The effects of buddy support on physical activity in African American women

Patricia Ann Hogue

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A Dissertation

Entitled

The Effects of Buddy Support on Physical Activity in African American Women

By

Patricia Ann Hogue

Submitted as partial fulfillment of the requirements for the

Doctor of Philosophy Degree in Health Education

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An Abstract of

The Effects of Buddy Support on Physical Activity in African American Women

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The purpose of this study was to determine the effectiveness of an intervention utilizing individual buddy support to increase physical activity in African American women. The current study was a 10-week, pretest/post-test, quasi-experimental design that was conducted at two churches in Toledo, Ohio. Members of one church served as the intervention group and members of the second church served as the comparison
The participants were African American women (25 in the comparison group and 28 in the intervention group). Women in the intervention group were required to recruit and enlist the help of a “buddy” that was to provide social support for physical activity.

Both groups completed the following data collection measures at pretest and post-test: 1) social support for exercise survey (SSES), 2) rapid assessment of physical activity survey (RAPA), 3) body weight and height, 4) diastolic and systolic blood pressure and, 5) a six-minute walk test. Participants in both groups also received educational information on healthy living, a pedometer to serve as a cue to action for walking, and instructions to record daily pedometer steps and physical activity minutes. The intervention group alone was required to identify a buddy, record the number of minutes per day spent interacting with the buddy, and the type of interaction with the buddy.

Seven women dropped out of the comparison group leaving a total of 18 women that completed the study. One participant in the intervention group did not submit physical activity minutes but was included in the analyses for all other measures.

The average age of women in the study was 46 years of age (SD = 10). The vast majority of participants (82%) had at least some college education and 76% had households comprised of 2 to 4 persons. About two thirds of participants worked fulltime outside the home. A majority (43%) of participants was married and 38% had gross household incomes greater than $ 75,000. No statistically significant differences in demographic characteristics were detected between the intervention and comparison groups.

According to participants’ daily logs at week one and at week ten of the study, physical activity minutes decreased during the study for both groups (- 49 minutes
intervention/-1 minute comparison group). For the intervention group only, the RAPA I score increased in a statistically significant way. By the end of the study, 61% of the intervention group and 44% of the comparison group was in the “active” range on their RAPA I scores. For both groups, there were no statistically significant differences over time in mean social support scores for friend social support. However, in the intervention group, family social support scores increased in a statistically significant way. There was no statistically significant correlation between social support, RAPA I scores, and physical activity minutes.

Analysis of the physiologic measures revealed that body mass index statistically significantly decreased over the course of the study for the comparison group only. In contrast, only the intervention group experienced a statistically significantly increase in endurance as measured by the six-minute walk test. There were no statistically significant changes in systolic and diastolic blood pressures for either group.

The findings from the current study do not support the effectiveness of the buddy support intervention in increasing self-reported physical activity minutes. However, RAPA I scores, six-minute walk test distance, and family social support scores did improve over time for the intervention group. The lack of statistical power in the current study and the many limitations make it difficult to state any conclusions with confidence.
DEDICATION

This dissertation is dedicated to my parents:

Frances Mary (Shank) Hendley (1916-1991)

Robert (Roberto) Hendley (1915-1998)

for their unwavering love and support of my educational endeavors. You have been the wind beneath my wings as I traveled through life. I forever remember your words to your children to always trust in God and allow God to order your steps.

“For God so loved the world that he gave his only Son, so that everyone who believes in him will not perish but have eternal life.” John 3:16
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Chapter One

INTRODUCTION

This chapter describes the current levels of physical activity and exercise among African American women and explains the purpose of the study. The chapter also describes the importance of daily physical activity and the association between inactivity and morbidity and mortality. The chapter includes the following sections: 1) Statement of the Problem, 2) Significance of the Problem, 3) Purpose of the Study, 4) Research Questions and Hypotheses, 5) Definition of Terms, 6) Delimitations of the Study and, 7) Limitations of the Study.

Statement of the Problem

Rates of participation in leisure time physical activity among adults in the United States (U.S.) are generally low, particularly among African American women (Adams-Campbell et al., 2000). Surveillance system studies show that few women participate in sufficient regular physical activity to receive the desired health benefits (Ainsworth,
Moreover, women of color report spending less leisure time in physical activity than white women at all levels of social strata. As demonstrated in the Behavioral Risk Factor Surveillance System (BRFSS) data, only 36.3% of African American women met the physical activity recommendations of the American College of Sports Medicine (ACSM) and the Centers for Disease Control and Prevention (CDC) compared to 49.8% of white women (Kruger, Yore, Solera, & Moeti, 2007). For the state of Ohio, 42% of African American women and 49% of white women engaged in recommended levels (CDC, 2006c).

The recommended levels of physical activity can be met in various ways and performed at various levels of intensity. “Moderate-intensity activities” include such activities as brisk walking, bicycling, vacuuming, gardening, or anything else that causes small increases in breathing and heart rate. The CDC and ACSM recommend that adults engage in “moderate-intensity activities” for greater than or equal to 30 minutes per day for a minimum of five days per week (Sapkota, Bowles, Ham, & Kole, 2005).

Recommended physical activity levels may also be met via “vigorous-intensity activities” (e.g., running, aerobics, heavy yard work, or anything else that causes large increases in breathing or heart rate). It is recommended that adults engage in “vigorous-intensity activities” for greater than or equal to 20 minutes per day for a minimum of 3 days per week (Pate, et al., 1995; Sapkota et al.).

Despite the known benefits of physical activity, many women are physically inactive and/or do not participate in the recommended physical activity levels. Inactivity, according to the Center For Disease Control (CDC, 2006a), is defined as less than 10 minutes total per week of moderate or vigorous intensity lifestyle activities. Lack of
regular physical activity may be one reason why cardiovascular disease (CVD) is the leading cause of death for women in the U.S. (Peterson, Yates, Atwood, & Hertzog, 2005).

One of the major risk factors for CVD is physical inactivity. Large cohort studies such as the Women’s Health Study and the Women’s Heart Initiative Observational Study indicate that physically active women have a 60% to 75% lower risk of CVD than inactive women (Albright & Thompson, 2006). The CDC reports that regular physical activity substantially reduces the risk of dying of coronary heart disease and reduces the risk of stroke, colon cancer, diabetes, and high blood pressure (CDC, 2003). Regular physical activity is associated with many health benefits. Some of these benefits include weight control, healthy bones, stronger muscles and joints, reduced risk of falling among older adults, relief of pain related to arthritis, and reduction of anxiety and depression. Regular physical activity is also associated with fewer hospitalizations, fewer physician visits, and lower rates of medication use (CDC, 2006b).

The disparity in physical activity between African American and white women is especially noticeable when rates of inactivity are examined. In 2005, 24% of African American women and 12% of white women were inactive. For the state of Ohio, 19% of African American and 11% of white women were inactive (CDC, 2006c).

BRFSS survey data show that physical activity levels are inversely related to age. In 2005, the proportion of women getting the recommended levels of physical activity declined from 53% in the 18-24 year old group to 36% in the 65 and older group (CDC, 2006c). In Ohio, 61% of 18-24 year old women participated in recommended levels of
physical activity compared to 45% in the 45-64 age group and 37% in the 65 and over age group (CDC).

This relationship between age and physical activity levels is also evident when 2005 BFRSS survey results are analyzed by race and age. The proportion of African American versus white women in various age groups that met the recommended level of physical activity was as follows: 18-24 years old - 52% African Americans/61% whites; 35-44 years old - 39% African Americans/54% whites; 65 years old and above - 28% African Americans/42% whites (CDC, 2006c).

**Barriers to Physical Activity**

Past research has indicated that women face actual and perceived barriers to physical activity. Understanding the barriers to physical activity is important for health promotion efforts aimed at women who engage in low levels of physical activity. Various internal (cognitive) and external (environmental) barriers to exercise have been identified (Walcott-McQuigg, Zerwic, Dan, & Kelley, 2001). Internal barriers cited in past studies have included fear, pain, lack of motivation, and lack of knowledge. External barriers have included lack of the following: support, resources, transportation, and income.

In a study done by Myers and Roth (1997), social factors, such as “don’t like to exercise alone” and “friends do not like to exercise,” were identified as barriers to exercise. A qualitative study featuring six focus groups conducted at two health centers serving communities of predominantly African American women identified lack of community support as a major barrier to exercise (Wilbur, Chandler, Dancy, Choi & Plonczynski, 2002).
Low levels of physical activity in women may be attributed to barriers such as lack of social support. Several descriptive studies identified social support as a primary factor that was associated with physical activity levels, particularly in women (Nies, Vollman & Cook, 1999; Eyler et al., 1999). In a qualitative study to evaluate physical activity, African American women aged 35 to 50 years identified social support from spouses, family, and friends as a key factor that facilitated physical activity (Nies et al.). In a national sample telephone survey of racially diverse women, participants reporting moderate or high levels of social support were much more likely to be physically active than women that reported little or no support (Eyler et al.). Findings showed that participants with the highest level of social support for physical activity were twice as likely to have 300 minutes of total weekly activity as those with no or low social support (Eyler et al.). Therefore, interventions designed to promote physical activity among African American women should include methods of promoting social support for behavioral change.

**Significance of the Problem**

Lack of regular physical activity is a proven risk factor for premature morbidity and mortality. In 2000, the annual costs in the U.S. for diseases associated with physical inactivity were approximately $76 billion (CDC, 2006c). Furthermore, researchers estimate that there are 300,000 deaths per year in the U.S. that are linked to diet and physical activity patterns (McGinnis & Foege, 1993; Powell & Blair, 1994).

Because lack of regular physical activity has become a national public health problem in the United States, *Healthy People 2010* includes two objectives (objectives 22-1 and 22-2) that encourage increased physical activity. These objectives aim to
increase the proportion of adults who engage in regular, moderate or vigorous physical activity to at least 50% and to decrease the proportion of adults who engage in no leisure-time physical activity to 20% (U.S. Department of Health and Human Services [HHS], 2000). Unfortunately, these objectives have not been met by African American women. BRFSS data from 2005 indicate that only 36% of African American women participate in regular, moderate or vigorous physical activity and 24% of African American women are completely inactive (CDC, 2006c).

Millions of Americans suffer from illnesses that can be prevented or improved through regular physical activity. The 1996 report of the Surgeon General on physical activity and health concluded that physical activity reduces the risk of premature mortality in general, and of coronary heart disease, hypertension, colon cancers, and diabetes mellitus in particular (Myers, 2003; Romans, 1997). Since heart disease is the leading cause of death among women in the U.S., interventions that reduce the risk of heart disease could make a major improvement in women’s health (Myers; Romans).

Physical inactivity is a risk factor for cardiovascular diseases. According to the American Heart Association (AHA), the relative risk of coronary heart disease associated with physical inactivity ranges from 1.5 to 2.4 (AHA, 2006a). This increased risk is comparable to that observed for high blood cholesterol, high blood pressure or cigarette smoking (AHA, 2006b). The AHA also states that for less-active, less-fit individuals, there is a 30-50% greater risk of developing high blood pressure. If women would walk briskly for 3 hours per week or exercise vigorously for 1.5 hours per week, this would decrease coronary heart disease risks in women by 30 to 40% (AHA, 2006b).
Obesity among women has also become a significant health problem in the U.S. Lack of physical activity is a primary risk factor for obesity. Obesity-related costs in 1995 among U.S. adults were $99 billion, of which $51.6 billion was for direct medical costs (AHA, 2006c). When using a body mass index (BMI) of 25 to 29.9 as the criteria for overweight and a BMI of 30 or higher as the criterion for obese, NHANES 2003-2004 survey data reports that 62% of women age 20 and older are overweight. Further reporting determined that of the total number, 58% of white women and 82% of African American women were considered overweight. The data also reported that 33% of all women were considered obese; with 30% of white women and 54% of African American women considered obese (Ogden et al., 2006). Similarly, in a stage-targeted physical activity intervention among a predominantly African American low-income primary care population, 69% of the study participants were obese at the time of recruitment (Whitehead, Bodenlos, Cowles, Jones & Brantley, 2007).

**Purpose of the Study**

One possible way to increase physical activity is to provide a greater level of social support for exercise. A comprehensive review of the literature found few studies that investigated the use of individual “buddy support” in an effort to increase physical activity in African American women. The Task Force on Community Preventive Services evaluated evidence of intervention effectiveness by conducting a systematic review of community interventions to increase physical activity. The Task Force strongly recommended social support interventions in community settings (CDC, 2001). The purpose of the current study was to test the effectiveness of an intervention utilizing individual buddy support to increase physical activity in African American women.
Research Questions and Hypotheses

**Research Question 1:** Does a 10-week “buddy support” intervention significantly increase physical activity among African American women in the intervention group?

- **Hypotheses 1.1:** For the participants in the intervention group, there will be a statistically significant increase in the number of minutes spent in physical activity per week.

- **Hypotheses 1.2:** For the participants in the intervention group, there will be a statistically significant increase in Rapid Assessment of Physical Activity (RAPA) scores.

**Research Question 2:** After the 10-week intervention, will there be significant differences in physical activity levels between the intervention and comparison groups?

- **Hypotheses 2.1:** After the 10-week intervention, there will be no statistically significant difference in recorded physical activity minutes between the intervention and comparison groups.

- **Hypotheses 2.2:** At the end of the 10-week intervention, there will be no statistically significant difference in total RAPA scores between the intervention and comparison groups.

**Research Question 3:** Does physical endurance, as measured by the six-minute walk test, significantly improve in African American women as a result of participation in a 10-week buddy support intervention?
• **Hypotheses 3.1:** For participants in the intervention group, there will be a statistically significant increase in endurance as measured by the six-minute walk test distance.

• **Hypotheses 3.2:** There will be no statistically significant difference in six-minute walk test distances between women in the intervention and comparison groups.

**Research Question 4:** Do physiological responses such as BMI and blood pressure significantly decrease as a result of participation in a 10-week buddy support intervention?

• **Hypotheses 4.1:** For participants in the intervention group, there will be a statistically significant decrease in BMI (body mass index) during the study period.

• **Hypotheses 4.2:** For participants in the intervention group, there will be a statistically significant decrease in systolic blood pressure.

• **Hypotheses 4.3:** For participants in the intervention group, there will be a statistically significant decrease in diastolic blood pressure.

**Research Question 5:** After the 10-week intervention, will there be differences in physiological responses (e.g., BMI and blood pressure) between the intervention and comparison groups?

• **Hypotheses 5.1:** After the 10-week intervention, there will be no statistically significant difference in BMI (body mass index) between women in the intervention and comparison groups.

• **Hypotheses 5.2:** After the 10-week intervention, there will be no statistically significant difference in systolic blood pressure between women in the intervention and comparison groups.
• **Hypotheses 5.3:** After the 10-week intervention, there will be no statistically significant difference in diastolic blood pressure between women in the intervention and comparison groups.

**Research Question 6:** Does social support for exercise significantly increase among women that participate in a 10-week buddy support intervention?

• **Hypotheses 6.1:** There will be a statistically significant increase in social support among intervention group participants.

• **Hypotheses 6.2:** There will be no statistically significant difference in social support between women in the intervention and comparison groups.

• **Hypotheses 6.3:** After the 10-week buddy support intervention, there will be no statistically significant correlation between physical activity and social support.

**Definition of Terms**

• **Blood Pressure:** Blood pressure is the force of blood against the walls of arteries. Blood pressure is recorded as two numbers—the systolic pressure (as the heart beats) over the diastolic pressure (as the heart relaxes between beats) (National Heart, Lung, and Blood Institute [NHLBI], n.d.).

• **Body Mass Index:** Body mass index (BMI) is a mathematical formula to assess relative body weight. The measurement correlates highly with body fat. It is calculated by taking the weight of the individual in kilograms and dividing by the square of the height in meters (BMI=kg/m^2) (AHA, 2006a).

• **Buddy Support:** Participants in the intervention group enlisted the help of a significant other, friend, or family member to provide support and encouragement for physical exercise. The buddies enter into a contractual agreement with one another to
complete a 10-week physical activity program. Buddy support was accomplished through telephone calls, email, or one-on-one partnering during exercise.

- **Comparison Group**: Women that participated in a 10-week physical activity program but did not enlist the help of a specific buddy to strengthen their social support for exercise.

- **Intervention Group**: Women that participated in a 10-week physical activity program and did enlist the help of a specific buddy to strengthen their social support for exercise.

- **Leisure-time physical activity**: Leisure-time physical activity is exercise, sports, recreation, or hobbies that are not associated with activities as part of one’s regular job duties, household, or transportation (Sepkota et al., 2005).

- **Moderate-intensity physical activity**: Moderate-intensity activities include such things as brisk walking, bicycling, vacuuming, gardening, or anything else that causes small increases in breathing or heart rate. The recommendation is that adults engage in moderate-intensity activities for greater than or equal to 30 minutes per day for a minimum of five days per week (Sepkota et al., 2005).

- **Physical activity**: Any form of exercise or bodily movement produced by skeletal muscles that result in energy expenditure (Weist & Lyle, 1997). Physical activity may include planned activity such as walking, running, basketball, or other sports as well as other daily activities such as household chores, yard work, walking the dog, etc.

- **Physical endurance**: The capacity to sustain a given velocity or power output for the longest possible time (Jones & Carter, 2000).
• **Physical inactivity**: Less than 10 minutes total per week of moderate or vigorous intensity lifestyle activities (Sepkota et al., 2005).

• **Social Support**: An exchange of resources between two individuals perceived by the provider and/or recipient to be intended to enhance the well-being of the recipient (Shumaker & Brownell, 1984). In terms of exercise, social support includes the building, strengthening and maintaining of social networks that provide supportive relationships for positive behavior change (CDC, 2001).

• **Vigorous-intensity physical activity**: Vigorous-intensity activities include such things as running, aerobics, heavy yard work, or anything else that causes large increases in breathing or heart rate. The recommendation is that adults engage in vigorous-intensity activities for greater than or equal to 20 minutes per day for a minimum of three days per week (Sepkota et al., 2005).

• **Weight**: The gravitational force exerted on an object, usually by the earth. The quality of being heavy and using a system to express weight in a certain unit or standard such as pounds or grams (Jones & Hall, 2004).

**Delimitations of the Study**

This study has been delimited by certain parameters. First, the survey instruments used to collect data were closed-format in style. Therefore, additional information that may have been relevant or important to respondents may not have been collected or analyzed. Second, the survey instruments were written only in English. As a result, this study was delimited to English speaking females. Third, this study enrolled only African American women in the faith-based community as participants. Thus, the study was delimited to African American Christian women that attended two specific churches in
Toledo, Ohio. Fourth, the study was delimited to only women that attended these two churches on a regular basis.

**Limitations of the Study**

This study had a number of significant limitations. First, random selection of study participants and random assignment of participants into the intervention and comparison groups were not possible. Lack of randomization may have introduced bias into the study and may have affected the internal validity of the results.

Second, it is possible that some of the comparison group participants had already been participating in a wellness program sponsored by the church to which they belonged. Exposure to this on-going wellness program and the naturally occurring social support that is part of such programs likely introduced significant bias into the study and negatively affected the internal validity of the results.

To facilitate enrollment of adequate numbers of participants in the study, enrollment for the comparison group occurred over two weeks. Enrollment for the intervention group occurred over three weeks. As a result, true baseline data were not collected for all participants as planned during the week before the start of the 10-week study period. Some of the participants arrived for designated appointments at the first session whereas other participants failed to report for the first session but reported for the second session a week later. When this occurred, activities for both sessions 1 and 2 were completed during week # 2. Such a staggered start meant that baseline data were collected at different times for different participants.

Fourth, African American women in the faith community of Toledo, Ohio, often interact with one another socially. Through social contact between intervention and
comparison group participants, diffusion of information about the study may have impacted the results. It was not possible to completely isolate the comparison group from the intervention group.

Fifth, recruitment and retention efforts produced challenges throughout the study. Recruitment efforts produced a promising list of potential participants: 100 for the intervention group and 50 for the comparison group. However, only 28 women were enrolled in the intervention group, 27 successfully completed every phase of the study and one intervention participant completed eight of the nine measures. The participant did not submit physical activity minutes but was included in the analyses; 25 women enrolled in the comparison group and only 18 successfully completed every phase of the study. Seven women dropped out of the study: seven in the comparison group and none in the intervention group. Such a small sample size decreased the statistical power of the study.

Sixth, inter-rater and intra-rater reliability were not performed for height, weight, six-minute walk test, diastolic and systolic blood pressure measurements. Research assistants were trained according to protocol for physiologic measurements, however, agreement between research assistants was not determined.

Seventh, this was not a blinded study. The lead investigator and the research assistants that collected data were aware of the purpose of the study. They were also aware of which participants were in the intervention and comparison groups. Not being blinded to the intent of the study and to the groups may have introduced bias into the study and affected the validity of the results.
Eighth, both comparison and intervention participants received Therabands at the mid-program point of the study with instruction booklets to increase flexibility and strength. Increased RAPA 2 scores from pre-intervention to post-intervention may have been a result of the bands that were given as an incentive to remain in the study with no regard by the researcher to any possible ramifications to the RAPA 2.

Ninth, this study included women living in Toledo Ohio. Therefore, the ability to generalize these results to other African American women in other geographical areas may be severely limited. Moreover, participants in the study were members or regular attendees at two specific churches. Results of this study may therefore not apply to women that do not regularly attend church. Lastly, this study was only 10-weeks in length. Therefore, long-term effects of buddy support on exercise cannot be determined from this study.

Summary

Heart disease is the leading cause of death among women in the U.S. Physical activity can reduce the risk of premature mortality due to coronary heart disease. However, rates of participation for recommended levels of physical activity are especially low in African American women. African American women have reported that lack of social support is a barrier for engaging in physical activity. The Task Force on Community Preventive Services strongly recommends social support interventions in community settings to increase physical activity. The purpose of this study was to test the impact of a social support intervention on physical activity. Specifically, this study assessed whether increasing social support via a buddy support intervention would
improve the level of physical activity among faith-based African American women in Toledo, Ohio.
Chapter Two

REVIEW OF LITERATURE

This chapter explores research literature that pertains to physical activity and African American women. The major sections of this review include 1) Physical Activity and Risk Factors, 2) Physical Activity Patterns in Women, 3) Barriers to Physical Activity in Minority Women, 4) Social Support and Health, 5) Increasing Physical Activity Using Social Support in Intervention Studies, 6) Increasing Physical Activity Levels Through Church-Based Interventions, 7) Pedometer and Physical Activity Levels, 8) the Health Belief Model and, 9) Summary.

Physical Activity and Risk Factors

Regular physical activity is associated with enhanced health and reduced risk of all-cause mortality and morbidity. Studies show that regular physical activity is a form of primary and secondary prevention for cardiovascular diseases (Manson, et al., 1999; Speck & Harrell, 2003). Regular physical activity provides health benefits including the reduction in risks of coronary heart disease, hypertension, diabetes mellitus type 2, obesity, and premature mortality (Belsa & Warms, 2004).
In 1995, The Centers for Disease Control and Prevention (CDC) and the American College of Sports Medicine (ACSM) convened a group of experts to review pertinent scientific evidence and to develop a clear, concise “public health message” regarding physical activity (Pate, et al., 1995). After review of physiological, epidemiologic and clinical evidence, the expert panel formulated the following recommendation: every U.S. adult should accumulate 30 minutes or more of moderate-intensity physical activity on most, preferably all, days of the week. (Pate, et al.; Wiest & Lyle, 1997). This conclusion was based on evidence that performance of short bouts of activity throughout the day, but totaling at least 30 minutes or longer, can provide significant health benefits. The shift to a “physical activity-health paradigm” from an “exercise-fitness paradigm” was further supported by observation that the greatest health benefits occur when the very sedentary begin a regular program of moderate, endurance-type activity (Wiest & Lyle). Of note, the National Institutes of Health (NIH) and the American Heart Association (AHA) published a consensus statement endorsing the CDC and ACSM recommendations for physical activity guidelines for all ages (NIH, 1995).

**The Role of Physical Activity in Reducing Cardiovascular Disease**

Habitual physical activity prevents the development of coronary artery disease (CAD) and reduces symptoms in patients with established cardiovascular disease (Thompson, et al., 2003). Regular physical activity using large muscle groups, (e.g. walking, running, or swimming) produces cardiovascular adaptations that increase exercise capacity, endurance, and skeletal muscle strength (Thompson et al.). Epidemiologic data suggest that as little as 30 minutes per day of moderate-intensity
physical activity, including brisk walking, reduces the incidence of clinical cardiovascular events (Bassuk & Manson, 2003).

An investigation of the relationship between physical activity and cardiovascular disease (CVD) in women, followed 1,564 University of Pennsylvania female alumnae who were initially free of CVD (mean age, 45.5 years) from 1962 until 1993. The researchers found no overall association between physical activity and CVD risk (Sesso, Paffenbarger, Ha, & Lee, 1999). However, women who walked greater than or equal to 10 blocks/day (approximately 6 miles [9.7 km]/week) had a 33% decrease in the risk of developing CVD.

Prospective data from 72,488 female nurses over an eight-year period documented 645 coronary events (nonfatal myocardial infarction or death from coronary disease). There was a strong graded inverse association between physical activity and the risk of coronary events in increasing quintile groups compared with those in the lowest quintile groups, relative risk 0.77, 0.65, 0.54 and 0.46 ($p$ for trend less than .001) for coronary events (Manson, et al., 1999).

Lastly, in the Women’s Health Initiative Observational Study, 73,743 postmenopausal women ages 50 to 79 years enrolled at baseline were free of diagnosed cardiovascular disease and completed detailed questionnaires about physical activity (Manson, et al., 2002). During follow-up that continued for up to 5.9 years, Manson, et al. documented 345 newly diagnosed cases of coronary heart disease and 1,551 total cardiovascular events. An increasing physical-activity score had a strong graded inverse association with the risk of both coronary events and total cardiovascular events. These findings were similar among white and African American women. The above results
suggest that moderate physical activity plays a role in the prevention of cardiovascular disease.

**The Role of Physical Activity In The Treatment of Hypertension**

Physical activity remains the cornerstone therapy for the primary prevention, treatment, and control of hypertension. A prescription for physical activity is recommended as the initial treatment strategy for lowering blood pressure. Brennan et al. (2005) studied exercise as an antihypertensive lifestyle therapy in 109 women with isolated systolic hypertension. Systolic hypertension was lower among women that moved greater or equal to five hours per day (142.2 +/- 18.7 mm Hg) than those moving less than five hours per day (149.8 +/- 19.0 mm Hg) \((p = .038)\).

Steffen et al. (2001) studied 112 unmedicated high normal or stage one to stage two hypertensive participants randomized to one of three conditions. Compared to the control group (143.2 +/- 9.8 mm Hg), blood pressure levels in the exercise only group as well as their combined exercise and behavioral weight management group (138.6 +/- 8.4 mm Hg) were reduced \((p < .0001)\). Lastly, Seals, Silverman, Reiling, and Davy (1997) found that systolic (-10 mm Hg) and diastolic blood pressures (-5 mm Hg) were significantly \((p = .06 \text{ and } .07 \text{ respectively})\) lowered in 10 postmenopausal women with high normal resting blood pressures or stage one essential hypertension after 12-weeks of moderate-intensity aerobic exercise. In agreement with the above studies, a review of twenty-one exercise intervention studies showed that moderate-intensity aerobic exercise training could lower blood pressure in individuals with stage one and two essential hypertension (Kokkinos, Narayan, & Papademetriou, 2001).
The Role of Physical Activity in Lowering Body Mass Index

Physical inactivity is correlated with higher body mass index (BMI) levels. Both, the National Institutes of Health (NIH) and the World Health Organization (WHO) provide guidelines for definition of overweight and obesity that use body mass index as the criterion measure (Stevens, Juhaeri, Cai, & Jones, 2002). The aforementioned organizations have identified a BMI range of 25 to 29.9 as “overweight” and a value of 30 and over as “obese.”

In the African American Women’s Health Study, 64,101 women provided data on their levels of physical activity. More than 40% of the study population was overweight or obese. Strenuous physical activity was inversely associated with BMI (Adams-Campbell, et al., 2000). In a study by Sharpe, Granner, Hutto, Ainsworth and Cook (2004) to investigate the association between BMI and physical activity, telephone researchers used 2001 Behavior Risk Factor Surveillance Survey questions to measure physical activity. Data revealed a monotonic association between BMI and physical activity levels (n=1810). Odds ratios were statistically significant for both obese and overweight persons (0.50 [.38, .64] and 0.70 [.56, .88], respectively \( p < .05 \)) compared to the normal/underweight reference group. These studies support the suggestion that higher BMI is associated with lower levels of physical activity.

Physical Activity Patterns in Women

Many women participate in low levels of physical activity. Overall, only 32% of U.S. adults of the 1990 National Health Interview Survey (NHIS) met the CDC-ACSM recommendations for moderate physical activity. Moreover, only 29.8% of women met the CDC-ACSM recommendations (Ainsworth, Irwin, Addy, Whitt, & Stolarczyk, 1999;
Jones et al., 1998). In comparison, the early release of 2006 NHIS data, reported that 31.1% of adults in the United States (U.S.) and 31.5% of women met the CDC-ACSM recommendations for moderate physical activity (CDC, 2006a). Ainsworth (2000) reported that a small proportion of women participate in a sufficient amount of regular physical activity to receive the desirable health benefits. According to Ainsworth, 43% of U.S. adult women are classified as sedentary and nearly 40% perform activity at levels that are insufficient to gain health benefits. Furthermore, only 15% of women report regular, sustained physical activity, five or more times per week for 30 or more minutes per day. Similarly, according to data from the 2005 Behavior Risk Factor Surveillance Survey by States, 28.1% of Ohio women report no leisure time activity and 38.8% reported engaging in insufficient physical activity (CDC, 2006b).

Physical activity patterns vary with age, education, income and race. The proportion of women classified as sedentary and insufficiently active, increases with age. Sedentary lifestyles are highest among women with lower education and income levels (King et al, 2000). Women of color report less leisure time physical activity than whites at all levels of social strata (Ainsworth, 2000). Sternfeld, Ainsworth, and Quesenbery (1999) studied 2,636 adult women living in northern California and found that women who were younger, white race, and had higher education were more likely to participate in sports and exercise activities than their older, less educated and minority counterparts.

Women engage in various types of physical activity. American women obtain most of their physical activity in non-exercise settings (Ainsworth, 2000). A study of physical activity among adults living in Baltimore found that walking for transportation contributed significantly to daily physical activity among older, urban African American
women (Young, Miller, Wilder, Yanek, & Becker, 1998). Ainsworth et al. (1999) identified housework, walking for exercise, childcare, and occupational tasks as frequent physical activities reported by middle-aged African American and American Indian women.

**Physical Activity Patterns in African American Women**

African American women in general have lower levels of physical activity than white women. Sharma, Sargent, and Stacy (2005) analyzed BRFSS data from 2003, and found 60.8% of African Americans did not meet the recommended guidelines for moderate intensity physical activity a month prior to the survey. BRFSS data from 2005 indicated that 58.3% of African Americans did not meet the above-recommended guidelines (CDC, 2006c). Whitt, Kumanyika, and Bellamy (2003) found African American women over 20 years of age were more likely to report being physically inactive during leisure time compared with African American men and white men and women (41.2% vs. 23.4%, 13.9% and 23.5%, respectively). In addition, even among older adults, retired African American women reported a lower prevalence of participation in exercise/sports, vigorous activity, regular activity, and walking or biking during leisure time compared to retired African American men and retired white men and women (Evenson et al., 1999). Lastly, data from the 1995 African American Women’s Health Study survey of 64,524 African American women from various parts of the United States revealed 57% of the participants’ reported an hour or less per week walking for exercise (Adams-Campbell et al., 2000).

Rural ethnically diverse women are less active than urban women. A study to assess leisure time physical activity in rural and urban, older and ethnically diverse
women in the U.S. found that rural women, especially southern and less educated women, were more sedentary than their urban counterparts (Wilcox, Castro, King, Housemann, & Brownson, 2000). Researchers studying 234 urban African American women in Baltimore Maryland reported that 21% of the women met the recommendations for physical activity, 61% were insufficiently active and 18% were inactive (Young & Voorhees, 2003). Lastly, as part of the Women’s Cardiovascular Health Network Project, telephone surveys were collected from African American women residing in three rural counties in Alabama (Sanderson et al., 2003). Among the 567 women who were classified into physical activity groups, 221 (39%) met the recommendations, 260 (46%) were insufficiently active and 86 (15%) were inactive. In conclusion, a significant proportion of African American women do not meet the recommended levels of physical activity and exercise. Rural and urban women face different barriers, different enabling factors, and report different patterns of physical activity (Wilcox, et al.).

**Barriers to Physical Activity in Minority Women**

Personal, social and environmental barriers to physical activity in African American women have been identified in various studies. One qualitative study used focus groups to explore African American women’s experiences with physical activity in their daily lives (Nies et al., 1999). Women aged 35-50 years were recruited to participate in the focus groups. The identified barriers to physical exercise were lack of childcare, lack of an exercise partner, competing responsibilities, lack of space at home, lack of motivation, fatigue, and unsafe neighborhoods. Similarly, an investigation of physical activity patterns in 585 women in rural Alabama, found white women were
significantly more likely than African American women to report being physically active ($p = .009$) (Sanderson et al., 2003). Some of the reasons the African American women cited for not being more physically active were health related issues, lack of motivation, no facility, and no safe place to exercise.

Six focus groups in South Carolina with African American women aged 19-51 years identified factors that influence physical activity. Social environmental factors were found to influence how physical activity was enabled or constrained. Social support was seen as positive by helping women to incorporate physical activity in their daily lives (Richter, Wilcox, Greaney, Henderson, & Ainsworth, 2002). However, the absence of social support constrained women’s physical activity. Incorporating exercise partners into daily physical activity routines was considered positive. In contrast, when the coordination of two busy schedules inhibited facilitation of engaging in physical activity, participants viewed it as negative. Social support was referred to as support for exercise from family, friends, coworkers, community professionals and neighbors.

Utilizing a semi-structured interview format to explore and describe the barriers to exercise that occur in low-income African American women, focus groups identified barriers such as living in fear, not having support, not having control, can not be bothered, not having confidence, and exercise is too risky (Mathew, 2000). In addition, thirty-three sedentary African American women between the ages of 40 and 78 from a mixed income community in a large Midwestern city identified perceived internal barriers to exercise such as lack of time and fear of being harmed (Walcott-McQuigg et al., 2001). The identified external barriers included the lack of the following: resources, exercise facilities, income, friend support, and family support.
**Social Support and Health**

**Social Support Definition**

Social support includes the various types of assistance/help that individuals receive from others and is generally classified into three major categories: emotional, instrumental, and informational support (House, 1981; Seeman, 1998). Emotional support is associated with the things that people do that make them feel loved and cared for, that bolster their sense of self-worth (e.g., talking over a problem, providing encouragement/positive feedback). Instrumental support refers to the type of help that others may provide (e.g., help with childcare/housekeeping, provision of transportation or money) and informational support represents the help that others may offer through the provision of information (House, 1981; Seeman, 1998).

**The Relationship Between Social Support and Health**

Many studies have reported a beneficial effect of social support on mental and physical health in adults, including the elderly (Berkman & Syme, 1979; Choi & Wodarski, 1996). The relationship among social ties, community ties, and mortality were assessed using the 1965 Human Population Laboratory survey of a random sample of 6928 adults in Alameda County, California. Subsequent nine-year mortality follow-up findings showed that people who lacked social and community ties were more likely to die in the follow-up period than those with more extensive contacts (Berkman & Syme, 2001). The age-adjusted relative risks for those most isolated when compared to those with the most social contacts were 2.3 for men and 2.8 for women. In another study that targeted older men (mean age = 62.7 years), data from this Normative Aging Study showed that over half of the 1,386 participants reported high levels of support when
reporting high levels of well-being (DuPertuis, Aldwin & Bosse, 2001). Lastly, a community sample of 331 individuals aged 65 years and older was assessed for adequacy of social support along three parameters: roles and available attachments, perceived social support, and frequency of social interaction. Mortality status was determined 30 months after the initial assessment. The crude relative risks of mortality was 1.96 for impaired roles and available attachments, 3.86 for impaired perceived social support and 2.72 for impaired frequency of social interaction (Blazer, 1982). These three parameters of social support significantly predicted 30-month mortality in a community sample of older adults.

A review of six large prospective studies comparing groups with differing degrees of social integration found that less socially integrated individuals had higher mortality rates from all causes, including cardiovascular mortality (House, Landis & Umberson, 1988). Research that provided a direct comparison of the relative importance of structure versus functional aspects of social network ties, as they relate to the susceptibility to coronary artery disease, indicated that certain functional aspects of social network ties are more strongly associated with host resistance to coronary atherosclerosis than are structural characteristics like network size (Seeman & Syme, 1987).

Uchino, Uno, and Holt-Lunstad (1999) reviewed over fifty studies to investigate the association between social support and cardiovascular function with the majority of these studies focusing on the risk of elevated blood pressure in the development of cardiovascular disease. Overall, the researchers found that individuals with higher levels of social support had lower blood pressures than individuals with lower levels of social
support. The researchers also found evidence linking social support to better blood pressure regulation in hypertensive patients.

Epidemiological studies suggest that the association between social support and health outcomes may be more complex in women (Seeman, 1996; Schumaker & Hill, 1991). To predict how social support might influence cardiovascular reactivity during acute stress in women, 88 undergraduate women (mean age = 21 years) received either emotional, instrumental, or no support from a close female or male friend while performing a series of speech tasks (Uno, Uchino & Smith, 2002). Results suggested that the effectiveness of social support for women depended primarily on the quality of the friendship (i.e. purely positive or ambivalent). Women friends were rated as more positive (supportive) than men ($F (1, 76) = 4.52, p < .05$). Women who interacted with a female ambivalent friend had the largest changes in diastolic blood pressure, total peripheral resistance, and pre-ejection period compared to the other conditions. Individuals in the group receiving emotional support reported receiving significantly higher levels of emotional support than did women in the “no support” or instrumental support groups (Uno, Uchino & Smith).

In another study, resting assessments of heart rate, systolic blood pressure, diastolic blood pressure, respiratory sinus arrhythmia and pre-ejection period were obtained from 45 young (mean age = 18.67) and 20 elderly women (mean age = 66.86) to determine the influence of appraisal support on age-related differences in cardiovascular function (Uchino, Cacioppo, Malarkey, Glaser & Kiecolt-Glaser, 1995). Individuals with increased appraisal support had lower resting systolic blood pressures ($M_{high} = 115.82$) ($F (1, 61) = 6.53, p < .02$) and diastolic blood pressures ($M_{high} = 71.85$) ($F (1, 61) = 5.24$).
compared with individuals low in appraisal support (M low = 121.03, M low = 75.21 respectively). This study suggests that one’s appraisal of social support is an important component of social support and may influence cardiovascular risk factors.

**The relationship of social support and physical activity**

Studies to assess the relationships between self-reported physical activity and social support for physical activity find that individuals with lower levels of social support for physical activity were more likely to be sedentary (Eyler et al., 1999). To assess the role of physical activity related social support in a national sample of minority women, the U.S. Women’s Determinant Study was conducted in 1996-1997. The telephone survey of 2,912 women indicated that subjects with high levels of social support were significantly less likely to be sedentary than those with low support, even after adjusting for race/ethnicity (OR = 0.47 [0.38-0.58]; OR = 1.0 respectively). Similarly, data obtained from 153 Latinos (86 females and 67 males) revealed that individuals high in leisure time physical activity received more social support from friends to exercise [F = 6.78, p = .01] (Marquez & McAuley, 2006).

**Increasing Physical Activity Using Social Support in Intervention Studies**

When determining why women do not engage in recommended levels of physical activity, lack of social support is a frequently identified barrier. The Task Force on Community Preventive Services of the U.S. Department of Health and Human Services conducted a systematic review of published studies of community interventions to increase physical activity. Six community interventions received a “strong recommend” or a “recommend” evaluation by the Task Force on Community Preventive Services (CDC, 2001) for the development of intervention programs. The recommended
approaches included two informational/educational approaches, three behavioral and social approaches, one environmental and policy approach. The Task Force strongly recommended that social support interventions be included in community settings. Social support was defined as those interventions that are involved with setting up a buddy system, contracting with another person to complete specified levels of physical activity, or establishing walking groups or other groups to provide friendship and support (CDC). This recommendation by the Task Force provides strong evidence that community-based interventions with women, particularly African American women, should include methods to increase social support for exercise.

As reported in the MMWR (CDC, 2001), social support could come from family, friends, or health care providers such as physicians, nurse practitioners, nurses, therapists, or exercise trainers. Research with older adults has shown that social support from friends and/or co-participants during structured exercise programs resulted in a positive influence on older adults’ adherence to exercise. As seen in a study of older adults living in an urban continuing care retirement community, the study examined factors such as social support (family, friends, and expert support) related to exercise, self-efficacy expectations, outcome expectations and exercise behavior in a sample (n = 74) of older adults (Resnick, Orwig, Magaziner, & Wynne, 2002). The participants were interviewed face to face or via the telephone and were asked to respond to the self-efficacy for exercise scale, the outcome expectations for exercise scale, and the social support for exercise scale. In addition, they were asked to state whether they participated in at least 20 minutes of regular aerobic or resistance exercise three times per week (yes or no). In
this sample, friend support had a statistically significant positive relationship with exercise behavior and indirectly influenced exercise ($p < .05$).

Family members can also provide social support as described in a project entitled Daughters and Mothers Exercising Together (DAMET), a 12-week pilot project designed to improve physical self-perception and to increase recreational physical activity. This study recruited ten mother-daughter dyads and two mother-daughter triads (n=26) through newspaper articles and local Girl Scout troops (Ransdell et al., 2001). Daughter participants were between 11 and 17 years of age and the mother participants were less than 50 years of age. For 24 sessions, the subjects participated in an intervention twice a week, approximately 1.5 to 2 hours each, during a 12-week period. One session per week was dedicated to participating in physical recreational activities and the other session was dedicated to participating in classroom-oriented topics and activities. To facilitate the development of regular physical activity habits, participants were asked to increase their level of physical activity outside of the intervention. This family-based physical activity intervention, grounded in social cognitive theory, promoted positive changes in three of five domains of physical self-perception and changes in perceptions about physical activity. There was a slight increase in weight ($F = 5.5, p = 0.03$). Participants failed to increase aerobic fitness as measured by VO$_2$ peak from baseline ($F = .52, p = .52$). The researchers suggested that possible reasons for the participants’ failure to increase physical activity could be that the intervention only occurred once a week and that the participants were already quite physically active at the start of the study.

Another family based social support study promoted aerobic physical activity among healthy African American families with children in the fifth through seventh
grades (Baranowski et al., 1990). Ninety-four African American families were recruited and randomly assigned to experimental or control groups. Families in the experimental group were encouraged to participate in a program with the following features: one education session and two fitness sessions per week for 14 weeks. Varieties of incentives to improve attendance were offered including free transportation and babysitting. Participation was low, with about 28% participating in the desired fitness center sessions by the end of the program. Of the 60 experimental group adults and 64 experimental group children, 50% of adults and 47% of children did not attend any fitness center sessions. There were no reports of dissatisfaction with the program. The primary self-reported reasons for discontinued or nonattendance were conflicts with work schedule for the adults and conflicts with school schedules for the children. Because of low participation, no differences were detected between experimental and control groups on indicators of cardiovascular fitness. Pre to post changes were detected in metabolic equivalents (METS) for both experimental and control group adults (22.8/46.6 and 16.1/29.4, respectively, \( p < .01 \)). For kilocalorie (kcal) expenditure, the post values were higher than pre values in both experimental and control group (6152/6630 and 4941/4958, respectively, \( p < .01 \)).

Enhancing social support is important in physical activity interventions aimed at women of various racial-ethnic backgrounds. Eyler et al. (1999) assessed the association of physical activity-related social support on several measures of physical activity using data from the U.S. Women’s Determinants Study, a national sample of minority women. The U.S. Women’s Determinants Study conducted a telephone survey of 2,912 African American, Hispanic, American Indian/Alaskan Native, and white women aged 40 and
older. A composite score of physical activity social support (PASS) was analyzed as the independent variable. Four measures of physical activity levels served as the dependent variables. A separate analysis was done to distinguish PASS from friends versus PASS from relatives. The potential confounding effects of race/ethnicity, marital status, age, income and education were evaluated and adjusted in the models. There was no significant difference between the contributions of “friend” support versus “family” support on any of the four physical activity measures. Those women with low social support were more likely to be sedentary.

Wing and Jeffery (1999) looked at the benefits of recruiting participants with friends and increasing social support for weight loss and maintenance. One hundred and sixty-six participants either alone or with three friends or family members were randomly assigned to a standard behavioral treatment or standard behavioral treatment with social support strategies. Participants with friend support had greater weight loss at the end of the four-month treatment and at month ten follow-up then those who did not have social support (weight loss = 8.7 kg versus 5.8 kg). This particular study evaluated the effectiveness of a more comprehensive social support condition, which included both intragroup cohesiveness activities during the initial phase of treatment and intergroup competitions with group contingencies focused on prevention of weight regain. The main finding was that recruiting participants with a team of three friends and treating them with a strong social support intervention decreased the number of dropouts and markedly increased the percentage of participants who maintained their weight loss. In summary, these studies suggest that social support is an important aspect of any intervention designed to help women achieve recommended amounts of physical activity.
Increasing Physical Activity Levels Through Church-Based Interventions

Since churches represent a major social link to the community, they are attractive settings in which to conduct health promotion interventions targeting African Americans (Resnicow et al., 2002). In a church-based physical activity intervention for African American women, 196 participants from 11 churches in the Baltimore county or city were randomized to participate in a six-month aerobic exercise or a six-month stretching and health intervention (Young & Stewart, 2006). One hundred and seventeen (60%) participants completed the six-month follow-up physical activity assessments (61% of aerobic exercise and 58% of stretch and health). Reasons for loss to follow-up included: unable to schedule, no interest, unable to locate, did not participate in intervention and were unwilling to be re-measured. At the end of the study period, physical activity levels determined from the Stanford 7-day Physical Activity Recall (PAR) were not statistically different ($p = 0.06$ to $0.07$) in the aerobic exercise group compared to the stretching and health group. Both treatment groups increased their level of physical activity. When compared to baseline, the stretch and health group had a 26% increase in physical activity, while the aerobic exercise group had an average increase of 18%.

In another church-based study, “Project Joy,” 529 African American women from 16 inner city churches in Baltimore were enrolled in a one-year church-based nutrition and physical activity strategy intervention to tests its impact on cardiovascular risk profiles (Yanek, Becker, Moy, Gittelsohn, & Koffman, 2001). Intervention participants achieved significant improvements in body weight (-1.1 lbs), waist circumference (-0.66 inches), and systolic blood pressure (-1.6 mmHg) one year after program initiation. The self-help group did not achieve significant improvements. For physical activity, in the
intervention group, there were improvements in energy expenditure, although the magnitude of the change was modest ($p = .055$).

Lastly, in the Healthy Body, Healthy Spirit study, 906 African Americans were recruited from 16 churches in the Atlanta metropolitan area and randomized to three treatment groups (Resnicow et al., 2005). Group one (five churches) received a standard nutrition and physical activity intervention. Group two (6 churches) received culturally targeted self-help nutrition and physical activity intervention materials, and Group three (5 Churches) received the same intervention as Group two plus four telephone counseling calls based on motivational interviewing. The cohort was predominantly African American females. The primary measure for physical activity was the Community Health Activities Model Program for Seniors (CHAMPS) physical activity recall. At the one-year follow-up, there was a significant change in physical activity minutes per week from baseline in the treatment groups: control (874.6 to 826.2), treatment 1, (769.5 to 927.7) and treatment 2, (793.9 to 935.9), $p = < .05$ (Resnicow, et al., 2005). In summary, if designed properly, church-based interventions can assist African American women in increasing the level of physical activity.

**Pedometers and Physical Activity Levels**

As cited in LeMasurier, Sidman and Corbin (2003), a pedometer-based target of 10,000 steps per day has been promoted in the popular press as a way for adults to meet the current national physical activity guidelines. Pedometers are simple, inexpensive, body-worn motion sensors that are readily used by researchers and practitioners to assess and motivate physical activity behaviors (Tudor-Locke & Bassett, 2004). Interventions featuring minimal contact with participants in pedometer-based studies are gaining
popularity as a cost-effective method of promoting physical activity. After the initial meeting with participants, minimal contact can be accomplished by utilizing email, mailings, telephone calls, and self-report log sheets.

The impact of a six-week minimal contact intervention on walking behaviors in 36 women, aged 31 to 51 years was evaluated by Heesch, Dinger, McClary, and Rice (2005). Participants wore pedometers, completed weekly logs of daily steps, received weekly emails, and created personal physical activity goals. Participants significantly increased ($p = .001$) their total walking minutes from baseline (median = 55) to post intervention (median = 245). The findings of this study suggest that to increase walking to meet the 10,000 steps per day recommendation among women, minimal contact pedometer based interventions may be an effective low-cost approach.

Pedometer based physical activity interventions may be effective in lowering blood pressure, improving glucose levels and improving body composition. Moreau, et al. (2001) examined the effects of a 24-week pedometer-based walking activity on blood pressure in 24 postmenopausal women with borderline to stage 1 hypertension. The walking activity met the ACSM-CDC physical activity recommendation as measured by pedometers. The researchers reported that resting systolic blood pressure was reduced at 12 weeks by 6 mm Hg ($p < .005$) and further reduced at week 24 by 5 mm Hg ($p < .005$).

Despite the well-known benefits of a physically active lifestyle, many individuals with type 2 diabetes are sedentary (Tudor-Locke, Bell, et al., 2002). In a cross-sectional study on pedometer-based ambulatory activity in 160 free-living individuals with type 2 diabetes, steps per day and BMI were inversely and significantly correlated ($r = -0.27, \ p < .01$) (Tudor-Locke, Myers, et al.). Daily physical activity levels in this obese and
sedentary group of individuals with type 2 diabetes were elevated and led to sustained levels over a two-month post-intervention follow-up period. There was a significant \( p < .01 \) reduction in waist girth (baseline \( M = 107.7 \) to post-intervention \( M = 103.3 \)) and significant \( p < .05 \) reduction in resting systolic blood pressure (baseline \( M = 139.3 \) to \( M = 129.5 \)).

Lastly, a study of eighteen overweight, inactive women in a pedometer based eight-week walking program with no change in diet, improved glucose tolerance (Swartz, et al., 2003). Physical activity as measured by the pedometer (baseline steps \( M = 4,972 \) to post intervention steps \( M = 9,213 \)) increased significantly \( p < .001 \). The increase in activity resulted in significantly \( p < 0.001 \) beneficial changes in two-hour post load glucose levels (baseline \( M = 9.4 \text{mmol/L} \) to post-intervention \( M = 8.6 \text{mmol/L} \)), significant \( p < 0.001 \) decrease in systolic blood pressure (baseline \( M = 138\text{mmHg} \) to post-intervention \( M = 130\text{mmHg} \)) and a significant \( p = 0.002 \) decrease in diastolic blood pressure (baseline \( M = 88\text{mmHg} \) to post-intervention \( M = 83\text{mmHg} \)).

Pedometer driven physical activity interventions have been found to improve body composition variables in middle-aged and postmenopausal women. Studies examining the relationship between pedometer driven physical activity and body composition variables in eighty middle-aged women found a significant correlation between average steps per day and percent body fat \( (r = -.713, p < .0001) \); body mass index \( (r = -.417, p < .0001) \); waist circumference \( (r = -.616, p < .0001) \); hip circumference \( (r = -.278, p = .13) \) and waist-to-hip ratio \( (r = -.652, p < .0001) \) (Thompson, Rakow, & Perdue, 2004). There were significant \( p < .05 \) differences in body composition variables among the activity groups. The researchers found that those
women who walked more (> 6,000 steps/day), had lower percent body fat, body mass index, waist circumference, hip circumference and waist-to-hip ratios when compared to those women who were less active (< 6000 steps/day).

In a similar study, it was concluded that sedentary postmenopausal women can meet current public health recommended weekly physical activity through planned moderate-intensity walking as measured by pedometer steps (Jordan, Jurca, Tudor-Locke, Church, & Blair, 2005). Data used from a sample of 111 sedentary women from the DREW (Dose Response to Exercise in Women) study, aged 45-75 years, were randomly assigned into one of three exercise groups expending 4, 8 or 12 kcal.kg\(^{-1}\).wk\(^{-1}\) (KKW) for a six-month study. Participants wore pedometers at baseline and throughout the study. At the conclusion of the study, the initially sedentary postmenopausal women met with a significantly linear trend \(p = .001\) the current recommendations of weekly physical activity: 50% (4 KKW), 100% (8 KKW), and 150% (12 KKW).

Lastly, 93 women wore a pedometer for 14 days after receiving body composition measurement for height, body mass, percent body fat, trunk fat, and waist and hip circumference to examine the relationship between pedometer-determined physical activity and adiposity in postmenopausal women (Krumm, Dessieux, Andrews, & Thompson, 2006). Significant inverse associations were found between average steps per day and all adiposity variables (ranging from \(r = -.487\) to \(-.368, p < .001\)) demonstrating that postmenopausal women who take more daily steps have more favorable adiposity profiles.

Pedometer based physical activity interventions have also been effective in workplace groups. A pilot study examined the influence of a pedometer-based intervention on
physical activity levels of 37 college employees: 29 females and 8 males (Croteau, 2004). The intervention consisted of goal-setting, pedometer use, self-monitoring, and weekly e-mail reminders. Physical activity measures (pedometers and survey) were taken at baseline and immediately following the intervention. The results indicated a significant increase in average daily steps \( (p < .01) \) from baseline (M = 8565, SD = +/- 3121) to steps after the program (M = 10,538 SD = +/- 3681). Feedback from participants indicated the following components had an impact on their daily step increase: (1) having step goals and strategies to use each day; (2) being able to examine the number of steps recorded on the pedometer throughout the day; and (3) recording the daily steps and strategies used in a log (Croteau).

A medical worksite study determined if wearing a pedometer could significantly increase awareness and the amount of physical activity in 400 female employees at a large health care setting (Rooney, Smalley, Larson, & Havens, 2003). The women were encouraged to walk 10,000 steps per day, set daily step goal, keep a log of their daily activity, and to wear the pedometer all of the time. The women who wore the pedometers all of the time \( (n = 173) \) were more aware of their activity level \( (86\%, p = .0031) \), became more active \( (44\%, p = .0027) \), met the 10,000 step per day goal more often \( (47\%, p = .0001) \) and were more likely to walk more than 10,000 steps per day \( (85\%, p = .0001) \). The most significant benefit to wearing a pedometer may not be its ability to monitor the actual amount of activity in any given day, but rather to provide immediate feedback for participants by serving as a cue to action and to reinforce positive behaviors.
The Health Belief Model

The Health Belief Model (HBM) is one of the most widely used public health theoretical frameworks. Social psychologists developed the HBM during the 1950’s to predict why individuals did not participate in preventative health behaviors (Rosenstock, 1975). The model assumes a value expectancy approach, postulating that behavior depends upon the expected outcomes of an action and the value an individual places on those outcomes (Strecher, Wang, Derry, Wildenhaus, & Johnson, 2002). The HBM has six constructs: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, self-efficacy and cues to action (Glanz, Lewis, & Rimer, 1997; Kloeblen & Batish, 1999). According to the HBM, the likelihood that someone will take action to prevent illness depends on the individual’s perception that (a) they are personally vulnerable to the condition, (b) the consequences of the condition would be serious (c) the precautionary behavior effectively prevents the condition, and (d) the benefits of reducing the threat of the condition exceed the costs of taking action (Al-Ali & Haddad, 2004).

The Health Belief Model can be used to develop interventions to increase physical activity. The Health Belief Model proposes that four types of beliefs influence health behaviors. Applied to physical activity, these health beliefs are: the individual’s perceived susceptibility of developing health problems because of inactivity; the perceived impact of the health problems on the individual’s quality of life; the individual’s belief that adopting an active lifestyle will be beneficial for them; and the extent to which the benefits of exercising exceed the costs of exercising for the individual (Marcus, King, Clark, Pinto, & Bock, 1996). The model also incorporates cues to action
as important elements in electing or maintaining patterns of behavior. Cues to action involve stimuli that motivate an individual to engage in the health behavior. The stimulus that triggers action may be internal or external (Becker & Maiman, 1975). Health motivation has also been used as part of the HBM in predicting health related behavior.

To understand levels of physical activity among individuals, various researchers have identified a number of variables that may influence levels of physical activity. Two particularly cognitive variables that are consistently cited in research as accounting for physical activity levels are perceived barriers and perceived benefits. Perceived barriers refer to an individual’s evaluation of the potential obstacles (e.g., limited time) that curtail him or her from engaging in a health behavior (Brown, 2005).

A total of 398 college students completed the Exercise Benefits/Barriers Scale and a measure of self-efficacy, the Physical Exercise Self-Efficacy Scale (Brown, 2005). In addition, a sample of 275 students (134 men and 141 women) also completed a semi-structured interview on physical activity, the Seven-day Physical Activity Recall. A large proportion of the participants (81.5%) met the physical activity guidelines. Simple correlations revealed a significant correlation between perceived benefits and physical activity ($r = .20, p < .05$) but not with perceived barriers ($r = -.11, p > .05$). In this population, only perceived benefits significantly accounted for differences in physical activity levels.

To evaluate the effect of a pre-intervention physical activity preparatory course on physical activity, and social, cognitive, and Stages of Change Theory constructs, a sample of 82 low-income multiethnic women (75% Latina) completed an eight-week course
designed to prepare them to become more active prior to randomization into a 10-month physical activity intervention (Collins, Lee, Albright & King, 2004). Participants completed pre-course and post-course measures. Increases in knowledge, perceived social support for exercise, minutes of walking per week, and total cognitive and behavioral processes followed the pre-preparatory course. Perceived barriers and self-efficacy for exercise did not change from pre-course to post-course. There was a significant increase in perceived social support from friends representing a relative increase in social support of greater than 15% in less than two months. The researchers suggest that the interactive method in the delivery of the preparatory course facilitated self-disclosure and resolution of barriers to exercise through group problem solving.

Lastly, a self-report survey was conducted for the purpose of assessing characteristics associated with self-management of type 2 diabetes (attitudes, certain behaviors, perceived barriers and perceived knowledge) among 196 low income white (n = 86) and African American adults (n = 100) enrolled in the Virginia Food Stamp Nutrition Education Program (Cox, Carpenter, Franklin, Poole, & Gaylord, 2004). A majority of the whites (81.4%) and African Americans (84%) reported they were told to exercise regularly by their healthcare provider. Forty-nine percent of the whites and 50% of the African Americans said they exercised on a regular basis. Of the 88 subjects who reported type of exercise, 71% of whites and 72.7% of African Americans walked. There were no significant correlations between physical limitations, perceived barriers to physical activity and current physical activity levels. The researchers believed the manner in which the question was asked might contribute to not finding a correlation between these variables. If the participant responded that they were participating in
regular physical activity, they were not asked about possible physical limitations and perceived barriers to exercise.

The HBM was used as the theory to examine the role of exercise in African American women with type 2 diabetes mellitus (Koch, 2002). The study determined if women who maintain a regular exercise regimen possess different health beliefs and perceived benefits than those who did not exercise regularly. Using a 32-item Health Belief Model Diabetes Scale administered to a convenience sample of 31 African American women, the investigator identified statistically significant differences between “exercisers” and “non-exercisers” in perceived benefits ($t = 7.85$, $df = 29$, $p < .001$) and barriers ($t = -7.21$, $df = 29$, $p < .001$) to exercise and glycemic control ($t = 7.43$, $df = 29$, $p < .001$).

Another application of the HBM examined cognitive responses to a 4-month health promotion program targeting diet and physical activity in recently cohabitating couples. The period when partners begin living together often signals changes in lifestyle. Burke, Giangiulio, Gillam, Beilin, and Houghton (2004) evaluated the couples by using the constructs of the Stages of Change, Health Belief Model, and self-efficacy constructs on a written questionnaire. Seventy-eight couples were randomized to one of three group-controlled trials: no intervention, interactive group sessions and educational mail outs. Social support was considered central to the study and therefore encouraged among the couples. The proportion in the action and maintenance stage for physical activity increased significantly in both the intervention groups compared with the control ($p < .001$). Perceived barriers to physical activity fell by 12% in the intervention groups compared with 1% for the control, ($p = .051$). Family support was a significant predictor
of change in physical activity behavior. Couples that had high partner social support for health promotion reported improved specific health behaviors. Health related behavior was also influenced by perceptions of the severity of the consequences of the behavior and the severity of the risk.

The Health Belief Model is often paired with other theoretical models in intervention studies that look to change behaviors. Juniper, Oman, Hamm, and Kerby (2004) used the Transtheoretical Model (TTM) stages of behavior change and the relationship among constructs in the Health Belief Model (HBM) to investigate possible differences in perceptions of physical activity among African American college women. A cross sectional survey was conducted with a convenience sample of 233 African American women ages 18 to 30 years. The variables of interest included the TTM stages of physical activity behavior and the HBM constructs of perceived benefits, barriers, susceptibility, severity, self-efficacy and cues to action. Generally the theory-based perceptions related to physical activity did vary according to the participants’ stage of behavior change, with the exception of perceived benefits (mean = 3.1, p > .05) for precontemplation vs. action (mean = 3.3, p > .05). Perceived barriers were significantly higher in the inactive (precontemplation) stage (mean = 2.3, p > .05) than in more active (action) stages of physical activity behavior (mean = 1.9, p > .05). Whereas inactive (precontemplation) stages for perceived severity (mean = 3.1, p > .05), cues to action (mean = 2.9, p > .05), and self-efficacy (mean = 47.7, p > .05) were significantly higher in the more active (action) stage for severity (mean = 3.4, p > .05), cues to action (3.1p >.05) and self-efficacy (66.5, p > 0.05).
**Theoretical Model**

Two constructs of the Health Belief Model were used in the current study: perceived barriers and cues to action. To address the barrier of lack of social support for engaging in physical activity, the intervention group was instructed to enlist a “buddy” that would provide support and encouragement for exercise. To provide cues to action, both comparison and intervention groups received ethnic and gender specific printed and verbal information from the researcher on how to begin to engage in physical activity and ways to increase physical activity levels. In addition, both the comparison and intervention groups received pedometers, physical activity log sheets and incentive items such as water bottles, sweatbands, Therabands® and tee shirts. In summary, the HBM can be used in the design, implementation, and evaluation of health promotion and disease prevention programs and interventions.

**Summary**

This chapter reviewed the literature on the importance of physical activity in the promotion of health and prevention of disease. Every U.S. adult should accumulate 30 minutes or more of moderate-intensity physical activity on most, preferably all, days of the week. The role of engaging in physical activity serves to prevent or ameliorate many risk factors for the development of disease states such as cardiovascular events, type 2 diabetes mellitus, and hypertension.

A review of the literature served to provide background information on the physical inactivity levels among women and the specific patterns of physical inactivity in African American women. Barriers to physical activity in African American women
were explored and various studies were reviewed that featured social support and church-based interventions to increase physical activity levels.

This review also examined pedometer-based interventions and how wearing pedometers can help to increase physical activity, lower blood pressure, lower body mass index and facilitate positive changes in body composition. In addition, studies were reviewed that utilized the Health Belief Model as a theoretical framework for behavior change. This literature review served as a foundation for developing the methods for the current research project.
Chapter Three

METHODS

This chapter describes the methods used to conduct the study including the following major sections: 1) Purpose of the Study, 2) Study Design, 3) Subjects, 4) Variables, 5) Measures, 6) Procedures, 5) Analysis of Data and, 5) Summary.

Purpose of the Study

The purpose of the current study was to assess the impact of a buddy support intervention on physical activity among African American women. The researcher hypothesized that providing social support for exercise in the form of buddy support would increase physical activity in African American women.

Study Design

A pretest-posttest, non-equivalent groups, quasi-experimental design was used for the current study. The non-equivalent groups design is probably the most frequently used design in social research (Trochim, 2000). The non-equivalent group design is structured like a pretest-posttest randomized experiment, but it lacks the key feature of random selection and random assignment. Research studies lacking random selection and
assignment of subjects are susceptible to selection bias that may weaken the internal validity of the study. To minimize this threat, the researcher selected groups that were as similar as possible so that the intervention group was comparable to the comparison group. The researcher attempted to establish equivalency between groups by recruiting subjects of the same race (African American), same sex, from the same community (Toledo, Ohio), and from similar African American, evangelical churches.

**Subjects**

**Protection of Human Subjects**

Prior to data collection, the investigator received approval to conduct the study from the following groups/persons: the Human Subjects Research Committee at the University of Toledo, Bishop Duane Tisdale, Pastor of Friendship Baptist Church, and Raymond Bishop, Pastor of Mt. Pilgrim Baptist Church. There were minimal risks to participants in this study. Participation was voluntary. Participants were free to stop their participation in the research project at any time without penalty. All data collection forms were coded to protect subjects’ confidentiality. In addition, contact information for participants was secured in a locked cabinet in the researcher’s office, unavailable to anyone other than the researcher. Following the study, the contact information was destroyed. See Appendix A for the letter of approval and consent form.

**Selection of Subjects**

The subjects for this research study were African American women who lived in the greater Toledo area and were members of Friendship Baptist or Mount Pilgrim churches. The participants met the following inclusion criteria:
1. Eighteen to seventy years of age
2. Female
3. African American descent or African heritage
4. Members of Friendship Baptist or Mount Pilgrim churches

The subjects were excluded if they reported any medical condition that would prevent participation in daily physical activity. To assess their physical eligibility to participate in physical activity, the prospective participants were asked to complete The Physical Activity Readiness Questionnaire (PAR-Q). If the PAR-Q results indicated that the prospective participant would be at risk due to increased exercise, the prospective participant was asked to seek medical clearance from her personal physician.

Two protestant churches with predominantly African American congregations served as the sites for recruitment. Participants recruited from Friendship Baptist church were designated as the intervention group and participants recruited from Mt. Pilgrim church were designated as the comparison group.

Recruitment occurred via flyers at the church and recruitment announcements in church newsletters. Recruitment displays were arranged in the narthex of the two churches. The researcher also made public announcements at each church and personally recruited participants after church services and while attending various organizational meetings at each church. See Appendix J for a copy of the recruitment notices.

**Sample Size**

To detect an increase in physical activity among the groups, a power analysis was performed for a two-sample \( t \)-test. The projected mean for physical activity minutes per week for the intervention group was 150 minutes (based on recommended guidelines of
at least 30 minutes per day, preferably on most days of the week). The projected mean for physical activity minutes per week for comparison group was 140 minutes. The difference in the projected means between the intervention and comparison groups was ten minutes with a common standard deviation of fifteen. At an alpha level of .05 and a desired power level of 80%, one would need a sample size of 28 participants per group to conduct a one-sided, two-sample $t$-test.

Twenty-five participants were enrolled in the comparison group. Eighteen participants successfully completed every phase of the twelve-week study (72% completion rate). Twenty-eight participants were enrolled in the intervention group. Twenty-seven participants successfully completed every phase of the study (96% completion rate), and one participant did not submit physical activity minutes but was included in the analyses.

**Variables**

Dependent variables were measured to determine the effectiveness of the intervention (Blessing, 2001). The dependent variables were:

- Self-reported physical activity as measured by logged total number of minutes spent in physical activity at week one and at week ten of the study
- Physical activity levels for type of activity and amount as measured by the Rapid Assessment of Physical Activity (RAPA I) scale
- Physical activity levels for strength and flexibility as measured by the Rapid Assessment of Physical Activity (RAPA II) scale
- Social support as measured by the Social Support and Exercise Survey (SSES)
Physical activity levels as measured by Yamax Digiwalker pedometer steps at week one and at week ten

Physical endurance as measured by the six-minute walk test (6MWT)

Physiological responses as measured by body mass index (BMI) and systolic and diastolic blood pressures

Independent variables are ones whose boundaries are defined in advance and are selected because they are causative or important to the logical purpose of the research study (Blessing, 2001). The independent variables are assumed to cause something to happen. The independent variables for this study were:

- Buddy support as measured by total minutes of buddy support and type of buddy support (email, telephone, or in person exercise)

**Measures**

The Physical Activity Readiness Questionnaire (PAR-Q) was used as a screening tool to determine if prospective participants were able to participate in physical activity without health risks. The primary outcome measures for the study were the Rapid Assessment of Physical Activity (RAPA) scores I and II. The secondary outcome measures included Social Support and Exercise Survey (SSES), buddy support minutes and types, physical activity minutes, pedometer steps, systolic blood pressure, diastolic blood pressure, six-minute walk test and BMI. Listed below is a more detailed description of the measures used in the current study.

**Demographics**

The researcher designed several items to capture demographic information from participants. Demographic information was obtained from both comparison and
intervention groups at pretest. The week before the study, participants were asked their age, level of education completed, how many people lived in their household, total gross income for the household, marital status, employment status and race. See Appendix B for a copy of the instrument.

**The Physical Activity Readiness Questionnaire (PAR-Q)**

The PAR-Q instrument is a validated screening tool used to identify those individuals in whom an increase in physical activity might be medically inappropriate or those who should have medical advice concerning the type of activity most suitable for them (Shephard, 1988). The PAR-Q assesses readiness to engage in physical activity using a ten-item scale that requires a “no” for all questions for the person to be considered “safe” to engage in physical activity. This instrument was administered before participants were formally enrolled in the study.

**Rapid Assessment Physical Activity (RAPA)**

The RAPA scale is a validated instrument developed to provide an easily administered and interpreted method of assessing levels of physical activity among adults older than 50 years (Topolski et al., 2006). Clinicians and measurement experts at the University of Washington developed this scale for primary care settings (Glasgow, et al., 2005). In preliminary validation studies by Glasgow et al., the RAPA compared well with more established physical activity measures. According to Topolski et al., a major advantage was that the RAPA enabled respondents to visualize differences in activity intensity. Pictures and examples were made culturally relevant and setting relevant. Compared with the Behavioral Risk Factor Surveillance System (BRFSS) and the Patient-Centered Assessment and Counseling for Exercise (PACE), the RAPA was more
positively correlated with the Community Healthy Activities Model Program for Seniors (CHAMPS) moderate caloric expenditure \( (r = .54\) for RAPA, \( r = .40\) for BRFSS and \( r = .44\) for PACE) and showed as good or better sensitivity (81%), positive predictive value (77%), and negative predictive value (75%) as the other tools. The flexibility and strength-training questions of the RAPA had similar properties. Specificity, sensitivity, and positive predictive value of the questions on flexibility and strength training were in the 80% range, except for specificity of flexibility questions (62%). A t-test on mean caloric expenditure showed significant differences between those who reported inadequate physical activity on the RAPA and those who met the guidelines for moderate or vigorous activity with the RAPA, outperforming either the PACE or the BRFSS questions, \( p < .001\) (Topolski et al.). In the current study, this instrument was administered to both groups the week preceding and the week after the 10-week study.

**Scoring of the RAPA Survey**

The RAPA score is a measure of the level and intensity of physical activity. When scoring the instrument, two scores are reported. For the RAPA I score, the RAPA scale has seven questions that assess the type and amount of physical activity, which requires a yes or no answer. According to the designers of the RAPA survey, a “yes” response is worth the number of points that corresponds to that question. For example, a “yes” response to question one is coded as “1.” A “yes” response to question two is coded as “2.” If a participant answered “yes” to more than one question, the question with the highest points is the assigned score. For example, if a participant answered “yes” to question two and “yes” to question five, the participant is assigned a score of five. The total score from these items ranged from one to five. The score is the maximum level of
activity for which the respondent checked yes. The interpretations of the RAPA scores are listed below:

<table>
<thead>
<tr>
<th>Score</th>
<th>Highest Question Checked</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>sedentary q1</td>
</tr>
<tr>
<td>2</td>
<td>under-active q2</td>
</tr>
<tr>
<td>3</td>
<td>under-active regular light q3</td>
</tr>
<tr>
<td>4</td>
<td>under-active regular q4 or q5</td>
</tr>
<tr>
<td>5</td>
<td>active q6 or q7</td>
</tr>
</tbody>
</table>

The second score, RAPA II, are the responses to the strength and flexibility items, scored separately. These items determined whether the participants engaged in strength or flexibility exercises.

<table>
<thead>
<tr>
<th>Score</th>
<th>Response Combination</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Selected NO for both strength and flexibility</td>
</tr>
<tr>
<td>1</td>
<td>Selected YES for strength but NO for flexibility</td>
</tr>
<tr>
<td>2</td>
<td>Selected NO for strength but YES for flexibility</td>
</tr>
<tr>
<td>3</td>
<td>Selected YES for both strength and flexibility</td>
</tr>
</tbody>
</table>

In the current study, the RAPA scores were obtained at pretest and posttest to measure physical activity levels across the study. See Appendix C for a copy of the instrument.

**Social Support and Exercise Survey (SSES)**

This validated instrument is used to measure social support for exercise behaviors (Sallis, Grossman, Pinski, Patterson, & Nader, 1987). The Social Support and Exercise Survey (SSES) is a 13-item instrument that describes things that people might do or say
to encourage someone who is trying to exercise regularly. Respondents are asked to rate how frequently family members and friends did or said such things in the past three months. Of the 13 questions on the survey, ten of the items specifically elicit responses pertaining to exercise and social support. The remaining three questions elicit responses for family rewards and punishment or criticism for engaging in exercise. In the current study, this instrument was administered to both groups the week before and the week after the 10-week study.

The psychometric properties of this instrument have been reported as follows: reliability (range, $r = .55$ to .86), internal consistency (range, alpha = .61 to .91), and adequate validity (Sallis et al., 1987). Most factors on this instrument appear to be stable enough to use as subscales with the exception of the family rewards and punishment factors. When used in a study with African American women, high internal consistency was reported for social support and exercise from family (alpha = .86) and friends (alpha = .92) (Wilcox, Bopp, Oberrecht, Kammermann & McElmurray, 2003). In the current study, similar to Wilcox et al., the internal reliability coefficient was .89 for family social support and .92 for friend social support.

**Scoring of the Social Support and Exercise Survey (SSES)**

The Social Support and Exercise Survey (SSES) asks respondents to rate how frequently family members and friends did or said anything to encourage exercise in the last three months. For family social support, the participants are instructed to rate how often anyone living in their household said or did what was described on the survey during the last three months. For friend social support, the participants rate how often
their friends, acquaintances, or coworkers say or do what is described in the question during the last three months.

The participants are instructed to select one answer for each question using the following response scale: 1) never, 2) rarely, 3) sometimes, 4) often, 5) very often, and 6) does not apply. During data analysis, the answers for the questionnaire are coded as follows: 0= does not apply, 1= never, 2= rarely, 3= sometimes, 4= often and 5= very often. Scores for family social support and friend social support were calculated separately. For family and friend social support, the potential range is 0 to 50. For family social support only, there is an optional scale for family rewards and punishment with a possible range of 0 to 15. The rewards and punishment subscale was not used in data analysis for the current project. The higher the respondent’s total score, the greater the level of his/her perceived social support. Each participant received a social support score for family and a social support score for friends. See Appendix D for a copy of this instrument.

*Physical Activity Minutes Log Sheet*

The intervention and comparison groups were instructed to complete a daily physical activity log sheet and record the number of minutes they engaged in light, moderate or vigorous physical activity. To compare week one and week ten levels of physical activity minutes, the total of the first seven days of physical activity minutes and the total of the final seven days of physical activity minutes were compared. In the current study, participants in both groups logged the number of minutes engaged in physical activity for 10 consecutive weeks. See Appendix E for a copy of the log sheet.
The selection of an appropriate criterion measure against which to validate physical activity surveys is difficult due to the absence of a universally accepted “gold standard” for measuring population level physical activity participation (Timperio, Salmon, Rosenberg, & Bull, 2004). Many different criteria have been used to validate physical activity surveys including caloric intake, heart rate monitors, physical work capacity, motion sensors, pedometers and other questionnaires (Washburn, Heath, & Jackson, 2000). Physical activity logs have been used in previous research to measure physical activity with modest levels of correlation reported between the physical activity logs and biometric measures of physical activity (i.e. accelerometers) (Matthews & Freedson, 1995; Schmidt, Freedson & Chasan-Taber, 2003; Timperio et al.). These results suggest that recording daily activity is cost-effective and an acceptable intervention that may increase activity levels in women (Speck & Looney, 2001).

**Pedometer Step Log**

The most significant benefit to wearing a pedometer may not be its ability to monitor the actual amount of activity in any given day, but rather to provide immediate feedback for participants by serving as a cue to action and to reinforce positive behaviors. Each participant in the intervention and comparison groups received a Yamax Digiwalker pedometer with a safety strap to count steps. The participants were instructed to wear the pedometer every day and at the end of the day to record the number of steps on the physical activity log sheet. Total pedometer steps for week one and total pedometer steps for week ten were used in the data analysis for the comparison and intervention groups. In the current study, participants in both groups logged the number of daily steps for 10 consecutive weeks. See Appendix E for a copy of the log sheet.
**Six-Minute Walk Test**

The six-minute walk test (6MWT) is a validated, simple, safe and low-cost field test often used before and after physical training to evaluate physical capacity or endurance (Kervio, Carre & Ville, 2003). The self-paced 6MWT assesses the sub-maximal level of functional capacity (American Thoracic Society [ATS], 2002). The 6MWT is a practical simple test that requires minimal equipment and training for assistants. A pre-measured level hallway, stopwatch, and specific instructions are all that are necessary for this test. The 6MWT requires the participant to walk and therefore can be performed easily by all ages. The test measures the distance that a participant quickly walks on a flat, hard surface in a period of six minutes. In the current study, the 6MWT was performed the week before and the week after the 10-week study.

A study to test the reliability and intensity of the 6MWT in twelve healthy elderly subjects aged 60-70 years, found a significant correlation between VO$_{2\text{max}}$ and anthropometric values and six minute walk test parameters ($r = .97$, $r^2 = .94$, $p < .01$) (Kervio et al., 2003). According to Kervio et al., the use of coefficients of variation (CV) and standard deviation (SD) in addition to classical statistical analysis is recommended to study a method’s reliability. Two familiarization trials of the 6-MWT are required to obtain reliability in healthy subjects aged 60-70 years and is well tolerated in this population. After familiarization trials, high reliability makes this test appropriate for assessing functional capacity in healthy subjects. In the Kervio et al. study, CV and SD for distance decreased more than half between the first two and the last two six-minute walk tests. This confirms that familiarization trials with the six-minute walk test are required in healthy elderly subjects. However, the American Thoracic Society (ATS)
guidelines for the 6MWT do not recommend practice walks. The ATS position is that a practice test is not needed in most clinical settings (ATS, 2002). In the current study, practice tests were not performed.

The following procedure was followed each time the 6MWT was conducted. At each church, the length of the hallway was marked every three feet. A starting line, which marked the beginning and end of each 100-foot lap, was marked on the floor using white colored tape. A lap counter system consisting of strokes was used to count the laps and a countdown timer was used to document the six-minute time. Assistants were trained using the standard protocol and then supervised while they conducted several tests before performing alone. The participants were informed to wear comfortable clothing, appropriate shoes for walking and instructed to walk between the two orange cones, back and forth in the hallway for six minutes. There were two walk stations located in separate hallways for each data collection session. Walkers were tested individually at each location. For each participant in the comparison and intervention groups, distances walked were recorded in feet. See Appendix F for a copy of the protocol.

**Blood Pressure**

To measure blood pressure, the researcher used Omron electronic blood pressure monitors. Omron electronic blood pressure monitors are tested for accuracy against two protocols, the Association for the Advancement of Medical Instruments (AAMI) and the International Protocol of the European Society of Hypertension. In March 2001, the *British Medical Journal* published the results of testing for electronic blood pressure monitors. Of the 23 devices that were validated, only five were recommended of which all five were Omron products. In the current study, blood pressure measurements were
taken during the week preceding the study and the week after the study. Blood pressures were taken using the following procedure: sitting blood pressure levels in the right and left arm were recorded for each participant. Guidelines revised by the American Heart Association in 2005 were followed for taking the blood pressure measurements. Blood pressure measurements were recorded for diastolic and systolic measurements using an Omron electronic blood pressure monitor. Assistants placed the cuff as directed on the participant’s arm and pushed the button to begin the measurement of the blood pressure. A stethoscope or bulb inflation was not required to obtain the measurement. When needed, a large blood pressure cuff was used for those participants with larger upper arms. Right and left arm blood pressure measurements were averaged to provide one reading. The unit of measure was millimeter of mercury (mmHg). See Appendix G for a copy of the protocol used to measure blood pressure.

**Height**

Height was measured for the comparison and intervention groups at pretest only, the week before the study began. The height measurements were used in the calculation of body mass index. Height was obtained with a tape measure that was affixed to the wall. Participants were instructed to remove their shoes, and place their backs against the wall for measurement. Measurements for each participant were recorded to the nearest centimeter. See Appendix H for a copy of the protocol.

**Weight**

The Tanita 300 scale was used to measure the weight of participants in both groups the week before and the week after the 10-week study. The weight measurements were used in the calculation of body mass index. Participants were weighed without
shoes while wearing light indoor clothing. Weight was recorded in kilograms for each participant. (See Appendix H).

**Body Mass Index (BMI)**

Using Microsoft Excel, body mass index (BMI) was calculated for both groups the week before and the week after the 10-week study. It was calculated by taking the weight of the individual in kilograms and dividing by the height in meters squared (BMI=kg/m²).

**Buddy Support Log**

The intervention group participants were instructed to identify a buddy and have him/her sign a contract that specified his/her responsibilities as a buddy during the ten-week study. The intervention group recorded the time spent with their buddy in minutes in a column that was specific to the intervention group’s physical activity log sheet. Participants were instructed to record actual physical activity minutes spent with their buddy on the log sheet. For telephone and email support, participants were instructed to record a standardized value of ten minutes for each telephone call or email received from their buddy. Total buddy support minutes for week one through week ten were used in the data analysis. See Appendix B for a copy of the instrument.

**Procedure**

At the time of recruitment, prospective members of the comparison group were given a copy of the PAR-Q screening survey and a consent form to complete and return. Reminder letters were mailed to prospective members of the comparison group informing them of the time and date of the pre-intervention meeting and reminded participants that the PAR-Q and consent forms had to be completed before participation in the study. At
the pre-intervention meeting, those comparison group participants who had not completed the PAR-Q were given another copy of the PAR-Q and a consent form. Participants were encouraged to read the consent form and complete the PAR-Q. If they answered “yes” to any of the questions on the PAR-Q, they were instructed to take the form to their primary care provider and obtain permission to participate in the ten-week physical activity study. Fifteen prospective participants in the comparison group had a positive PAR-Q and only one provided clearance from their primary care provider before participating in the study. The remaining 14 prospective participants were not enrolled in the study.

For the intervention group, prospective participants did not receive the PAR-Q or consent forms at the time of recruitment. At recruitment times, there were large numbers of women at the display table making it difficult to distribute surveys and forms. Therefore, the researcher obtained the names, addresses and telephone numbers of prospective participants for the intervention group. Subsequently, a letter was sent to the prospective participants along with the PAR-Q and consent form with instructions to read and complete the PAR-Q and the consent form and bring it to the first pretest session. For “yes” answers on the PAR-Q, participants were instructed to contact their primary care providers for permission to participate in the study. Twenty-five prospective participants in the intervention group had a positive PAR-Q and only three provided clearance from their primary care provider before participating in the study. The remaining twenty-two prospective participants were not enrolled in the study. See Appendix K for a copy of the letter and Appendix L for the PAR-Q instrument.
To differentiate intervention group materials from comparison group materials, all surveys and forms for the comparison group were printed on green paper. All surveys and forms for the intervention group were printed on pink paper. To reduce potential diurnal variations in weight and blood pressure measurements, data collection was scheduled at the same time of the day for pretest and posttest. To encourage participation in the study, incentives such as mints, suckers, buttons, and calendars were given to participants in both groups. To decrease potential attrition, appointment cards were given to the participants with the date, time and place to report for the follow-up sessions. Reminder cards were mailed to each participant one week prior to the data collection sessions. See Appendix K for copies of the appointment and reminder cards.

Training

Research assistants included one adjunct faculty member and two core faculty members from the University of Toledo, Health Science Campus, Department of Physician Assistant Studies and graduate students from the University of Toledo. All assistants were trained to take blood pressure, height, weight and conduct the six-minute walk test according to predetermined protocols. The research assistants did not participate as subjects. No assessment of inter-rater or intra-rater reliability was conducted for any of the measures.

The Intervention

To test the effect of buddy support for exercise, both the intervention and comparison groups were given exactly the same conditions with the exception of two: only the intervention group was instructed to contract with a friend or family member to provide buddy support and the data collection locations were different. Both groups were
given education, encouragement to increase levels of physical activity, incentives for attending data collection meetings, pedometers, instructions on how to use the pedometers, log sheets to record pedometer steps, and logs to record physical activity minutes. Data were collected from members of both groups using the measures described previously.

Participants in the intervention group identified one person to serve in the role as a “buddy” that would support exercise behavior. The buddy was to provide daily support in the form of, but not limited to, making telephone calls to encourage or get feedback as to how the participant was doing, sending emails for encouragement or feedback, engaging in physical activity with the participant, and meeting with the participant to encourage or get feedback.

Only participants in the intervention group were given a copy of a buddy contract that outlined the responsibilities and duties of the buddy when providing social support. The participants were instructed to give the designated buddy the contract, have him/her read the requirements for being a buddy, and if he or she agreed to provide buddy support, obtain a signature on the contract. The participants were instructed to bring a copy of the buddy contract to the next session. The intervention group was instructed to have daily contact (minimum five times per week) with their support buddy. Buddy support was recorded as number of minutes in the column labeled buddy support minutes on the intervention group physical activity log sheet. Participants were instructed to log actual minutes for physical activity and a standardized value of 10 minutes for each telephone call or email.
Figure 1. Data Collection Timeline

<table>
<thead>
<tr>
<th>Data Collected: Both Groups</th>
<th>Week Preceding Study</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6*</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>Week Post Study</th>
</tr>
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<td>Physical Activity Readiness Questionnaire (PARQ)</td>
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<td></td>
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<td></td>
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<td></td>
<td></td>
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<tr>
<td>Rapid Assessment Physical Activity (RAPA)</td>
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<td></td>
<td></td>
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<tr>
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<td></td>
<td></td>
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<tr>
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<td></td>
<td></td>
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</tr>
<tr>
<td>Pedometer Step Log</td>
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<td></td>
<td></td>
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<td></td>
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<td>Six-Minute Walk Test</td>
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<td></td>
<td></td>
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<tr>
<td>Diastolic Blood Pressure</td>
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<tr>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

*Participants returned at week six for a meeting to turn in log sheets from the previous 5 weeks, to receive new log sheets for the remaining 5 weeks, and to receive tangible incentives for participating.
Using the measures described previously, the researcher collected data from members of both groups according to the schedule in Figure 1. For both groups, two pretest data collection meetings were scheduled during the week preceding the ten-week study. Some participants arrived for designated appointments at the first session whereas other participants missed their appointments and failed to report for the first session but reported for the second session. When this occurred, activities that were scheduled for the first two pretest data collection sessions were done in one session.

**Description of First and Second Pre-intervention Meetings with Participants**

At the first pre-intervention meeting with participants, the researcher described the purpose of the study, provided a complete description of what participants were being asked to do, answered questions, and collected signed consent forms and completed PAR-Q surveys. Exercise permission notes from health care providers of both groups were collected from those participants who answered yes to any of the PAR-Q questions. For those who forgot their permission notes or for whom permission notes were pending, they were instructed to bring them to the second pre-intervention meeting. During this pre-intervention meeting, participants in both groups completed the following measures:

- Demographic information
- Systolic and Diastolic blood pressures
- Height
- Weight
- The social support and exercise survey to determine pretest levels of social support
- The RAPA instrument to determine pretest activity levels
- A six-minute walk test to assess pretest endurance
During the first pre-intervention meeting, the intervention group participants were told that they would need to identify a person who would serve as their buddy support while they participated in the ten-week intervention. The participants were given a buddy contract that was to be signed by their buddy and returned at the second pre-intervention meeting (See Appendix L for a copy of the contract).

During the first pre-intervention meeting, participants in both groups were given a packet containing a copy of a three-day physical activity log sheet, a pedometer, a pedometer instruction sheet and an appointment card for session two. The researcher gave detailed instructions for recording and completing the daily physical activity log sheets as outlined below:

- Record daily number of minutes they were engaged in physical activity
- Record the level of physical activity (light, moderate or vigorous)
- Record the number of steps taken as recorded by the pedometer
- Subjects were encouraged to include activities from each of the three main categories of physical activity: endurance (aerobic), flexibility (stretching), and strength (weight lifting).

Instructions were given to the participants as to how to position and wear the pedometer to measure walking steps. The participants were instructed to place the pedometer on their belt or waistband as soon as they woke up each morning and remove it before going to bed each night. A typed instruction sheet outlining the above instructions was given to each participant. Participants were told that any incremental improvement in steps from when they first started the program would be beneficial, with
the ultimate goal being 10,000 steps or more per day on most days of the week (Tudor-Lock & Bassett, 2004). This information was printed on each log sheet for both groups.

If the participants attended the first pre-intervention session, they were instructed to place the pedometer on their body the following morning and to complete the physical activity log sheet as instructed above for three days. They were instructed to bring the log sheets to the second pre-intervention meeting. Having participants log their physical activity levels (pedometer steps) for three days prior to the start of the project enabled the participants to practice logging and the researcher to obtain physical activity levels with which to develop intervention goals. This data was not used in the data analysis. The practice also helped participants learn how to fill out their log sheet and work out any issues with the researcher regarding how and when to wear the pedometer. Before the end of the pre-intervention meeting, the researcher distributed incentives and rewards to participants for keeping their appointment. A nutritional snack was served and a water bottle with an inspirational message was given to each participant in both groups.

**Second Pre-intervention Data Collection Session**

Prior to the second pre-intervention data collection session, the researcher called each participant in both groups and reminded them of their scheduled appointment. For those that had attended the first session three days prior, the preceding three-day physical activity log sheets were reviewed and questions or concerns were addressed. For those that returned their practice physical activity log sheets, physical activity goals were determined by setting a gradual increase over current physical activity levels. In addition, instructions to gradually increase their daily pedometer steps and physical activity goals according to the CDC recommendation were discussed with the groups. These
instructions were printed on the intervention and comparison group physical activity log sheets.

Comparison and intervention participants received educational material on types of physical activity and the important benefits of engaging in physical activity for African American women. In addition, the participants were given instructions on techniques to help gradually increase their exercise levels.

If the participants in the intervention and comparison groups attended the first pre-intervention session, weight and height were measured for BMI calculation, systolic and diastolic blood pressure measurements were obtained. If a participant did not attend the first pre-intervention session, the following forms or data were collected at the second pre-intervention session: height, weight, blood pressures, consent form, PAR-Q survey, demographics, RAPA survey, and SSES survey.

During the second pre-intervention data collection meeting, only the intervention group received continued instruction on expected buddy support activities. Once again, the intervention group was instructed to have daily contact (minimum five times per week) with their support buddy. Intervention group participants were instructed to record the daily number of minutes of buddy support in the additional column labeled buddy support minutes on the physical activity log sheet as well as the type of buddy support received (Appendix B).

**Week Six**

Participants in both groups were asked to attend a meeting during week six of the study. This meeting was needed to encourage participant retention, collect completed log sheets from the five prior weeks, to distribute new log sheets for the remaining five
weeks, and to provide an incentive for continued participation. Participants in both groups received a reminder card one week before the scheduled day to return for the week six data collection. During the week six meeting, the following activities took place:

- Participants received motivational encouragement, physical activity FAQ sheet, and an African American food pyramid.
- Log sheets that had physical activity minutes and pedometer steps recorded were collected for the preceding five weeks.
- Participants were given an opportunity for questions and answers.
- Participants in each group received a packet containing five copies of a one-week physical activity log sheet and an appointment card for post testing with verbal instructions to continue or increase their physical activity levels for the remaining five weeks of the study.
- As an incentive and reward for keeping their appointment, a nutritional snack was served and Therabands were given to each participant in both groups.

**Posttest Data collection**

Participants in both groups were asked to return to the data collection sites the week after the 10-week study period had concluded. Participants in both groups received a reminder card one week before the scheduled day to return for data collection. During this meeting the following events and activities took place:

- The comparison and intervention groups completed:
  - Blood pressure measurements
  - Weight for BMI calculation
Six-minute walk test to measure endurance

- RAPA
- SSES
- Post program “customer satisfaction” survey

- Logs sheets with recorded physical activity minutes and pedometer steps were collected for the preceding five weeks.
- Participants were given an opportunity for questions and answers.
- Light nutritional refreshments were served.
- Each participant received a parting gift as a thank you for participation in the study.

In the colorfully decorated bag with inspirational appliqués was a printed tee shirt with motivational words, a cookbook for African American heart healthy cooking, physical activity and nutritional literature specific to African American women.

**Analysis of Data**

All data were checked for accuracy of input prior to analysis. Intention-to-treat (ITT) analysis, which is typically reserved for randomized clinical trials, was not performed on the current study data. According to the revised Consolidated Standards of Reporting Trials (CONSORT), the basic principle for ITT is that participants in trials should be analyzed in the groups to which they were randomized, regardless of whether they received or adhered to the allocated intervention (Altman et al., 2001). There are only a few studies in the literature where ITT analysis was performed on physical activity intervention data. In the Gabbe, Branson and Bennell (2006) study, the participants received two of the five interventions. The data from the two interventions was used for the ITT analysis. Reasons for the decision to not perform ITT on the current study data
included the fact that the current study was a quasi-experimental design and lacked randomization, the noncompleters did not participate in the physical activity intervention, nor did they complete the eight measures needed for data analysis. According to the CONSORT principles, in cases where data is missing, the analysis involves making assumptions about outcomes in the lost participants. In the current study, making assumptions could introduce bias because the participants that did not complete the study were different from the comparison group. The comparison group received interventions (e.g., water bottles, wrist bands, pedometers, printed exercise and nutritional handouts, cookbooks and tee shirts) throughout the 10-week study that served to keep them motivated.

For all participants, the first seven days (week one) of logged physical activity minutes and pedometer steps were classified as “week one” values. Week ten values were classified as “post-test” values. For week ten, the last seven days of logged physical activity minutes and pedometer steps were used to calculate week ten measurements. The initial coding of measures and variables has been included for review in the Appendices B, D and E. All data was analyzed using SAS (SAS Institute, Cary, NC) and SPSS 15.0 software (SPSS, Inc., Chicago, IL).

Distributions for each of the categorical demographic variables were described and included frequencies and percentages. Using Microsoft Excel and the SPSS software applications, body mass index was calculated at pretest and posttest from the ratio of weight (kg) to height (m$^2$). After data entry, all variables were plotted to determine their distribution. Parametric tests were performed on those variables that had a normal distribution (intervention group physical activity minutes, six-minute walk test, BMI,
systolic and diastolic blood pressures, family and friend social support; control group six-minute walk test, BMI, systolic and diastolic blood pressures, family and friend social support). For those variables that did not have a normal distribution, nonparametric tests were used (intervention group RAPA 1 and RAPA 2 scores; control group physical activity minutes, RAPA 1 and RAPA 2 scores).

Descriptive statistics were generated for both groups (intervention and comparison). For continuous and interval level data, statistics included mean, standard deviation, range, and median. Confidence intervals were calculated based on large-sample assumptions. Change over time was calculated as posttest minus pretest (i.e. week ten minus week one). For categorical data, frequencies and percentages were calculated.

For continuous or interval data, the normality assumption was assessed by visual examination of plots and the Shapiro-Wilk test of normality. If the Shapiro-Wilk p-value exceeded .05, then parametric statistical tests were used. Otherwise, nonparametric tests were used.

Changes over time within both groups were tested with either paired t-test or signed rank test. Differences between intervention and comparison groups were tested with either the Wilcoxon two sample test or unpaired t-test. Categorical demographic characteristics were compared between groups using Chi-square or Fisher’s Exact test. All statistical tests were conducted as though the null hypothesis is “no difference” and the alternative hypothesis is “a difference.” Correlations between social support and physical activity were analyzed using the Spearman Rank Order Correlation Coefficient test.
For the participants who did not complete the study, distributions for each of the categorical demographic variables were described and included frequencies and percentages. For continuous and interval level data, statistics included mean, median, standard deviation, and range.

For testing the hypotheses, the following tests were used to describe the findings: signed rank test for hypotheses 1.1, 1.2, 3.1, 4.2; Wilcoxon two-sample test for hypotheses 2.1, 2.2, 3.2, 5.2; paired $t$-test for hypotheses 4.1, 4.3, 6.1; unpaired $t$-test for hypotheses 5.1, 5.3, 6.2 and Spearman rank order correlation coefficient test for hypotheses 6.3.

**Summary**

This chapter describes and outlines the methods, measures and procedures that were used to collect data and test buddy support as an intervention for increasing physical activity in African American women. This was accomplished by measuring the following dependent variables: physical activity minutes, RAPA scale I and II, social support as measured by the social support and exercise survey, physical endurance as measured by the six-minute walk test, and physiological variables as measured by BMI, systolic, and diastolic blood pressures. The independent variables in this study were buddy support as measured by the buddy support minutes. Data analysis consisted of frequencies and descriptive statistics on the demographic information, nonparametric tests on abnormal distribution variables, and parametric tests on normally distributed variables.
Chapter Four

RESULTS

The results of the data analyses are presented in this chapter. The content of this chapter includes the following sections: 1) Subject Recruitment and Retention, 2) Demographic Characteristics of Participants, 3) Changes in Outcomes Over Time Within the Intervention Group, 4) Changes in Outcomes Over Time Within the Comparison Group, 5) Changes in Outcomes Over Time: Intervention Versus Comparison Groups, 6) Correlation Between Baseline Social Support and Physical Activity at End of Study, and 7) Differences Between Groups at Week 10. Lastly, the results of hypotheses testing are discussed in relationship to the research questions.

Subject Recruitment and Retention

Participants for this study were recruited from two predominantly African American protestant churches in Northwest Ohio. African American women were approached and invited to participate in this study in June 2005. The recruited participants from the Mt. Pilgrim Baptist Church were designated as the comparison group and the recruited participants from the Friendship Baptist Church were designated
as the intervention group. The 10-week study was conducted from July 2005 through September 2005.

**Demographic Characteristics of Participants**

All 46 participants were women of African American heritage or descent. The average age of women in the study was 46 years of age (SD = 10). The vast majority of participants (82%) had at least some college education and 76% had households comprised of 2 to 4 persons. About two thirds of participants worked fulltime outside the home. A plurality (43%) of participants was married and 38% had gross household incomes greater than $75,000. No statistically significant differences in demographic characteristics were detected between the intervention and comparison groups (Table 1).

**Intervention Group**

Initially, 100 women were recruited for the intervention group. However, only 50 women reported to the pre-intervention sessions. Twenty-five (50%) of the participants had a positive finding on the physical activity readiness questionnaire (PARQ). These positive findings required the participants to obtain permission from their healthcare provider to participate in the study. Only three (12%) of the 25 participants who required medical clearance provided the required documentation and were enrolled in the study. The 22 participants, who did not provide clearance, were not enrolled in the study. Therefore, 28 participants were enrolled in the study. Twenty-seven of the enrolled participants in the intervention group successfully completed every phase of the 10-week physical activity study and one of the enrolled participants did not submit data for physical activity minutes but was included in the data analyses for all other measures.
Table 1

Demographics of Participants: Intervention vs. Comparison Group

All Participants were African-American women

<table>
<thead>
<tr>
<th>Characteristic of Participants</th>
<th>Comparison (n=18)</th>
<th>Intervention (n=28)</th>
<th>P-value</th>
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<tr>
<td></td>
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Unpaired t-test reported for age comparison. Fisher’s Exact test for all other comparisons. (p-values are two-tailed)
Intervention group participants can be described as African American (100%), with some college education (86%), with 2-4 members in the household (79%), employed full time (68%), married (36%), and with gross household incomes greater than $ 75,000 (36%) (Table 1).

Comparison Group

Initially, 75 participants were recruited for the comparison group. However, only 39 African American women attended the pre-intervention sessions. Because of positive findings on the physical activity readiness questionnaire (PARQ), fifteen (38%) of the participants were required to obtain permission from their healthcare provider to increase their physical activity level. Only one participant provided the required documentation and the remaining 14 participants were not enrolled in the study. Seven of the 25 enrolled participants failed to respond to repeated contacts requesting that they return physical activity log sheets and to report for the five and ten week follow-up sessions. Therefore, 18 women in the comparison group successfully completed every phase of the 10-week physical activity study and were included in the analysis.

Participants in the comparison group can be described as follows: African American (100%), with some college education (78%), employed fulltime (67%), living in households with 2-4 members (72%), married (50%), and gross household incomes of over $ 75,000 (39%) (Table 1).

Equivalency of Intervention and Comparison Group at Baseline/Pre-Intervention

Because two different groups (i.e. intervention and comparison) were being compared over time, it was important to assess whether participants in both groups were similar at baseline. Pre-intervention data were obtained from both groups for nine
outcome measures: body mass index (BMI), systolic and diastolic blood pressure, rapid assessment of physical activity (RAPA I and RAPA II), social support family and friend participation, six-minute walk test, and physical activity minutes. Only one measure was statistically significantly different between the two groups: the intervention group’s mean BMI was 5 units higher than the comparison group (95% CI = 32.5 to 40.2; \( t = -2.15; df = 44; p = .04 \)) (Table 2).

**Participants Who Did Not Complete the Study**

Seven comparison group participants dropped out of the study. Therefore, to determine if those who dropped out or were not included in the data analysis were statistically significantly different from those that completed the study, frequencies and descriptive statistics were calculated on the demographic variables (Table 3).

Statistically significant differences between comparison completers and comparison non-completers were noted in the all of the demographic characteristics except for household income, age and marital status. The comparison non-completers were younger, had less education and worked less outside of the home (Table 3).

**Changes in Outcomes Over Time Within the Intervention Group**

Changes over time were measured from baseline (or week 1) to post-intervention (or week 10) for nine outcome measures: physical activity minutes, rapid assessment of physical activity (RAPA I and RAPA II), six-minute walk test, body mass index (BMI), systolic and diastolic blood pressure and social support family and friend participation.

**Minutes spent in physical activity**

In the intervention group, the average number of minutes spent exercising during the study period actually decreased. Wilcoxon signed rank test analyses were performed
Table 2
Equivalency of Intervention and Comparison Groups at Baseline

<table>
<thead>
<tr>
<th>Characteristic of Participants</th>
<th>Comparison (n=18)</th>
<th>Intervention (n=28)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>STD</td>
<td>Range</td>
</tr>
<tr>
<td><strong>BMI (kg/m²)</strong></td>
<td>31</td>
<td>7.3</td>
<td>19-44</td>
</tr>
<tr>
<td>Systolic Blood Pressure</td>
<td>128</td>
<td>15.5</td>
<td>98-159</td>
</tr>
<tr>
<td>Diastolic Blood Pressure</td>
<td>86</td>
<td>9.1</td>
<td>68-101</td>
</tr>
<tr>
<td>RAPA I score</td>
<td>3.9</td>
<td>1.4</td>
<td>1-5</td>
</tr>
<tr>
<td>RAPA II score</td>
<td>1.0</td>
<td>1.2</td>
<td>0-3</td>
</tr>
<tr>
<td>Family Social Support</td>
<td>25</td>
<td>12.7</td>
<td>10-50</td>
</tr>
<tr>
<td>Friends Social Support</td>
<td>20</td>
<td>10.6</td>
<td>10-48</td>
</tr>
<tr>
<td>Six minute walk test</td>
<td>1376</td>
<td>292.7</td>
<td>710-1800</td>
</tr>
<tr>
<td>Week 1 physical activity minutes</td>
<td>236</td>
<td>165</td>
<td>43-660</td>
</tr>
</tbody>
</table>

* **(1 person missing data from intervention group, n = 27)**

<table>
<thead>
<tr>
<th>RAPA I Score</th>
<th>Comparison (n = 18)</th>
<th>Intervention (n = 28)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classified in the “active” range</td>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>8</td>
<td>44</td>
<td>17</td>
<td>61</td>
</tr>
</tbody>
</table>

N = 46 * represents a statistically significant difference (p ≤ .05)

¹ Analysis conducted using unpaired t-test

² Analysis conducted using Wilcoxon two-sample test

³ Analysis conducted using Chi-square test
Table 3

Demographic Characteristics: Non-Completers vs. Completers in Comparison Group

<table>
<thead>
<tr>
<th></th>
<th>Non-completers N = 7</th>
<th>Comparison Group N = 18</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Completers:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M = 39.78 (SD = 9.7)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comparison Group:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M = 43.72 (SD = 9.7)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27 - 37</td>
<td>3 (33.3)</td>
<td>5 (27.8)</td>
<td>.056¹</td>
</tr>
<tr>
<td>38 - 48</td>
<td>4 (55.6)</td>
<td>8 (44.4)</td>
<td></td>
</tr>
<tr>
<td>49 - 59</td>
<td>0 (11.1)</td>
<td>4 (22.2)</td>
<td></td>
</tr>
<tr>
<td>60+</td>
<td>0 (0)</td>
<td>1 (5.6)</td>
<td></td>
</tr>
<tr>
<td><strong>Highest level of education</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 – 12 (high school)</td>
<td>2 (28.6)</td>
<td>4 (22.2)</td>
<td>.014²</td>
</tr>
<tr>
<td>13 – 16+ (some college)</td>
<td>4 (57.1)</td>
<td>14 (77.8)</td>
<td></td>
</tr>
<tr>
<td><strong>Number of People in Household</strong></td>
<td></td>
<td></td>
<td>.001²</td>
</tr>
<tr>
<td>One</td>
<td>1 (14.3)</td>
<td>4 (22.2)</td>
<td></td>
</tr>
<tr>
<td>Two to Four</td>
<td>4 (57.1)</td>
<td>13 (72.2)</td>
<td></td>
</tr>
<tr>
<td>Greater than Four</td>
<td>2 (28.6)</td>
<td>1 (5.6)</td>
<td></td>
</tr>
<tr>
<td><strong>Gross Household Income</strong></td>
<td></td>
<td></td>
<td>.199²</td>
</tr>
<tr>
<td>Less than $10,000</td>
<td>1 (14.3)</td>
<td>1 (5.6)</td>
<td></td>
</tr>
<tr>
<td>$10,001 - $32,000</td>
<td>0 (0)</td>
<td>5 (27.8)</td>
<td></td>
</tr>
<tr>
<td>$32,001 - $60,000</td>
<td>3 (28.6)</td>
<td>3 (16.7)</td>
<td></td>
</tr>
<tr>
<td>$60,001 - $75,000</td>
<td>2 (14.3)</td>
<td>2 (11.1)</td>
<td></td>
</tr>
<tr>
<td>Greater than $75,000</td>
<td>2 (28.6)</td>
<td>7 (38.9)</td>
<td></td>
</tr>
<tr>
<td><strong>Marital Status</strong></td>
<td></td>
<td></td>
<td>.125²</td>
</tr>
<tr>
<td>Single never married</td>
<td>2 (28.6)</td>
<td>5 (27.8)</td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>4 (57.1)</td>
<td>9 (50.0)</td>
<td></td>
</tr>
<tr>
<td>Divorced</td>
<td>1 (14.3)</td>
<td>4 (22.2)</td>
<td></td>
</tr>
<tr>
<td><strong>Employment Status</strong></td>
<td></td>
<td></td>
<td>.001²</td>
</tr>
<tr>
<td>Do not work</td>
<td>2 (28.6)</td>
<td>1 (5.6)</td>
<td></td>
</tr>
<tr>
<td>Work part-time</td>
<td>0 (0)</td>
<td>5 (27.8)</td>
<td></td>
</tr>
<tr>
<td>Work full-time</td>
<td>5 (71.4)</td>
<td>12 (66.7)</td>
<td></td>
</tr>
</tbody>
</table>

* Represents a statistically significant difference ($p \leq .05$)
¹ Analysis performed using the Mann-Whitney test
² Analysis performed using the Chi-square test
on 27 participants who reported minutes for both week one and week 10. One participant did not report physical activity minutes. The mean physical activity minutes during week one was $M = 248$ minutes, $SD = 207$. The mean physical activity minutes during week ten was $M = 199$ minutes, $SD = 146$. This 49 minute decrease between week one and week ten was not statistically significant (95% CI = -112.6 to 14.6; $W = -1.5835$; $n = 27$; $p = 0.1$) (Table 4).

**RAPA I Score**

RAPA I scores increased moderately during the study period. The mean RAPA I score at baseline (pre-intervention) was 4.2 (SD = 1.1). The mean RAPA I score post-intervention was 4.8 (SD = 0.6). Wilcoxon signed rank test analysis indicated this 0.6 increase in RAPA I score was statistically significant (95% CI = 0.2 to 0.9; $T = 30$; $n = 28$; $p = .01$) (Table 4).

**RAPA II Score**

Participants reported a minor increase in RAPA II scores. The mean RAPA II score at baseline (pre-intervention) was 1.3 (SD = 1.3). The mean RAPA II post-intervention was 1.6 (SD = 1.3). Wilcoxon signed rank test analysis indicated this 0.3 increase in RAPA II scores was not statistically significant (95% CI = -0.2 to 0.9; $T = 10.5$; $n = 28$; $p = 0.3$) (Table 4).

**Six-Minute Walk Test**

During the study, the average distance walked in six minutes increased by nearly 200 feet for the intervention group. The mean six-minute walk test distance in feet at baseline (pre-intervention) was 1462 (SD = 218). The mean six-minute walk test post-
<table>
<thead>
<tr>
<th>Outcome</th>
<th>Pre-Intervention (or Week 1)</th>
<th>Post-Intervention (or week 10)</th>
<th>Change Over Time (Post – Pre) or (Week 10 – Week 1)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Median</td>
<td>Mean</td>
</tr>
<tr>
<td>Minutes spent in physical activity</td>
<td>248</td>
<td>206.9</td>
<td>190</td>
<td>199</td>
</tr>
<tr>
<td>RAPA I score</td>
<td>4.2</td>
<td>1.1</td>
<td>5.0</td>
<td>4.8</td>
</tr>
<tr>
<td>RAPA II score</td>
<td>1.3</td>
<td>1.3</td>
<td>1.5</td>
<td>1.6</td>
</tr>
<tr>
<td>Six-minute walk test (feet)</td>
<td>1462</td>
<td>218.0</td>
<td>1470</td>
<td>1643</td>
</tr>
<tr>
<td>BMI (kg/m2)</td>
<td>36.4</td>
<td>9.8</td>
<td>33.0</td>
<td>36.1</td>
</tr>
<tr>
<td>SBP</td>
<td>123</td>
<td>15.4</td>
<td>125</td>
<td>124</td>
</tr>
<tr>
<td>DBP</td>
<td>81</td>
<td>9.0</td>
<td>79</td>
<td>82</td>
</tr>
<tr>
<td>Social Support – Family participation</td>
<td>19</td>
<td>7.9</td>
<td>19</td>
<td>22</td>
</tr>
<tr>
<td>Social support – Friend participation</td>
<td>24</td>
<td>11.1</td>
<td>23</td>
<td>26</td>
</tr>
</tbody>
</table>

* represents a statistically significant difference (p ≤ .05)

1 Analysis performed using the Wilcoxon signed rank test

2 Analysis performed using the paired t test
intervention was 1643 (SD = 228). Paired $t$ test analysis indicated this 181 feet increase in six-minute walk test feet was statistically significant (95% CI = 115 to 248; $t = 5.56995$; $df = 27; p < .001$) (Table 4).

**Body Mass Index (BMI)**

Body mass index decreased slightly during the study period. The mean BMI at baseline (pre-intervention) was 36.4 (SD = 9.8). The mean BMI post-intervention was 36.1 (SD = 9.9). Paired $t$ test analysis indicated this 0.2 decrease in BMI was not statistically significant (95% CI = -0.6 to 0.2; $t = -1.12127$; $df = 27; p = 0.3$) (Table 4).

**Systolic Blood Pressure (SBP)**

Systolic blood pressures increased slightly over the course of the study. The mean SBP at baseline (pre-intervention) was 123 (SD = 15.4). The mean SBP post-intervention was 124 (SD = 16.1). Paired $t$ test analysis indicated this 1.0 mmHg SBP increase was not statistically significant (95% CI = -1.6 to 3.6; $t = .76804$; $df = 27; p = 0.4$) (Table 4).

**Diastolic Blood Pressure (DBP)**

Diastolic blood pressures also increased slightly over the study period. The mean DBP at baseline (pre-intervention) was 81 (SD = 9.0). The mean DBP post-intervention was 82 (SD = 9.2). Paired $t$ test analysis indicated this 0.9 mmHg DBP increase was not statistically significant (95% CI = -1.9 to 3.6; $t = .64920$; $df = 27; p = 0.5$) (Table 4).

**Family Social Support**

Family social support scores increased moderately over the study period. The mean family social support score at baseline (pre-intervention) was 19 (SD = 7.9). The mean family social support score post-intervention was 22 (SD = 8.9). Paired $t$ test
analysis indicated this 3 unit increase in family social support scores was statistically significant (95% CI = 0 to 5.9; \( t = 2.06957; df = 27; p = .05 \)) (Table 4).

**Friend Social Support**

Friend social support scores increased over the study period. The mean friend social support score at baseline (pre-intervention) was 24 (SD = 11.1). The mean friend social support score post-intervention was 26 (SD = 10.2). Paired \( t \) test analysis indicated this 2.7 increase in friend social support scores was not statistically significant (95% CI = -1.5 to 6.8; \( t = 1.33223; df = 27; p = 0.2 \)) (Table 4).

**Changes in Outcomes Over Time Within the Comparison Group**

Changes over time were measured from pre-intervention (or week 1) to post-intervention (or week 10) for nine outcome measures: physical activity minutes, rapid assessment of physical activity (RAPA I and RAPA II), six-minute walk test, body mass index (BMI), systolic and diastolic blood pressure and social support family and friend participation.

**Minutes Spent in Physical Activity**

There was no reported increase in physical activity minutes among the comparison group participants. Analyses were performed on 18 participants who reported minutes for both week one and week 10. The mean physical activity minutes during week one was 236 minutes, SD = 165. The mean physical activity minutes during week ten was 235 minutes, SD = 183. Wilcoxon signed rank analysis indicated this one minute decrease between week one and week ten was not statistically significant (95% CI = -56 to 55; \( W = 10.5; n = 18; p = 0.6 \)) (Table 5).
Table 5

Changes in Outcomes Over Time Within the Comparison Group

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Pre-Intervention (or Week 1)</th>
<th>Post-Intervention (or week 10)</th>
<th>Change Over Time (Post – Pre) or (Week 10 – Week 1)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (95% CI)</td>
<td>Mean (95% CI)</td>
<td>Mean (95% CI)</td>
<td></td>
</tr>
<tr>
<td>Minutes spent in physical activity</td>
<td>236 -1.56,55</td>
<td>235 -56,55</td>
<td>-111.9 1.5</td>
<td>0.61</td>
</tr>
<tr>
<td>RAPA I score</td>
<td>3.9 -0.1, 1.1</td>
<td>4.4 -1, 1.1</td>
<td>0.5 1.2</td>
<td>0.11</td>
</tr>
<tr>
<td>RAPA II score</td>
<td>1.0 -0.2, 1.5</td>
<td>1.7 0.7</td>
<td>0.7 1.8</td>
<td>0.21</td>
</tr>
<tr>
<td>Six-minute walk test (feet)</td>
<td>1376 -63,85</td>
<td>1387 148.1</td>
<td>11 148.1 10</td>
<td>0.82</td>
</tr>
<tr>
<td>BMI (kg/m2)</td>
<td>31 -1.4, -0.2</td>
<td>30 -1.4, -0.2</td>
<td>-0.8 1.2</td>
<td>.01 *2</td>
</tr>
<tr>
<td>Systolic Blood Pressure</td>
<td>128 -6.6, 4.1</td>
<td>126 -6.6, 4.1</td>
<td>-1.3 10.7</td>
<td>0.62</td>
</tr>
<tr>
<td>Diastolic Blood Pressure</td>
<td>86 -3.3, 4.0</td>
<td>86 -3.3, 4.0</td>
<td>0.4 7.4</td>
<td>0.82</td>
</tr>
<tr>
<td>Social Support – Family Participation</td>
<td>25 -6.0, 6.0</td>
<td>25 -6.0, 6.0</td>
<td>0 12.0</td>
<td>1.02</td>
</tr>
<tr>
<td>Social Support – Friend Participation</td>
<td>20 -5.4, 3.0</td>
<td>19 -5.4, 3.0</td>
<td>-1.2 8.5</td>
<td>0.62</td>
</tr>
</tbody>
</table>

* represents a statistically significant difference (*p* ≤ .05)

1 Analysis was performed using Wilcoxon signed rank test
2 Analysis was performed using paired *t* test
**RAPA I Score**

RAPA I scores increased slightly over the course of the study. The mean RAPA I score at baseline (pre-intervention) was 3.9 (SD = 1.4). The mean RAPA I score post-intervention was 4.4 (SD = 1.0). Wilcoxon signed rank analysis indicated this .5 increase in RAPA I score was not statistically significant (95% CI = -0.1 to 1.1; \(W = 9.5; n = 18; p = 0.1\)) (Table 5).

**RAPA II Score**

RAPA II increased slightly over the study period. The mean RAPA II score at baseline (pre-intervention) was 1.0 (SD = 1.2). The mean RAPA II score post-intervention was 1.7 (SD = 1.4). Wilcoxon signed rank analysis indicated this 0.7 increase in RAPA II score was not statistically significant (95% CI = -0.2 to 1.5; \(W = 17; n = 18; p = 0.2\)) (Table 5).

**Six-Minute Walk Test**

During the study, the average distance walked in six minutes increased slightly for the comparison group. The mean six-minute walk test distance in feet at baseline (pre-intervention) was 1376 (SD = 293). The mean six-minute walk test distance at post-intervention in feet was M = 1387 (SD = 259). Paired \(t\) test analysis indicated this increase of 11 feet in six-minute walk test distance was not statistically significant (95% CI = -63 to 85; \(t = 0.3135; df = 17; p = 0.8\)) (Table 5).

**Body Mass Index (BMI)**

For the comparison group, body mass index decreased moderately over the study period. The mean BMI at baseline (pre-intervention) was 31 (SD = 7.3). The mean BMI
at post-intervention was 30 (SD = 7.6). Paired t test analysis indicated this 0.8 decrease in BMI was statistically significant (95% CI = -1.4 to -0.2; $t = -2.83548; df = 17; p = .01$) (Table 5).

**Systolic Blood Pressure (SBP)**

Systolic blood pressures decreased over the course of the study. The mean SBP at baseline (pre-intervention) was 128 (SD = 15.5). The mean SBP post-intervention was 126 (SD = 13.3). Paired t test analysis indicated this 1.3 mmHg SBP decrease was not statistically significant (95% CI = -6.6 to 4.1; $t = -0.50609; df = 17, p = 0.6$) (Table 5).

**Diastolic Blood Pressure (DBP)**

Diastolic blood pressure increased slightly over the course of the study. The mean DBP at baseline (pre-intervention) was 86 (SD = 9.1). The mean DBP post-intervention was 86 (SD = 8.1). Paired t test analysis indicated this 0.4 mmHg DBP increase was not statistically significant (95% CI = -3.3 to 4.0; $t = 0.224613; df = 17; p = 0.8$) (Table 5).

**Family Social Support**

Mean family social support scores for the comparison group did not change from pre-intervention to post-intervention. The mean family social support score at baseline (pre-intervention) was 25 (SD = 12.7). The mean family social support score post-intervention was 25 (SD = 9.8). Paired t test analysis indicated no change in family social support scores (95% CI = -6.0 to 6.0; $t = 0; df = 17; p = 1.0$) (Table 5).

**Friend Social Support**

Friend social support scores decreased over the study period. The mean friend social support score at baseline (pre-intervention) was 20 (SD = 10.6). The mean friend
social support score post-intervention was 19 (SD = 7.7). Paired $t$ test analysis indicated this 1.2 decrease in friend social support scores was not statistically significant (95% CI = -5.4 to 3.0; $t = 0.58609$; $df = 17$; $p = 0.6$) (Table 5).

**Changes in Outcomes Over Time: Comparison Versus Intervention Group**

**Minutes spent in physical activity**

For the comparison group, there was a mean decrease of 1 physical activity minute ($n = 18$) compared to a mean decrease of 49 minutes ($n = 27$) for the intervention group over the course of the study. Data missing for one participant in the intervention group. Wilcoxon two-sample test analysis indicated these values were not statistically significantly different (95% CI = -39.76 to 136.32; $W = 472.500$; $n = 46$; $p = 0.2$) (Table 6).

**RAPA I Score**

For the comparison group, there was a mean increase of 0.5 points in RAPA I scores compared to an increase of 0.6 points in the intervention group over the course of the study. Wilcoxon two-sample test analysis indicated these values were not statistically significantly different (95% CI = -0.716 to 0.5737; $W = 415.000$; $n = 46$; $p = 0.8$) (Table 6).

**RAPA II Score**

For the comparison group, there was a mean increase of 0.7 points in RAPA II scores compared to 0.3 points in the intervention group over the course of the study. Wilcoxon two-sample test analysis indicated these values were not statistically significantly different (95% CI = -0.582 to 1.2728; $W = 460.000$; $n = 46$; $p = 0.4$) (Table 6).
Table 6

Changes in Outcomes Over Time: Comparison versus Intervention Group

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Comparison Group n = 18</th>
<th>Intervention Group n = 28</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minutes spent in physical activity</td>
<td>-1</td>
<td>-49</td>
<td>0.2&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>-56, 55</td>
<td>-113, 15 * data missing for 1 participant n = 27</td>
<td></td>
</tr>
<tr>
<td>RAPA I score</td>
<td>0.5</td>
<td>0.6</td>
<td>0.8&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>-.1, 1.1</td>
<td>0.2, 0.9</td>
<td></td>
</tr>
<tr>
<td>RAPA II score</td>
<td>0.7</td>
<td>0.3</td>
<td>0.4&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>-0.2, 1.5</td>
<td>-0.2, 0.9</td>
<td></td>
</tr>
<tr>
<td>Six-minute walk test (feet)</td>
<td>11</td>
<td>181</td>
<td>&lt;0.01&lt;sup&gt;*2&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>-63, 85</td>
<td>115, 248</td>
<td></td>
</tr>
<tr>
<td>BMI (kg/m2)</td>
<td>-0.8</td>
<td>-0.2</td>
<td>.09&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>-1.4, -.2</td>
<td>-0.6, 0.2</td>
<td></td>
</tr>
<tr>
<td>SBP</td>
<td>-1.3</td>
<td>1.0</td>
<td>0.4&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>-6.6, 4.1</td>
<td>-1.6, 3.6</td>
<td></td>
</tr>
<tr>
<td>DBP</td>
<td>0.4</td>
<td>0.9</td>
<td>0.8&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>-3.3, 4.0</td>
<td>-1.9, 3.6</td>
<td></td>
</tr>
<tr>
<td>Social Support – Family Participation</td>
<td>0</td>
<td>3</td>
<td>0.3&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>-6.0, 6.0</td>
<td>0, 5.9</td>
<td></td>
</tr>
<tr>
<td>Social support – Friends participation</td>
<td>-1.2</td>
<td>2.7</td>
<td>0.2&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>-5.4, 3.0</td>
<td>-1.5, 6.8</td>
<td></td>
</tr>
</tbody>
</table>

*represents a statistically significant difference (p < .05)

<sup>1</sup> Analysis performed using the Wilcoxon two-sample test

<sup>2</sup> Analysis performed using the unpaired t test
**Six-Minute Walk Test**

For the comparison group, there was a mean increase of 11 feet for the six-minute walk test distance compared to an increase of 181 feet for the intervention group over the course of the study. Unpaired t test analysis indicated these values were statistically significantly different (95% CI = -269.9 to -70.94; \( t = -3.45; df = 44; p = <0.01 \)) (Table 6).

**Body Mass Index (BMI)**

The mean BMI of the comparison group decreased 0.8 units compared to a 0.2 decrease in the intervention group over the course of the study. Unpaired t test analysis indicated these values were not statistically significantly different (95% CI = -1.282 to 0.0948; \( t = -1.74; df = 44; p = .09 \)) (Table 6).

**Systolic Blood Pressure (SBP)**

For the comparison group, there was a mean decrease of 1.3 mmHg compared to an increase of 1.0 mmHg for the intervention group over the course of the study. Unpaired t test analysis indicated these values were not statistically significantly different (95% CI = -7.442 to 2.9218; \( t = -0.88; df = 44; p = 0.4 \)) (Table 6).

**Diastolic Blood Pressure (DBP)**

Over the course of the study, for the comparison group, there was a mean increase of 0.4 mmHg compared to a mean increase of 0.9 mmHg for the intervention group. Unpaired t test analysis indicated these values were not statistically significantly different (95% CI = -4.879 to 3.9069; \( t = 0.22; df = 44; p = 0.8 \)) (Table 6).
**Family Social Support**

For the comparison group, there was no change compared to a mean increase of 3 points for the intervention group over the course of the study. Unpaired $t$ test analysis indicated these values were not statistically significantly different (95% CI = -8.78 to 2.8518; $t = -1.03; df = 44; p = 0.3$) (Table 6).

**Friend Social Support**

For the comparison group, there was a mean decrease of 1.2 points compared to a mean increase of 2.7 points for the intervention group over the course of the study. Unpaired $t$ test analysis indicated these values were not statistically significantly different (95% CI = -9.842 to 2.1518; $t = -1.29; df = 44; p = 0.2$) (Table 6).

**Differences Between Groups at Week 10**

Another way to look at the differences between the two groups is to compare them at week 10, ignoring baseline (or week 1). This may be reasonable given that the groups were similar at baseline, with the exception of BMI. Table 7 shows the post-intervention comparison of the groups at week 10. There was a statistically significant difference in post-intervention mean BMI (intervention $M = 36$ vs. comparison $M = 30$, CI = -11.94 to -0.856, $t = -2.33, df = 44, p = .02$), mean walk test distances (intervention $M = 1643$ vs. comparison $M = 1387$, CI = -402.3 to -109.5, $t = -3.57, df = 44, p < 0.01$), and social support friend participation (intervention $M = 26$ vs. comparison $M = 19$, (95% CI = -12.94 to -1.593, $t = -2.58, df = 44, p = .01$) (See Table 7).

RAPA I scores can also be used to classify individuals as “Active” (score of 5) or “Inactive” (scores 1-4). At the end of the program, 63% of the intervention group was
### Table 7

**Post-Intervention (week 10) Outcomes: Comparison versus Intervention Group**

**Without Controlling for Baseline**

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Comparison Group n = 18</th>
<th>Intervention Group n = 28</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Post or Week 10 Mean (95% CI)</td>
<td>Post or Week 10 Mean (95% CI)</td>
<td></td>
</tr>
<tr>
<td>Minutes spent in physical activity</td>
<td>234 144, 326</td>
<td>199 141, 256</td>
<td>0.6¹</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* data missing for 1 participant n = 27</td>
<td></td>
</tr>
<tr>
<td>RAPA I score</td>
<td>4.4 3.9, 4.9</td>
<td>4.8 4.5, 5.0</td>
<td>.07¹</td>
</tr>
<tr>
<td>RAPA II score</td>
<td>1.7 1.0, 2.4</td>
<td>1.6 1.1, 2.1</td>
<td>0.9¹</td>
</tr>
<tr>
<td>Six-minute walk test (feet)</td>
<td>1387 1258, 1516</td>
<td>1643 1555, 1731</td>
<td>&lt;0.01*²</td>
</tr>
<tr>
<td>BMI (kg/m2)</td>
<td>30 26, 34</td>
<td>36 32, 40</td>
<td>.02*²</td>
</tr>
<tr>
<td>SBP</td>
<td>126 120, 134</td>
<td>124 118, 131</td>
<td>0.7²</td>
</tr>
<tr>
<td>DBP</td>
<td>86 82, 90</td>
<td>82 78, 85</td>
<td>0.1²</td>
</tr>
<tr>
<td>Social Support – Family Participation</td>
<td>25 20, 29</td>
<td>22 18, 25</td>
<td>0.3²</td>
</tr>
<tr>
<td>Social support – Friends participation</td>
<td>19 15, 23</td>
<td>26 22, 30</td>
<td>.01*²</td>
</tr>
</tbody>
</table>

*represents a statistically significant difference (p ≤ .05)

¹ Analysis performed using the Wilcoxon two-sample test

² Analysis performed using the unpaired t test
“active” compared to 42% of the comparison group. However, this difference was not statistically significant ($X^2 = 2.1189; df = 1; p = 0.1)$.

**Correlation Between Baseline Social Support and Physical Activity at End of Study**

Spearman rank order correlations were calculated to test the relationship between baseline scores for social support (family) and social support (friend) with (1) RAPA I scores at week 10 and (2) minutes spent in physical activity at week 10 for both groups (intervention and comparison). No statistically significant relationships were found (Table 8).

**Correlation Between Baseline Social Support and Buddy Support Minutes at End of Study**

Spearman rank order correlations were calculated to test the relationship between baseline scores for social support (family and social support (friend) with week ten buddy support minutes. No statistically significant relationships were found (Table 9).

**Testing the Research Questions and Hypotheses**

The research questions and hypotheses that were stated in Chapter 1 are answered in this section as they relate to the final data analyses.

**Research Question 1:** Does a 10-week “buddy support” intervention significantly increase physical activity among African American women in the intervention group?

- **Hypotheses 1.1:** For the participants in the intervention group, there will be a statistically significant increase in the number of minutes spent in physical activity per week.
Table 8
Correlation Between Social Support and Physical Activity

<table>
<thead>
<tr>
<th>Intervention Group</th>
<th>(n = 28)</th>
<th>(n = 27)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RAPA I Score at End of Study</td>
<td>Minutes Spent in Physical Activity Week 10</td>
</tr>
<tr>
<td>Baseline Social Support Family</td>
<td>$r_s = .002 \ (p = 1.0)$</td>
<td>$r_s = 0.2 \ (p = 0.4)$</td>
</tr>
<tr>
<td>Baseline Social Support Friend</td>
<td>$r_s = .02 \ (p = 0.9)$</td>
<td>$r_s = -0.2 \ (p = 0.3)$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Comparison Group (n = 18)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAPA I Score at End of Study</td>
</tr>
<tr>
<td>Baseline Social Support Family</td>
</tr>
<tr>
<td>Baseline Social Support Friend</td>
</tr>
</tbody>
</table>

*Statistics presented include Spearman Rank Order Correlation Coefficient ($r_s$) and ($p$-value)
Table 9
Correlation Between Social Support and Buddy Support Minutes

<table>
<thead>
<tr>
<th>Intervention Group</th>
<th>Week 10 Buddy Support Minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline Social Support Family</td>
<td>$r_s = .3 \ (p = .9)$</td>
</tr>
<tr>
<td>Baseline Social Support Friend</td>
<td>$r_s = .3 \ (p = .8)$</td>
</tr>
</tbody>
</table>

* Statistics presented include Spearman Rank Order Correlation Coefficient $(r_s)$ and $(p$-value)
Intervention group physical activity minutes decreased an average of 49 minutes (SD = 161) from week 1 to week 10 (p = 0.1). Thus, the hypothesis was rejected.

- **Hypotheses 1.2:** For the participants in the intervention group, there will be a statistically significant increase in Rapid Assessment of Physical Activity (RAPA) scores.

Intervention group RAPA I scores increased an average of .6 points (SD = 1.0) from week 1 to week 10 (p = .01). Thus, the hypothesis was accepted for RAPA I scores.

Intervention group RAPA II scores increased an average of 0.3 points (SD = 1.4) from week 1 to week 10 (p = 0.3). Thus, the hypothesis was rejected for RAPA II scores.

**Research Question 2:** After the 10-week intervention, will there be significant differences in physical activity levels between the intervention and comparison groups?

- **Hypotheses 2.1:** After the 10-week intervention, there will be no statistically significant difference in recorded physical activity minutes between the intervention and comparison groups.

Intervention group physical activity minutes decreased an average of 49 minutes (SD = 160) from week 1 to week 10 (p =0.1).

Comparison group physical activity minutes decreased an average of 1 minute (SD = 112) from week 1 to week 10 (p =0.1).

Change over time between intervention and comparison groups for physical activity minutes was not statistically significantly different (p =0.2). Thus, the hypothesis was accepted.
Hypotheses 2.2: At the end of the 10-week intervention, there will be no statistically significant difference in RAPA scores between the intervention and comparison groups.

*Intervention group RAPA I scores increased an average of 0.6 points (SD = 1.0) from week 1 to week 10 (p = .01).*

*Comparison group RAPA I scores increased an average of 0.5 points (SD = 1.2) from week 1 to week 10 (p = 0.1).*

*Change over time between the intervention and the comparison group for RAPA I scores was not statistically significantly different (p = 0.8).*

*Intervention group RAPA II scores increased an average of 0.3 points (SD = 1.4) from week 1 to week 10 (p =0.3).*

*Comparison group RAPA II scores increased an average of 0.7 points (SD = 1.8) from week 1 to week 10 (p =0.2).*

*Change over time between the intervention and comparison group for RAPA II scores was not statistically significantly different (p = 0.4). Thus, the hypothesis was accepted for RAPA I and RAPA II scores.*

Research Question 3: Does physical endurance, as measured by the six-minute walk test, significantly improve in African American women as a result of participation in a 10-week buddy support intervention?

Hypotheses 3.1: For participants in the intervention group, there will be a statistically significant increase in endurance as measured by the six-minute walk test distance.
Intervention group six-minute walk test distance increased an average of 181 feet (SD = 172.3) from week 1 to week 10 (p = <.001). Thus, the hypothesis was accepted.

- **Hypotheses 3.2:** There will be no statistically significant difference in six-minute walk test distances between women in the intervention and comparison groups.

  Intervention group six-minute walk test distance increased an average of 181 feet (SD = 172.3) from week 1 to week 10 (p = .001).

  Comparison group six-minute walk test distance increased an average of 11 feet (SD = 148.1) from week 1 to week 10 (p = 0.8).

  Change over time between the intervention and comparison group for the six-minute walk test was statistically significantly different (p = .01). Thus, the hypothesis was rejected.

*Research Question 4:* Do physiological responses such as BMI and blood pressure significantly decrease as a result of participation in a 10-week buddy support intervention?

- **Hypotheses 4.1:** For participants in the intervention group, there will be a statistically significant decrease in BMI (body mass index) during the study period.

  Intervention group BMI decreased an average of 0.2 points (SD = 1.1) from week 1 to week 10 (p = 0.3). Thus, the hypothesis was rejected.

- **Hypotheses 4.2:** For participants in the intervention group, there will be a statistically significant decrease in systolic blood pressure.

  Intervention group systolic blood pressure increased an average of 1.0 mmHg (SD = 6.8) from week 1 to week 10 (p =0.4). Thus, the hypothesis was rejected.
• **Hypotheses 4.3:** For participants in the intervention group, there will be a statistically significant decrease in diastolic blood pressure.

> *Intervention group diastolic blood pressure increased by an average of 0.9 mmHg (SD = 7.1) from week 1 to week 10 (p = 0.5). Thus, the hypothesis was rejected.*

**Research Question 5:** After the 10-week intervention, will there be significant differences in physiological responses (e.g., BMI and blood pressure) between the intervention and comparison groups?

• **Hypotheses 5.1:** After the 10-week intervention, there will be no statistically significant difference in BMI (body mass index) between women in the intervention and comparison groups.

> *Intervention group BMI decreased an average of 0.2 points (SD = 1.1) from week 1 to week 10 (p = 0.1).*

> *Comparison group BMI decreased an average of 0.8 points (SD = 1.2) from week 1 to week 10 (p = .01).*

> *Change over time between the intervention and comparison group for BMI was not statistically significantly different (p = .09). Thus, the hypothesis was accepted.*

• **Hypotheses 5.2:** After the 10-week intervention, there will be no statistically significant difference in systolic blood pressure between women in the intervention and comparison groups.

> *Intervention group systolic blood pressure increased an average of 1.0 mmHg (SD = 6.8) from week 1 to week 10 (p = 0.4).*

> *Comparison group systolic blood pressure decreased an average of 1.3 mmHg (SD = 10.7) from week 1 to week 10 (p = 0.6).*
Change over time between the intervention and comparison group for systolic blood pressure was not statistically significantly different ($p = 0.4$). Thus, the hypothesis was accepted.

- **Hypotheses 5.3:** After the 10-week intervention, there will be no statistically significant difference in diastolic blood pressure between women in the intervention and comparison groups.

  Intervention group diastolic blood pressure increased by an average of 0.9 mmHg ($SD = 7.1$) from week 1 to week 10 ($p = 0.5$).

  Comparison group diastolic blood pressure increased by an average of 0.4 mmHg ($SD = 7.4$) from week 1 to week 10 ($p = 0.8$).

  Change over time between the intervention and comparison group for diastolic blood pressure was not statistically significantly different ($p = 0.8$). Thus, the hypothesis was accepted.

**Research Question 6:** Does social support for exercise significantly increase among women that participate in a 10-week buddy support intervention?

- **Hypotheses 6.1:** There will be a statistically significant increase in social support between women in the intervention group.

  Intervention group family social support increased an average of 3 points ($SD = 7.6$) from week 1 to week 10 ($p = .05$). Thus, the hypothesis was accepted for family social support.

  Intervention group friend social support increased an average of 2.7 points ($SD = 10.6$) from week 1 to week 10 ($p =.02$). Thus, the hypothesis was rejected for friend social support.
• **Hypotheses 6.2:** There will be no statistically significant difference in social support between women in the intervention and comparison groups.

*Intervention group family social support score increased an average of 3 points \((SD = 7.6)\) from week 1 to week 10 \((p = .05)\).*

*Comparison group family social support did not change from week 1 to week 10 \((p = 1.0)\).*

*Change over time between the intervention and comparison group for family social support score was not statistically significantly different \((p = 0.3)\). Thus, the hypothesis for family social support was accepted.*

*Intervention group friend social support scores increased an average of 2.7 points \((SD = 10.6)\) from week 1 to week 10 \((p = 0.2)\).*

*Comparison group friend social support score decreased 1.2 points \((SD = 8.5)\) from week 1 to week 10 \((p = 0.6)\).*

*Change over time between the intervention and comparison group for friend social support score was not statistically significantly different \((p = 0.2)\). Thus, the hypothesis for friend social support was accepted.*

• **Hypotheses 6.3:** After the 10-week buddy support intervention, there will be no correlation between physical activity and social support.

*In the intervention group, there was no statistically significant correlation between baseline family social support and RAPA I end of study score \((r_s = .002, p =1.0)\); no statistically significant correlation between baseline family social support and week 10 minutes spent in physical activity \((r_s =0.2, p = 0.4)\); no statistically significant correlation between baseline friend social support and end of study RAPA I score \((r_s,
and no statistically significant correlation between baseline friend social support and week 10 physical activity minutes ($r_s = -0.2, p = 0.3$). Thus, the hypothesis was accepted.

**Summary**

Results of the data analyses were presented in this chapter. All 46 participants were women of African American heritage or descent. The average age of women in the study was 46 years of age (SD = 10). The vast majority of participants (82%) had at least some college education and 76% had households comprised of 2 to 4 persons. About two thirds of participants worked fulltime outside the home. A majority (43%) of participants were married and 38% had gross household incomes greater than $75,000. No statistically significant differences in demographic characteristics were detected between the intervention and comparison groups.

Physical activity minutes for the intervention group decreased over the course of the study. Women in the buddy support intervention did not report a statistically significant increase in physical activity minutes over the course of the study.

For the intervention group only, the RAPA I mean score increased significantly over the course of the study. Of note, 61% of the intervention group and 44% of the comparison group were in the “active” range for their baseline RAPA I scores. In both groups, the RAPA II score, which assessed participation in strength and flexibility, did not significantly increase over the course of the study.

For both groups, there were no statistically significant differences in mean social support scores for friend social support. However, for the intervention group, family social support scores increased and were statistically significant for change over time.
For both groups, there was no correlation between social support, RAPA I and physical activity minutes.

Analysis of the physiologic changes revealed that body mass index statistically significantly decreased over the course of the study for the comparison group. Of note, at baseline, the comparison group had lower BMI scores than the intervention group. Only the intervention group experienced a statistically significantly increase in endurance as measured by the six-minute walk test. The results also revealed that systolic and diastolic blood pressures for both groups were not statistically significantly different over the course of the study. The implications of these results will be fully discussed in Chapter 5.
Chapter V

CONCLUSIONS

This final chapter contains the following sections: 1) Summary, 2) Accepted Hypotheses, 3) Rejected Hypotheses, 4) Discussion, 5) Limitations, 6) Implications and Future Recommendations.

Summary

This study was conducted to answer the following research questions:

1. Does a 10-week “buddy support” intervention increase physical activity among African American women?

2. After the 10-week intervention, will there be significant differences in physical activity levels between the intervention and comparison groups?

3. Does physical endurance, as measured by the six-minute walk test, significantly improve in African American women as a result of participation in a 10-week buddy support intervention?

4. Do physiological responses such as BMI and blood pressure significantly decrease as a result of participation in a 10-week buddy support intervention?
5. After the 10-week intervention, will there be differences in physiological responses (e.g., BMI and blood pressure) between the intervention and comparison groups?

6. Does social support for exercise significantly increase among women that participate in a 10-week buddy support intervention?

Before and after the 10-week intervention, nine outcome measures were recorded: systolic and diastolic blood pressure, body mass index (BMI), six-minute walk test, rapid assessment of physical activity (RAPA I and RAPA II), number of minutes spent in physical activity, and perceptions of social support received from family and friends. Each intervention group participant designated a buddy and for each day, recorded the type of buddy support received and logged the minutes engaged in physical activity with their buddy.

Twenty-five comparison participants and 28 intervention participants were enrolled in the pre-intervention phase of the study. Of the enrolled subjects, 18 comparison (67%) and 27 intervention (96%) participants successfully completed every phase of the ten-week study. One participant in the intervention group did not submit physical activity data. In terms of demographic characteristics, there were no statistically significant differences between the comparison and intervention group.

The results of this study indicated that physical activity minutes did not increase among the African American women enrolled in the buddy support intervention group. However, for the intervention group, there were statistically significant changes in the desired direction in mean RAPA I scores, six-minute walk distance, and family social support scores.
Accepted Hypotheses

Based on the results of this study, the following 10 hypotheses of 17 (59%) were accepted:

**Hypothesis 1.2a**

For participants in the intervention group, there will be a statistically significant increase in Rapid Assessment of Physical Activity (RAPA) I scores.

**Hypothesis 2.1**

After the 10-week intervention, there will be no statistically significant difference in recorded physical activity minutes between the intervention and comparison groups.

**Hypothesis 2.2**

At the end of the 10-week intervention, there will be no statistically significant difference in RAPA I and RAPA II scores between the intervention and comparison groups.

**Hypothesis 3.1**

For participants in the intervention group, there will be a statistically significant increase in endurance as measured by the six-minute walk test distance.

**Hypothesis 5.1**

After the 10-week intervention, there will be no statistically significant difference in BMI (body mass index) between women in the intervention and comparison groups.
Hypotheses 5.2

After the 10-week intervention, there will be no statistically significant difference in systolic blood pressure between women in the intervention and comparison groups.

Hypothesis 5.3

After the 10-week intervention, there will be no statistically significant difference in diastolic blood pressure between women in the intervention and comparison groups.

Hypothesis 6.1a

There will be a statistically significant increase in social support reported by women in the intervention group.

Hypothesis 6.2

There will be no statistically significant difference in social support between women in the intervention and comparison groups.

Hypothesis 6.3

After the 10-week buddy support intervention, there will be no correlation between physical activity and social support.

Rejected Hypotheses

Based on the results of this study, the following seven hypotheses of 17 (41%) were rejected:

Hypothesis 1.1

For the participants in the intervention group, there will be a statistically significant increase in the number of recorded minutes spent in physical activity.
Hypothesis 1.2b

For the participants in the intervention group, there will be a statistically significant increase in Rapid Assessment of Physical Activity (RAPA) II scores.

Hypothesis 3.2

There will be no statistically significant difference in six-minute walk test distances between women in the intervention and comparison groups.

Hypothesis 4.1

For participants in the intervention group, there will be a statistically significant decrease in BMI (body mass index).

Hypothesis 4.2

For participants in the intervention group, there will be a statistically significant decrease in systolic blood pressure.

Hypothesis 4.3

For participants in the intervention group, there will be a statistically significant decrease in diastolic blood pressure.

Hypothesis 6.1b

There will be a statistically significant increase in social support between women in the intervention group.

Discussion

A comprehensive review of the literature by the Task Force on Community Preventive Services found social support interventions provided in community settings improved the effectiveness of programs designed to increase physical activity (CDC, 2001). The purpose of the current study was to test an intervention using buddy support
to increase physical activity minutes in African American women. The results of this study suggest that a buddy support intervention did not help to increase physical activity levels. However, within the intervention group, there were statistically significant changes in the desired direction for RAPA I scores, family social support scores, and endurance as measured by the six-minute walk test.

Although past research has indicated that providing increased levels of social support for exercise helps to increase physical activity levels and improve adherence to exercise regimens (Jackson, 2006; Peterson et al., 2005; Sharma, et al., 2005; Young & Stewart, 2006), the results of the current study did not bear this out. In fact, women that participated in the buddy support intervention reported an average decrease in physical activity of 49 minutes per week. In contrast, the women in the comparison group reported an average decrease of only 1 minute of physical activity per week.

There are several plausible explanations for this unexpected result. First, the nature, intensity, and the perceptions of the buddy support that participants received are factors that need to be considered. At the beginning of the current study, participants were instructed to identify a buddy and obtain a signed contract from that buddy. The contract outlined the role of the buddy in a general way. How the buddies were to provide social support for exercise was not specified in great detail. Lack of specificity regarding how the buddy was to provide social support for exercise may have been a factor in the results. For example, in the intervention group, the majority (71%) of women reported receiving buddy support via the telephone. Telephone calls from friends and family may not have been intense enough or specific enough to facilitate behavior change. It is also possible that women perceived these telephone calls as just usual and customary
communication with friends and family rather than as specific social support for exercise behavior change. In past research investigating sources of social support as predictors of exercise adherence, social support specific to exercise was a better predictor of exercise adherence than was general social support (Litt, Kleppinger & Judge, 2002; Oka, King & Young, 1995). Exercise-specific social support may provide the initial motivation to increase physical activity and may be more important for increasing moderate levels of physical activity than general social support (Eyler et al., 1999). Exercise-specific social support delivered in a group setting may also be helpful in motivating individuals to participate in physical activity (Christensen, Schmidt, Budtz-Jorgensen & Avlund, 2006; Spink & Carron, 1992). Wing and Jeffery (1999) reported that having adults form structured exercise groups or teams, and adding in the element of competition among team members and across team members, helped to motivate behavior change. Furthermore, Christensen and colleagues concluded that manipulating group processes by team-building intervention seems to be a promising and effective way for the promotion of leisure-time physical activity. In the current study, designating the buddy support as exercise-specific as well as incorporating a group exercise component may have helped to improve the results.

In support of the more open-ended, non-specific buddy support process that was used in the current study, Peterson and colleagues (2005) used a similar buddy support system. Postmenopausal women (aged 50 to 65 years) received information on walking, finding a walking partner, and were given continued support for walking over a two-year period. These women had a 79% increase in reported number of blocks walked from baseline to year two in the intervention group compared to a 16% increase in the
comparison group. However, it should be noted that the partners actually walked together rather than just talking on the phone and the intervention was two-years in length compared to 10-weeks duration in the current study.

Another factor to consider in explaining the results of the current study is who provided the buddy support. The intervention group participants in the current study were not asked to identify who the buddy was - whether family member, friend, co-worker, or acquaintance. It was interesting to note that for the intervention group, the perceptions of social support from family members significantly increased over time while perceptions of social support from friends increased but not in a statistically significant way. Moreover, no positive correlation was found between perceived levels of social support and exercise behavior. The reported increase in social support from family members may indicate that most of the buddies were family members. Some previous research of the past (Eyler et al., 1999; Spanier & Allison, 2001) reported that social support from family members was significantly associated with lower levels of physical activity while social support from non-familial sources (e.g., work colleagues) was associated with higher levels of physical activity. In the current study perhaps the family social support was interpreted as “have to” or obligatory thereby producing a constraint on exercise behavior. In support of this interpretation, an investigation of social support from significant others on exercise motivation and exercise behavior, concluded that it is important that social support promote desirable behaviors such as encouragement to exercise and support of physical activity. This is in contrast to social support that creates constraints in the form of pressure to exercise, disappointment towards the individual if
they decide to quit, or the individual feels obligated to performing desirable exercise behaviors (Gabrielle, Walker, Gill, Harbor, & Fisher, 2005).

The fact that physical activity levels essentially remained the same for women in the comparison group may have been due to the fact social support systems existed naturally during interactions with the researcher and the research assistants as well as in the community church setting. During weekly church services and during the follow-up sessions at the church, comparison group participants may have received social support that was not measured or documented by the researcher in the current study. White, Drechel and Johnson (2006) report that an adult’s involvement in a faith community is a factor that is often overlooked and can influence health and wellness. This unique social network can be defined as a group of people who meet regularly to share their common history, values, beliefs and relationship with a higher power (Buijs & Olson, 2001). Similarly, Peterson, Atwood and Yates (2002) reported that existing social support systems in African American churches provide a natural foundation for conducting physical activity interventions. This naturally occurring social support received by women in the comparison group was not accounted for in any way. The presence of existing social support networks in church-based interventions should be considered when designing future research studies.

In terms of the buddy support, it was interesting to note that there was no attrition in the intervention group. In contrast, 28% of the comparison group participants dropped out during the 10-week intervention. The buddy support received by intervention group participants may have been helped to motivate participants’ to remain in the study but was not sufficient to actually change exercise behaviors.
Although self-reported physical activity minutes in the intervention group decreased over time, their RAPA I (Rapid Assessment of Physical Activity) scores and their 6-minute walk distances increased over time. Such positive changes in the RAPA I scores and 6-minute walk results may mean that physical activity did indeed increase as a result of the buddy support intervention. The fact that there was a statistically significant increase in six-minute walk test distance but no corresponding increase in self-reported physical activity minutes is not an unknown phenomenon. Other researchers have reported a weak association between self-reported physical activity and six-minute walk distances (Camarri, Eastwood, Cecins, Thompson, & Jenkins, 2006; Gibbons, Fruchter, Sloan, & Levy, 2001; Troosters, Gosselink, & Decramer, 1999).

Although there is disagreement among researchers regarding the necessity of having participants complete practice walk tests prior to a final 6-minute walk test (Sciurba et al., 2003), it is possible that improvement on the post-test walk may have been due to a learning effect rather than true improvement in physical conditioning (Wise & Brown, 2005). Sciurba et al. performed two six-minute walks on successive days on 470 participants. On the second day of testing, they found statistically significant improvement, likely due to familiarity with the walking course, better pacing, or motivational factors. The reported implication is that studies that rely on six-minute walks before and after an intervention should schedule post testing several weeks after the pretest walk to minimize the learning effect.

Another plausible explanation for the incongruities between the physical activity logs, the RAPA I scores, and 6-minute walk measures is that the participants’ logs may have been invalid. The process of logging physical activity minutes, or the lack of
consistent logging by participants, may have negatively influenced the reliability and validity of the logged results. Estimated physical activity using a computer science and applications accelerometer and a physical activity log concluded that errors in the log may be the result of inaccuracy in self-reporting physical activity (Schmidt et al., 2003). An example would be those errors in recording due to poor memory if the log was not updated on an on-going basis. As a result of concerns about the accuracy of self-reported exercise, subjects in another research study recorded their exercise in a daily exercise log and wore a Tri-Trac accelerometer to validate self-reported exercise bouts (Jakicic, Polley & Wing, 1998). The results showed that 54.2% of the participants who were randomly assigned to a group with an extended exercise routine, under-reported and 45.8% over-reported the number of sessions they engaged in exercise. An investigational study that examined agreement (convergent validity) of six methods to assess physical activity in daily life found that there was poor agreement across the different types of monitors: physical activity log, international physical activity questionnaire, heart rate monitors, pedometers, and one and three dimension accelerometers (Macfarlane, Lee, Ho, Chan, & Chan, 2006). The researchers suggest that these measures sample different levels of habitual physical activity and care is needed when comparing results. These comments may explain why in the current study, RAPA scores, physical activity logs and six-minute walk tests did not agree.

The method of logging and the daily frequency of logging may have discouraged some of the participants from logging correctly. Admittedly, recording and logging physical activity minutes every day was a “chore.” In the client satisfaction survey, 20% of the participants reported that they did not like having to log physical activity minutes.
This dislike for logging may have contributed to a higher number of participants that did not faithfully log their minutes and may have caused inaccuracies in reporting. Perhaps the researcher should have collected the log sheets weekly.

In retrospect, the researcher in the current study should have provided some type of incentive to participants for increasing their physical activity levels and for completing their physical activity logs. In support of providing incentives, researchers reported that a free one-year membership to a study-site gym provided to participants resulted in a 71\% retention at one year and significantly increased physical activity levels at two months and six months. Results of this study showed that the economic incentive of a free one-year gym membership was a more potent intervention than the tested education and social support intervention (Yancey, McCarthy, Harrison, Wong, Siegel & Leslie, 2006).

In the current study, the researcher did not have participants turn in their first five weeks of log sheets until the midpoint of the study period. Then, there was another long period of time without contact from the researcher until the end of the study. The lack of incentives, long periods of time without contact with the researcher, and not having to turn in logs for weeks at a time may have contributed to logging problems. To increase compliance, Jakicic, Polley and Wing (1998) collected completed exercise records weekly from 50 participants for 20 weeks. There was a 100\% compliance with the above procedure. Similarly, Anderson, Wojcik, Winett, and Williams (2006) instructed their participants to not reset their pedometers and at the end of the week, participants brought or mailed their pedometers and step logs to the church or research office. Seventy-seven percent of the participants complied. According to the researchers, those that did not comply, did not differ from those who did in mean steps, exercise MET hours per week.
or in any of the demographic variables, thus step-count data were included in the study. The staff then used the week accumulation of steps on the pedometer to verify the step counts recorded by participants. Lastly, the current study was a 10-week intervention. Having to maintain log sheets each day for 10-weeks without a mechanism for incentives for log completion and verification of logs, may have contributed to a decrease in motivation and inaccuracies as the weeks progressed.

Motivation to log on a daily basis and motivation to walk may have also been influenced by the presence or absence of cues to action. According to the Health Belief Model, cues to action are an important factor in motivating healthy behaviors such as increased exercise (Becker & Maiman, 1975). In the current study, pedometers were given to participants as a cue to action. Pedometers can help walkers meet daily physical activity guidelines and provide reinforcement for movement (Rooney et al., 2003). Several of the obese participants in the intervention group complained that their pedometers were not recording their steps correctly. Placement of the pedometer on the waist of those participants who were obese may have caused a decrease in sensitivity to step movement and recordings. Past research has indicated that pedometers do become less accurate as BMI, waist circumference, and pedometer tilt increase (Crouter, Schneider, & Bassett, 2005; Shepherd, Toloza, McClung, & Schmalzried, 1999). Obese participants may not have been able to use the pedometer as a visual cue to action or as a method of positive reinforcement.

In terms of the physiologic measures in the current study, systolic and diastolic blood pressures did not significantly improve. At baseline, both groups were classified as pre-hypertensive. The Seventh Report of The Joint National Committee on Prevention,
Detection, Evaluation, and Treatment of High Blood Pressure classifies pre-hypertension as systolic reading 120-139 mmHg and diastolic reading 80-89 mmHg (Chobanian et al., 2003). The average reduction in systolic blood pressure for the comparison group was 1.3 mmHg and 1.0 mmHg for the intervention group. The diastolic reduction for the comparison group was 0.4 mmHg and .9 mmHg for the intervention group.

Physical activity remains the cornerstone therapy for the primary prevention, treatment, and control of hypertension. Kokkinos and colleagues (2001) completed a review of twenty-one exercise intervention studies and found that most of the studies show that moderate-intensity aerobic exercise training can lower blood pressure in patients with stage one and stage two essential hypertension. The average reduction in blood pressure in the reviewed studies was 10.5 mmHg for systolic and 7.6 mmHg for diastolic blood pressures. Perhaps a 10-week intervention was not long enough to detect significant changes in blood pressure. Researchers Yanek, Becker, Moy, Gittelsohn, and Koffman (2001) found that systolic blood pressures were significantly lowered in African American women (-1.6 mmHg) one year after initiating an exercise program.

It was interesting to note that mean BMI measurements decreased significantly in the comparison group only. One possible reason for this finding is that the church used for the comparison group continued an on-going group exercise program during the study period. It is possible that some members of the comparison group participated in the church’s fitness program. This was unknown to the researcher until the end of the study. Due to the influence of this existing program, members of the comparison group may have already begun to make some lifestyle changes before enrolling in the current study. In addition, BMI calculations revealed that the comparison group lost more weight (2.6
than the intervention group (0.7 kg), although such a weight loss is of little practical significance. Both groups received information on eating healthy and the African American food pyramid. Coupled with the influence of the existing church program and their regular group meeting sessions, the comparison group may have followed the healthy eating suggestions more than the intervention group.

Limitations

The results of this study should be interpreted with its limitations in mind. First, random selection and random assignment of participants was not done. This lack of randomization may have introduced bias into the study and may have negatively affected the validity of the study. The researcher tried to compensate for this potential limitation by selecting participants that were very similar to one another in many ways.

Second, the small sample size of the study and attrition were limitations. Many more individuals were recruited than those who actually enrolled and participated in the study. The small sample size limited the statistical power of the study. Estimating a sample size before a study relies on several assumptions using the best available information and educated guesses. In this study, many of the assumptions were not actually observed, thereby leading to an underpowered study. The original sample size calculation only considered the outcome physical activity. There were no a priori considerations of detectable differences for the other outcomes. An a priori power analysis was conducted for a one-tailed test for sample size estimation, but two-tailed tests were used for the actual analysis. The original sample size calculation assumed a common standard deviation of 15 minutes of physical exercise. However, the variability observed in the study was much larger. At week 10, the physical activity SD was 183 in
the control group and SD in the intervention group was 146. In power analyses, the larger the SD the larger the sample size requirement. Therefore, a priori, the SD assumption was underestimated. If these SD values had been used in the original calculations, 3389 participants per group would have been needed to detect a difference of 10 minutes between groups. In theory, two-tailed tests require more subjects. Post-hoc power analysis were conducted to determine the true statistical power of the study. For several reasons the study was underpowered to detect the observed differences in physical activity minutes at week 10. Assuming the two-tailed two-sample test, 5% type I error, the observed means and SD (control 234 ± 183 n=18; intervention 199 ± 146, n=28), the study had 11% power to detect this difference. Thus, the researcher cannot make confident conclusions regarding the effectiveness or ineffectiveness of the buddy support intervention.

Third, the researcher did not plan for a long enough period of time to receive medical clearance for those participants that had a positive Physical Activity Readiness Questionnaire (PARQ). The allotted time in the study design did not allow sufficient time for participants to make appointments and obtain medical clearance prior to enrollment in the study. The lack of adequate time for obtaining medical clearance prior to enrollment resulted in 21 prospective subjects in the comparison group and 22 in the intervention group being willing, but ineligible, to participate in the study.

Fourth, there was difficulty with the self-reporting of physical activity minutes. Lack of logging may have caused faulty reporting and negatively impacted the validity of the results. To attempt to overcome this potential limitation, the researcher did schedule a mid-point booster session meeting to collect log sheets and to encourage participants to
continue to be faithful to the task. However, one mid-point meeting may not have been sufficient.

Fifth, the method of measuring buddy support in the current study may not have been adequate. This may have led to problems with internal validity. The researcher did not account for the source or type of buddy support. It was not known if the buddy support was delivered by family or friend. Furthermore, the participants were not instructed to interact with their buddy in person for the purpose of engaging in physical activity. The majority of the participants (71%) received telephone calls from their buddy but did not exercise with their buddy.

Sixth, true baseline data on physical activity minutes were not collected. Some participants were given three days to wear their pedometer and to practice logging while other participants who did not show up for their first session were enrolled in the study without a three-day baseline period. Lack of true baseline data made it difficult to establish the validity of pre to post differences.

Seventh, the researcher and research assistants collected data from participants and were not blinded to the objectives of the research study nor were they blinded to the group assignments. The fact that those that collected data were not blinded to the study may have introduced bias and posed a threat to the internal validity of the study. However, this is unlikely since few positive results were credited to the intervention.

Eighth, during the study period, some members of the comparison group may have been involved in an existing wellness program (intervening variable) at the church that was designated as the comparison group church. Participating in this existing program may have influenced the results obtained from comparison group subjects. This
wellness program may have also provided social support to some members of the comparison group. Such influences may have posed a threat to the internal validity of the study.

Ninth, the distribution of Therabands®, water bottles, sweatbands, soul food pyramid, and inspirational scriptures may have served as an unintended intervention to the comparison group, i.e. Hawthorne Effect. The distribution and potential effects of these materials was not accounted for or measured in any way.

Tenth, as suggested in the literature, familiarization trials help to establish the reliability of the six-minute walk test. In the current study familiarization trials were not performed for baseline measurements or for post-intervention measurements. Furthermore, for the six-minute walk test, systolic and diastolic blood pressure measurements, and height and weight measurements, no intra-rater or inter-rater reliability was assessed.

Lastly, diffusion of information across the two groups may have been a limitation. The comparison and intervention groups may have communicated with each other as a result of being a member of the African American Christian community. Some participants knew each other and were related to one another. This may have led to discussions about the study. This diffusion of information poses a threat to the internal validity of the findings.

Implications & Recommendations

This study has several implications for understanding the effects of buddy support on physical activity in African American women. In the current study, the majority of the participants received buddy support provided by telephone. Buddy support in the form of
telephone communication did not increase physical activity levels in African American women. Future studies that are designed to use buddy support to increase physical activity may want to compare telephone or other electronic versions of buddy support with in person forms of buddy support. It would also be beneficial to compare one-on-one buddy support with more structured group support formats. Researchers may want to augment the body support with group exercise classes, group discussions, and group competition.

In the current study, for the intervention group, social support provided by family members significantly increased yet physical activity minutes decreased over the course of the study. These results support Eyler and colleagues (1999) and Spanier and Allison’s (2001) findings that familial structured support is associated with lower levels of physical activity. Repeated contacts from family members may be interpreted as “harping” or criticism. Future research in this area may want to compare social support from family members versus social support from friends and co-workers.

Church-based interventions are likely to feature an internal, existing system of social support. This factor must be controlled in future research studies. Church-based interventions can exert a positive effect on health promotion behaviors, however, they may not be the best environment to conduct and test interventions based on social support since social support systems exist naturally in the church setting.

This study relied on the participants to accurately and frequently log physical activity minutes, which proved to be problematic. Future researchers that use physical activity logs should provide clear, specific, written and verbal instructions on how to log data and the importance of logging data correctly. Participants should be given the
opportunity to practice logging and wearing a pedometer prior to the initiation of the
study. A pilot testing period could identify problems earlier and allow time for correction
and remediation. Some participants did not log physical activity minutes for the ten
weeks, only pedometer steps and vice versa. It may be useful in future studies to collect
activity data weekly rather than only at the mid point of the study and at the end of the
study. It may be useful to offer alternative methods of data collection such as on-line
logging via a website or by telephone calls. Researchers could provide monetary
incentives to participants that submit completed logs in a timely fashion.

One problem that was identified in this study was that some of the participants
who were obese with large abdomens, felt the pedometers were not recording the steps
accurately. Future researchers should consider having those participants with obese
abdomens who identify inaccuracies while placing the pedometer on the front of the
waistband, to place the pedometer on the side or back of the waistline. In addition
piezoelectric pedometers can be placed on the ankle, however, ankle pedometers are
more expensive than those that are placed on the waist (Karabulut, Crouter & Bassett,
2005).

Conclusions

Interventions developed with a social support component may increase physical
activity behaviors through building, strengthening, and maintaining social networks that
provide supportive relationships for behavior change (CDC, 2001). As evident through
the review of the literature, social support is correlated with higher levels of physical
activity, particularly in women. Although results of the current study did not show a
correlation between buddy support and increased physical activity levels, the many limitations of this study likely hindered the reliability and validity of the results.

In the intervention group, RAPA I scores, 6-minute walk test distances, and social support from family members significantly increased over the course of the study. Thus, there was some success with the intervention. The women in both groups also lost a little body weight and had minor decreases in blood pressure.

The health of African American women is important. African American women have more disease, disability and premature mortality than white women. African American women are more obese and have lower physical activity levels than white women. Physical inactivity is a major public health issue as well as a national priority. Mortality rates for African American women exceed any other racial or ethnic group for nearly every major cause of death. Public health researchers need to continue to investigate why these disparities exist and discover creative ways of eliminating them.
REFERENCES


American Heart Association (2006c) Physical Activity and Cardiovascular health


Appendix A

Human Subject Approval Letter
Human Subjects Research Committee

4-26-05

TO: Patricia Hogue

RE: Research Project# 205-092

Effects of buddy support on physical inactivity in African American women

The University of Toledo Human Subjects Research Review Committee has completed its review of your project utilizing human subjects.

Your project has been approved as submitted, and you are authorized to use human subjects in that project until 4-26-06. At the end of that time, if your project is not complete, you must submit a request for an extension and a progress report in order to continue the project beyond that date. When your project has been completed, please fill out and send me the enclosed Certificate of Compliance.

This approval for the use of human subjects is contingent upon your following the research plan presented in your submitted proposal. You are not permitted to undertake any actions involving human subjects which are not a specific part of that proposal. If it becomes necessary to make changes, you may use those modifications only after you submit them for review and inclusion in your project file. Without such review, this authorization is void and you are not permitted to use human subjects in your research.

If any untoward incidents or unanticipated adverse reactions should develop in the course of your research on human subjects, you must suspend the project temporarily and notify me immediately.

Thank you very much for your cooperation. If you have any questions, please feel free to contact me at 419-530-1918.

Sincerely,

[Signature]

Gerald P. Sherman, Chair

cc: Office of Research HSRC File
Debra Boardley, MS#119
Appendix B

Log Sheets
Examples of physical activity intensity levels:

<table>
<thead>
<tr>
<th>Light activities</th>
<th>Moderate activities</th>
<th>Vigorous activities</th>
</tr>
</thead>
</table>
| • your heart beats slightly faster than normal  
• you can talk and sing | • your heart beats faster than normal  
• you can talk but not sing | • your heart rate increases a lot  
• you can’t talk or your talking is broken up by large breaths |

Walking Leisurely  
Stretching  
Vacuuming or Light Yard Work  
Fast Walking  
Aerobics Class  
Strength Training  
Swim Gently  
Stair Machine  
Jogging or Running  
Tennis, Racquetball, Pickle ball or
# PHYSICAL ACTIVITY LOG - INTERVENTION

**ID# ___________**

**Week # ______**

<table>
<thead>
<tr>
<th></th>
<th>Light (minutes)</th>
<th>Moderate (minutes)</th>
<th>Vigorous (minutes)</th>
<th>TOTAL MINUTES</th>
<th>TOTAL STEPS</th>
<th>BUDDY SUPPORT MINUTES*</th>
<th>TYPE OF BUDDY SUPPORT**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td></td>
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</tbody>
</table>

Use this log to record the number of minutes you are physically active and/or the number of steps you take each day. The following guidelines can help you begin and maintain a **physical activity** program:

- Start slowly and build up gradually. You can do 30 to 60 minutes of activity all at once or add up 10-minutes sessions over the course of each day.
- Count your steps using your pedometer. The following information lists averages for different groups. Active adults: 7,000–13,000 steps per day; Active older adults: 6,000–8,500 steps per day; Inactive adults: 3,500–5,500 steps/day. We suggest that you gradually increase your steps by an additional 2,500–3,000 steps/day.
- Remember to try to include activities from each of the three main categories of **physical activity**: endurance (aerobic), flexibility (stretching), and strength (lifting weights).

- *For each day that your support buddy is utilized (telephone call, email, exercise partner) during the week, record how long you were engaged with your buddy.
- ** For type of support, place a T = Telephone, C = Call, E = Email, X = Exercise and O = Other (make a notation of what you did with your buddy)
**PHYSICAL ACTIVITY LOG**

**ID# __________**

**Week # ______**

<table>
<thead>
<tr>
<th></th>
<th>Light (minutes)</th>
<th>Moderate (minutes)</th>
<th>Vigorous (minutes)</th>
<th>TOTAL MINUTES</th>
<th>TOTAL STEPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
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<tr>
<td>Tuesday</td>
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<td>Sunday</td>
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</tbody>
</table>

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- Remember to try to include activities from each of the three main categories of physical activity: endurance (aerobic), flexibility (stretching), and strength (lifting weights).
Appendix C

Pedometer Protocol
Pedometer Instructions

- The pedometer should be placed on a belt or waistband in the morning.
- For best results the pedometer should be kept in line with the “crease line” of your pants.
- Once the pedometer is placed on the garment, attach the “bungee” cord to a belt loop, waist band or belt. The bungee cord will prevent losing the pedometer.
- You should strive to take 10,000 steps per day (five miles)
- The pedometer should be reset at night after recording steps on the physical activity log sheet
Appendix D

Rapid Assessment Of Physical Activity Survey
How Physically Active Are You?

An assessment of level and intensity of physical activity
**RAPA**

**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:**

<table>
<thead>
<tr>
<th>Light activities</th>
<th>Walking Leisurely</th>
<th>Stretching</th>
<th>Vacuuming or Light Yard Work</th>
</tr>
</thead>
<tbody>
<tr>
<td>• your heart beats slightly faster than normal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• you can talk and sing</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Moderate activities</th>
<th>Fast Walking</th>
<th>Aerobics Class</th>
<th>Strength Training</th>
<th>Swim Gently</th>
</tr>
</thead>
<tbody>
<tr>
<td>• your heart beats faster than normal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• you can talk but not sing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vigorous activities</th>
<th>Stair Machine</th>
<th>Jogging or Running</th>
<th>Tennis, Racquetball, Pickle ball or</th>
</tr>
</thead>
<tbody>
<tr>
<td>• your heart rate increases a lot</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• you can’t talk or your talking is broken up by large breaths</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### How physically active are you?  *(Check one answer on each line)*

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Does this accurately describe you?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I rarely or never do any physical activities.</td>
<td>Yes □  No □</td>
</tr>
<tr>
<td>2</td>
<td>I do some <strong>light</strong> or <strong>moderate</strong> physical activities, but not every week.</td>
<td>Yes □  No □</td>
</tr>
<tr>
<td>3</td>
<td>I do some <strong>light</strong> physical activity every week.</td>
<td>Yes □  No □</td>
</tr>
<tr>
<td>4</td>
<td>I do <strong>moderate</strong> physical activities every week, but less than 30 minutes per day, 5 days a week.</td>
<td>Yes □  No □</td>
</tr>
<tr>
<td>5</td>
<td>I do <strong>vigorous</strong> physical activities every week, but less than 20 minutes per day, 3 days a week.</td>
<td>Yes □  No □</td>
</tr>
<tr>
<td>6</td>
<td>I do 30 minutes or more per day of <strong>moderate</strong> physical activities, 5 or more days per week.</td>
<td>Yes □  No □</td>
</tr>
<tr>
<td>7</td>
<td>I do 20 minutes or more per day of <strong>vigorous</strong> physical activities, 3 or more days per week.</td>
<td>Yes □  No □</td>
</tr>
<tr>
<td>8</td>
<td>I do activities to increase muscle <strong>strength</strong>, such as lifting weights or calisthenics, once a week or more.</td>
<td>Yes □  No □</td>
</tr>
<tr>
<td>9</td>
<td>I do activities to improve <strong>flexibility</strong>, such as stretching or yoga, once a week or more.</td>
<td>Yes □  No □</td>
</tr>
</tbody>
</table>

ID # __________                        Today’s Date  __

**Scoring Instructions**
**RAPA 1: Aerobic**

To score, choose the question with the highest score with an affirmative response. Any number less than 6 is suboptimal.

For scoring or summarizing categorically:

**Score as sedentary:**

1. I rarely or never do any physical activities.

**Score as under-active:**

2. I do some light or moderate physical activities, but not every week.

3. I do some light physical activity every week.

**Score as under-active regular:**

4. I do moderate physical activities every week, but less than 5 days per week or less than 30 minutes at a time.

5. I do vigorous physical activities every week, but less than 3 days per week or less than 20 minutes at a time.

**Score as active:**

6. I do 30 minutes or more per day of moderate physical activities, 5 or more days per week.

7. I do 20 minutes or more per day of vigorous physical activities, 3 or more days per week.

---

**RAPA 2: Strength & Flexibility**

I do activities to increase muscle strength, such as lifting weights or calisthenics, once a week or more. (1)

I do activities to improve flexibility, such as stretching or yoga, once a week or more. (2)

Both. (3)

None (0)
Appendix E

Social Support and Physical Activity Survey
1. What is your age?
   I am __________ years old
   Please fill in the blank

2. Please circle the highest level of education you completed:
   Elementary  Jr. High  High School  College
   1 2 3 4 5 6  7 8 9 10 11 12  13 14 15 16+

3. How many people including yourself live in your house?
   A. One
   B. Two to four
   C. Greater than four

4. What is the average total gross income for your household?
   A. Less than $10,000
   B. 10,001 to $32,000
   C. $32,001 to 60,000
   D. $60,001 to $75,000
   E. Greater than $75,000

5. What is your marriage status?
   A. Single never married
   B. Married
   C. Divorced
   D. Live with partner
   E. Widow

6. What is your employment status?
   A. Do not work
   B. Stay home Mom
   C. Work part-time
   D. Work full-time
   E. Retired

7. What is your race?
   A. African American
   B. Other

Please Turn To The Back Of This Page
### Family & Friends Survey for Physical Activity

**Instructions:** In the table below, please rate **HOW OFTEN** a family member or a friend did what is described in each question. For each item in the table below, write down a number for family and a number for friends. Use the scale below for your ratings:

**Rating Scale**

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Never</td>
<td>Rarely</td>
<td>Sometimes</td>
<td>Often</td>
<td>Very Often</td>
<td>Does Not Apply</td>
</tr>
</tbody>
</table>

During the **PAST 3 MONTHS**, how **OFTEN** did a family member (or a member of my household) or a friend do the following?

<table>
<thead>
<tr>
<th></th>
<th>Family</th>
<th>Friends</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>exercised with me ...........................................</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>offered to exercise with me ..................................</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>gave me helpful reminders to exercise .......................</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Example - “Are you going to exercise tonight?”).</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>gave me encouragement to stick with my exercise program.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>changed their schedule so we could exercise together .......</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>discussed exercise with me ....................................</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>complained about the time I spend exercising ................</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>criticized me or made fun of me for exercising ..............</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>gave me rewards for exercising ................................</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Example – Bought me or gave me something I like.)</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>planned for exercise on recreational outings ..................</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>helped plan activities around my exercise .....................</td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>asked me for ideas on how they can get more exercise .........</td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>talked to me about how much they like to exercise .............</td>
<td></td>
</tr>
</tbody>
</table>

*Before you turn in your survey, please check to make sure that you wrote down a rating number for family and friends for each item above. Thank you!*
Appendix F

Six-Minute Walk Test Protocol
Six-Minute Walk Test Protocol
American Thoracic Society Guidelines

The six-minute walk test protocol (6MWT) should be performed indoors, along a long, flat, straight, enclosed corridor with a hard surface that is seldom traveled. If the weather is comfortable, the test may be performed outdoors. The walking course must be 30 m in length. A 100-ft hallway is, therefore, required. The length of the corridor should be marked every 3 m. The turnaround points should be marked with a cone (such as an orange traffic cone). A starting line, which marks the beginning and end of each 60-m lap, should be marked on the floor using brightly colored tape.

REQUIRED EQUIPMENT

1. Countdown timer (or stopwatch)
2. Mechanical lap counter
3. Two small cones to mark the turnaround points
4. A chair that can be easily moved along the walking course
5. Worksheets on a clipboard

PARTICIPANT PREPARATION

1. Comfortable clothing should be worn.
2. Appropriate shoes for walking should be worn.
3. Patients should use their usual walking aids during the test (cane, walker, etc.).
4. The patient’s usual medical regimen should be continued.
5. A light meal is acceptable before early morning or early afternoon tests.
6. Patients should not have exercised vigorously within 2 hours of beginning the test.
MEASUREMENTS

1. Repeat testing should be performed about the same time of day to minimize intraday variability.
2. A “warm-up” period before the test should not be performed.
3. The patient should sit at rest in a chair, located near the starting position, for at least 10 minutes before the test starts. During this time, check for contraindications, measure pulse and blood pressure, and make sure that clothing and shoes are appropriate.
4. Complete the first portion of the worksheet.
5. Set the lap counter to zero and the timer to 6 minutes. Assemble all necessary equipment (lap counter, timer, clipboard, worksheet) and move to the starting point.
6. Instruct the patient as follows:

“The object of this test is to walk as far as possible for 6 minutes. You will walk back and forth in this hallway. Six minutes is a long time to walk, so you will be exerting yourself. You will probably get out of breath or become exhausted. You are permitted to slow down, to stop, and to rest as necessary. You may lean against the wall while resting, but resume walking as soon as you are able. You will be walking back and forth around the cones. You should pivot briskly around the cones and continue back the other way without hesitation. Now I’m going to show you. Please watch the way I turn without hesitation.” Demonstrate by walking one lap yourself. Walk and pivot around a cone briskly. “Are you ready to do that? I am going to use this counter to keep track of the number of laps you complete. I will click it each time you turn around at this starting line. Remember that the object is to walk AS FAR AS POSSIBLE for 6 minutes, but don’t run or jog. Start now, or whenever you are ready.”

Reprinted from American Thoracic Society
Appendix G

Blood Pressure Measurement Protocol
BLOOD PRESSURE MEASUREMENT PROTOCOL

Both systolic and diastolic blood pressures, as well as which arm the measurement is taken will be recorded.

Patients will be advised to refrain from smoking or taking caffeine or food during the 30 minutes before measurement.

- The patient will be instructed to go to the bathroom before having their blood pressure taken.
  
  A full bladder can change their blood pressure reading

  - Measurement will start after 5 minutes of rest.
  - Patients will be seated comfortably with their arms bared and supported at the level of the heart. The feet will be on the floor.
  - Patients will be instructed to relax and not talk. The correct cuff size will be used for an accurate measurement. The cuff's bladder will encircle at least 80% of the arm.
  - Measurements will be taken with a recently calibrated and validated instrument.
Appendix H

Weight and Height Protocol
Weight

Tanita Scale Instructions and Protocol

Operating Instructions

1. STEP ON: The flashing LCD display read “000”.
   - Have the patient step on the scale with bare feet.
   - DO NOT step off from the weight platform until the final number registers
   - The measurement is now complete – record on the data collection log.

   To clean the footpads apply alcohol to a cloth and wipe.

Height

Height will be measured using a tape measure to the nearest centimeter. Tape measure will be affixed to the wall. Participants will stand with feet together, shoes off and back to the wall. Measurements will be recorded on the data collection tool (see below).

BMI:

Body mass index will be calculated using weight in kilograms divided by height in meters squared.
ID #________________________

DATA COLLECTION LOG

*Pretest - Baseline*

**Six minute walk distance** _________________
  Blood pressure systolic R arm ________  L arm ________
  Blood pressure diastolic R arm ________  L arm ________

  Weight __________
  Height __________
  BMI ____________


*Week Twelve – Post test*

  Six minute walk distance _________________

  Blood pressure systolic R arm ________  L arm ________
  Blood pressure diastolic R arm ________  L arm ________

  Weight __________
  Height __________
  BMI ____________
Appendix I

The Physical Activity Readiness Questionnaire
Physical Activity Readiness Questionnaire (PAR-Q)

Regular exercise is associated with many health benefits, yet any change of activity may increase the risk of injury. Completion of this questionnaire is a first step when planning to increase the amount of physical activity in your life. Please read each question carefully and answer every question honestly:

1) Has a physician ever said you have a heart condition and you should only do physical activity recommended by a physician?
   Yes  No

2) When you do physical activity, do you feel pain in your chest?
   Yes  No

3) When you were not doing physical activity, have you had chest pain in the past month?
   Yes  No

4) Do you ever lose consciousness or do you lose your balance because of dizziness?
   Yes  No

5) Do you have a joint or bone problem that may be made worse by a change in your physical activity?
   Yes  No

6) Is a physician currently prescribing medications for your blood pressure or heart condition?
   Yes  No

7) Are you pregnant?
   Yes  No

8) Do you have insulin dependent diabetes?
   Yes  No

9) Are you 66 years of age or older?
   Yes  No

10) Do you know of any other reason you should not exercise or increase your physical activity?
    Yes  No

If you answered yes to any of the above questions, talk with your doctor BEFORE you become more physically active. Tell your doctor your intent to exercise and to which questions you answer yes.

If you honestly answered no to all questions you can be reasonably positive that you can safely increase your level of physical activity gradually.

If your health changes so you then answer yes to any of the above questions, seek guidance from a physician.

Need PCP Prescription  Yes  No
Appendix J

Recruitment Notices
RECRUITMENT NOTICES

For Church weekly newsletter:

DO YOU WANT TO GET ACTIVE?

African American women needed to volunteer for a 12 week study to test an intervention to physical inactivity. Gifts and pedometers will be given to each participant. Please stop by the table in the Narthex for details and to sign up. For questions, contact Sis. Patricia Francis Hogue at 419-383-4807 during the day and 419-380-8052 at home.

For The Links monthly meeting notice:

DO YOU WANT TO GET ACTIVE?

African American women needed to volunteer for a 12 week study to test an intervention to physical inactivity. Gifts and pedometers will be given to each participant. Please see Link Patricia Hogue for details and to sign up. For questions, contact Link Hogue at 419-383-4807 during the day and 419-380-8052.

For Alpha Kappa Alpha Sorority monthly meeting newsletter:

DO YOU WANT TO GET ACTIVE?

African American women needed to volunteer for a 12 week study to test an intervention to physical inactivity. Gifts and pedometers will be given to each participant. Please see Soror Patricia Francis Hogue for details and to sign up. For questions, contact Soror Hogue at 419-383-4807 during the day and 419-380-8052.
Appendix K

Appointment and Reminder Postcards
APPOINTMENT CARDS

Baseline Session 1
Intervention Session 2
Week Six – Log data collection
Week Twelve – Post Testing

You will need to report to Friendship Baptist Church, 5801 Nebraska Avenue, Toledo, OH on ____________________________ at __________. Please try very hard to keep this appointment. Please call 419-380-8052 if you are unable to attend this meeting and to reschedule.

You will need to report to Mt. Pilgrim Baptist Church, 1401 Hoag Street, Toledo, OH on ____________________________ at __________. Please try very hard to keep this appointment. Please call 419-380-8052 if you are unable to attend this meeting and to reschedule.

REMINDER

Just a reminder that you have an appointment to return to Friendship Baptist Church, 5801 Nebraska Avenue, Toledo, Ohio on ____________________________ at ____________________________
Please try very hard to keep this appointment. Please call 419-380-8052 if you are unable to attend this meeting and to reschedule.

Just a reminder that you have an appointment to return to Mt. Pilgrim Baptist Church, 1401 Nebraska Avenue, Toledo, Ohio on ____________________________ at ____________________________
Please try very hard to keep this appointment. Please call 419-380-8052 if you are unable to attend this meeting and to reschedule.
Appendix L

Buddy Support Contract
ID # ___________________

BUDDY SUPPORT
CONTRACT

I agree to serve as buddy support for the entire 12-week physical activity study. My daily support can be in the form of but not limited to:

- Telephone calls to encourage or get feedback as to how the participant is doing
- Emails for encouragement or feedback
- Engaging in physical activity with the participant
- Meeting with the participant to encourage or get feedback

______________________________ ___________
Initials Date
Appendix M

Post Program Evaluation
1. I enjoyed being physically active.
   ___ Yes, I strongly agree
   ___ Yes, I agree
   ___ No, I disagree
   ___ No, I strongly disagree
   ___ I neither agree nor disagree

2. I get as much physical activity as I need.
   ___ Yes, I strongly agree
   ___ Yes, I agree
   ___ No, I disagree
   ___ No, I strongly disagree
   ___ I neither agree nor disagree

3. I would rank my current overall health as
   ___ Excellent
   ___ Good
   ___ Fair
   ___ Poor

4. I will be more consistent with my daily walking as a result of participating in the physical activity study.
   ___ Yes, strongly agree
   ___ Yes, I agree
   ___ No, I disagree
   ___ No, I strongly disagree
   ___ I neither agree nor disagree

5. I feel better now than I did prior to starting the pedometer walking program.
   ___ Yes
   ___ No

6. The length of the program was
   ___ Too long
   ___ About right
   ___ Too short

PLEASE TURN THIS PAGE OVER AND COMPLETE THE REMAINING QUESTIONS
7. What did you like most about the program?

________________________________________________________________________

8. What did you like least about the program?

________________________________________________________________________

9. Would you participate in a similar program in the future?
   ___ Yes
   ___ No
   ___ Not sure

10. If you could change one thing to make the program better, what would it be?

________________________________________________________________________

In the space below, please set a walking goal for yourself that you will work towards in the next 1 to 3 months.

During the next 1 to 3 months, I will

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

Make it a SMART goal! (specific, measurable, attainable, realistic, time bound)

Thank you for participating in this study!
This study was made possible by Healthy Community Foundation Grant and The PA Foundation Community Based Project Grant.
Appendix N

Consent Form
RESEARCH FORM FOR ADULT SUBJECT CONSENT

The Effects of Buddy Support on Physical Inactivity in African American Women

Patricia A. Hogue, MS PA-C (phone 419 383-4807)
Debra Boardley, Ph.D. (phone 419 530-2433)

PURPOSE

You are being asked to take part in a research study of physical activity. The purpose of the study is to increase physical activity in African American women. You were selected as someone who may want to take part in this study because of your interest to increase your physical activity level. There will be approximately 64 subjects in the study.

PROCEDURES AND DURATION

If you decide to take part in this 12-week study, you will be asked to engage in at least 30 minutes of physical activity preferably all days of the week for 10 weeks. You will first need to complete a questionnaire that will determine if you are eligible to increase your physical activity level. Depending upon the results of this questionnaire, you may need to contact your doctor to receive written permission to increase your physical activity level. You will be asked to attend 2 meetings, each approximately 2 hours in length, prior to the beginning of your 10-week physical activity. During these meetings you will receive blood pressure, weight, and height measurements. You will walk for 6 minutes and the distance will be recorded. In addition, you will be asked to complete 2 questionnaires and receive instructions and information for increasing your physical activity levels. You will receive a pedometer, which is a device you will wear on your waist that will record the number of steps you take daily, with instructions on how to use it during the 10 weeks. You will also receive a form to record your physical activity levels and the number of steps recorded on the pedometer daily. You will be required to report for another meeting for approximately 1 hour during the 5th week. The last week of the study, week 12, you will be required to attend a final 2 hour meeting where you will receive blood pressure and weight measurements. You will again walk for 6 minutes and the distance recorded. Lastly, you will complete 2 surveys.

RISKS AND DISCOMFORTS

There is the potential risk of minor injury or discomfort during physical activity. Sedentary people that have more than one risk factor for cardiovascular disease (i.e. smoking, hypertension, hyperlipidemia, diabetes, etc.) and begin a moderate exercise program are at very low risk of having a heart attack or stroke. These same people who may begin a vigorous exercise program are at a somewhat greater risk for events. You will be asked to engage in moderate physical activity only. If you have one or more risk factors, we will ask you to contact your doctor for permission to increase your activity level.
**BENEFITS AND/OR COMPENSATION**

Engaging in daily physical activity provides health benefits including the reduction in risks of cardiovascular disease, hypertension, type II diabetes mellitus, obesity, and premature death. We cannot and do not guarantee or promise that you will receive any benefits from this study.

You will receive small incentive gifts, nutritional snacks and water at each meeting.

**CONFIDENTIALITY**

By agreeing to take part in this research study, you give to the University of Toledo, the Principal Investigator and all personnel associated with this research study your permission to use or disclose health information that can not be identified with you that we obtain in connection with this study. We will use this information for the purpose of conducting the research study as described in the research consent form.

The information that we will use or disclose includes blood pressure, weight, body mass index calculations, six-minute walk test, physical activity minutes and answers to the survey instruments. We may use this information ourselves, or we may disclose or provide access to the information to study sponsor and its designees (for study oversight and monitoring), coordinating center (for data collection and study monitoring), other sites participating in this research (for multi-institutional studies), statistician (for analysis of data) as part of the research study. Under some circumstances, the Institutional Review Board at The University of Toledo may review your information for compliance audits.

The University of Toledo is required by law to protect the privacy of your health information, and to use or disclose the information we obtain about you in connection with this research study only as authorized by you in this form. There is a possibility that the information we disclose may be re-disclosed by the persons we give it to, and no longer protected. However, we will encourage any person who receives your information from us to continue to protect and not re-disclose the information.

Your permission for us to use or disclose your personal health information as described in this section is voluntary. However, you will not be allowed to participate in the research study unless you give us your permission to use or disclose your personal health information by signing this document.

Your access to your own personal health information may be denied during the term of the research study, but you can access your information once the research study is completed.

You have the right to revoke (cancel) the permission you have given to us to use or disclose your personal health information at any time by giving written notice to Patricia Hogue, 2539 West Village Drive, Toledo, OH 43614. However, a cancellation will not apply if we have acted with your permission, for example, information that already has been used or disclosed prior to the cancellation. Also, a cancellation will not prevent us from continuing to use and disclose information that was obtained prior to the cancellation as necessary to maintain the integrity of the research study.

Except as noted in the above paragraph, your permission for us to use and disclose personal health information has no expiration date.
A more complete statement of The University of Toledo’s Privacy Practices is set forth in its Joint Notice of Privacy Practice.

**COST TO YOU FOR TAKING PART IN THIS STUDY**

You will not incur any costs for participating in this study.

**IN THE EVENT OF A RESEARCH-RELATED INJURY**

In the event of injury resulting from your taking part in this study, treatment can be obtained at a health care facility of your choice. You should understand that the costs of such treatment will be your responsibility. Financial compensation is not available through The University of Toledo. By signing this form you are not giving up any of your legal rights as a research subject.

In the event of an injury, contact Patricia Hogue, 419-380-8052

**VOLUNTARY PARTICIPATION**

Taking part in this study is voluntary. If you decide not to take part in this study, your decision will not affect your future relations with The University of Toledo, their personnel, and associated institutions. If you do decide to take part in this research, you are free to withdraw your consent and to discontinue your participation at any time without a penalty.

**OFFER TO ANSWER QUESTIONS**

Before you sign this form, please ask any questions on any aspect of this study that is unclear to you. You may take as much time as necessary to think it over.

**AUTHORIZATION**

YOU ARE MAKING A DECISION WHETHER OR NOT TO PARTICIPATE IN THIS RESEARCH STUDY. YOUR SIGNATURE INDICATES THAT YOU HAVE READ AND UNDERSTOOD THE INFORMATION PROVIDED ABOVE, HAVE HAD ALL YOUR QUESTIONS ANSWERED, AND HAVE DECIDED TO PARTICIPATE.

BY SIGNING THIS DOCUMENT YOU AUTHORIZE US TO USE OR DISCLOSE YOUR PERSONAL HEALTH INFORMATION AS DESCRIBED IN THIS FORM.

<table>
<thead>
<tr>
<th>Name of Subject (please print)</th>
<th>Signature of Subject or Legally Authorized Representative</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Relationship to the Subject</th>
<th></th>
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<thead>
<tr>
<th>Time</th>
<th></th>
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<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>
YOU WILL BE GIVEN A SIGNED COPY OF THIS FORM TO KEEP.

If you have any questions concerning this study or consent form beyond those answered by the investigator, including questions about the research, your rights as a research subject or research-related injuries, please feel free to contact Gerald Sherman, PhD. HSRRC Chair, University of Toledo at (419) 530-1918.