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The Impact of a Church-Based Physical Activity Intervention on Exercise Adherence in Middle-Aged Women

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Abstract

Women are at risk of cardiovascular disease which regular physical activity has been shown to reduce; yet 60% do not exercise 30 minutes daily for minimal health benefits. This study determined the effectiveness of a 24-week church-based physical activity intervention for middle-aged women (n = 12) aged 35 to 65 years in increasing and maintaining weekly moderate-intensity activity.

An intervention group and control group logged weekly exercise activity. They received separate intervention including encouragement to exercise with a partner and attend a biweekly support meeting for Bible study and wellness education during phase one and two, respectively. The entire sample did increase exercise time during the study (p = .000). The results offer wellness programs aid in exercise adherence development.

Introduction

The purpose of this study was to determine the effectiveness of a 24-week church-based physical activity intervention for middle-aged women (35-65) in increasing and maintaining moderate-intensity physical activity on a weekly basis.

Cardiovascular disease (CVD), conditions that affect the heart and blood vessels (arteries and veins), often implies medical complications that can result in heart attack, chest pain (angina), or stroke (Mayo Clinic, 2009). Heart attacks are abundant in the United States and largely stem from the number one heart disease known as coronary heart disease (CHD; Centers for Disease Control and Prevention, 2009). The American Heart Association (AHA, 2009) estimated in 2006 that 80 million people in the United States had one or more forms of CVD including 16.8 million with CHD, the single leading cause of death in American today. Middle-aged women are at risk of coronary heart disease evidenced in factors such as hypercholesterolemia, hypertension, impaired fasting glucose, and obesity (Heyward, 2006; Segar, Jayaratne, Hanlon & Richardson, 2002).

Regular exercise or physical activity has been shown to reduce CVD risks and can decrease morbidity and mortality (Heyward, 2006). The American College of Sports Medicine (ACSM) recommends 60 minutes of daily moderate-intensity activity to prevent weight gain and achieve additional health benefits (Armstrong, Balady, Berry, Davis, & Davy, 2006). However, the Surgeon General reports that 60% of women do not meet the recommended daily exercise of even 30 minutes moderately-intense activity for minimal health benefits (NCCDPHP, 1999).

Research indicates that middle-aged women lack regular exercise adherence due to a variety of reasons including, but not limited to, a lack of motivation, time, ability, and health limitations (King, Castro, Wilcox, Eyler, Sallis, & Brownson, 2000). Clinical research has shown that middle-aged women benefit from various social support factors such as exercise partners when attempting to increase and to adhere to consistent physical activity (Peterson, Yates, Atwood, & Hertzog, 2005). Furthermore, studies indicate that women who develop a routine exercise program are more likely to adhere to exercise (Nies, Reisenberg, Chruscial, & Artibee, 2003). Finally recent trend indicates that churches offer successful sites for fostering exercise adherence with middle-aged women (Dornelas, Stepnowski, Fischer, & Thompson, 2007).

Given the research, the health problem for middle-aged women is their risk of CHD due in part to physical inactivity. Figure 1 shows that physical inactivity is caused by the women's lack of time, social support, motivation, ability, and/or health limitations. The problem is mediated by establishing a habit of a regular routine and learning to overcome barriers given that the women have support of friends/family, education, and training. This assumes that family responsibilities, work commitment, and injuries existed prior to the causes of physical inactivity.

Four hypotheses were tested in this study:

1. Middle-aged women (35-65) who participate in the intervention group (exercising in groups of two or more and attending biweekly support meetings) will spend more time in moderate-intensity physical activity ($\geq$ 4.0 METs) as measured at 12 weeks, the conclusion of phase one of the

study, than those women in the control group (receiving no intervention support).

2. The intervention program will increase total time exercising with a partner such that the intervention group will have more total exercise time with a partner than the control group in phase one.
3. The time effect for both groups will indicate increased total exercise time over the 24-week study period.
4. Waist circumference measurements will decline for the participants over the 24-week study.

This study tested for evidence of middle-aged women's exercise adherence when exercising with a partner and having consistent opportunity for accountability. The test also examined if middle-aged women would further benefit from fellowship in a familiar environment (such as their church) in which wellness education, spiritual application, and routine establishment (via goal setting and overcoming barriers to exercise) training was offered. The results of this study could assist fitness directors in a variety of private and public settings including churches, corporations, and community wellness programs. Physical activity motivators could use the insight into developing successful programs for women aged 35-65 to begin and continue in regular exercise.

The study was conducted over a 24-week period beginning August 27, 2009 and ending April 2, 2010. There was a four-week break in the intervention during December 2009 which may have created a limitation in the research but was scheduled to accommodate the hectic holiday season. A second limitation in the study design may have existed due to the different seasons of climate and personal responsibilities during

the study period which may have provided incentive and/or obstacles to the participants' commitment to the study. However, the longevity of the study added credibility to the conclusions especially related to the participants' success in exercise adherence. The participants were grouped with others from their church which could have been considered an "intact group", typically a source of limited internal validity in research; however, the participants were randomly assigned to the intervention and control groups, thus reducing the risk of compromised validity. The use of the intact group gave strength to the purpose of the social support aspect of the intervention.

Delimitations of the study included middle-aged women (35-65 years) who were currently participating in less than 30 minutes of moderate-intensity activity daily. Eligible participants included those not pregnant at any time during the life of the study. Subjects were also required to successfully complete a Physical Activity Readiness Questionnaire (Par-Q, see Appendix A) and provide physician's written permission if applicable.

The independent variables for the research were exercise partners and biweekly support meeting attendance, and the dependent variable was total exercise time in minutes and with partners. The adherence goal was defined as regular, moderate-intense exercise of at least 150 minutes per week. The ultimate goal for the women, although not necessarily during the study period, was to increase participants' weekly moderate-intense physical activity to 60 minutes per day for at least five days per week. The intervention group was encouraged to exercise in groups of two or more and attend a biweekly support meeting. Physical activity was measured as the total minutes per week spent in moderate-intensity exercise classified as such by using a percentage of the

maximum heart rate calculation. The activity was measured by week, 12 weeks, and 24 weeks using the 7-Day Activity Recall (7-DAR; Dishman & Steinhardt, 1988; Sallis, Haskell, & Wood, 1985) completed by the participants. Behavioral variables (goal establishment, adjustment and maintenance), regular routine maintenance and overcoming barriers to exercise were also included in this research as part of the bi-weekly support meeting instruction. Finally, waist circumference, the only body composition variable, was measured at base, at the beginning of the second 12-week period and at 24 weeks. Demographic information for the subjects was also documented.

For the purpose of this study, moderate-intensity activity was defined as exercise utilizing 64-76% of the maximum heart rate for the subject (Armstrong et al., 2006a). Maximum heart rate was calculated as 200 less the subject's age. The subjects measured their heart rates over 15 seconds using either the radial or carotid artery palpitation and then multiplied the result by four to calculate beats per minute (Armstrong et al., 2006c).

Literature Review

Research into physical activity for middle-aged women has been exhaustive in an effort to discover benefits of exercise for reducing CVD risk and has proven it to be effective to reduce CVD risks and an agent to decrease morbidity and mortality (Heyward, 2006). In spite of these conclusions, 60% of middle-aged women are not getting the recommended weekly physical activity (NCCDPHP, 1999). Therefore, vast amounts of research have been conducted as to why middle-age women are not exercising. Studies measure variables impacting women's motivation to exercise as well as their adherence to regular exercise. These variables include factors such as time, social support, cardiorespiratory fitness, stress level, wellness habits, etc. The current

research study focused on increasing middle-age women's physical activity adherence through multiple social support vehicles including exercising with partners and utilizing a familiar environment, the participant's church. In an effort to establish a regular routine of exercise, theory based support is often utilized in research design. The current research combined theories in structuring a design where the women receiving the intervention attended biweekly support meetings including wellness education (nutrition and exercise instruction), Bible study and application, and behavioral modification training (goal setting and overcoming barriers to exercise). The design of this study was stimulated by the review of previous research. The support for such design is reflected in this literature review.

Social Support

Studies focusing on social support interventions for middle-aged women have proven effective in increasing regular physical activity and exercise adherence (Peterson et al., 2005). Peterson et al (2005) tested the effectiveness of a 12-week church-based social support intervention entitled Heart and Soul Physical Activity Program (HSPAP) versus an information only comparison group. The intervention was designed to increase physical activity (PA) time, energy expenditure, and cardiorespiratory fitness in middle-aged women. The sample group of 42 included primarily white, highly educated women who were measured for the three variables at baseline, six weeks and 12 weeks. The intervention group received a HSPAP interactive booklet, met one hour per week for 12 weeks, and received support in appraisal, belonging, tangible help and self-esteem. The comparison group received the American Heart Association booklet "Exercise and Your Heart", one hour of verbal instruction and suggestions, and one follow-up phone call

within two weeks of initiation. While no significant test results were noted, each of the three variables did improve and the intervention was concluded to be effective. Physical activity for the intervention group increased 140 minutes per week compared to an increase of 67 minutes per week for the comparison group. Energy expenditure or the amount of calories burned during exercise as of the 12th week of the study had increased by 1,458 kcals for the intervention group indicating slightly higher than the comparison's group increase of 1,234 kcals. Lastly the intervention group showed a higher change in VO_{2max}, a measure of cariorespiratory ability or one's ability to use oxygen, with a 7 ml improvement, higher than the comparison group's 2 ml improvement. This study was well designed in its organization of participants and randomization by church. The intervention treatment was a basic model for further study and a basis for the subject research proposed.

A study by Nies et al. (2003) also determined the effectiveness of partners in exercise for middle-aged women tied to a walking program. Thirty-one American women of African and European descent were engaged in a 24-week intervention during which they received 16 scripted phone calls from interviewers who gave specific instructions and gathered respondents' information. The participants self-reported physical and psychological benefits including less stress and more energy. The most notable results of this study revealed that middle-aged women identified the most help in exercise adherence being that of a partner (most often a friend) and development of an exercise routine (Nies et al., 2003). This study was limited in a small sample size (n=31) but was strengthened by the 24-week length of the study. The qualitative research also left room for future studies to add a quantitative element for additional evidence.

Dornelas et al. (2007) also determined the effectiveness of an intervention held at churches versus a women's health clinic. Seventy-six women aged 17-70 participated in 20 sessions over ten weeks at either a church or health clinic in an attempt to determine if location mattered to attendance. Five questionnaires were given to the women regarding exercise habits, diet, self-esteem, social support and well-being; however, no measurement was taken to determine any change in these areas. Evaluations were given prior to the intervention, at its conclusion and three months post intervention. Significant difference (p = .013) was shown in favor of the church location regarding the number of sessions attended, and it was noted that middle-aged women (50-70 years) had better attendance. While the study may have been limited given the dissimilar options of exercise locale, churches appear to be good locations for these women to adhere to such exercise programs.

Church-based intervention programs are widely used in African American communities as Baruth, Wilcox, Lakaen, Bopp, and Saunders (2008) studied eight programs that the African Methodist Episcopal (AME) church in South Carolina used for health promotion. Over two years, 303 churches activated one or more of the eight programs ranging from simple to complex interventions including physical activity components. No significant differences were found when comparing PA over time between the immediate and delayed intervention groups. The research did show that the simple programs such as bulletin inserts and bulletin boards were most utilized (32% of all churches), but the most effective intervention in terms of increasing exercise was the most complex program which included behavioral training (26% utilized but none maintained the program). Church directors responsible for the implementation noted that

barriers to success were lack of motivation, dedication and time of the participants. There was success in heightening greater health awareness. The study was limited by the informal recall of the health directors, no quality control for the intervention activities, low statistical power and inconsistent dose of implementation. Therefore, it would be wise to utilize dose recommendations, standard evaluation reports for subjects and training for coordinators responsible for implementation in future studies.

In the current electronic generation, internet-based interventions are being tested and that is true for church-based programs as well. Winett, Anderson, Wojcik, Winett and Bowden (2007) coupled the internet and church support to study nutrition and physical activity improvements. The design included the internet tool, Guide to Health (GTH). Three groups were established according to GTH in the church setting, GTH alone, and no tool for the control group. Two primary variables, fruit and vegetable intake (F&V) and pedometer steps were measured. Health behavior according to social cognitive theory (SGT) was measured with the Health Beliefs survey. Research subjects totaling 1,071 from 14 churches were randomly assigned to one of the three study groups. Significant difference ($p < .05$) was found for increased steps (1,500) in GTH-Plus versus (400) in the control group. The study also revealed that planning, tracking, and regular routine walking resulted in participants' greater likelihood to adhere to physical activity. This study was limited in that the GTH-church subjects may have been more influenced by the church support than the GTH intervention. However when trying to determine the effectiveness of a church-based intervention program, this study was helpful in establishing future study designs to see the impact of the social support from the church.

Theoretical Approach to Intervention

Segar et al. (2002) tested the effectiveness of a theory-based intervention in middle-aged women again white and well educated. Participants paid $148 and volunteered for the program after seeing various means of advertisements. The main objective of the program was to improve physical activity levels and adherence of the women after the program concluded. The design included six two-hour sessions that focused on consciousness-raising methods using four theories: social cognitive, empowerment, objectification, and self-in-relation theories. Fifty women were separated into small groups of 8-12 with a facilitator. Three questionnaires (baseline, conclusion and follow up) were utilized to measure self-reported physical activity, self-care and pleasure. The results that were significant ($p = < .01$) were an increase in the women's prioritization of self-care behavior and a pleasure-based approach to exercise. Overall physical activity (PA) increased from baseline to post-intervention and again to long-term follow up. The women showed less concern for culture opinion, became more proactive in exercise, and enjoyed exercise. This study showed addressing the thinking of women and equipping them with ways to overcome barriers to exercise increases long term exercise adherence. The study was limited, however, in that 39% of the participants did not submit either the baseline survey or follow-up survey.

D'Abundo (2007) organized a qualitative study to determine how aerobic instructors were communicating social, spiritual, physical, intellectual, emotional and environmental factors to exercise participants. Through observation and interviews, D'Abundo noted that the aerobic instructors' most popular message related to physical health as the instructor cued for good exercise form, proper breathing and physiological

safety. The remaining factors studies were rarely observed. The study concluded that instructors remain current in their professional aerobic certifications but lack in health education. D'Abundo determined the need for instructors to engage in a mind and body approach to leading exercise and in such a way to spur the participants to wonder by questions asked and then answered. The solution, at least in part, was noted to be continuing education for instructors from reputable sources. This qualitative study was limited in that it only used exercise facilities with an overall health focus, yet the findings from these sites suggest a great need for overall health education for instructors.

Moore and Charvat (2007) have conducted analysis using the theory of Appreciative Inquiry (AI), a developmental theory that highlights the positive behavior of the subject and uses it to build an exercise routine. As Moore and Charvat (2007) demonstrated, most behavioral theories seek to change the negative components of people's actions. AI was developed by David Cooperrider in the 1980's and is now used in a variety of settings for organizations and corporations. AI theory is divided into four phases entitled discovery, dream, design and deliver whereby an interviewer allows the subject to give his "story" and establish goals based on past positive experiences. The theory is founded on eight principles including: (1) all subjects have experienced something that worked well, (2) one's focus becomes one's reality, (3) statements made drive the reality, (4) there are multiple ways to achieve the goal, (5) using a questioning method prompts ideas, (6) people embrace the future best when drawing on their past, (7) the future is best served when utilizing the best of the past, and (8) differences are to be valued. Moore and Charvat (2007) examined the difference in AI versus social learning theory, cognitive-behavioral theory, self-efficacy enhancement, relapse prevention

strategies, and the transtheoretical model theory. Their review indicated those theories had limited effectiveness given the low success rate of change in healthy lifestyles while AI taught resourcefulness and would be useful in physical activity interventions as well since behavior change is the goal. The complication of AI is the need for a skillful interviewer/facilitator. Additionally, AI is limited in usefulness unless there is sufficient time given for the process. Documentation through the AI process is difficult as the information is qualitative. Regarding physical activity intervention for women, Moore and Charvat (2007) noted that AI is powerful since females typically benefit from expressing their personal circumstances, needs and desires. AI is one theory that can be used in intervention design, and this study gives tangible questions and format for future studies to utilize in executing the intervention interviews and instructional meetings to achieve behavior change in increasing physical activity and exercise adherence.

Interventions are only as useful as the fidelity to theory according to Keller, Fleury, Sidani and Ainsworth (2009). Fidelity, or staying faithful to the design of the intervention, is evaluated according to (1) identification of the problem, (2) the theory's plan, (3) the process of the mediation components, and (4) the impact of the outcome variables. In physical activity interventions, theories are intended to promote behavioral change. Once the health problem has been accurately diagnosed, the specific implementation plan is structured to cause and effect on the problem for the better. A successful intervention is one that brings about the expected and desired change. Keller et al. (2009) reviewed 15 of 470 PA intervention studies for the purpose of summarizing theories. The search only included peer reviewed, English language studies since 2000. Most of the studies were found to actually have used the theories they stated in their

interventions. Mediation effects were analyzed and various studies were found to have significant effects for self-efficacy. However, others found no significance for such or for outcome expectancy. One of the results of this study was the conclusion that problem identification is often not well stated and limits the usefulness of studies. Fidelity was thought to be well utilized in most interventions but even when not, little impact was revealed. Ultimately, fidelity was thought to be of little consequence according to this review. That conclusion aside, Keller et al. (2009) did state that comprehensive planning for any intervention is critical. This study was limited by the comprehensive topic of studies. The authors' conclusion, however, is applicable to this research proposal in that implementation will be most effective when thoroughly planned.

Using the Health Promotion Model as the supporting theory, Gillis and Perry (1991) sought to identify the relationship between physical activity and self health perspectives in middle-aged women. The research included a pre- and post-test experimental design including 126 women aged 35-65 in Canada. The sample was taken from a variety of settings and then randomly assigned to an experimental or control group. The intervention group exercised 60 minutes three times per week for 12 weeks using a warm up, aerobic (dance) and cool-down structure in a fitness center. Adherence was measured via attendance. The study also measured self-perceived health factors with five instruments, all surveys. The study was testing for women's physical activity levels according to their self perceptions of themselves and their health. The results from the study indicated no significance ($p < .619$) between the experimental and control group showing that self-perception theories did not have significant impact on regular exercise. The researchers did state, however, that the experimental group had greater physical

activity levels and, therefore, concluded from the survey instruments it could be suggested that exercise and stress are inversely related. The researchers, anticipating more relationship between social support and exercise adherence, were surprised to not find more evidence making this case. Ultimately the study concluded that specific interventions for specific populations would be most effective. The study was limited in not addressing a defined target audience within the middle-age bracket of women and was, therefore, unable to add specificity to its intervention.

Motivations to Exercise / Reasons to Drop Out of Exercise

In an effort to determine motivations to exercise, Surakka, Alanen, Aunola, Karppi and Lehto (2004) first studied 226 participants, of which 140 were females with an average age of 44, to identify reasons why people drop out of interventions for regular exercise. They provided a 22-week intervention including 52 structured and supervised resistance-training sessions. The primary reasons for dropping out of the intervention program included a lack of motivation, time and injuries. The greatest success in the sample group for exercise adherence was for women over the age of 40. The study concluded that adherence, for these women, was largely dependent upon an established routine and a group setting (Surakka et al, 2004).

Reviewing various studies for psychological, social environmental, physiological, demographics, health status, and physical activity variables, Speck and Harrell (2003) identified motivations for women maintaining regular physical activity. Psychological studies showed a significant (p = .001) positive effect between self-efficacy and exercise behavior in a study with 209 female occupational health nurses. These studies revealed outcome expectation is closely related to self-efficacy and value expectancy also

provided motivation. In Speck and Harrell's (2003) review, they stated that social support was an important predictor of activity level. Social environment issues also served as barriers to exercise when considering time constraints, multiple obligations and safety concerns. Studies with a physiological focus showed significant ($p < .001$) improvements as related to aerobic capacity (measured by VO_{2max}) in the health of women who regularly exercised. Demographics indicated that women had different motivations based on their socioeconomic status; therefore, specific interventions would need to be made to specific populations. The health status variable was a key barrier for women not exercising when they considered themselves to be in poor health. Finally the physical activity variable, choice of exercise, made a difference in the willingness of women to participate in regular fitness options. Walking, gardening, and normal lifestyle activities were the most popular choice of activity as indicated in three separate studies reviewed within Speck and Harrell's review which also identified the main deterrent to regular exercise being the ease in which women were distracted for regular programs and their inability to return. The strength of this article was the application element stated for clinicians in that the variables analyzed could be addressed individually with patients as well as structured in fitness interventions. The limitation is that consensus is difficult to achieve in the clinical realm so the applications are difficult to generalize for usefulness.

Kowal and Fortier (2007) identified daily activities and fatigue as the most common barriers to exercise in their study of middle-aged women. This study was attempting to see if they would find obstacles to exercise to be consistent with commonly reported barriers including lack of time, lack of energy, fatigue and health problems. The study used a three-frame approach for intrapersonal, social environment, and physical

environment factors. Of the 509 women invited to participate, 229 eligible subjects took part in the study. Baseline information was taken and a six-month follow up questionnaire was sent out with a 77% return rate. The final sample included 149 women aged 39-68 years. The Community Health Activities Model Program for Seniors (CHAMPS) was administered to assess physical activity behavior. The only significant result was participants who completed both the pre- and post-tests were more highly educated than those who dropped out (p <.05). The most commonly reported barriers included daily activities (40%), being too busy (32%), feeling too tired (20%), feeling too lazy (20%), health problems (15%), time management issues (15%), and no one with whom to exercise (13%). The women who did not adhere to exercise felt lazy and tired suggesting a motivation to exercise is indeed to feel better. This study was limited in that the participants were women who wanted to increase physical activity and were primarily well educated. Their motivation levels were likely atypical. In order to generalize even to a target audience, future studies would benefit in recruiting women with multiple motivations for accepting the invitation to the study.

In an effort to determine reasons for exercise adherence, Cox, Burke, Gorely, Beilin, and Puddey (2003) studied middle-aged women (40-65 years) who had been given six months of supervised exercise and then independent exercise for the following 12 months to see if they would adhere to exercise more than those without the supervised six months. Participants were assessed at baseline, 6, 12, and 18 months for their current stage of exercise activity and fitness according to VO2max using an ergometer test. Physical activity was assessed using the 7-day Physical Activity Recall (PAR) questionnaire. The research also took into account energy expenditure. The intervention

group had six months of supervised training sessions three times per week while the control group simply exercised at home for the entire 18 months. Also within the two groups another division was made for participants exercising at moderate rates and those at vigorous rates. Given the length of the study the retention rate was reported at 6, 12, and 18 months. Overall 36 of the 126 subjects dropped out claiming illness, injury, and lack of time. Remarkably no one in the center-based group dropped out during the study while all other groups declined at each marker. Adherence was positively enhanced by the initial supervised six-month period. The study was limited in that subjects who did not return logs were counted as nonadherent. Also exercise intensity was self reported. This report shows good reason for physical activity interventions to be offered outside of traditional settings. Also, it was concluded that those exercising in moderate intensity instead of vigorous intensity maintained regular exercise on a longer basis. This information is useful to those researchers designing interventions for long periods for the purpose of promoting long term adherence.

National Importance

The Center for Disease Control and Prevention estimated a total of $403 billion would be spent in 2006 on CVD (NCCDPHP, 2008). Roux et al. (2008) realized these high costs as well as quality of life issues demand the need for better health in middle-age women and the need for women to take an active role in improving their health through exercise. Therefore, Roux et al. (2008) analyzed seven interventions to increase physical activity for the purpose of comparing those to the effect of no intervention in order to determine the cost effectiveness of interventions. The study identified estimated lifetime costs, health gains, and cost-effectiveness of population based interventions for adults in

the United States. The basis of the cost analysis was the difference between the total expected cost of the intervention and the total cost if there was no intervention. The approach for no intervention was estimated at an average annual cost of $195,013 using probability of having one of the five diseases most impacted positively by physical activity (CHD, ischemic stroke, type 2 diabetes, breast cancer and colorectal cancer). Assuming physical activity increases due to one of the seven interventions analyzed, the average cost of the intervention was determined to be $195,000. The intervention cost was, therefore, no greater than doing nothing and reason to use interventions. Furthermore, life expectancy was expected to increase an average of 14.77 years. The study's primary consideration was for adults 25-64 years. Based on this study, money is well spent on interventions when physical activity can make a difference in middle-aged women's health. The limitation to this study, however, was the ability to generalize to middle-aged women across the country. Population level interventions must consider the target audience and the cultural environment. Therefore, future studies would need to allow for target audiences within the geographical area.

Parish Nurse Ministry

According to Pravecek (2005), parish nurse ministry involves nurses who serve a faith-based community as a health educator, counselor and support group facilitator. The parish nurse does not provide hands-on health care but does assist his/her community with obtaining health resources and understanding health issues. The emphasis of the parish nurse ministry is holistic including mind, body, and spirit. The purpose of the ministry is to combine faith and health. The setting promotes freedom for patients to freely discuss their health in terms of their faith. Pravecek (2005) identified common

intervention programs as teaching, health screening, group education, counseling and community resource, and service referrals. Typically these ministries are managed within the church government are established according to the organization's written guidelines prior to initiating the program.

Anderson (2004) surveyed 25 parish nurses to determine the role of such nurses and the benefits of the ministry. The primary role of the nurse was determined to be promoting health and increasing access to health care all in a spiritual setting in which the nurse is able to pray with and for the patients. The approach in the ministry is to advance healthy lifestyles using the existing influence of churches. Anderson concluded that various models of parish nurse ministry exist including those that emphasize relations between hospitals and churches, a volunteer model whereby churches recruit help from volunteer hospital nurses, a third model whereby a church congregant assumes the parish nurse job when she/he teaches various health related classes. Anderson's interview of the 25 nurses indicated that the ministries were intentionally structured for the purpose of promoting health and wellness. Social support was the dominant theme in the responses and involved church congregants supporting each other. This was exemplified in emotional support, tangible support, informational and instrumental support, all of which went beyond the worship setting in the church facility. The primary role of the parish nurse was an educator and motivator. The nurses build relationships with the people and share their faith, praying with them and being accessible. The study's limitations included its local approach to analysis thereby making generalization difficult beyond the scope of this study. The information gathered does offer understanding into parish nurse

ministry structure and its usefulness to the research proposal design included in this paper.

When considering the body, mind and spirit, people benefit from various health agents work together according to Brudenell (2003). Testing this Brudenell determined to find the effectiveness of parish nurse programs in the intermountain West area. He tested how programs are formed and their effect on health outcomes. Using a qualitative design, a sample of 13 churches were surveyed, specifically the pastors, nurses and chaplains to assess four phases of forming parish nurse programs. The first phase involves thinking or inquiring about parish nursing. Those surveyed relayed the initial planning process they used. Using a holistic approach was a common theme. The second phase was about knowing the faith community. Those surveyed made it clear that educating the congregation about the ministry was vital. This assessment phase also included identifying the health issues of the particular congregation. Specificity for the congregation is one source of the ministry's success and involves planning. The third phase involved the acceptance of the program as a ministry within the church. The respondents indicated this took time and consistent visibility to the church members. A sense of trust and reliability had to be established. The ministry is a means of connecting the faith community and the health agencies in a relationship of collaboration. One limitation from this study was the lack of essential tendency for the program from the perspective of the pastors surveyed. They indicated the program was helpful but not essential as in the case of worship. The fourth phase was identified as an ongoing ministry for the faith community. Like other church programs, it has limitations based on the needs of the current membership. However, the longevity of the ministry was shown

to be practical due to the ongoing need for health. Brudenell (2003) concluded that parish nursing was a viable program for the intermountain West. The study was limited to the Christian faith.

Parish nurse ministry success is largely dependent upon accurate assessment of the congregation incorporating the ministry. Swinney, Anson-Wonkka, Maki and Corneau (2001) purposed to assess the health status, health needs, and barriers to those needs for the intent of parish nurse ministry establishment. Two methods of data collection were used including a health questionnaire modified from the National Parish Nurse Association and focus group discussions. The survey was completed by 421 of 800 parishioners in a large Catholic parish in Auburn, Ma. A total of six focus groups completed by 17 church members were also used in the research. Church staff facilitated the focus groups which were audio taped and transcribed. Good health was reported by 93% of the respondents most of which were nonsmokers. Those with someone in their family with health problems totalled 38%. Psychosocial issues were considered revealing 31% of those surveyed gained counsel from the church, 42% consumed alcohol, 7% knew someone involved in spousal abuse, etc. The focus group participants considered themselves in good health, typical of focus group findings. Overall the assessment revealed concerns for adolescent members. The conclusion of the assessment showed the specific areas of concern for the specific parish nurse ministry of this church. The church staff was then able to structure a parish nurse ministry specifically for its purposes. The study revealed ways to identify assessing individual needs of a congregation but conclusions could not be generalized beyond the congregation. The study design is applicable for assessing congregations of all types.

Congregations interested in parish nurse ministries begin with an assessment process that is also useful in discerning the community's health beliefs and needs, promoting health awareness within the church congregation and prioritizing health education programs for such (Miskelly, 1995). This study surveyed 500 adults using a self-developed wellness inventory that was piloted with 15 church members. The response rate of 35% was achieved (173 respondents) and included 70% female and 30% male with an age range of 20-83. The survey instrument addressed physical, emotional/relational, spiritual, and health system relationship/knowledge base. Congregation specific results were indicated and were reported in the aggregate including health issues such as non-exercising adults, overweight adults, and high blood pressure. Miskelly (1995) used national and/or state standards as well as common ideas from other research studies in planning the specific wellness program for this church community. Specific intervention was then designed to help the congregants meet the standard measures. This study revealed how parish nurse ministries can be specific to populations utilizing the assessment, process planning and implementation of the plan in accordance with the target community's health standards. This study's use of community information made it clear how the parish nurse ministry supports the nation's health initiatives. The study was limited in its assessment by the majority of respondents being female and, as a result, limited in its generalization for the entire church need assuming that the overall membership was not also weighted with more female membership. This study did give a basis for other church assessments and research study design in church-based interventions when assessing the needs of the individual church and establishing intervention to meet national health standards.

Physical activity for middle-aged women (35-65) is impacted by variables such as social support, behavioral theories, women's motivation to exercise and to overcome barriers to exercise as well as their adherence to regular exercise. The industry research indicates women's physical activity adherence increases with multiple social support vehicles including exercising with partners and utilizing a familiar environment, the participant's church. In an effort to establish a regular routine of exercise, theory based support is often utilized in research design, one of which is an affirmative method called Appreciative Inquiry. A holistic approach to wellness, including physical, social, and spiritual components, is possible through parish nurse ministries which can be an effective stimulant for positive health changes in middle-aged women. This research combined into an intervention program can not only improve the lives of middle-aged women but also benefit the nation in its attempt to reduce medical expenses and increase the quality of living for citizens.

Methodology

Participants

Participants initially included 19 middle-aged women (35-65 years, mean 49.5 $\pm$ 9 years) who self-reportedly were currently exercising less than 30 minutes of moderate-intensity activity daily. An example of moderate-intensity physical activity for most healthy adults is a brisk walk of 3 to 4 mph according to ACSM (Armstrong et al., 2006a). Subjects, all recruited from First Presbyterian Church of Edmond, Oklahoma (FPCE) which had given written permission for the study, were required to successfully complete a Par-Q (see Appendix A) and provide physician's written permission if

applicable. Institutional Review Board (IRB) approval and informed consent forms (IFC, see Appendix B) were also received.

The women were randomly assigned to the intervention or control group. In order to establish certainty that there was no difference between the total exercise time of the intervention and control groups at the onset of the research study, an independent *t* test was run with the level of confidence set at 95% or an alpha of .05. The test results, shown in Table 1, indicated no significant difference between the groups (t = -.919, p = .38); therefore, the two groups had similar exercise times in week one of the study and served as effective comparisons.

During the intervention the participants attended biweekly support meetings held at FPCE, a requirement of the study that was clearly communicated in the recruiting process via the IFC. Participants had additional motivation to fully participate in the program as they were eligible to receive a complimentary dual-energy X-ray absorptiomety (DXA) scan at UCO upon successful completion of the study. Within the first four weeks of the study, six participants dropped out due to health issues (n = 1) and a lack of time resulting from family responsibilities (n = 5). The remaining 13 participants completed the study in its entirety. The demographics of the sample, reflected in Table 2, included all Caucasian women. Overall the participants were highly educated and in good health.

A statistical power analysis for a RMANOVA test with an alpha level of .05, statistical power of .80 and a moderate effect size (Cohen's d = 1.91; Peterson et al., 2005) required a sample size of only 6 participants to detect a significant difference between the intervention and control group's physical activity time at 12 weeks (the end

of phase one of the study). Difference in total exercise time was also measured within the two groups comparing the end of phase one at 12 weeks and the end of phase two at 24 weeks. Based on this power analysis, the initial recruitment of 19 participants and the ultimate, combined group retention of 13 were adequate for testing purposes. The investigator purposed to recruit enough initial subjects from FPCE in order to create groups large enough for meaningful conversation in the biweekly support meetings and allow for attrition. The loss of 6 members in the first phase of the study was similar to other studies in church-based intervention research (Peterson et al., 2005) and still allowed for an appropriate sample size.

Assessment Tools

The initial assessment of any need for participant's medical clearance was evaluated through a PAR–Q (see Appendix A), and those who answered negative to any questions provided a physician's written permission for inclusion in the research.

Body composition was measured using waist circumference, an anthropometric index for disease risk (Heyward & Wagner, 2004). According to the U.S. Department of Health and Human Services (n.d.) waist circumference in excess of 35 inches for women represents a high risk for disease such as cardiovascular disease.

Physical activity ($\geq$ 4.0 METs) was measured weekly for the 12-week periods in phase one and phase two of the study using the 7-Day Activity Recall (7-DAR; see Appendix C; Dishman & Steinhardt, 1988; Sallis et al., 1985) that was delivered by email, postal mail or personal delivery. The subjects recorded their daily exercise time of $\geq$ 4.0 METs (measured by maximum heart rate calculations of 220 less the participant's age multiplied by 64% - 76%) for the previous seven days. Subjects received MET level

education and instruction at the orientation meeting prior to the study's commencement. MET levels were assessed according to ACSM's target heart rates for moderate-intense activity noted as 64-76% of maximum heart rate calculated as 220-age of the participant (Armstrong et al., 2006).

Procedures

Treatment

The research was conducted in accordance with a true experimental design utilizing an intervention and control group, both randomly assigned by participant. One of the two independent variables was the number of exercise partners including groups of two or more for the intervention participants and independent exercise for the control group. The second independent variable was the biweekly support meetings designed to enhance holistic wellness for the intervention participants relating to their spirituality and intellect in the form of Bible study and wellness education, respectively. The dependent variable was total exercise time measured in minutes per week and measured by time with a partner.

The groups participated in one orientation meeting to complete all necessary documentation granting permission to be involved in the study and providing medical releases. Furthermore, the orientation was a time of instruction for participants' measuring moderate-intense physical activity in order to accurately report their weekly activity minutes. No other instruction or training was given to the control group at the initial orientation as they were dismissed from the meeting. The intervention group received instruction for the need to exercise with one or more partners of their own choosing as often as possible when exercising and was given information regarding the

six biweekly support meetings and materials. All intervention group members received Elizabeth George's text and study guide entitled Loving God With All Your Mind (George, 2005). Additionally the intervention group received a syllabus for the intervention phase's biweekly support meetings.

Upon completion of the first phase of the research (11/25/09), the study recessed until January 7, 2010 at which time the control group converted to a delayed intervention group and received the intervention for the final 12 weeks of the study beginning January 7, 2010 through April 1, 2010. The delayed intervention (originally the control) group attended an orientation meeting at the beginning of phase two of the study on January 7, 2010, receiving all necessary materials for the Bible study and support meetings and proceeded according to the same format as the intervention group in phase one. The original intervention group of phase one continued logging weekly exercise hours during phase two of the study but no longer attended biweekly support meetings.

The six biweekly support meetings, one hour in length, included 30 minutes of Bible study and application utilizing George's text and study guide (George, 2005). The second half of the support meetings offered wellness education covering the following six topics: goal setting, exercise modes, nutrition, behavioral modification (overcoming barriers to exercise, time management and routine development), social interaction, and encouragement. The intervention group training at the biweekly support meetings utilized Appreciative Inquiry (AI), a developmental theory that highlights the positive behavior of the subject and uses it to build an exercise routine (Moore & Charvat, 2007). Upon conclusion of the 24 week study, all participants were invited to attend a concluding report session for the results of the study.

Organizational Plan

Human resources for the research included the primary investigator who was supported by University of Central Oklahoma (UCO) faculty. The investigator was responsible for all organizational planning and intervention implementation. The investigator had contact with FPCE primarily through the church's congregational (parish) nurse and an associate pastor.

FPCE provided the necessary physical resources, a meeting room adequate for the number of participants, on a biweekly basis for the one hour meetings. No exercise facilities were necessary since the subjects exercised on their own time and in their preferred setting.

Informational resources included permission forms from the church and each participant. The participants signed a PAR-Q (see Appendix A) and informed consent form (see Appendix B). The investigator prepared recruiting advertisements in the form of email fliers (see Appendix D) and provided them to FPCE for distribution within the church's communications policies. The investigator also made ready the 7-DAR. All participants had their own computer access for data entry and internet usage.

Time resources included the 24 week study period including two phases of 12-weeks, the first of which was September 1, 2009 through November 25, 2009 and the second January 7, 2010 through April 1, 2010. The study recessed during the month of December 2009. The study also included four weeks of preparation during July - August 2009 and four weeks of conclusion during April - May 2010. The following time line outlined the schedule.

July - August 2009. Preparation included IRB submission and approval, documentation writing, and copying. All participant data bases were created and FPCE's permission secured. Recruiting began with an email blast to women in the church and then continued through word of mouth. Participants completed all necessary permission documentation and required data forms. The investigator entered data and properly stored all documentation. Training and instruction for participants occurred on August 27, 2009 and August 28, 2009, the participants' orientation to phase one of the study.

September – November 2009. Beginning September 1, 2009, all subjects began tracking their daily moderate-intense activity for biweekly reporting. The biweekly support meetings for the intervention group met on Thursdays and Fridays beginning September 10, 2009, and September 11, 2009 through November 24, 2009. The Thursday times were from 6:00 – 7:00 pm, and Fridays from 6:00 – 7:00 am. Participants chose the most convenient meeting times to attend. During the first phase, the control group provided the investigator their biweekly 7-DAR totals via the internet, mail or personal delivery. Phase one reports were submitted in full by November 25, 2009. The investigator input all data in accordance with the biweekly schedule.

December 2009. The study was idle.

January – March 2010. Beginning January 7, 2010, all subjects resumed tracking their daily activity. The control group, now the delayed intervention group, all attended the January 7, 2010 research orientation meeting at 6 p.m. for the purpose of receiving instruction about exercising with a partner(s) and attending the biweekly support meetings. The support meetings were held on Thursday evenings, beginning January 21, 2010, since all members preferred the evening hour. Due to spring break, the March 18,

2010 date was postponed to March 25, 2010. The original intervention group continued logging daily physical activity hours, submitted biweekly, but no longer attend biweekly support meetings.

April – May 2010. The investigator gathered and input all data. Descriptive statistics were run for the intervention and control groups' variables including: total exercise time for week one (the original point of comparison), total exercise time for phase one (12th week) and phase two (24th week), total time exercising with a partner for phase one (12th week) and phase two (24th week), and attendance of the support meetings. Inferential statistics were run via independent *t* tests and RMANOVA tests. The purpose of the testing was to determine the accuracy of the four hypotheses:

1. The intervention group would spend more time in moderate-intensity physical activity at the conclusion of the first 12 weeks than the control group.
2. The intervention group would have greater total time exercising with a partner than the control group in phase one.
3. The time effect for both groups would show increased total exercise time over the life of the study.
4. Waist circumference measurements would decline for the participants over the 24-week study.

The investigator reported her conclusions, noting positive and negative aspects of the program, to the participants and thanked them for their involvement.

Design

Demographic information, useful to identifying the sample group, included age, marital status, race, employment status, education level and various health parameters. The research focus was on improved PA time, but the investigator also considered qualitative behavioral measures such as social support and exercise routines. In the analysis the mean was used for central tendency evaluation and was evaluated using independent *t* tests and RMANOVA with an alpha = .05. Like the test of Peterson et al. (2005), this study allowed for independence by randomly assigning each participant to the intervention or control group. Measurement totals of the two groups were tested at the 12 and 24 week periods to determine the group-by- time interaction effects. An alpha level of .05 was assumed. During phase one, the intervention group received treatment while the control group received none. Both groups submitted weekly logs (7-DAR) of activity on a biweekly basis. During phase two, the delayed intervention group received the intervention program. Data was collected at the biweekly support meeting dates.

Results

Descriptive Statistics

Outlier Elimination and Normal Distribution

Table 3 includes the 13 participants who completed the entire study. When analyzing the skewness and kurtosis, the intervention group's total exercise time with a partner in phase one and two was not normally distributed. Upon further examination, it was noted that the intervention group participant number 19 was an outlier for total exercise time in phase one and two as well as total exercise time with a partner for both

phases. Figures 2-5 depict the outlier compared to the intervention group for total time phase one, total time phase two, total partner time phase one, and total partner time phase two. The intervention participant number 19 was, therefore, excluded from the statistical data since her exercise habits were greater than the delimitation parameter calling for current exercise less than 30 minutes of moderate-intensity activity daily. Once the outlier was eliminated from the data, all variables were normally distributed as reflected in Table 4.

Intervention Attendance

Intervention attendance was defined by the number of biweekly support meetings attended out of a possibility of six and expressed as a percentage in Table 5. The purpose of the intervention program was to promote exercise adherence, defined as a minimum of 150 minutes of moderate-intense or greater physical activity per week. The intervention group was measured over a period of 24 weeks for adherence since it received the intervention immediately and should have benefited from it in both phases of the research period as far as achieving regular physical activity. The control group was only measured over the second 12-week phase for adherence given the timing of intervention receipt. The point was to measure the efficacy of the intervention program in motivating exercise adherence in the participants. The results displayed in Table 5 were summarized by group according to intervention attendance of at least five of the six meetings ($\geq$ 83%) for both groups as follows: the intervention group (50%) versus control group (67%). The mean adherence for the intervention group was 46% compared to 50% for the control group.

Inferential Statistics

Hypothesis 1: Phase one total time for intervention group vs. control group

Using an independent *t* test (a = .05), no significant differences were found between total exercise time of the intervention and control groups in phase one of the study ($t = -1.229$, $p = .247$); mean scores of which were reported in Table 6. The effect size was .60 reflecting a moderate effect. While the results meant that the two groups had similar exercise times in the first 12-week period of the study, the intervention group did exercise more. Therefore, the intervention program (attending biweekly support meetings) apparently did make a difference to the intervention group but with marginal results.

Hypothesis 2: Total partner time for intervention group vs. control group

Table 7 reflected the mean time spent exercising with partners in phase one was slightly higher for the intervention group than that of the control group (849.83 vs. 618.33 minutes, respectively); thus, the additional time with partners may have offered some extra motivation for the intervention group although not statistically significant ($t = -.698$, $p = .501$). Referring once again to Table 7, the time spent exercising with partners was higher for the group currently receiving the intervention evidenced by the control group's mean total partner time of 1,052 minutes in phase two compared to the intervention group total of 660 minutes ($t = 1.026$, $p = .329$).

Hypothesis 3: Time effect for both groups over 24 weeks

RMANOVA tests were run using two independent variables (elapsed time and the groups) and the dependent variable of exercise time (12-week cumulative measurements at the 12^{th} and 24^{th} week). Table 8 indicates the mean time for the two 12-week periods

for both groups. According to the RMANOVA, the main effect for elapsed time, or the difference between exercise time for the entire sample of 12 participants from phase one (mean of 1,529 minutes) to phase two (mean of 1,896 minutes), was statistically significant ($F = 35.948$, $p = .000$). This meant that the research period was effective in getting the women to increase their physical activity. Separately, however, when analyzing the participants within their own groups, the study did not show a significant increase ($F = 2.046$, $p = .155$) in exercise time by group suggesting that the intervention may not have been the reason, or the sole reason, for the increased physical activity.

Hypothesis 4: Changes in waist circumference during the study

The 24-week study period made a significant impact on waist circumference (WC), measurements noted in Table 2, from the base of the study for the total sample group of 12 participants as exposed by the independent t test ($t = 2.682$, $p = .021$) with an alpha of .05. Furthermore, there was a significant difference between 12 and 24 weeks ($t = 3.127$, $p = .010$) revealing that the greatest reduction in waist size came during phase two of the study (mean WC at 12 weeks = 32.5833 vs. 31.5833 at 24 weeks).

Discussion

Adherence and Attrition

Given the purpose of this study (increasing and maintaining exercise adherence for middle-aged women), the effectiveness of the intervention program was first evaluated according to the participants' attendance of the support meetings in order to determine if the intervention was received. Since only 50% of the intervention group attended 5 of 6 ($\geq$ 83%) of the meetings, it was not surprising that these participants experienced less success in exercise adherence than the control group with 67% of the

members attending at least 5 meetings during phase two. While the mean adherence for the intervention group was 46% compared to 50% for the control group, both groups increased their total weekly exercise over the course of the study. It was clear early in the study that a primary motivator in continuing with exercise and with the study was due to the requirement to complete weekly logs (7-DAR) and submit them to a research investigator. Through the course of the research, the primary stimulus for exercise may have been accountability via the 7-DAR.

Phase One (Hypotheses One and Two)

Both experimental groups recorded similar exercise times in the first 12-week period of the study. This was explained, in part, by the enthusiasm of most members to change their exercise habits and comply with the study's objective regardless of the intervention's support meetings. The investigator realized that the women in the 12-member sample group had a level of commitment that was independent of the intervention since they completed phase one of the study as members of the intervention group (with low attendance) or the control group (no intervention). However, the investigator also realized that even limited attendance made an impact on the participants as they had fellowship with the group's members through other church activities and with the investigator through church and research check points (7-DAR submission dates). All of the subjects had contact, at least biweekly, with the investigator as they submitted their 7-DAR logs. The personal contact with the investigator at the biweekly support meetings was also a place to encourage including some weekly exercise with a partner. The support meetings were designed to stimulate the participants in their overall holistic thinking of health and well being on a physical and spiritual basis; therefore, the

intervention group may have benefitted from various forms of encouragement in addition to the intended treatment.

Phase Two(Hypotheses Three and Four)

Of interest was the total exercise time with a partner(s) being higher for the group currently receiving the intervention, thus, suggesting that the support meetings were effective in suggesting ways to find and maintain a relationship with a fellow exerciser. Additionally, the group receiving the intervention recorded more time spent in moderate-intense activity. The control group appeared to benefit more from the overall study than did the intervention group. The control group had more physical activity time following their delayed intervention as measured between total exercise time at 12 versus 24 weeks (1311.33 minutes vs. 2114.17 minutes, respectively) which was validated with significance ($p = .05$). This may have been in part to the tenacity of the control subjects who were willing to complete the first phase of the study independently in hopes of the benefits they believed would be received in the delayed intervention. This also prompted the investigator to recognize the possibility that an element of bonding could have made a difference in the success of the individual groups. The control group had a slightly higher attendance at the support meetings, maybe a function of only one meeting being offered and a resulting cohesion that was not present with the intervention group.

The intervention group was able to maintain a similar level of exercise in phase two as in phase one; however, they were under the goal of 150 minutes moderate-intensity per week. The investigator did notice an increase in exercise for several subjects from both groups once the DXA scan was completed for the members. Several women were highly motivated to make regular exercise a part of their weekly habit when

they realized their high body fat percentage. Some of the women were motivated to exercise to lose weight, others wanted to increase their lean mass through resistance training, and others wanted to be diligent about a healthy diet combined with exercise. Given the timing of the DXA scan at about week 20 of the study, the exercise time totals were increased. Regardless of the motivation, the women experienced a significant reduction in waist circumference for the 24-week study showing that exercise makes a difference in body composition. Given the statistics in the measurement date at 12 weeks and 24 weeks, it appeared that the changes in body size take at least that amount of time.

Comparison with Other Studies

The subject study was designed similarly to the Peterson et al. (2005) study in that the intervention program targeted middle-aged women with the primary purpose of increasing physical activity and exercise adherence. Both studies were designed to take advantage of social support within the participants' church setting via a support meeting. The sample groups were also comparable with white, highly educated women who were measured for exercise time midway through the study period and at the conclusion. Peterson et al. (2005) found no significant test results but did see improvement in the variables measured including physical activity time, a result parallel to the current research. Other studies such as Nies et al. (2003) corroborated the efficacy of partners in exercise for the purpose of increasing physical activity, a result true for this research since exercise time with partners increased with total exercise time during the intervention phase of both experimental groups. It appeared that partners motivated the women to engage in exercise more than no support in the form of a partner or biweekly meeting with other women. While it was true that barriers to exercise interfered with the

goal of a minimum of 150 minutes per week moderate-intense exercise, the training offered in the biweekly support meetings appeared to assist the women in improving exercise time as reflected in the increased time totals for the intervention phases.

Relation to Theory

Appreciative inquiry theory was utilized for the biweekly support meetings in accordance with Moore and Charvat (2007). The meetings included 30 minutes of wellness education designed to teach concepts promoting exercise adherence by causing the women to discover the positive experiences from the past, dream of ways to incorporate similar habits, design ways to accomplish the task, and deliver the ability to perform the task. In order for the intervention program to be successful, it required the participant's fidelity to the course as discovered by Keller et al. (2009). When the participant committed fully to the intervention, exercise time increased. It also appeared that the women gained some benefit from gathering within their own church but it did not automatically lend itself to exercise partners outside of the biweekly support meetings primarily due to varying exercise time preferences and locale.

Limitations

The study was conducted over a 24-week period which included a four-week break in the intervention between phase one and phase two. The break may have created a limitation in the research since some women may have lost a level of commitment during that time while others may have been reenergized by it. A second limitation in the study design may have been varying, seasonal climates and personal responsibilities. Again, these changes may have provided incentive and/or obstacles to the participants' physical activity commitment to the study. Thirdly, using the subjects' church as the

recruiting site could have been considered an “intact group”, typically a source of limited internal validity in research; however, the participants were randomly assigned to the intervention and control groups thus reducing the risk of compromised validity. Using the commonality of the church was part of the social support theory. Finally, the use of only one biweekly support meeting for the control group may have presented a limitation in that the control group possibly experienced a deeper friendship and collaboration than the intervention group which met in divided fashion based on their choice of two meeting times. On the other hand, the control group was restricted to only one meeting choice possibly reducing attendance.

External Validity

Churches, corporations, and community wellness programs could utilize the findings of this research to structure interventions analogous to this design. Using key features such as daily activity reports, periodic marker dates for body composition measurements, and consistent contact with the investigator, private and public organizations could assist other middle-aged women in establishing habits of regular exercise.

Recommendations

Future studies would profit from a minimum study period of 24 weeks allowing time for routine establishment which was becoming evident only toward the end of this study. Additional research programs would also gain by continuing the daily activity reports as this created accountability for the participant and would equip the investigator with specific points of guidance for the subjects. A variable to be strengthened would be a more effective approach to providing and/or encouraging exercise partners. The

women desired a partner but were often unsuccessful in either finding one or in creating an agreeable schedule. Future studies would also gain from regular body composition bench mark tests as the DXA scan at the end of the research was extremely motivating for some of the women. The support meeting structure was effective in the 30 minutes of Bible study and 30 minutes of wellness education. The Bible study portion, however, may have been better suited for a less involved text and workbook. The wellness education portion was valuable and well timed. Each week the support meetings ended with a specific challenge issued to the participants giving them something meaningful on which to concentrate and seemed to be inspirational for the time between meetings. The investigator also concluded that the most important factor in the adherence of the participants to the research study was the relationship between subject and investigator. The women respected the investigator's guidance and appreciated her encouragement regardless of the level of exercise adherence they realized.

Overview of the Need for the Study

Middle-aged women are at risk of CHD, the single leading cause of death in America today (AHA, 2009). Regular exercise has been shown to reduce CVD risks and can decrease morbidity and mortality (Heyward, 2006). Thus, the health problem for middle-aged women is their risk of CHD due in part to physical inactivity. Women need to be motivated to begin and maintain exercise of moderate-intensity. Therefore, finding ways to help women achieve at least 150 minutes per week and preferably 60 minutes per day is a health initiative worth pursuing.

Conclusion

The 24-week church-based physical activity intervention for middle-aged women was successful in increasing moderate-intensity physical activity from the point of initiation. The help of partners, opportunity for consistent accountability, and the investigator's support meeting guidance were key inspirations for success. Establishing routine exercise and overcoming barriers that interrupted the routine were remaining areas in need of work since the women were still trying to reach the goal of an on-going routine of at least 150 minutes per week in moderate-intense exercise. Given the success of raising exercise time over the course of the study, it appears that a long-term habit of regular exercise is possible but would take more than 24 weeks. The encouragement of a leader is essential, and a basis of accountability is inspiring to most women. The need for physical activity to improve the health of middle-aged women is immense; therefore, the study of various intervention programs created to stimulate exercise adherence is an honorable and meaningful quest.

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Appendix A

Physical Activity Readiness Questionnaire (PAR-Q)

Regular physical activity is fun and healthy, and increasingly more people are becoming more active every day. Being active is safe for most people. However, some people should check with their physician before becoming more physically active. Please complete this form as accurately and completely as possible.

YES	**NO**		
____	____	1.	Has your doctor ever said you have heart trouble?
____	____	2.	Do you frequently have pains in your heart and chest?
____	____	3.	Do you often feel pain or have spells of severe dizziness?
____	____	4.	Has a doctor ever said your blood pressure was too high?
____	____	5.	Has your doctor ever told you that you have a bone or joint problem(s),such as arthritis that has been aggravated by exercise, or might be made worse with exercise?
____	____	6.	Is there a good physical reason, not mentioned here, why you should not follow an activity program even if you wanted to?
____	____	7.	Are you over age 60 **and** not accustomed to vigorous exercise?
____	____	8.	Do you suffer from any problems of the lower back, i.e., chronic pain, or numbness?
____	____	9.	Are you currently taking any medications? If YES, please specify.
____	____	10.	Do you currently have a disability or a communicable disease? If YES, Please specify,

If you answered NO to all questions above, it gives a general indication that you may participate in physical and aerobic fitness activities and/or fitness evaluation testing. However, the fact that you answered NO to the above questions is no guarantee that you will have a normal response to exercise. If you answered Yes to any of the above questions or develop one or more conditions during the research period of exercise, then you will need written or verbal permission from a physician before / during participating in physical and aerobic fitness activities and/or support meetings within this research study.

_____	_____	_____
Print Name	Signature	Date

UNIVERSITY OF CENTRAL OKLAHOMA

INFORMED CONSENT FORM

Research Project Title: The impact of a church-based physical activity program on PA levels and exercise adherence in middle-aged women

Researcher (s): Emily Blaess

A. Purpose of this research: The purpose of this study is to determine the effectiveness of a 24-week church-based physical activity intervention for middle-aged women (36-65) in increasing and maintaining moderate-intensity physical activity on a weekly basis.

B. Procedures/treatments involved: Participants will be randomly assigned to either the intervention or control group. The study will be conducted over a 24-week period divided into two 12-week phases (Phase 1 and Phase 2). Phase 1 will begin September 1, 2009 and end November 25, 2009. The study will recess during December 2009. Phase 2 will begin January 7, 2010 and end April 2, 2010. Prior to Phase 1 all participants will attend an orientation meeting (August 27 or 28, 2009) at which time they will be instructed how to log and submit their required weekly exercise minutes that meet specified moderate-intensity physical activity definitions determined by ACSM (Armstrong, et al., 2006). The instruction will include procedures for taking heart rates to determine physical activity intensity. Each subject will exercise on their own time and in any manner they choose; therefore, this will not be part of the intervention program. During Phase 1 of the intervention, the control group will receive no intervention. The intervention group will be required to exercise with at least one partner of their own choosing and attend six biweekly support meetings at First Presbyterian Church of Edmond, Oklahom (FPCE). The support meetings, one hour in length, will offer 30 minutes of Bible study and application using Elizabeth George's text and study guide entitled "Loving God With All Your Mind". (Participants will be given these materials but donations not to exceed $25.00 will be accepted.) The remaining 30 minutes will offer wellness education covering the following six topics (one per meeting): goal setting, exercise modes, nutrition, behavioral modification (overcoming barriers to exercise, time management and routine development), social interaction and encouragement. All of the women will record their weekly physical activity and submit the log on a biweekly

basis in person at the biweekly support meeting or via email or postal mail. During Phase 2 of the study, the original intervention group will continue to log their physical activity weekly but no longer attend the biweekly support meetings. The original control group will convert to a delayed intervention group and receive the same program as offered in Phase 1. Upon conclusion of the 24 week study, the participants will be invited to attend a concluding report session for the results of the study. Also those completing the study will be eligible to receive a complimentary dual-energy X-ray absorptiometry (DXA) scan at the UCO Wellness Lab.

C. Expected length of participation: August 27, 2009 - April 2, 2010 (excluding December 2009). Phase 1 of the study will be 12 weeks from August 27, 2009 through November 25, 2009. All participants will attend one of two orientation meetings on August 27, 2009 at 6pm or August 28, 2009 at 6am at FPCE. (All participants will log weekly hours of physical activity and submit biweekly.) The intervention group (not the control group) will attend biweekly support meetings one hour in length at FPCE on the following six dates (your choice between the two consecutive dates at 6pm or 6am, respectively): Sep 10/11, Sep 24/25, Oct 8/9, Oct 22/23, Nov 5/6, and Nov 19/20. Final log reports for Phase 1 due by November 25, 2009. Phase 2 of the study will be 12 weeks from January 7, 2010 through April 2, 2010. (All participants will log weekly hours of physical activity and submit biweekly.) The control group will convert to the delayed intervention and receive the intervention program while the original intervention group will no longer receive the intervention but will continue to submit weekly logs on a biweekly basis. The delayed intervention group will attend one of two orientation meetings on January 7, 2010 at 6pm or January 8, 2010 at 6am. They will also attend biweekly support meetings one hour in length at FPCE on the following six dates (your choice between the two consecutive dates at 6pm or 6am, respectively): Jan 21/22, Feb 4/5, Feb 18/19, Mar 4/5, Mar 25/26, and Apr 1/2. Final log reports for Phase 2 due by April 2, 2010.

D. Potential benefits: The women involved in this study may benefit in physical and mental health due to increasing physical activity regardless of being in the intervention or control (delayed intervention) group. Regular exercise or physical activity has been proven to reduce CVD risks and can decrease morbidity and mortality (Heyward, 2006).

The American College of Sports Medicine (ACSM) recommends 60 minutes of daily moderate-intensity activity to prevent weight gain and achieve additional health benefits (Armstrong, Balady, Berry, Davis, S., Davy, B., 2006). Clinical research has shown that middle-aged women benefit from various social support factors such as exercise partners when attempting to increase and to adhere to consistent physical activity (Peterson, Yates, Atwood, & Hertzog, 2005). Furthermore, studies indicate that women who develop a routine exercise program are more likely to adhere to exercise (Nies, Reisenberg, Chruscial, & Artibee, 2003). Recent trend indicates that churches offer successful sites for fostering exercise adherence with middle-aged women (Dornelas, Stepnowski, Fischer, & Thompson, 2007). The women completing the study who choose to accept the DXA Scan will also benefit from the body composition results especially bone density, a common health measure for middle-aged women.

E. Potential risks or discomforts: Exercise may bring on fatigue and/or muscle soreness. In the event you are injured, you will be responsible for all costs associated with the treatment of the injury. By signing this form, you indicate that you understand that the primary or co principal investigators, UCO, or FPCE are not liable for any injuries that may occur during your participation in this study. While exercise is good for most women, a few individuals should exercise only with physican permission. Therefore, pre-screening for medical release will be accomplished using a PAR-Q (medical questionnaire) form which may also require a physician's permission.

F. Medical/mental health contact information (if required):

G. Contact information for researchers and UCO IRB: The primary investigator, Emily Blaess may be contacted at home (341-2700) or by cell phone (627-6157). Questions pertaining to participation may also be made to UCO IRB at 974-5479.

H. Explanation of confidentiality and privacy:

Due to the amount of information shared by the participant with the investigator, confidentiality and privacy are protected. All the information will be input in the investigator's computer and stored on a flash drive with password protection. Access to confidential information associating name and data will be granted only to the primary investigator. Otherwise all information will be protected by code and access to coded information will include only the primary investigator. Hard copy and electronic

information (stored on flash drives with password protection) will be properly stored in a locked storage box in UCO Library #315-C or Wantland Hall Computer Lab. Any hard copy information and code sheets will be shredded upon final completion of the study and electronic information will be deleted no longer than five years after the study is complete.

I. Assurance of voluntary participation:

This study is completely voluntary. If at anytime for any reason, you feel you can't complete the task at hand you may quit the study. There will be no repercussions for your absence to the program. If you do quit, please notify the investigator immediately.

AFFIRMATION BY RESEARCH SUBJECT

I hereby voluntarily agree to participate in the above listed research project and further understand the above listed explanations and descriptions of the research project. I also understand that there is no penalty for refusal to participate, and that I am free to withdraw my consent and participation in this project at any time without penalty. I acknowledge that I am at least 18 years old. I have read and fully understand this Informed Consent Form. I sign it freely and voluntarily. I acknowledge that a copy of this Informed Consent Form has been given to me to keep.

Research Subject's Name: _____

Signature: _____ Date _____

Appendix C

7-DAR (3b) 7-Day Physical Activity Recall (Sallis et al.), Modified

Instructions: Identify this weekly log (7-DAR) using the participant code # assigned to you by the primary investigator. Please do not identify this log using your name. Include the week # and date (see attached schedule / chart). By time of day (morning /afternoon /evening), note the number of minutes you exercised (according to the physical activity calculated by heart rate - see attached schedule / chart), whether you exercised with a partner(s), and the mode or type of exercise in which you participated. Please complete the questions on the reverse side of the 7-DAR. Once you have completed the log for the week, submit all log sheets you may have accumulated to the primary investigator as instructed on the attached schedule / chart. If you have any questions, please contact the primary investigator, Emily Blaess at either eblaess@uco.edu or by phone 341-2700.

Participant Code #_____

Week #____(# of 24) Beginning Date_____, 2009

		Minutes per Day						
		1	**2**	**3**	**4**	**5**	**6**	**7**
	Sleep							
Physical Actiivty (PA)								
Morning	**Moderate**							
	Hard							
	Very Hard							
Exercised with partner(s) yes/no								
Describe mode of exercise								
Afternoon	**Moderate**							
	Hard							
	Very Hard							
Exercised with partner(s) yes/no								
Describe mode of exercise								
Evening	**Moderate**							
	Hard							
	Very Hard							
Exercised with partner(s) yes/no								
Describe mode of exercise								
Total PA Minutes per Day (Sum of minutes / day)								

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1. Were you employed in the last seven days?
   If no, skip to question #4.

2. How many days of the last seven did you work?

3. How many total hours did you work in the last seven days?

4. What two days do you consider your weekend days?

5. Compared to your physical activity over the past 3 months, was last week's physical activity more, less, or about the same?

6. Were there any special circumstances concerning this 7-DAR?
   If yes, what were they?
   a. Injury all week
   b. Injury past week
   c. Illness all week
   d. Illness part week

7. Were there any problems with this 7-DAR?
   If yes, explain.

8. Please list below any activities reported by the subject which you do not know how to classify.

9. Please provide any other comments you may have.

Appendix D

Women Age 35-65

Help is available to begin and maintain an Exercise Program

Research Participants Needed

Purpose of research: to determine the effectiveness of a 24-week church-based physical activity program for middle-aged women (35-65) in increasing and maintaining moderate-intensity physical activity on a weekly basis**.**

Basic eligibility criteria: For the duration of the research study you must be between the ages of 35-65 and not pregnant or become pregnant during the study. Participants must be currently exercising less than 30 minutes daily.

Necessary Documentation:

Subjects will also be required to successfully complete a Par-Q (basic medical questionnaire) and provide physician's written permission if applicable. You will also be asked to sign a participant permission form and Informed Consent Form detailing all aspects of the study.

Responsibilities of Participants:

You must be willing to participate for two 12-week periods (Phase 1 = Sep-Nov '09) and (Phase 2 = Jan-Mar '10), complete weekly physical activity logs, and attend six biweekly support meetings during your randomly assigned intervention phase (either Phase 1 or 2). Exercise mode and time will be up to the participant's desire and will not be structured as part of the study except for the requirement of exercising with one or more partners of your choosing during the randomly assigned intervention in either Phase 1 or Phase 2.

Time commitment:

- August 27, 2009 through April 2, 2010 (excluding December 2009)
- Orientation Meeting (choose one): August 27, 2009 (6pm) or August 28, 2009 (6am)
- Weekly exercise logs submitted on biweekly basis for all participants
- Six 1-hour support meetings during one of the following two phases of the study:
    - Phase 1: September 1, 2009 – November 25, 2009
    - Phase 2: January 7, 2010 – April 2, 2010

Benefits of taking part in the research study: Regular exercise has been proven to be potentially beneficial to your health. For those who complete the study, you will be eligible to receive a complimentary bone density scan (dual-energy X-ray absorptiometry or "DXA") from the University of Central Oklahoma Wellness Lab.

Contact person – Emily Blaess, Principle Investigator, 341-2700

University of Central Oklahoma

Table 1

Intervention Group vs. Control Group Week One Total Exercise Time – Independent t test (N = 12)

	Mean	Skewness	SE_{skew}	Z_{skew}	Kurtosis	SE_{kurt}	Z_{kurt}
Intervention: $Time_{week1}$	179.50	.472	.845	.56	-1.19	1.74	-.68
Control: $Time_{week1}$	132.33	.607	.845	.72	-1.19	1.74	-.68

Note. Time (minutes); SEskew = Standard error for skewness; Zskew = Z score for skewness; SEkurt = Standard error for kurtosis; Zkurt = Z score for kurtosis.

Table 2

Research Participant Demographics

Participant	Age	Marital Status	Employment	Education	Health Status	WC Base	WC 12 Wk	WC 24 Wk
			Intervention Group					
I04	56	M	FT	C	AVG	34.5	34.5	35.0
I10	53	M	FT	PG	AVG	30.5	30.5	30.0
I11	62	M	PT	G	AVG	37.5	37.0	37.0
I12	35	M	PT	PG	EXC	29.0	29.5	28.5
I13	47	M	FT	PG	AVG	25.5	26.0	26.5
I14	44	M	FT	G	AVG	38.0	39.0	36.5
I19	46	M	FT	C	EXC	42.0	42.0	42.5
			Control Group					
C01	52	M	FT	G	AVG	32.0	34.5	32.0
C02	62	M	PT	C	AVG	29.5	28.5	28.5
C06	42	M	FT	PG	AVG	39.0	38.0	37.0
C07	39	M	UN	G	AVG	29.0	28.0	26.5
C16	65	W	UN	C	AVG	34.0	33.0	31.0
C18	58	M	PT	C	EXC	31.5	32.5	30.5

Note. M = Married; W = Widowed; D = Divorced; FT = Full Time; PT = Part Time; UN = Unemployed; AVG = Average; EXC = Excellent; WC = Waist Circumference (inches); WK = Week

Table 3

Descriptive Statistics for Exercise Time by Phase, Time with a Partner by Phase, and Attendance of Support Meetings (Including the Outlier Intervention Participant, N = 13)

Variable	Mean	SD	Min	Max	Skewness	SE_{skew}	Z_{skew}	Kurtosis	SE_{kurt}	Z_{kurt}
				Intervention Group (N = 7)						
Time Week 1	194.57	103.58	60	320	.010	.794	.01	-2.072	1.59	-1.30
Time Phase 1	2059.71	1062.63	550	3930	.554	.794	.70	1.16	1.59	.73
Time Phase 2	2092.57	1335.81	350	4585	.891	.794	1.12	1.78	1.59	1.12
Partner Phase 1	1236.29	1103.75	235	3555	1.881	.794	2.37	4.16	1.59	2.62
Partner Phase 2	1037.14	1092.22	200	3300	1.82	.794	2.29	3.59	1.59	2.26
Attendance	.737	.19	.5	1.0	-.225	.794	-.28	-1.16	1.59	-.73
				Control Group (N = 6)						
Time Week 1	132.33	69.66	60	235	.607	.845	.72	-1.19	1.74	-.68
Time Phase 1	1311.33	467.18	715	1980	.208	.845	.25	-1.12	1.74	-.64
Time Phase 2	2114.17	985.33	565	3365	-.438	.845	-.52	.130	1.74	.07
Partner Phase 1	618.33	672.20	0	1500	.546	.845	.65	-2.04	1.74	-1.17
Partner Phase 2	1052.50	801.18	120	2280	.636	.845	.75	-.676	1.74	-.39
Attendance	.805	.1236	.7	1	.404	.845	.48	.088	1.74	.05

Note. Time (minutes); SD = Standard Deviation; Min = Minimum; Max = Maximum; SE_{skew} = Standard error for Skewness; Z_{skew} = Z score for skewness; SE_{kurt} = Standard error for kurtosis; Z_{kurt} = Z score for kurtosis.

Table 4

Descriptive Statistics for Exercise Time by Phase, Time with a Partner by Phase, and Attendance of Support Meetings (N = 12)

Variable	Mean	SD	Min	Max	Skewness	SE_{skew}	Z_{skew}	Kurtosis	SE_{kurt}	Z_{kurt}
				Intervention Group (N = 6)						
Time Week 1	179.50	104.72	60	320	.472	.845	.56	-1.19	1.74	-.68
Time Phase 1	1748.00	734.05	550	2660	-.752	.845	-.89	.543	1.74	.31
Time Phase 2	1677.17	831.73	350	2480	-.858	.845	-1.02	-.564	1.74	-.32
Partner Phase 1	849.83	455.43	235	1435	-.253	.845	-.30	-1.21	1.74	-.70
Partner Phase 2	660.00	486.57	200	1395	.555	.845	.66	-1.36	1.74	-.78
Attendance	.722	.20	.5	1.0	.081	.845	.10	-1.48	1.74	-.86
				Control Group (N = 6)						
Time Week 1	132.33	69.66	60	235	.607	.845	.72	-1.19	1.74	-.68
Time Phase 1	1311.33	467.18	715	1980	.208	.845	.25	-1.12	1.74	-.64
Time Phase 2	2114.17	985.33	565	3365	-.438	.845	-.52	.130	1.74	.07
Partner Phase 1	618.33	672.20	0	1500	.546	.845	.65	-2.04	1.74	-1.17
Partner Phase 2	1052.50	801.18	120	2280	.636	.845	.75	-.676	1.74	-.39
Attendance	.805	.1236	.7	1	.404	.845	.48	.088	1.74	.05

Note. Time (minutes); SD = Standard Deviation; Min = Minimum; Max = Maximum; SE_{skew} = Standard error for Skewness; Z_{skew} = Z score for skewness; SE_{kurt} = Standard error for kurtosis; Z_{kurt} = Z score for kurtosis.

Table 5

Intervention Efficacy

	Intervention Attendance	Adherence
Intervention Group Phase One and Phase Two		
I04	83%	4.17%
I10	50%	91.67%
I11	50%	45.83%
I12	100%	16.67%
I13	83%	62.50%
I14	67%	54.17%
Mean	50%	45.84%
Control Group Phase Two		
C01	83%	83.33%
C02	100%	8.33%
C06	83%	0.00%
C07	67%	50.00%
C16	67%	83.33%
C18	83%	75.00%
Mean	67%	50.00%

Note. Intervention calculated for phase one and two; Control calculated for phase two.

Table 6

Intervention Group vs. Control Group Total Exercise Time Phase One – Independent t test (N = 12)

	Mean	SD	Skewness	SE_{skew}	Z_{skew}	Kurtosis	SE_{kurt}	Z_{kurt}
Intervention: $Time_{phase1}$	1748.00	734	-.752	.845	-.89	.543	1.74	.31
Control: $Time_{phase1}$	1311.33	467	.208	.845	.25	-1.12	1.74	-.64

Note. Time (minutes); SD = Standard deviation; SEskew = Standard error for skewness; Zskew = Z score for skewness; SEkurt = Standard error for kurtosis; Zkurt = Z score for kurtosis.

Table 7

Total Time Exercising with a Partner

Variable	Mean	SD	Min	Max	Skewness	SE_{skew}	Z_{skew}	Kurtosis	SE_{kurt}	Z_{kurt}
Intervention Group (N = 6)										
Partner Phase 1	849.83	455.43	235	1435	-.253	.845	-.30	-1.21	1.74	-.70
Partner Phase 2	660.00	486.57	200	1395	.555	.845	.66	-1.36	1.74	-.78
Control Group (N = 6)										
Partner Phase 1	618.33	672.20	0	1500	.546	.845	.65	-2.04	1.74	-1.17
Partner Phase 2	1052.50	801.18	120	2280	.636	.845	.75	-.676	1.74	-.39

Note. Time (minutes); SD = Standard Deviation; Min = Minimum; Max = Maximum; SE_{skew} = Standard error for Skewness; Z_{skew} = Z score for skewness; SE_{kurt} = Standard error for kurtosis; Z_{kurt} = Z score for kurtosis.

Table 8

Time Effect for Total Exercise Time for Phase One and Phase Two for the Total Sample

Variable	Mean	SD	Min	Max	Skewness	SE_{skew}	Z_{skew}	Kurtosis	SE_{kurt}	Z_{kurt}
					Intervention Group (N = 6)					
Time Phase 1	1748.00	734.05	550	2660	-.752	.845	-.89	.543	1.74	.31
Time Phase 2	1677.17	831.73	350	2480	-.858	.845	-1.02	-.564	1.74	-.32
					Control Group (N = 6)					
Time Phase 1	1311.33	467.18	715	1980	.208	.845	.25	-1.12	1.74	-.64
Time Phase 2	2114.17	985.33	565	3365	-.438	.845	-.52	.130	1.74	.07
Attendance	.805	.1236	.7	1	.404	.845	.48	.088	1.74	.05

Note. Time (minutes); SD = Standard Deviation; Min = Minimum; Max = Maximum; SE_{skew} = Standard error for Skewness; Z_{skew} = Z score for skewness; SE_{kurt} = Standard error for kurtosis; Z_{kurt} = Z score for kurtosis.

Figure 1. The Health Problem

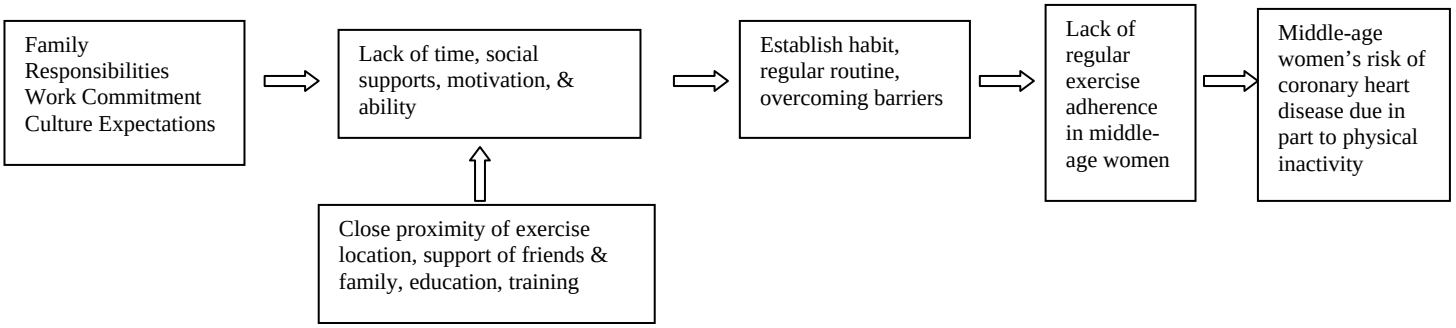

Figure 1. The health problem was the risk of coronary heart disease for inactive women.

Figure 2. Intervention Group Total Exercise Time Phase One Boxplot

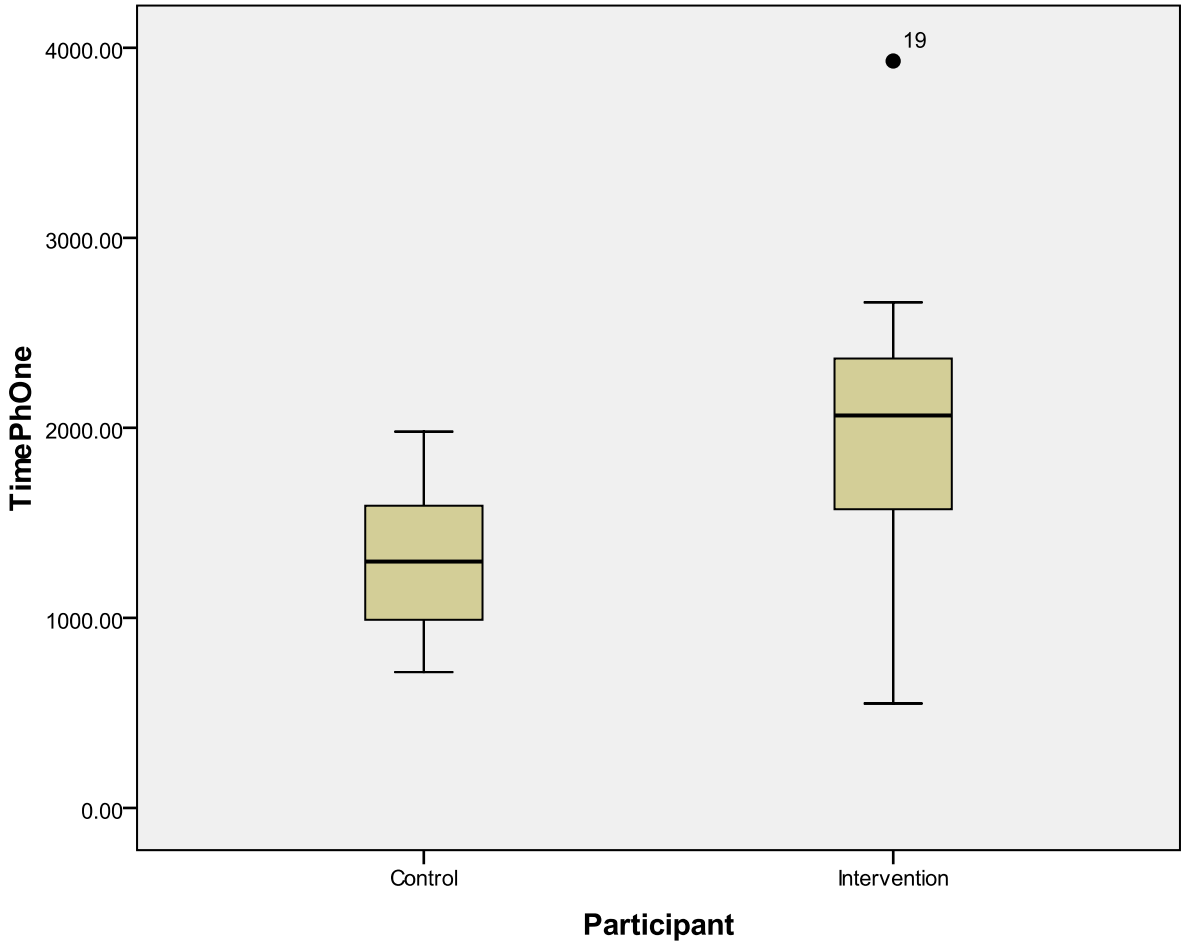

Figure 2. Intervention group subject 19 was an outlier for phase one total exercise time.

Figure 3. Intervention Group Total Exercise Time Phase Two Boxplot

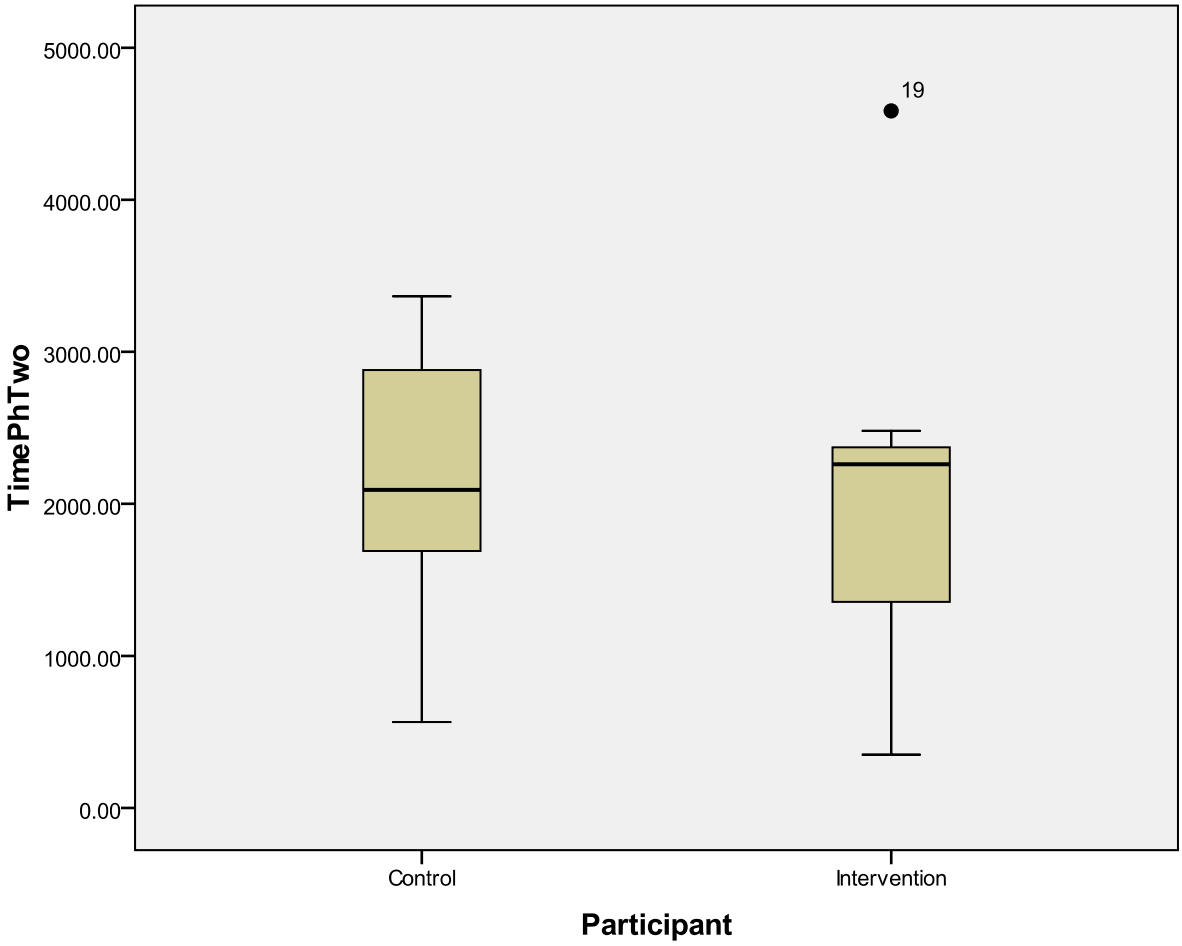

Figure 3. Intervention group subject 19 was an outlier for phase two total exercise time.

Figure 4. Intervention Group Total Exercise Time with a Partner - Phase One Boxplot

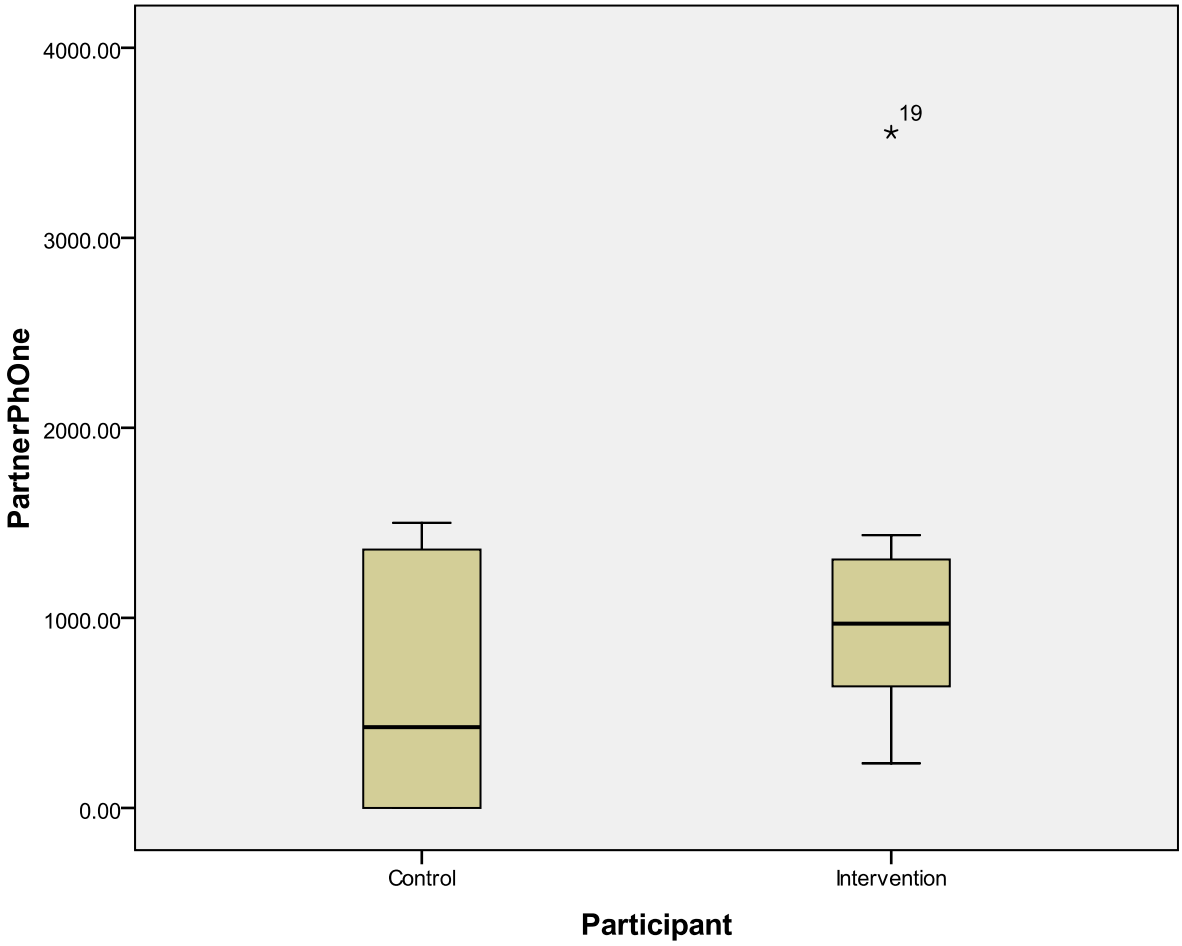

Figure 4. Intervention group subject 19 was an outlier for phase one partner time.

Figure 5. Intervention Group Total Exercise Time with a Partner - Phase Two Boxplot

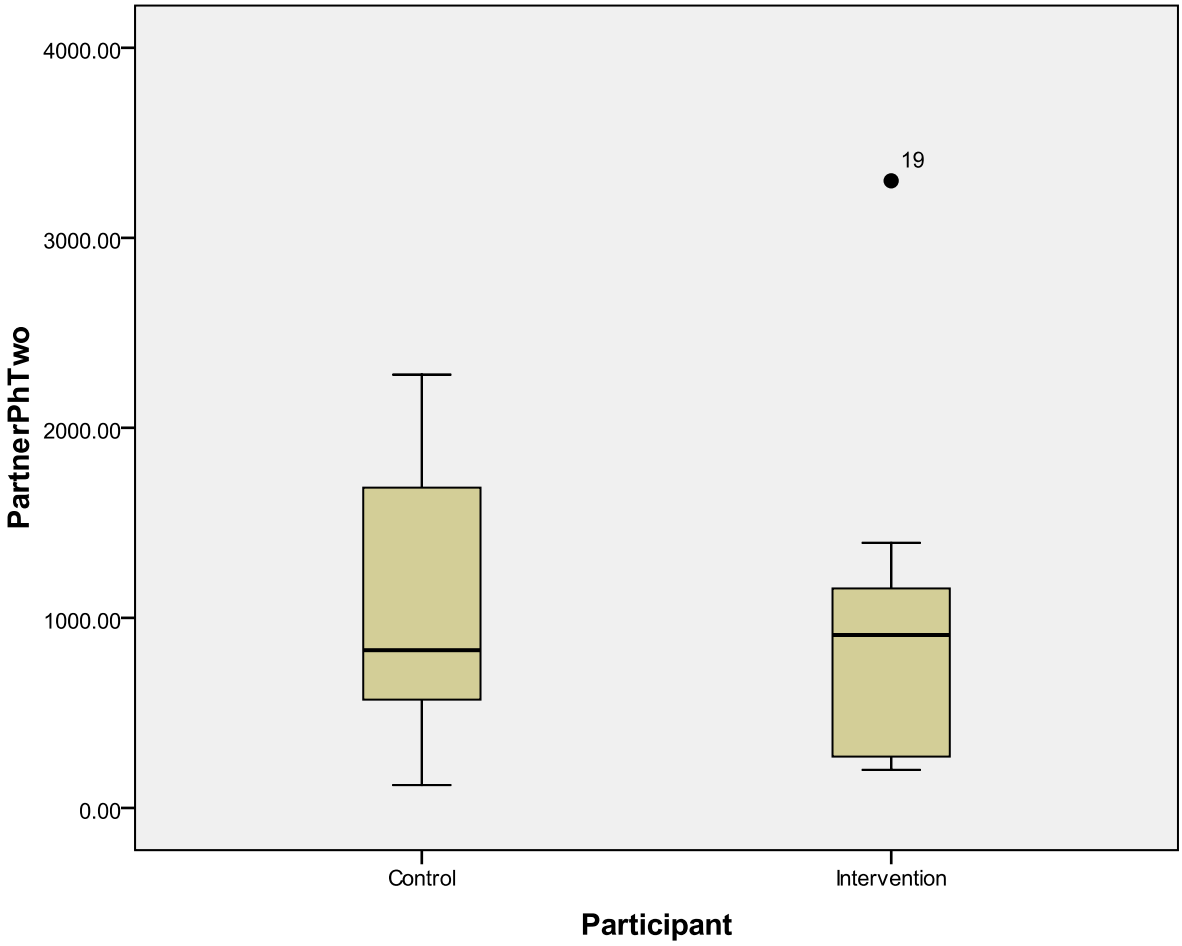

Figure 5. Intervention group subject 19 was an outlier for phase two partner time.