture, boxes or rubbish bins.	_____	_____	4.5
Food preparation: chopping, stirring, moving about to get food items and pans.	_____	_____	2.5
Food service: setting table, carrying food, serving food			2.5
Dish washing: clearing the table, washing / drying dishes, putting dishes away.	_____	_____	2.5
Light home repair. Small appliance repair, light home maintenance / repair.	_____	_____	3.0
Heavy home repair: painting, carpentry, washing/polishing car.	_____	_____	5.5
Other: _____	_____	_____	_____

Yard work	**Hours**	**Minutes**	
Gardening, pruning, planting, weeding, digging, hoeing	_____	_____	4.5
Lawn mowing (walking only)	_____	_____	4.5
Clearing walks/driveways: sweeping, shoveling, raking	_____	_____	5.0
Other: _____	_____	_____	_____
Care taking	**Hours**	**Minutes**	
Older or disabled person (lifting, pushing wheelchair)	_____	_____	5.5
Child care (lifting, carrying, pushing pram)	_____	_____	4.0
Exercise	**Hours**	**Minutes**	
Brisk walking	_____	_____	6.0
Pool exercises, stretching, yoga	_____	_____	3.0
Vigorous calisthenics, aerobics	_____	_____	6.0
Cycling	_____	_____	6.0
Swimming (laps only)	_____	_____	6.0
Other	_____	_____	_____

Recreation	Hours	Minutes	
Leisurely / slow walking	_____	_____	3.5
Needlework: knitting, sewing, needlepoint, etc	_____	_____	1.5
Dancing: line, ballroom, tap, square etc	_____	_____	5.5
Bowling	_____	_____	3.0
Golf	_____	_____	5.0
Racquet sports: tennis, squash	_____	_____	7.0
Billiards	_____	_____	2.5
Other	_____	_____	_____

Part two

Interviewer: *Please read to subject*:
I would now like to ask you about certain types of activities that you have done during the past month. I will ask you about how much vigorous activity, leisurely walking, sitting, standing and some other things you usually do.

1. About how many times during the month did you participate in **vigorous** activities, that lasted at least **10 minutes** and caused large increases in breathing, heart rate, or leg fatigue, or caused you to perspire?

Score: Not at all (go to Q3)	0
1-3 times per month	1
1-2 times per week	2
3-4 times per week	3
5 + times per week	4
Refused	7
Don't know	8

Frequency score _____

2. About how long do you do this vigorous activity/ies each time?

Not applicable	0
10-30 minutes	1
31 – 60 minutes	2
60 + minutes	3
Refused	7
Don't know	8

Duration Score _____
Weight 5

Vigorous activity index score:
Frequency score _____ X Duration score _____ X weight _____ = _____
(Responses 7 or 8 are scored as missing)

3. Think about the walks you have taken in the past month. About how many times per month did you walk **for at least 10 minutes** or more **without stopping** which was not strenuous enough to cause large increases in breathing, heart rate, or leg fatigue or cause you to perspire?

Score: Not at all (go to Q5)	0
1-3 times per month	1
1-2 times per week	2
3-4 times per week	3
5 + times per week	4
Refused	7
Don't know	8
Frequency score	_____

4. When you did this walking, for how many minutes did you do it?

Not applicable	0
10-30 minutes	1
31 – 60 minutes	2
60 + minutes	3
Refused	7
Don't know	8
Duration Score	_____
Weight:	4

Leisurely walking index score:
Frequency score _____ X Duration score _____ X weight _____ = _____
(Responses 7 or 8 are scored as missing)

5. About how many hours per day do you spend moving around on your feet while doing things? Please report only the item that you are **actually moving**.

Not at all	0
Less than 1 hour per day	1
1 to 3 hours per day	2
3 to 5 hours per day	3
5 to 7 hours per day	4
7+ hours per day	5
Refused	7
Don't know	8
Moving score	_____
Weight	3

Moving Index Score
Moving score _____ X Weight _____ = _____
(Responses 7 or 8 are scored as missing)

6. Think about how much time you spend standing or moving around on your feet on an average day during the past month. About how many how per day do you **stand**?

Not at all	0
Less than 1 hour per day	1
1 to 3 hours per day	2
3 to 5 hours per day	3
5 to 7 hours per day	4
7+ hours per day	5
Refused	7
Don't know	8

Standing score _____

Weight 3

Standing Index Score

Standing score _____ X Weight _____ = _____

(Responses 7 or 8 are scored as missing)

7. About how many hours did you spend sitting on an average day during the past month?

Not at all	0
Less than 3 hours	1
3 hours to less than 6 hours	2
6 hours to less than 8 hours	3
8 + hours	4
Refused	7
Don't Know	8

Sitting Score _____

Weight 1

Sitting Index Score

Sitting score _____ X Weight _____ = _____

(Responses 7 or 8 are scored as missing)

8. About how many flights of stairs do you climb up **each** day? (let 10 steps = 1 flight

_____

9. Please compare the amount of physical activity that you do during other seasons of the year with the amount of activity you just reported for a typical week in the past month. For example, in the summer, do you do more or less activity than what you reported in the past month?

Interviewer: *please circle the appropriate score for each season.*

	Lot more	Little more	Same	Little less	Lot less	Don't know
Spring	1.30	1.15	1.00	0.85	0.70	.
Summer	1.30	1.15	1.00	0.85	0.70	.
Autumn	1.30	1.15	1.00	0.85	0.70	.
Winter	1.30	1.15	1.00	0.85	0.70	.

Seasonal adjustment score: = sum of all seasons / 4 = _____

Interviewer: Please mark the time: _____ Hr _____ Min

Exercise Ability (Studies 1 & 2)
(McAuley, Blissmer, Katula, Duncan, & Mihalko, 2000)

Please circle the number that shows how **confident** you are that you can successfully walk at a moderately fast pace without stopping. **A moderately fast pace is sufficient to increase your heart rate and to work up a sweat.**

Using the scale below, please circle the number for how true each of the statements is for you. Please answer honestly and accurately. There are no right or wrong answers.

I believe that I can walk:	Not at all confident		Moderately confident		Highly confident
1. For **5 minutes** at a moderately fast pace without stopping	1	2	3	4	5
2. For **10 minutes** at a moderately fast pace without stopping	1	2	3	4	5
3. For **20 minutes** at a moderately fast pace without stopping	1	2	3	4	5
4. For **30 minutes** at a moderately fast pace without stopping	1	2	3	4	5
5. For **40 minutes** at a moderately fast pace without stopping	1	2	3	4	5
6. For **50 minutes** at a moderately fast pace without stopping	1	2	3	4	5
7. For **1 hour** at a moderately fast pace without stopping	1	2	3	4	5

Exercise Barriers (Studies 1 & 2)
(Resnick & Jenkins, 2000)

How **confident** are you right now that you could exercise three times per week for 20 minutes if:

		Not at all confident		Moderately confident		Highly confident
1.	The weather was bothering you	1	2	3	4	5
2.	You were bored by the program or activity	1	2	3	4	5
3.	You felt pain when exercising	1	2	3	4	5
4.	You had to exercise alone	1	2	3	4	5
5.	You did not enjoy it	1	2	3	4	5
6.	You were too busy with other activities	1	2	3	4	5
7.	You felt tired	1	2	3	4	5
8.	You felt stressed	1	2	3	4	5
9.	You felt depressed	1	2	3	4	5

Why Do You Exercise? (Studies 1 & 2)
(Markland & Tobin, 2004)

We are interested in the reasons people decide to either exercise or not exercise. Using the scale below, please circle the number for how true each of the statements is for you.

		Not true for me		**Sometimes true for me**		**Very true for me**
1	I exercise because other people say I should	0	1	2	3	4
2	I feel guilty when I don't exercise	0	1	2	3	4
3	I value the benefits of exercise	0	1	2	3	4
4	I exercise because it's fun	0	1	2	3	4
5	I don't see why I should have to exercise	0	1	2	3	4
6	I take part in exercise because my friends/family/partner say I should	0	1	2	3	4
7	I feel ashamed when I miss an exercise session	0	1	2	3	4
8	It's important to me to exercise regularly	0	1	2	3	4
9	I can't see why I should bother exercising	0	1	2	3	4

		Not true for me		Sometimes true for me		Very true for me
10	I enjoy my exercise sessions	0	1	2	3	4
11	I exercise because others will not be pleased with me if I don't	0	1	2	3	4
12	I don't see the point in exercising	0	1	2	3	4
13	I feel like a failure when I haven't exercised in a while	0	1	2	3	4
14	I think it is important to make the effort to exercise regularly	0	1	2	3	4
15	I find exercise a pleasurable activity	0	1	2	3	4
16	I feel under pressure from my friends/family to exercise	0	1	2	3	4
17	I get restless if I don't exercise regularly	0	1	2	3	4
18	I get pleasure and satisfaction from participating in exercise	0	1	2	3	4
19	I think exercising is a waste of time	0	1	2	3	4

Exercise Outcomes (Studies 1 & 2)
(Resnick, Zimmerman, Orwig, Furstenberg, & Magaziner, 2001)

For each statement, please circle the number corresponding to how much you agree with that effect of exercise.

		Strongly Agree		Neither Agree nor Disagree		Strongly Disagree
1.	Exercise makes me feel better physically.	1	2	3	4	5
2.	Exercise makes my mood better in general.	1	2	3	4	5
3.	Exercise helps me feel less tired.	1	2	3	4	5
4.	Exercise makes my muscles stronger.	1	2	3	4	5
5.	Exercise is an activity I enjoy doing.	1	2	3	4	5
6.	Exercise gives me a sense of personal accomplishment.	1	2	3	4	5
7.	Exercise makes me more alert mentally.	1	2	3	4	5
8.	Exercise improves my endurance in performing my daily activities.	1	2	3	4	5
9.	Exercise helps to strengthen my bones.	1	2	3	4	5

Social Support (Studies 1 & 2)
(Sallis, Grossman, Pinski, Pattersen, & Nader, 1987)

Below is a list of things people might do or say to someone who is trying to exercise regularly. If you are not trying to exercise, then some of the questions may not apply to you, but please read and give an answer to every question.

Please rate each question *twice.*

1. Under ***family***, rate how often anyone living in your household has said or done what is described during the last three months.
2. Under ***friends,*** rate how often your friends, acquaintances, or coworkers have said or done what is described during the last three months.

Please write *one* number from the following rating scale in each space:

never	rarely	a few times	often	very often	Does not apply
1	2	3	4	5	8

During the past three months, my family (or members of my household) or friends:

	Family	**Friends**
1. Exercised with me.		
2. Offered to exercise with me.		
3. Gave me helpful reminders to exercise ("Are you going to exercise tonight?").		
4. Gave me encouragement to stick with my exercise program.		
5. Changed their schedule so we could exercise together.		
6. Discussed exercise with me.		
7. Complained about the time I spend exercising.		
8. Criticized me or made fun of me for exercising.		
9. Gave me rewards for exercising (bought me something or gave me something I like).		
10. Planned for exercise on recreational outings.		
11. Helped plan activities around my exercise.		
12. Asked me for ideas on how *they* can get more exercise.		
13. Talked about how much they like to exercise.		

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Appendix E

PILOT STUDY APPROVED BY EINSTEIN IRB

EINSTEIN
Albert Einstein College of Medicine
OF YESHIVA UNIVERSITY

Science at the heart of medicine

Chester M. Edelmann, Jr., M.D.
Chairman
Committee on Clinical Investigations

Jack and Pearl Resnick Campus
1300 Morris Park Ave., Belfer 1002
Bronx, NY 10461
718.430.2237 fax 718.430.8817
cedelman@aecom.yu.edu
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April 7, 2010

Alyson Moadel, Ph.D.
Department of Epidemiology & Pop Health
Re: CCI #: 2006-590 FWA #: 00000140
Title: Counseling and Support Services For Patients with Cancer and Their Loved Ones in the Bronx

Dear Dr. Moadel:

This is to inform you that the Committee on Clinical Investigations has reviewed and re-certified the above referenced human research project and informed consent (Individual and Participant Letters - English and Spanish), for the period from 3/15/2010 to 3/14/2011. The protocol received Expedited review (Category 7) and will be included on the CCI agenda for the 4/14/2010 meeting.

If additional information is needed, please contact the CCI Administrative Office at (718) 430-2237.

Sincerely,

Chester M. Edelmann, Jr., M.D.
Chairman, Committee on Clinical Investigations

INVESTIGATOR, please note the following:

1. Use only Institutional Review Board stamped approved copies of the consent forms, letter(s), etc. in your research. Do not use expired consent forms.
2. Any modifications or changes made to the study must be submitted to the Institutional Review Board for review prior to the initiation of said modifications or changes.
3. Any serious and/or expected adverse event in a study subject and/or death of a subject is to be reported to the Committee on Clinical Investigations within 48 hours followed by a written report within 10 working days of the event.
4. All research protocols must be reviewed on a periodic basis not to exceed 365 days.
5. If facilities or subjects at NCB or JMC are to be used, the PI is required to have the approval of the Health and Hospitals Corporation (HHC) before the research may be initiated at their facility. Please call the AECOM Committee on Clinical Investigations Administrative office at 430-2237 for NCB and/or JMC research.

Cc: B. Levy, Assistant Dean for Academic Affairs
[Delete if JMC/NCB is not involved:]NBHN RPWG

Appendix F

STUDY II APPROVED BY TEACHERS COLLEGE IRB

TEACHERS COLLEGE
COLUMBIA UNIVERSITY
OFFICE OF SPONSORED PROGRAMS

Institutional Review Board

November 15, 2013

Amerigo Rossi
115 Underhill Avenue, Apt. 3
Brooklyn, NY 11238

Dear Amerigo,

Thank you for submitting a modification to your study entitled, *"The associations between physical activity, body mass index, and quality of life among underserved diverse endometrial cancer survivors"* to add Additional Investigators Gurpreet Kaur and Tiffany Young. The IRB has determined that your study remains **Exempt** from committee review [Category **2**].

Please keep in mind that the IRB Committee must be contacted if there are any changes to your research protocol. The number assigned to your protocol is **12-282**. Feel free to contact the IRB Office [212-678-4105 or hersch@tc.edu] if you have any questions.

Please note that your consent form bears an official IRB authorization stamp. Copies of this form with the IRB stamp must be used for your research work.

Best wishes for your research work.

Sincerely,

Karen Froud, Ph.D.
Associate Professor of Speech and Language Pathology
Chair, IRB

cc: File, OSP

Institutional Review Board, Office of Sponsored Programs, Box 151
525 West 120th Street, New York NY 10027 Tel: 212 678 4105 Fax: 212 678 8110

Appendix G

STUDY III APPROVED BY TEACHERS COLLEGE IRB

TEACHERS COLLEGE
COLUMBIA UNIVERSITY
OFFICE OF SPONSORED PROGRAMS

Institutional Review Board

February 26, 2014

Amerigo Rossi
115 Underhill Avenue, Apt. 3
Brooklyn, NY 11238

Dear Amerigo,

Please be informed that as of the date of this letter, the Institutional Review Board for the Protection of Human Subjects at Teachers College, Columbia University has given full approval to a modification to your study entitled "*The development and assessment of a comprehensive physical activity behavioral intervention on underserved diverse obese endometrial cancer survivors*" to recruit from the interest list for the Bronx Oncology Living Daily program after an **Administrative Review**.

The approval remains effective until **May 29, 2014.**

The IRB Committee must be contacted if there are any changes to the protocol during this period. **Please note**: If you are planning to continue your study, a Continuing Review application must be filed six weeks prior to the expiration of the protocol. The IRB number assigned to your protocol is **13-271**. Feel free to contact the IRB Office [212-678-4105 or **hersch@tc.edu** if you have any questions.

Please note that your consent form bears an official IRB authorization stamp. Copies of this form with the IRB stamp must be used for your research work.

Best wishes for your research work.

Sincerely,

Karen Froud, Ph.D.
Associate Professor of Speech and Language Pathology
Chair, IRB

cc: OSP file File, OSP

Institutional Review Board, Office of Sponsored Programs, Box 151
525 West 120th Street, New York NY 10027 Tel: 212 678 4105 Fax: 212 678 8110

Appendix H

12-WEEK INTERVENTION OUTLINE

Week 1: Introductions, Overview, Practical guide to pedometer use

Week 2: Benefits of physical activity, self-monitoring

Week 3: Motivational techniques, goal setting, intention implementation

Week 4: Physical activity in the neighborhood

Week 5: Increasing physical activity during daily life

Week 6: Review, self-evaluation

Week 7: Measuring progress

Week 8: Improving social/familial support

Week 9: Barrier avoidance, self-talk

Week 10: Injury prevention, minor injury treatment

Week 11: Review home exercises

Week 12: Graduation celebration

1. Starting Out
    a. Introductions
    b. Set up buddy system
    c. Hand out pedometers
    d. Test pedometers
    e. Feedback
    f. Go over exercise logs

    Homework: Use pedometers and training logs. Contact your buddy at least one time.

2. Why exercise?
    a. Discuss problems/solutions to pedometer usage
    b. Discuss feelings about first workout session. Feedback?
    c. Discuss feeling about exercise in general
    d. What are the benefits?
        i. Physical
        ii. Emotional
        iii. Short-term

iv. Long-term

e. Discuss expectations of exercise programming
f. Discuss exercise barriers / fears
    i. Solutions
g. HW: fill out handout with list of most important individualized benefits, along with potential barriers (put in binder)

3. Let's motivate
    a. Collect home addresses (or cross streets) for next week's session
    b. Create a group distance goal
        i. # of participants * 8000 steps/day * 7 days/week * 10 weeks
            1. ie. 10 participants = 2545 miles (Bronx à Las Vegas)
    c. Discuss behavioral change goals intention
    d. Discuss facilitators to behavior change
    e. Visualize Goal outcomes
    f. Develop a Goal statement

    HW: Create goal expression piece (written, pictures, drawing, song, etc.).

4. Know your neighborhood
    a. Present goal expression pieces, put in binder
    b. Pass out color coded maps of 1,2,3 mile routes from home
        i. Point out parks, healthy food, hills
        ii. Ask for feedback about routes
        iii. Points for stopping (stretch, visits, rest, water, bathroom)

    HW: Go on at least one of the marked routes

5. Move This, Not That!
    a. Discuss the walking routes. What was enjoyable or not enjoyable?
        i. If specific feedback, redo route and bring next week
        ii. Laminate, hole punch to put in binder
    b. Present likely sedentary scenarios at work or at home
    c. Discuss more active options
        i. Make list, draw pictures, participant demonstrations
            1. How would you make it into more challenging?

    HW: Practice 2 techniques for exchanging sedentary for active.

6. Recap, reset
    a. Present challenges successes from Move this/not that
    b. Go over goal statements again with buddy.
    c. Recap how much we've done so far.
    d. Update the group challenge walking progress. How far still to go?
    e. What were some of the strongest facilitators? How can we get more of those?
    f. What were the strongest barriers? How can we get less of those?

7. Tracking your progress

a. *Discuss the importance of developing ability to sustain physical activity*
b. Body weight
c. Waist circumference / belt loop / pants tightness
d. Heart rate
e. Time to walk the loop
f. Practice around the complex

HW: measure your waist circumference, measure the time for loop + HR at home

8. Bronx Activities
    a. *Discuss problems, solutions of tracking progress*
    b. Discuss fun things to do with family friends that involve physical activity. *Try to get free tickets from venues*
        i. Shopping
        ii. BBQ – plus games
        iii. Botanic gardens
        iv. Bronx Zoo
        v. Beach
        vi. Museums

    HW: Track the number of steps you take while doing something fun.

9. Let's talk about self talk
    a. *Discuss Bronx Activities*
    b. Discuss ways in which we talk to ourselves
        i. Compare positive (encouraging) to negative (discouraging) self-talk
        ii. Consider our own self-talk and it's impact
        iii. Practice positive self-talk in various situations (relapses)

    HW: fill in self-talk handout

10. Injury treatment and prevention
    a. *Recap self-talk, discuss some examples from the past week*
    b. Discuss common injuries and their treatment, prevention
        i. Sprain
        ii. Muscle soreness
        iii. Chaffing
        iv. Joint pain
    c. Discuss the importance of stretching, warming up
    d. Discuss the importance of correct apparel and shoes

11. Exercising in the home
    a. Review injury prevention and treatment. Questions?
    b. Discuss various resistance exercises for the home
        i. Participant ideas
        ii. Instructor ideas, demonstrations
        iii. How do you make it harder/easier?

HW: Find 5 exercises you can do in your home

12. Congratulations!
    a. Review basic benefits of exercise
    b. Recap how far we've come
    c. Discuss what the next steps need to be to keep it up
    d. Give out community resource list
    e. Award prizes for completion, for attaining walking goal

    HW: Continue leading active healthy lives to help others start on the same path.

Appendix I

FACILITATIVE INCENTIVES

*Every two weeks of attendence, with completed Physical Activity logs: $10 metrocard

Additionally:

2 weeks: water bottle and exercise towel
4 weeks: t-shirt
6 weeks: weigh scale
8 weeks: zumba DVD
12 weeks: sneakers

Qualitative Session: $25 gift card to Modell's Sporting Goods stores

Appendix J

INTERVENTION - INSTRUCTOR GUIDE

CLASS #1 (LET'S GET MOVING)

1. Introductions (~15 minutes)
    a. Outline the class plan
        i. 2 x/week, attend at least 1 class (90 min, incl 60 of exercise)
        ii. Wearing pedometers throughout (to be discussed in detail later)
    b. Provide a brief introduction of yourself and why you are interested in teaching this subject with these participants
    c. Introduction Activity
        i. Go around the room, each person should say their name, one amazing/interesting/ thing about themselves, and why they are part of the class

2. Set Up Buddy System (~3 minutes)
    a. Explain that people will be paired as "buddies" in case they have questions or problems that the other person might be able to help.
    b. Based on where people are seated, pair them up as "buddies."
    c. They should exchange phone numbers (write info on Sheet 2)

3. Pedometers (~15 minutes)
    a. Hand out pedometers (and sheets 3 & 4) to all participants
    b. Explain that these should be worn as much as possible (not in shower or while sleeping)
    c. Demonstrate placement – ask them to put them on
    d. Go over pedometer log (Sheet 4)
    e. Explain that it's okay if they forget, but PLEASE note that in the pedometer log (Sheet 4)
    f. Test pedometers outside (weather permitting).
        i. Walk 100 steps, see if it works.
        ii. March 20 steps, see if it works
    g. Feedback and questions about pedometer usage / logs

4. Go over Weekly Checklist & Sitting Chart
    a. Have a blank sheet and give examples

5. Show At Home Activities (Sheet 6):
    a. Contact your "buddy" at least one time to check in.
    b. Use pedometers and fill in pedometer log

CLASS #2 (GREAT EXPECTATIONS) Instructor Guide

1. Reintroduce yourself to the group if necessary

2. Discuss questions / comments / solutions to problems for pedometer usage (~5 - 10 min)

3. Discuss Weekly Exercise Checklist

4. Discuss feelings / comments / suggestions from the first workout session. (5-10 min)
    a. Provide solutions as needed
    b. Write down any big things afterward

5. Ask participants what benefits they think exercise provides. Let them discuss first – guide discussion if necessary. (~10 min)
    a. Add any if the group doesn't get them
        i. Physical
            1. increased good cholesterol (HDL), decreased bad cholesterol (LDL)
                a. as much as medicine
            2. decreased blood pressure
                a. almost as much as medicine
            3. decreased blood sugar (help diabetes)
                a. as much as medicine
            4. less body fat
            5. more muscle
            6. better ability to do activities of daily living (easier to do the things you do)
        ii. Emotional
            1. Increased happiness (less depression)
            2. Less stress
            3. Less fatigue
            4. Feel better
            5. Look better

Stress the immediate impacts, since people respond more to that

6. Have participants complete **Week 2, Sheet 1** (5 minutes)
    a. Have people present their expected changes to the group
    b. Add motivation by highlighting past changes in similar programs
        i. Improved QoL
        ii. Less fatigue
        iii. Strength doubled
        iv. 3-10 lb weight loss (inches off waist)
        v. More independent

7. At Home 1: fill out **Week 2, Sheet 2** with list of most important perceived facilitators and barriers to achieving expected outcomes.

8. Explain At Home 2 (Week 2, Sheet 3): try squats and push-ups at home, record how many (and how did them; i.e. knees)

9. And… don't forget pedometer sheets / workout chart / sitting chart

10. Too much??

****Data Collection:

Weekly step count and pedometer compliance (from training log) should be collected at each class.

Also, collect the weekly walking journal.

CLASS #3 (LET'S GET MOTIVATED) Instructor Guide

1. Discuss questions / comments / solutions to problems for pedometer usage

2. How did it go with the push-ups / squats?

3. Discuss feelings / comments / suggestions from the 2nd workout session. (5-10 min)
    a. Provide solutions as needed

4. Have students present their homework answers (most important facilitators and barriers). Ask for suggestions from other group members of how to maximize facilitation and minimize barriers. (10 min)

5. Based on first week's walking totals, create a cumulative walking goal for the class (offer options so they can choose the goal destination).
   *Color in the route on a large USA map, and use a pin to track progress.
        i. # of participants * 8000 steps/day * 7 days/week * 10 weeks
           ie. 10 participants = 2545 miles (Bronx → Las Vegas)

6. Behavioral change motivation
    a. Discuss how internal motivation is stronger and longer lasting than external motivators
    b. Discuss how we need to develop our <u>motivation muscles</u> to stay motivated
    c. Guide students through mental imagery technique to visualize their expected outcomes.
        i. Have them close their eyes and see themselves after having achieved their goals
        ii. Imagine themselves looking in the mirror
        iii. What are they wearing, what are people saying to them, how do they feel, what does their family/friends say, what time of day is it, what smells and sounds are present. Have them imagine the feeling of having finished all of the fitness and diet classes. Try and get them to imagine the **details** of what it feels like after having achieved their goals. (3 minutes)
    d. Develop a motivational statement (5 minutes)
        i. Have participants write a brief (3-5 sentence) paragraph describing the scene they just imagined (**Week 3, sheet 1**).
        ii. Bring an audio recorder or somebody to transcribe in case they can't write (well).

   At Home 1: Create motivational expression piece (written, pictures, drawing, song, etc.). **Week 3, Sheet 2**

   At Home 2: Show step ups / rows with exercise band (do these in class)

At Home 3 reminder: Pedometer / Walking / Sitting Charts

****Data Collection:

Weekly step count and pedometer compliance (from training log) should be collected at each class.

Also, collect the weekly walking journal.

** Collect address (home or work – wherever they walk from) for map making

CLASS #4 (KNOW YOUR NEIGHBORHOOD) Instructor Guide

1. Prior to class, create and print 1, 2 and 3 mile walking routes from each participant's house or work (using google maps). Try to incorporate as many hills, parks, and side streets as possible. Denote local gyms, community centers and health food stores.

2. Have participants present their motivational expression pieces.

3. Update walking goal progress on the map

4. Ask for any more questions concerns about the exercise course or pedometer usage.

5. Pass out color coded maps of 1,2,3 mile routes from home
    i. Point out
        1. Gyms, parks, healthy food, community centers, hills
        2. Points for stopping (stretch, rest, water, bathroom)
    ii. Have participants look over their routes and give feedback

At Home 1 (Sheet 1): Go on at least two of the marked routes and provide feedback for each.

At Home 2 (Sheet 2): Lunges and shoulder press (show in class first)

****Data Collection:

Weekly step count and pedometer compliance (from training log) should be collected at each class.

Also, collect the weekly walking journal.

CLASS #5 MOVE THIS, NOT THAT! Instructor Guide

1. *Discuss the walking routes. What was enjoyable or not enjoyable?*
    i. *If specific feedback, redo route and bring next week*
    ii. *Laminate, hole punch to put in binder*
2. *Update walking goal progress on the map*

3. Present likely sedentary scenarios at work or at home
   i.e. Ordering in food, calling instead of talking, Watching tv, knitting sitting down, Sitting down at park with kids
    a. After presenting a few, ask students for examples in their lives
    b. Then have them write them down. During which activities do they spend most time sitting? (Sheet 1, Part A)

4. Open the floor up for discussion about reasons they sit. Emotions, fatigue, laziness, is it weird to stand? Ask them to write to write which ones effect them (Sheet 1, Part B)

5. Discuss more active options (Sheet 1, Part C)
    a. Make list, ask for participant examples
        i. How would you make it into more challenging?
        Example (squats during commercials for one show → 2 shows/wk)
        Example (walking to farther train station → and taking stairs instead of elevator)
        Example (standing on bus → baby squats while holding on)

    b. On pg 2 ask participants to write or draw instructions of 2 more active activities.

At Home 1 (Sheet 3): Practice 2 techniques for exchanging sedentary for active, write them down.

At Home 2 (Sheet 4): Heel Raises / Dips (show in class)

At Home 3 Reminder: Pedometers / Walking / Sitting sheets

****Data Collection:
Weekly step count and pedometer compliance (from training log) should be collected at each class.

Also, collect the weekly walking journal.

CLASS #6 RECAP, RESET Instructor Guide

1. *Present challenges successes from Move this/not that*
2. *Update walking goal progress on the map*

3. Go over goal statements again with buddy
    i. after 6 weeks, does it need to be changed?
    ii. Ask for examples

4. Recap how much we've done so far.
    i. Update the group challenge walking progress. How far still to go?
        1. Hand out daily averages for each participant (bar graph for each week)
    ii. How many calories they've burned (walking + exercise class)
    iii. How many different exercises they've done

5. Ask what were some of the strongest facilitators? Ask them to write them down.
    i. How can we get more of those? Discussion.

6. What were the strongest barriers? Discuss, write down as discussing. Ask for examples.
    i. How can we get less of those? Discuss, then write down as discussing

At Home (Sheet 3): Clams / Biceps Curls (show in class first)

****Data Collection:

Weekly step count and pedometer compliance (from training log) should be collected at each class.

Also, collect the weekly walking journal.

CLASS #7 TRACKING YOUR PROGRESS Instructor Guide

1. *Update walking goal progress on the map*
2. *Ask about avoiding / dealing with difficult situations. Any success tips?*
3. *Ask about pedometers. Everything okay. Still need to wear as much as possible to track progress.*

4. Discuss the importance of developing ability to sustain physical activity.
    a. Make it your own.
    b. When, where will you continue <u>your</u> exercise program?
    c. Gym, church, group of friends

5. One reason people stop exercising is they don't see **progress**. How can we **measure (Sheet 1)**?
    a. Body weight
        i. increase muscle, decrease fat → no weight change)
        ii. Increases and decreases with water/salt
        iii. So, not a great test of health
    b. Waist circumference / belt loop / pants tightness is better for FAT LOSS
        i. <u>Hand out measuring tape</u>, show how to measure
        ii. At belly button, turn body to each side to make sure tape is horizontal (flat)
    c. Heart rate is also a good mark of health.
        i. Explain image in booklet (worse shape means higher HR)
        ii. Ask to take resting heart rate (count pulse for six seconds → mult by 10)
    d. Time to walk a certain loop (i.e. 3 mile neighborhood walk)
        i. Sheet 2
        ii. As we get in better shape, we get faster

Review: Ask class to make sure they understand.

1. Does exercising cause weight loss? (Prob not)
    a. Why? (more muscle, less fat)
2. Then how do you know if you're losing fat? (WC)
    a. How do you measure it? (belly button, horizontal)
3. What happens to your HR when you get in better shape? (Down)
4. What happens to time to complete a certain loop? (Less)

6. Practice around the complex
    a. Walk ¼ mile loop. Do twice if possible for ½ mile total.
    b. Measure time and HR at end.

At Home 1: measure your waist circumference, measure the time for loop + HR at home (Sheet 3)

At Home 2: Bridge / Donkey Kick / Plank (knees/elbows)

****Data Collection:

Weekly step count and pedometer compliance (from training log) should be collected at each class.

Also, collect the weekly walking journal.

CLASS #8 BRONX ACTIVITIES Instructor Guide

1. *Discuss problems, solutions of tracking progress*
    a. *WC*
    b. *HR*
    c. *Time*
    d. *Health trackers*

2. Ask students what kinds of things they normally do with friends/family? With each one, ask if sedentary or active?
    a. Probably a lot of movies, eating out, bbq, watching games

3. Discuss fun things to do with family and friends that involve physical activity. *Try to get free tickets from venues*
    a. Shopping at outdoor mall (watch out for food vendors)
    b. Botanical gardens
    c. Bronx Zoo
    d. Beach
    e. Museums
    f. Walking the dog
    g. Wave Hill
    h. Woodlawn cemetery tour
        i. Miles Davis, Duke Ellington
        ii. Celia Cruz
        iii. Joseph Pulitzer
        iv. Ralph Bunche (1st African American Nobel Peace Prize)
        v. Fiorello LaGuardia
        vi. Herman Melville (Moby Dick)

At Home 1: Track the number of steps you take while doing something fun.

****Data Collection:

Weekly step count and pedometer compliance (from training log) should be collected at each class.

Also, collect the weekly walking journal.

CLASS #9 LET'S TALK ABOUT SELF TALK Instructor Guide

1. *Discuss Bronx Activities*
    a. *Fun? How many steps? (Remind that 2000 steps is about 1 mile)*
    b. *Did anybody do anything different?*
2. *Update walking map (add projection if we keep at same pace)*

3. Discuss ways in which we talk to ourselves
    a. Compare positive (encouraging) to negative (discouraging) self-talk **(Sheet 1)**
    b. Consider our own self-talk and it's impact on our behaviors

    c. Read the negative thought on the left, and ask for a positive alternative (something like what's on the right)

Negative Thought Types	Positive Refocusing
"What did I do today? Nothing. I didn't even walk today. I'll never get in shape."	**IT'S JUST ONE DAY** "So I slipped up. It's just ONE day. Tomorrow I will put my shoes by the front door to remind myself to walk."
"It's too cold to take a walk today." "I don't have the will power or the energy to do this."	**WORK AROUND THE EXCUSES** "I will walk at the mall today." "I will exercise earlier so I have more energy."
"I am tired of handouts and completing my physical activity chart. What's the point?"	**FEEL YOUR GOALS** "Completing my activity charts will help me reach my long-term goals. And that will feel GREAT!"
"So-and-so walked five times this week and I only walked three times."	**BE YOUR BEST!** "I am improving at a rate that is safe for me and in line with my goals."
"I can't keep up with all this. I'll never be able to do this on my own."	**REACH OUT TO SUPPORT SYSTEM** "Whenever I feel like giving up, I will call one of my social support buddies and ask for some help."

    d. Ask students to write 2 or 3 negative things they say to themselves about physical activity, or getting healthy, or anything else.

    e. Then in partners, ask their partners to come up with positive statements for them – write them down if they like them.

AT HOME: fill in self-talk handout **(Sheet 3)**

****Data Collection:

Weekly step count and pedometer compliance (from training log) should be collected at each class.

Also, collect the weekly walking journal.

CLASS #10 INJURY TREATMENT AND PREVENTION Instructor Guide

1. *Recap self-talk, discuss some examples from the past week*
    a. *Ask what negative thoughts people had*
    b. *Prompt for alternate positive responses*

2. Discuss common injuries and their treatment, prevention
    a. Muscle soreness
        i. Who's had it? How long until it went away? Better now in 10th week?
    b. Chaffing
        i. Armpit, thighs (usually first few weeks, or loose clothes)
    c. Tendonitis
        i. Burning sensation in Achilles, knee
    d. Strain
        i. Pulled muscle (pain doesn't go away in a few days) - don't stretch
    e. Joint pain
        i. Hard to tell. Try rest. If that doesn't work, see a doctor.

*** If it hurts, don't do it ***

3. Discuss the importance of moderation, stretching, warming up

4. Discuss the importance of correct apparel and shoes

****Data Collection:

Weekly step count and pedometer compliance (from training log) should be collected at each class.

Also, collect the weekly walking journal.

CLASS #11 EXERCISING IN THE HOME Instructor Guide

1. *Review injury prevention and treatment. Questions?*
    a. *Moderation*
    b. *If it hurts don't do it (no pain, no gain is wrong)*

2. Discuss various resistance exercises for the home
    a. Participant ideas (which exercises, where in the home, when)
    b. Instructor ideas, demonstrations
        i. Try to focus on large muscle groups
            1. Up stairs (down backwards?)
            2. Lifting baby up (as a squat, or overhead, or like a bench press)
            3. Squats (on couch/chair)
            4. Pushups (wall, couch, or ground from knees)
            5. Dips on chair with arm rests (use legs and arms)
            6. Crunches during commercials
            7. Toe raises, etc.

    c. For each, ask how do you make it harder/easier?

    d. Remind students of exercise how-to in their binder

Demonstrate how to do HW:

1. Find 5 exercises you can do in your home
2. Give them your own funny name
3. Count how many times you can do it (tracking progress – reflect back)

****Data Collection:

Weekly step count and pedometer compliance (from training log) should be collected at each class.

Also, collect the weekly walking journal.

CLASS #12 CONGRATULATIONS! Instructor Guide

1. Ask about exercises at home
    a. Ask for other student suggestions
2. Review basic benefits of exercise
    a. Live longer, better
    b. Better quality of life (play with grandkids, be independent, less fatigue)
    c. Less health problems
    d. Look better
3. Recap how far we've come
    a. Walking map totals
    b. Give out individual charts as well
4. Discuss what the next steps need to be to keep it up
5. **Give out community resource list**
    a. Gyms, health centers
6. Post-testing schedule sign-up for next week
7. We will contact in 10 weeks to schedule a follow-up appointment as well
8. Award CERTIFICATE, for attaining walking goal

****Data Collection:

Weekly step count and pedometer compliance (from training log) should be collected at each class.

Also, collect the weekly walking journal.

Appendix K

PARTICIPANT BOOKLET

Name:

_____

3 Interesting things about me:

1. _____
   _____

2. _____
   _____

3. _____
   _____

My Buddy's Name Is:

_____

My Buddy's Phone Number Is:

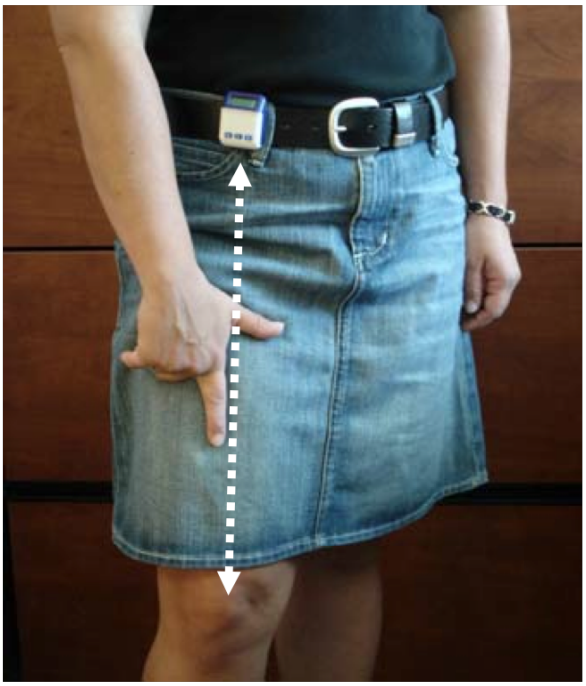
_____

Pedometer Instructions

Placement: Clip the pedometer to your belt or waistband of your pants. The pedometer should be near your hips, midway between your side and your belly button (directly above your knee).

When should I wear my pedometer? Wear your pedometer as much as possible. Please fill out your pedometer log accurately. You should not wear your pedometer in the shower or pool, or while sleeping.

How can I be sure that my pedometer is working? We will check your pedometer and your walking results each week.



1. Mark the time you woke up and went to bed
2. Shade in the boxes for the hours you wore the pedometer

	Mon	Tues	Wed	Thur	Fri	Sat	Sun	Example
	6/11	6/12	6/13	6/14	6/15	6/16	6/17	12/25
4 AM								
5 AM								woke up
6 AM								
7 AM								
8 AM								
9 AM								
10 AM								
11 AM								
12 PM								
1 PM								
2 PM								
3 PM								
4 PM								
5 PM								
6 PM								
7 PM								
8 PM								
9 PM								
10 PM								bed
11 PM								
12 AM								
1 AM								
2 AM								
3 AM								

Weekly Exercise Checklist

1. Exercise for at least 30 minutes on any 3 days of the week
    a. Cross out a block when you complete the exercise task.
    b. If you walk for 30 minutes straight, cross out 3 boxes.

Day 1	Day 2	Day 3	Day 4	Day 5
10 min walking	10 min walking	10 min walking	10 min walking	**Fitness Class w/ Monica …** (1 hr walk if you miss)
10 min walking	10 min walking	10 min walking	10 min walking	
10 min walking	10 min walking	10 min walking	10 min walking	

2. Try to avoid sitting down as much as possible.
    a. How many hours did you spend sitting on:

	Mon	Tues	Wed	Thurs	Fri	Sat	Sun	
0-2 hrs								Great!
2-4 hrs								Very Good!
4-6 hrs								Good.
6-8 hrs								Okay.
8+ hrs								Let's move it.

Week 1 At Home Activities:

☐ Call my buddy to check in

☐ Wear my pedometer and report the hours in my pedometer log

After the 12-week program, I expect to see these changes:

1. _____
   _____
2. _____
   _____
3. _____
   _____
4. _____
   _____
5. _____
   _____
6. _____
   _____
7. _____
   _____

3 people / things will help me stay in this program

1. _____
   _____
2. _____
   _____
3. _____
   _____

3 people / things will make me less likely to stay in the program.

1. _____
   _____
2. _____
   _____
3. _____
   _____

Home Activity

I did _____ squats

I did _____ push-ups

1. Mark the time you woke up and went to bed
2. Shade in the boxes for the hours you wore the pedometer

	Mon	Tues	Wed	Thur	Fri	Sat	Sun	Example
	6/11	6/12	6/13	6/14	6/15	6/16	6/17	12/25
4 AM								
5 AM								woke up
6 AM								
7 AM								
8 AM								
9 AM								
10 AM								
11 AM								
12 PM								
1 PM								
2 PM								
3 PM								
4 PM								
5 PM								
6 PM								
7 PM								
8 PM								
9 PM								
10 PM								bed
11 PM								
12 AM								
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3 AM								

Weekly Exercise Checklist

1. Exercise for at least 30 minutes on any 3 days of the week
    a. Cross out a block when you complete the exercise task.
    b. If you walk for 30 minutes straight, cross out 3 boxes.

Day 1	Day 2	Day 3	Day 4	Day 5
10 min walking	10 min walking	10 min walking	10 min walking	**Fitness Class w/ Monica …** (1 hr walk if you miss)
10 min walking	10 min walking	10 min walking	10 min walking	
10 min walking	10 min walking	10 min walking	10 min walking	

2. Try to avoid sitting down as much as possible.
    a. How many hours did you spend sitting on:

	Mon	Tues	Wed	Thurs	Fri	Sat	Sun	
0-2 hrs								Great!
2-4 hrs								Very Good!
4-6 hrs								Good.
6-8 hrs								Okay.
8+ hrs								Let's move it.

When I imagine myself after finishing the BOLD Healthy Living program, I see:

Week 3 Homework:

Think of a way to creatively express your motivational statement.

You can:
- Write a song
- Draw a picture
- Write a poem
- Cut and paste motivational pictures
- Anything that interests you and represents how you feel after having completed the 12-week program

Bring it with you to class next week to present to your group.

Steps Ups

Row with Exercise Band

I did _____ steps ups

I did _____ rows

1. Mark the time you woke up and went to bed
2. Shade in the boxes for the hours you wore the pedometer

	Mon	Tues	Wed	Thur	Fri	Sat	Sun	Example
	6/11	6/12	6/13	6/14	6/15	6/16	6/17	12/25
4 AM								
5 AM								woke up
6 AM								
7 AM								
8 AM								
9 AM								
10 AM								
11 AM								
12 PM								
1 PM								
2 PM								
3 PM								
4 PM								
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6 PM								
7 PM								
8 PM								
9 PM								
10 PM								bed
11 PM								
12 AM								
1 AM								
2 AM								
3 AM								

Weekly Exercise Checklist

1. Exercise for at least 30 minutes on any 3 days of the week
    a. Cross out a block when you complete the exercise task.
    b. If you walk for 30 minutes straight, cross out 3 boxes.

Day 1	Day 2	Day 3	Day 4	Day 5
10 min walking	10 min walking	10 min walking	10 min walking	**Fitness Class w/ Monica …** (1 hr walk if you miss)
10 min walking	10 min walking	10 min walking	10 min walking	
10 min walking	10 min walking	10 min walking	10 min walking	

2. Try to avoid sitting down as much as possible.
    a. How many hours did you spend sitting on:

	Mon	Tues	Wed	Thurs	Fri	Sat	Sun	
0-2 hrs								Great!
2-4 hrs								Very Good!
4-6 hrs								Good.
6-8 hrs								Okay.
8+ hrs								Let's move it.

Class #4 At Home Activities

Go on two of the walking routes that were handed out in class.
Provide some feedback.

•1st Route: _____ mile(s)

Things I liked about this route

Things I did not like about this route

•2nd Route: _____ mile(s)

Things I liked about this route

Things I did not like about this route

Lunge

Shoulder Press

I did _____ lunges

I did _____ shoulder presses

1. Mark the time you woke up and went to bed
2. Shade in the boxes for the hours you wore the pedometer

	Mon	Tues	Wed	Thur	Fri	Sat	Sun	Example
	6/11	6/12	6/13	6/14	6/15	6/16	6/17	12/25
4 AM								
5 AM								woke up
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4 PM								
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9 PM								
10 PM								bed
11 PM								
12 AM								
1 AM								
2 AM								
3 AM								

Weekly Exercise Checklist

1. Exercise for at least 30 minutes on any 3 days of the week
    a. Cross out a block when you complete the exercise task.
    b. If you walk for 30 minutes straight, cross out 3 boxes.

Day 1	Day 2	Day 3	Day 4	Day 5
10 min walking	10 min walking	10 min walking	10 min walking	**Fitness Class w/ Monica …** (1 hr walk if you miss)
10 min walking	10 min walking	10 min walking	10 min walking	
10 min walking	10 min walking	10 min walking	10 min walking	

2. Try to avoid sitting down as much as possible.
    a. How many hours did you spend sitting on:

	Mon	Tues	Wed	Thurs	Fri	Sat	Sun	
0-2 hrs								Great!
2-4 hrs								Very Good!
4-6 hrs								Good.
6-8 hrs								Okay.
8+ hrs								Let's move it.

Class #5 Activities

A. I spend a lot of time sitting for the following activities:

1. _____
2. _____
3. _____

B. Why do I sit during the above activities?

1. _____
2. _____
3. _____

_____

C. How could I be more active for activities 1, 2, 3?

1. _____
2. _____
3. _____

Write (or draw) yourself an instruction of how you will be more active during 2 times you normally sit down.

Example: When my favorite show comes on, even though I usually feel tired from a long day, I will stand up during commercial breaks to do squats.

1.

2.

Home Activity

In your daily life, try to be active during two situations that you would normally be sedentary.

Example: Normally I sit to watch TV. On Wednesday, I did 20 squats during each commercial break)

Which two activities did you change?

1. _____
   _____
   _____

2. _____
   _____
   _____

How did it feel to change how you normally do things?

_____
_____

Heel Raises

Chair Dips

I did _____ heel raises

I did _____ chair dips

1. Mark the time you woke up and went to bed
2. Shade in the boxes for the hours you wore the pedometer

	Mon	Tues	Wed	Thur	Fri	Sat	Sun	Example
	6/11	6/12	6/13	6/14	6/15	6/16	6/17	12/25
4 AM								
5 AM								woke up
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Weekly Exercise Checklist

1. Exercise for at least 30 minutes on any 3 days of the week
    a. Cross out a block when you complete the exercise task.
    b. If you walk for 30 minutes straight, cross out 3 boxes.

Day 1	Day 2	Day 3	Day 4	Day 5
10 min walking	10 min walking	10 min walking	10 min walking	**Fitness Class w/ Monica …** (1 hr walk if you miss)
10 min walking	10 min walking	10 min walking	10 min walking	
10 min walking	10 min walking	10 min walking	10 min walking	

2. Try to avoid sitting down as much as possible.
    a. How many hours did you spend sitting on:

	Mon	Tues	Wed	Thurs	Fri	Sat	Sun	
0-2 hrs								Great!
2-4 hrs								Very Good!
4-6 hrs								Good.
6-8 hrs								Okay.
8+ hrs								Let's move it.

Class #6 Activities

Updated Goals?

_____

_____

_____

_____

_____

Most helpful activities / people / situations

1.

_____

2.

_____

3.

_____

4.

_____

5.

_____

Most difficult activities / people / situations

1.

_____

2.

_____

3.

_____

4.

_____

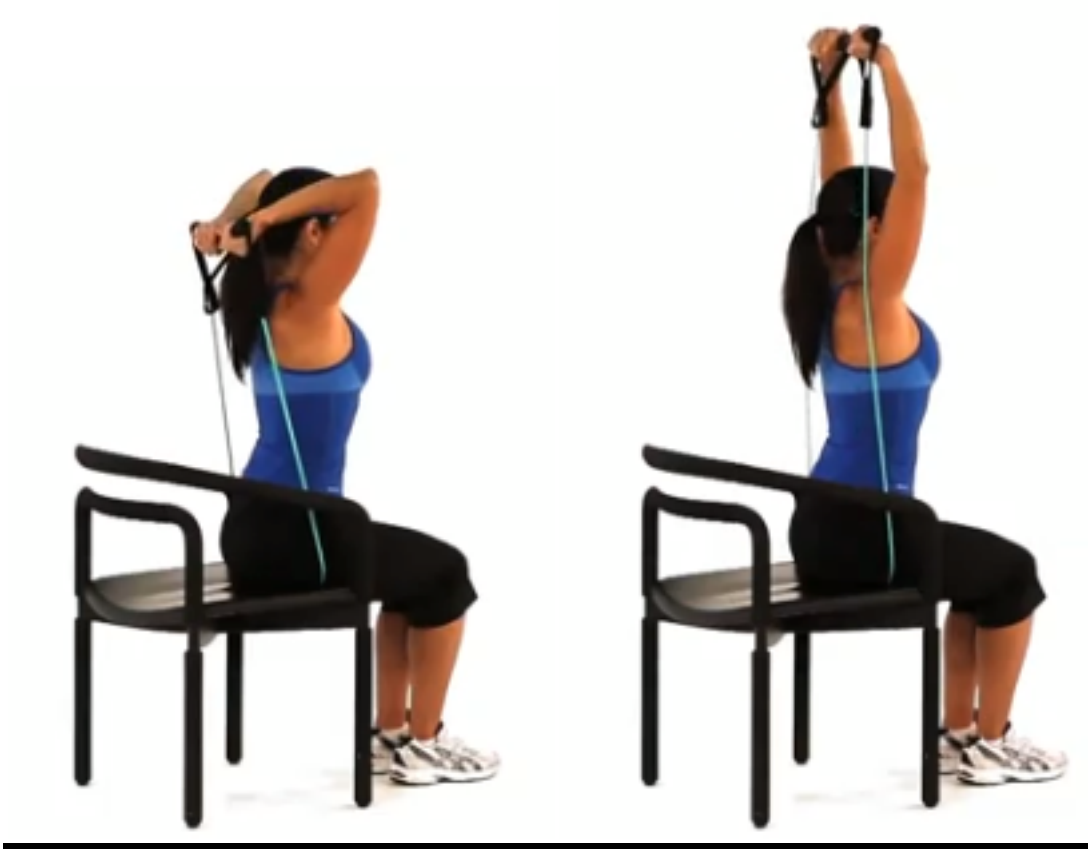
5.

_____

Clams

Biceps Curls

Triceps Extension



I did _____ clams

I did _____ biceps curls

I did _____ triceps extensions

1. Mark the time you woke up and went to bed
2. Shade in the boxes for the hours you wore the pedometer

	Mon	Tues	Wed	Thur	Fri	Sat	Sun	Example
	6/11	6/12	6/13	6/14	6/15	6/16	6/17	12/25
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10 min walking	10 min walking	10 min walking	10 min walking	
10 min walking	10 min walking	10 min walking	10 min walking	

2. Try to avoid sitting down as much as possible.
    a. How many hours did you spend sitting on:

	Mon	Tues	Wed	Thurs	Fri	Sat	Sun	
0-2 hrs								Great!
2-4 hrs								Very Good!
4-6 hrs								Good.
6-8 hrs								Okay.
8+ hrs								Let's move it.

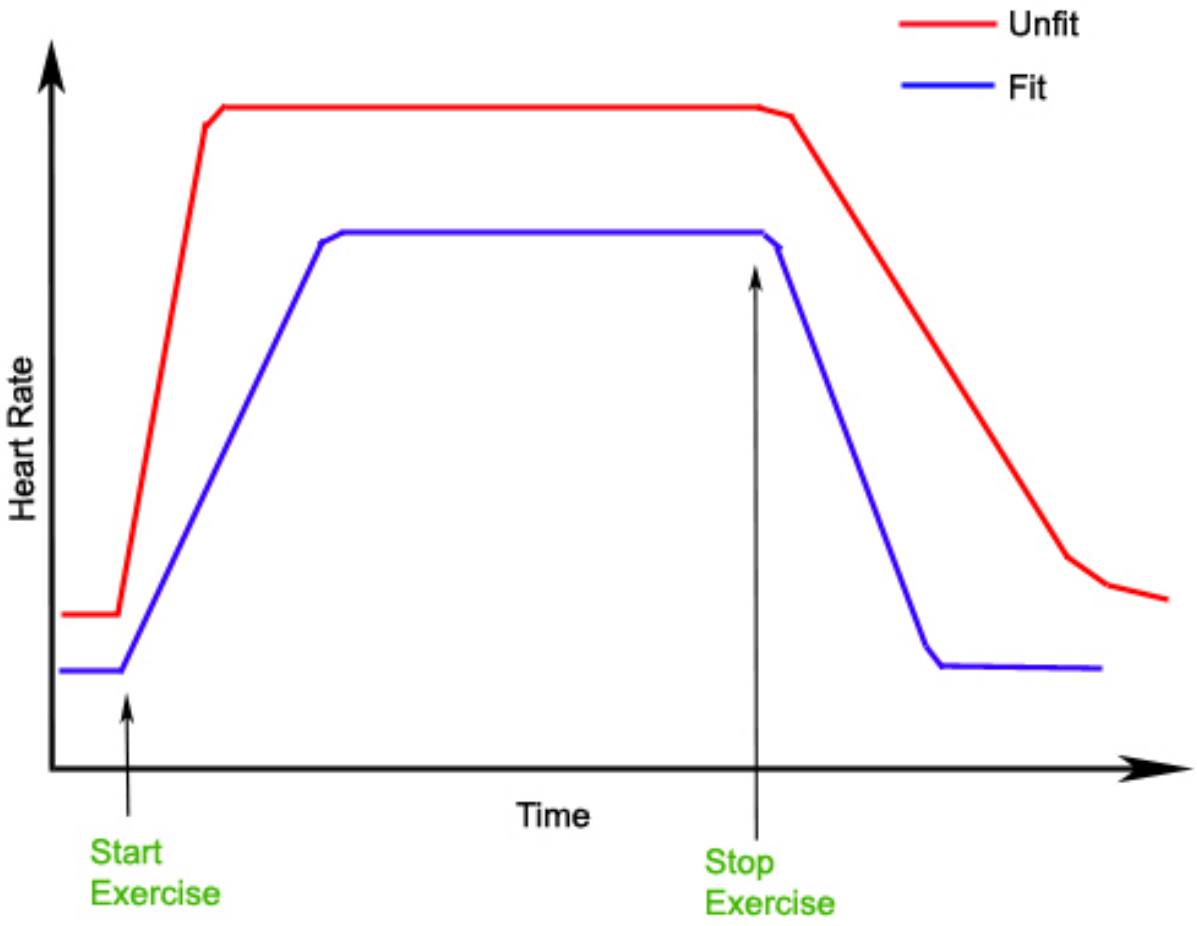
Class #7 Activities

Before I started the program, my weight was _____ lbs.

My current weight is _____ lbs.

My waist is _____ inches (at my belly button)

My resting pulse is _____ beats per minute



Weight	Waist	Heart Rate	Time	**Health**
No Change				

I walked ¼ ½ mile (circle one):

It took me _____ min and _____ sec

My heart rate was _____ beats per minute at the end.

Week 7 Home Activities

1. Measure your waist with your measuring tape: _____ in

2. Measure how long it takes you to walk <u>at least 1</u> of your neighborhood loops:

1 mile loop: _____ minutes _____ seconds

Heart rate at the end: _____ beats per minute
Count the beats in 6 seconds, add a zero on the end

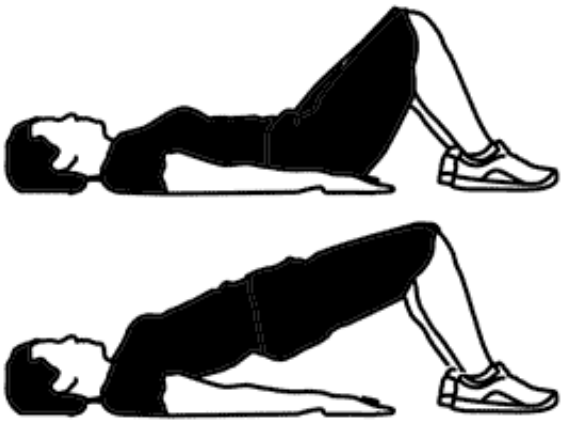
2 mile loop: _____ minutes _____ seconds

Heart rate at the end: _____ beats per minute
Count the beats in 6 seconds, add a zero on the end

3 mile loop: _____ minutes _____ seconds

Heart rate at the end: _____ beats per minute
Count the beats in 6 seconds, add a zero on the end

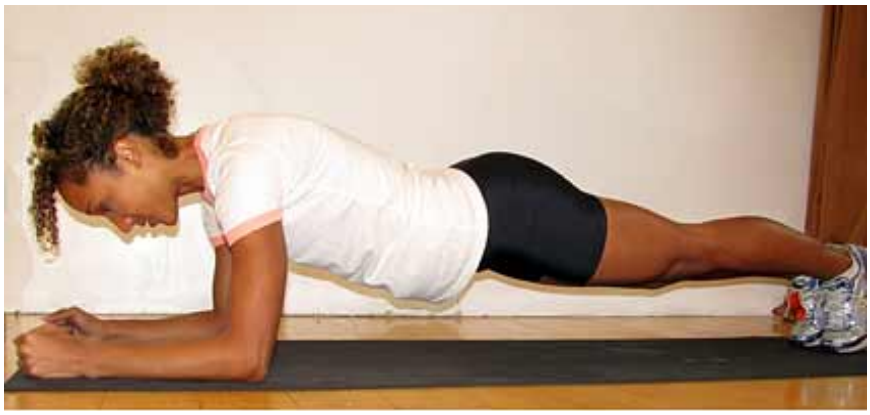
Bridge



Donkey Kick

Plank

or



I did _____ bridges

I did _____ donkey kicks

I did plank for _____ seconds

1. Mark the time you woke up and went to bed
2. Shade in the boxes for the hours you wore the pedometer

	Mon	Tues	Wed	Thur	Fri	Sat	Sun	Example
	6/11	6/12	6/13	6/14	6/15	6/16	6/17	12/25
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10 min walking	10 min walking	10 min walking	10 min walking	
10 min walking	10 min walking	10 min walking	10 min walking	

2. Try to avoid sitting down as much as possible.
    a. How many hours did you spend sitting on:

	Mon	Tues	Wed	Thurs	Fri	Sat	Sun	
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4-6 hrs								Good.
6-8 hrs								Okay.
8+ hrs								Let's move it.

Class #8 Activities

Active Bronx Activities

1. Shopping at a mall	Free	
2. Van Courtlandt Park	Free	
3. Pelham Bay Park	Free	
4. Beach	Free	
5. Walking the dog	Free	
6. Woodlawn cemetery tour	Free	718-920-0500
7. Bronx Museum of the Arts	Free	718-681-6000
8. Queens Country Farm	Free	718-347-3276
9. Bartow-Pell Mansion	$5	718-885-1461
10. Wave Hill (Free on Sat, Tue 9-12)	$8	718-549-3200
11. Botanical Gardens (Free on Wednesdays)	$10	718-817-8700
12. Bronx Zoo	$34	718-220-5100

Week 8 Home Activities

1. Visit at least one of the Bronx Active Activity Locations.
2. See how many steps you take while you are there.

I went to

_____

Pedometer at beginning of trip _____ steps

Pedometer at end of trip _____ steps

How many steps total? _____

1. Mark the time you woke up and went to bed
2. Shade in the boxes for the hours you wore the pedometer

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	6/11	6/12	6/13	6/14	6/15	6/16	6/17	12/25
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6-8 hrs								Okay.
8+ hrs								Let's move it.

Class #9 Activities SELF-TALK

Negative Thought Types	Positive Refocusing
"What did I do today? Nothing. I didn't even walk today. I'll never get in shape."	**IT'S JUST ONE DAY** "So I slipped up. It's just ONE day. Tomorrow I will put my shoes by the front door to remind myself to walk."
"It's too cold to take a walk today." "I don't have the will power or the energy to do this."	**WORK AROUND THE EXCUSES** "I will walk at the mall today." "I will exercise earlier so I have more energy."
"I am tired of handouts and completing my physical activity chart. What's the point?"	**FEEL YOUR GOALS** "Completing my activity charts will help me reach my long-term goals. And that will feel GREAT!"
"So-and-so walked five times this week and I only walked three times."	**BE YOUR BEST!** "I am improving at a rate that is safe for me and in line with my goals."
"I can't keep up with all this. I'll never be able to do this on my own."	**REACH OUT TO SUPPORT SYSTEM** "Whenever I feel like giving up, I will call one of my social support buddies and ask for some help."

What are some negative things you say to yourself when you don't exercise or eat poorly?

1. _____
2. _____
3. _____

What positive statements could you say instead?

1. _____
2. _____
3. _____

Week 9 Home Activities

Write down 3 negative things you have said to yourself this week.

1. _____
2. _____
3. _____

Write down 3 positive things you have said to yourself this week.

1. _____
2. _____
3. _____

1. Mark the time you woke up and went to bed
2. Shade in the boxes for the hours you wore the pedometer

	Mon	Tues	Wed	Thur	Fri	Sat	Sun	Example
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2. Try to avoid sitting down as much as possible.
    a. How many hours did you spend sitting on:

	Mon	Tues	Wed	Thurs	Fri	Sat	Sun	
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4-6 hrs								Good.
6-8 hrs								Okay.
8+ hrs								Let's move it.

Class #10 TAKE CARE OF YOUR BODY

	Prevention	Treatment
Sore muscles	Slow progress	Rest Easy walking
Chaffing	Vasoline Good fitting clothes	Band-aid Ointment
Tendonitis knee achilles	Slow progress Stretching Warm-up	Rest Easy stretching Advil/Motrin*
Muscle Strain	Slow progress Stretching Warm-up	Rest Advil/Motrin*
Joint Pain (inside)	Slow progress Stretching Warm-up	Rest See a doctor

*If your doctor says it's okay

1. Mark the time you woke up and went to bed
2. Shade in the boxes for the hours you wore the pedometer

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2-4 hrs								Very Good!
4-6 hrs								Good.
6-8 hrs								Okay.
8+ hrs								Let's move it.

Class #11 EXERCISING IN THE HOME

At home, try at least 5 different exercises; give them your own name (i.e. Off the couch). How many times can you do each one?

1. _____ # of times _____
2. _____ # of times _____
3. _____ # of times _____
4. _____ # of times _____
5. _____ # of times _____

1. Mark the time you woke up and went to bed
2. Shade in the boxes for the hours you wore the pedometer

	Mon	Tues	Wed	Thur	Fri	Sat	Sun	Example
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Weekly Exercise Checklist

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2-4 hrs								Very Good!
4-6 hrs								Good.
6-8 hrs								Okay.
8+ hrs								Let's move it.

Walking Groups

Bronx House Senior Center 990 Pelham Parkway South Bronx, NY 10461 Telephone: (718) 792-1800 Castle Hill Senior Center 625 Castle Hill Avenue Bronx, NY 10473 Telephone: (718) 824-8910 James Monroe Senior Center 1776 Story Avenue Bronx, NY 10473 Telephone: (718) 893-3484 PSS Parkside Senior Center 6 44 Adee Avenue Bronx, NY 10467 Telephone: (718) 881-7780 RAIN Boston Road Senior Center 2424 Boston Road Bronx, NY 10467 Telephone: (718) 547-8827	RAIN Eastchester Senior Center 1246 Burke Avenue Bronx, NY 10469 Telephone: (718) 882-8513 SEBCO Senior Program (Erma Cava) 887 Southern Blvd. Bronx, NY 10459 Telephone: (718) 617-3465 Senior Services @ Pelham Pkwy. NOR 2425 Williamsbridge Road Ste. 1B Bronx, NY 10469 Telephone: (718) 652-6363 William Hodson Senior Center (The) 1320 Webster Avenue Bronx, NY 10456 Telephone: (718) 538-1515

Appendix L

SEMI-STRUCTURED INTERVIEW OUTLINE

ADAPTED FROM MATTHEWS ET AL. (2010)

- What does being physically active mean to you?

- Describe what you do on a regular basis that involves physical activity.

  Explain: Think of things that you do like household chores, home repairs, yard work, walking to the store or the post office, and how you spend your leisure time.

Facilitator: "For the purposes of this discussion, when we use the terms 'physical activity' or 'exercise,' we mean activities such as gardening, yard work, vigorous cleaning, walking (including walking as a way to get to places where you need to go), swimming, dancing, and yoga. As you think about the following questions, reflect on your own life and what has encouraged or discouraged you from being physically active."

- What motivates you to do the kinds of physical activity you currently do?

  Probes:
  - What benefits do you get from being physically active?
  - Why is it important to you to keep physically active?

  Additional probes:
  - Health
  - Appearance
  - Emotional well-being
  - Being able to play with my children / grandchildren
  - Have done it in the past
  - Being with others (explain relationship – family / friends / coworkers?)
  - Getting out and seeing people
  - Walking to get somewhere
  - Enjoy going to a park in the neighborhood

  Follow up:
  - In which ways (if any) did the 12-week course (classroom and exercise) help you stay motivated?

- What has kept you from being as physically active as you would like to be? Describe those circumstances?

  Probes:
  - Other family responsibilities
  - Not important to family/friends
  - No one to do it with
  - Language barriers
  - Safety concerns in the neighborhood
  - Lighting

  1. No sidewalks
  1. Weather (cold/heat/rain)
  2. Traffic
  3. Physically unable
  4. Fear of injuries or falls
  5. Lack of interest or motivation
  6. Lack of money
  7. Lack of transportation
  8. Places you need to go to are too far away to walk

  Follow up:

  9. In which ways (if any) did the 12-week course (classroom and/or exercise) help you to overcome these challenges?

- If you could imagine the ideal program that would encourage you to be physically active, what would it be like?

  Probes:

  10. On your own or in a group setting?
  11. Outside or inside a building or both?
  12. Number of days a week?
  13. Duration of the class?
  14. Time of the class?
  15. Characteristics of the instructor?
  16. Cost (how much would you pay)?
  17. Proximity to home (how far would you be willing to travel)?

  Follow up:

  18. How could the 12-week course (classroom and/or exercise) be improved to help you become more physical active, or stay physically active.

References

Mathews, A. E., Laditka, S. B., Laditka, J. N., Wilcox, S., Corwin, S. J., Liu, R., . . . Logsdon, R. G. (2010). Older adults' perceived physical activity enablers and barriers: a multicultural perspective. *J Aging Phys Act, 18*(2), 119-140.