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A Community Health Program to Reduce Cardiovascular Risk in Women

Xander Bacchus
Walden University

WaldenUniversity

College of Health Sciences

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Xander Bacchus

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Review Committee
Dr. Chester Jones, Committee Chairperson, Public Health Faculty
Dr. Frazier Beatty, Committee Member, Public Health Faculty
Dr. Loretta Cain, University Reviewer, Public Health Faculty

Chief Academic Officer
Eric Riedel, Ph.D.

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Abstract

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M A, Andrews University, 1998

B S , Andrews University, 1996

Dissertation Submitted in Partial Fulfillment

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Abstract

Cardiovascular disease (CVD) is the leading cause of death among United States women. Regular aerobic exercise can significantly reduce CVD risk. This dissertation reflects one of the first studies of the efficacy of Community Health Programs (CHP) in promoting exercise among American women aged 25 to 65. Primary data used from a study involved a sample of 42 women aged 25 to 65 who attended a CVD and exercise-related CHP, while a 42-member control group merely received the CHP information in a printed form. A pretest was administered at the outset of the study, and a posttest was administered at 3 months from the date of the CHP. Differences in gain scores between the groups were analyzed to determine the effects of the CHP on the following: exercise behaviors, self-efficacy, exercise-related self-efficacy, knowledge of CVD and recommended exercise guidelines, knowledge of community-based opportunities for exercise, tendency to involve other community members in exercise and/or discussion of exercise and CVD, blood pressure, blood glucose, body weight, and LDL Cholesterol. As expected, participants in the community health program reported, a stronger awareness of how exercise can affect cardiovascular health, better understanding of exercise guidelines, improved knowledge of exercise possibilities in the community, and improved self-efficacy scores. As hypothesized, participants in the health program were more likely to discuss exercise with friends and relatives, take part in exercise programs, and have reduced blood pressure, blood glucose, body weight and blood cholesterol measurements. This research demonstrates societal and individual benefits and creates a catalyst for positive social change.

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Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction to the Study

Introduction

Any discussion of women and cardiovascular disease should begin with an acknowledgement that women's health in general was vastly understudied until approximately two decades ago (Hurdle, 2001). As recently as 1991, the Council on Ethical and Judicial Affairs of the American Medical Association reported that there had been an ongoing and detrimental lack of inquiry into the causes and treatment of various diseases that women face (Hurdle, 2001). Moreover, congressional testimony in the early 1990's was needed in order to prompt Congress to follow through with its own 1986 policy for including women in clinical research trials and other medical studies (Hurdle, 2001). This is an important starting point for discussion since, until quite recently, cardiovascular disease was thought of as a "man's disease." Even today misconceptions remain concerning the presentation of heart attacks in women, and very little is known about "broken heart syndrome"—a form of severe, short-term muscle heart failure that affects women in greater numbers than men (NHLBI, 2011). This is true even though, as Desvigne-Nickens (2009) has noted, "both men and women have heart attacks, but more women who have heart attacks die from them" (n. pag.).

That said, enormous strides have been made in research, it is hardly necessary to consult the scholarly literature to understand the consequences of cardiovascular disease among American women. Cardiovascular disease (which includes coronary heart disease, hypertensive disease, heart failure and stroke) is the single largest killer of women in the United States (NHLBI, 2011), accounting for 35.3% of deaths in

American women over age 20 (NCWHD, 2012). Nearly 60 % more women died of cardiovascular disease in 2004 than from all forms of cancer combined (Desvigne-Nickens, 2009). Approximately 42 million women currently suffer from one or more forms of cardiovascular disease, and more than 8 million U.S. women have already suffered at least one heart attack and/or episode of angina (NCWHD, 2012). Congestive heart failure alone, which accounts for more than half of heart failure-related deaths, is responsible for 159,000 deaths among American women each year—more than one death every minute (NCWHD, 2012).

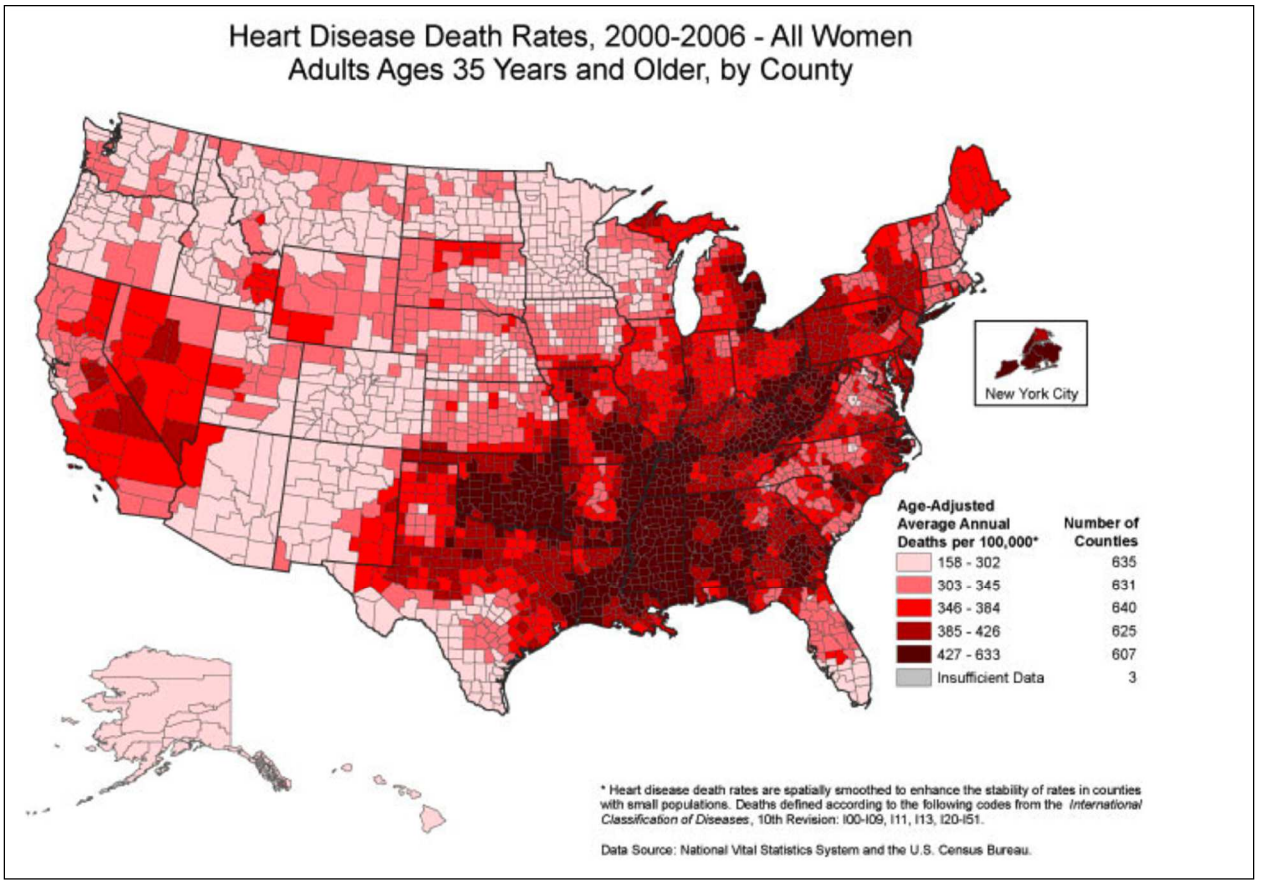
There are noticeable demographic trends in heart disease. Perhaps the most striking is gender-based. In 2009, according to the National Center for Health Statistics (2011), men still reported higher overall levels of heart disease; for instance, "46% of men and 31% of women 75 years of age and over had ever been told by a physician or other health professional that they had heart disease" (p. 5). However, among women who suffer a heart attack, 42% will die within one year, while for men that figure is 24% (Heart Foundation, 2012). Under the age of 50, men are twice as likely to survive a heart attack as women are (Heart Foundation, 2012). Moreover, heart disease rates over the last 25 years have been declining far more rapidly among men than among women (AHA, 2012).

There is a complex interplay between gender and age. As women age, they are more likely to be at risk of heart disease (Desvigne-Nickens, 2009). However, men's risk begins to rise at a slightly earlier age. Among men, the risk for heart attack increases steadily after 45 years of age, while in women, the risk increases most noticeably after age 50 (Heart Foundation, 2012). Based on self-reports from 2008-2009, the National

Center for Health Statistics (2011) found that the prevalence of heart disease (not including stroke) among women breaks down approximately as follows: 4.7% of those aged 18 to 44, 9.0% of those aged 45 to 54, 14.9% of those aged 55 to 64, 22.6% of those aged 65 to 74, and 32.3% aged 75 and above (p. 208).

There is also a significant geographic component to women's risk of heart disease. As illustrated by the following graphic from the CDC (2010), risk is heavily concentrated in areas of the south, the eastern band of the Midwest, and certain portions of the northeast, particularly New York City. Unfortunately, the data in Figure1 do not appear to have been adjusted to account for the differing age structures in the reporting counties; since heart disease increases with age, certain effects may reflect higher concentrations of the aged rather than controllable risk factors such as exercise and diet. Still, the geographic distribution of cardiovascular disease is so pronounced that public health experts speak of a "stroke belt" in the Southeast, where cardiovascular disease is strikingly more prevalent than in the rest of the nation (Bakalar, 2011).

Figure 1 Heart disease death rates for women in the United States from 2000-2006



Source: CDC, 2010, p. 1

The hardest hit areas exhibit higher risk factors, such as smoking, obesity, and diabetes (Bakalar, 2011). However, there may be other factors at work as well, since women of the so-called stroke belt also test more highly for prevalence ofC-reactive protein and other inflammation-related markers in their blood (Bakalar, 2011). These markers indicate increased risk of heart disease, and their prevalence in certain populations persists statistically, even when risk factors such as obesity, smoking, and diabetes are controlled for (Bakalar, 2011). This may indicate a genetic role in

cardiovascular disease, or—as some researchers contend—an economic one (Bakalar, 2011).

Finally, there is a significant racial and ethnic component to the distribution of cardiovascular disease in women. According to one source, African American women suffer heart disease at twice the rates of white women, and "Black women die from heart disease more often than all other Americans" (Black Women's Health Imperative, n. d., n. pag.). Note that the latter statement conflicts with statistics suggesting that in 2007, rates for death from cardiovascular disease were "294.0 per 100 000 for white males, 405.9 per 100 000 for black males, 205.7 per 100 000 for white females, and 286.1 per 100 000 for black females" (Roger, et al., 2010, n. pag.). Nevertheless, even by these more conservative statistics, the differentials are striking. Coronary heart disease, the leading cause of death of all cardiovascular diseases, has a particularly disproportionate impact on younger black women. Black women under the age of 55 experience 2.5 times the risk of death from CHD than do white women of the same age group (Hansford, 2011, p. 7). Overall, cardiovascular disease accounts for 41.6% of deaths among Black women (Hansford, 2011, p. 7). Black women overall suffer from elevated risk factors for cardiovascular disease, including higher rates diabetes, hypertension, elevated cholesterol, and higher rates of being overweight or obese—which is largely linked to inactivity ((Hansford, 2011; Black Women's Health Imperative, n. d.).

Overall, cardiovascular disease has an enormous impact on health care costs in the United States. The National Center for Chronic Disease Prevention and Health Promotion. (2011) suggests that the total economic toll of cardiovascular disease in the United States in 2010 was approximately $444 billion (p. 2). Heiderich, et al. (2011)

breaks down the direct and indirect costs of cardiovascular disease as follows: Coronary heart disease alone has an impact of nearly $109 billion; Hypertensive disease generates direct and indirect costs of $93.5 billion; stroke, $53.9 billion; and heart failure, $34.4 billion (p. 940). Treatment of cardiovascular disease represents 1 in every 6 dollars spent on health care in the United States, and as the population ages, these costs will only grow (NCCDPHP, 2011, p. 2).

In sum, no matter how the literature is read, and despite minor variations in reported rates, it has become apparent that cardiovascular disease has a staggering impact on women's lives and women's health, as well as a significant impact on the nation's economy and healthcare system. Although there is much work to be done in identifying the precise physiological mechanisms by which risk factors operate, research routinely validates the claim that exercise is a critical factor in reducing risk of cardiovascular disease among both women and men. The next section of this paper turns to examine the link between exercise or sedentary lifestyles and cardiovascular disease.

Problem Statement

Increasing cardiovascular health among U.S. women represents a preeminent public health concern. Regular aerobic exercise is a cornerstone of women's cardiovascular health, as well as their overall physical health and social wellbeing. Yet there is no doubt that promoting a less sedentary lifestyle among American women is a complex and difficult task. To date, research has heavily emphasized attitudinal dimensions of exercise habits, often relegating to an afterthought the more social

dimensions of exercise, such as how women encounter opportunities for exercise, community and cultural norms, the circulation of information and beliefs within social circles, and the social appraisal of individuals' roles as exercisers or non-exercisers. All of these social dimensions, anchored in the lives of communities, demonstrably affect how and when women exercise.

Despite ample evidence that community-based health interventions may be of particular use in shifting health behaviors that have significant social components, little research has been conducted into their application to the promotion of exercise among American women. Such research would be useful to doctors, public health analysts, and policy makers alike. If community interventions are efficacious, they can help boost the health status both of individuals and of their communities. Research showing their effectiveness can help motivate private and public insurers to cover entry into community health programs. Moreover, public health dollars are precious, and knowing how best to employ these dollars benefits not only individuals but the greater public. The present study aimsto advance knowledge concerning the efficacy of community health interventions in promoting women's exercise by focusing on a targeted, sustained community education program, that has used a controlled group, to track its effects on participant knowledge, awareness, sharing of information, blood pressure, blood glucose, body weight, blood cholesterol, attitudes and behaviors over time.

Purpose of the Study

The purpose of this study is to evaluate the effectiveness of a community-based public health program in promoting cardiovascular health among women, which may in

turn reduce disease risk. Specifically, the studyinvestigated the effect that the health program had on the awareness of links between cardiovascular health and exercise, knowledge of specific recommendations and guidelines, and knowledge of exercise possibilities. Also investigated was the affect that the health program had on self-efficacy scores, the likelihood of exercising, and the likelihood of discussing exercise with friends, neighbors, or relatives. This study is significant because a sedentary lifestyle is a major risk factor for cardiovascular disease, the single largest cause of death among American women, yet research suggests many women may not understand the importance of exercise in preventing the disease, and multiple factors may prevent them from exercising more frequently even when the link is understood.

Method of Inquiry

This study used primary data, which were collected as part of a church-based community program called NEW START. This program is used at both the Wildwood Health Institute and Weimar Institute. The data were collected as part of a study involving both a control and experimental group. The subjects were women between the ages of 25 and 65. The study was supervised by a retired Registered Nurse and conducted at the Boardwalk on Miami Beach. Subjects assigned to the experimental group signed a contract in which they agreed to participate for 12 weeks in an exercise program that involved brisk walking for approximately 45 minutes, 3 times each week. Four physiological variables were used to indicate cardiovascular fitness. These included blood pressure, blood glucose, body weight, and blood cholesterol.

Research Questions and Hypotheses

The study addresses 10 separate hypotheses. Each of these is presented in turn, along with the corresponding directional hypothesis.

Specification of Questions and Hypotheses

Research Question #1-How does a community health program that describes cardiovascular risk and promotes exercise among women, affect awareness of the links between cardiovascular health and exercise as measured by knowledge assessment questionnaire?

Hypothesis #1-It is expected that answers to a post-test by participants who engage in the community health program will reveal stronger awareness of the links between cardiovascular health and exercise than answers to the post-test by members of the control group.

Research Question #2-How does a community health program that describes cardiovascular risk and promotes exercise among women, affect knowledge of specific recommendations and guidelines for exercise to support cardiovascular health as measured by knowledge assessment questionnaire?

Hypothesis #2-It is expected that answers to a post-test by participants who engage in the community health program will demonstrate stronger knowledge of specific recommendations and guidelines for exercise to support cardiovascular health than answers to the post-test by members of the control group.

Research Question #3-How does a community health program that describes cardiovascular risk and promotes exercise among women, affect knowledge of exercise

possibilities within one's own community as measured by knowledge assessment questionnaire?

Hypothesis #3-It is expected that answers to a post-test by participants who engage in the community health program will demonstrate stronger knowledge of exercise possibilities within their own community than answers to the post-test by members of the control group.

Research Question #4-How does a community health program that describes cardiovascular risk and promotes exercise among women, with specific guidance concerning exercise programs, affect self-efficacy in exercise as measured by the New General Self-Efficacy Scale (NGSE) (Chen et al., 2001) and a modified NGSE tailored to measure exercise self-efficacy?

Hypothesis #4-It is expected that answers to a post-test by participants who engage in the community health program will demonstrate stronger self-efficacy scores than answers to the post-test by members of the control group as measured by the New General Self-Efficacy Scale (NGSE) (Chen et al., 2001) and a modified NGSE tailored to measure exercise self-efficacy.

Research Question #5-How does a community health program that describes cardiovascular risk and promotes exercise among women, affect women's likelihood of discussing(and/ or participating in) exercise with friends, neighbors or relatives as measured by exercise questionnaire?

Hypothesis #5-It is expected that answers to a post-test by participants who engage in the community health program will demonstrate greater likelihood

ofdiscussing (and/ or participating in) exercise with friends, neighbors or relativesthan answers to the post-test by members of the control group.

Research Question #6-How does a community health program that describes cardiovascular risk and promotes exercise among women, affect women's likelihood of exercising as reflected by entries in a personal log kept by participants over the course of three months as measured by a log sheet?

Hypothesis #6-It is expected that entries in a personal log kept over the course of three months participation in the community health program will post-test reflect increased likelihood of exercising, when compared to personal log entries maintained over the course of three months by members of a control group.

Research Question #7-How does acommunityhealth program that describes cardiovascular risk and promote exercise among women, affect women's blood pressure levels asmeasuredby sphygmomanometer and stethoscope?

Hypothesis #7-It is expected that women who participate in the community health program will have post-test, lower blood pressure levels as measured by sphygmomanometer and stethoscope than post-test measurements of women in the control group.

Research Question #8- How does a community health program that describes cardiovascular risk and promotes exercise among women, affect women's blood glucose level as measuredby meter, lancet and specific test strip?

Hypothesis #8. It is expected that women who participate in the community health program will have post-test, lower blood glucose levels as measured by meter,

lancet and specific test strip than post-test measurements of women in the control group.

Research Question #9- How does a community health program that describes cardiovascular risk and promotes exercise among women, affect women's body weight as measured by medical clinic standardized scale?

Hypothesis #9- It is expected that women who participate in the community health program will have post-test, a reduction in their body weight as measured by medical clinic standardized scale than post-test measurements of women in the control group.

Research Question #10- How does a community health program that describes cardiovascular risk and promotes exercise among women, affect women's low-density lipoprotein (LDL) cholesterol level as measured by meter, lancet and specific test strip?

Hypothesis #10- It is expected that women who participate in the community health program will have post-test, a reduction in their LDL cholesterol levels as measured by meter, lancet and specific test strip than post-test measurements of women in the control group.

Theoretical Base

Two major theoretical constructs are crucial to this research. The first is the construct of a community health intervention itself. The second is self-efficacy, which is theorized to have a complex relationship to both exercise and social life in this project. Each of these will be discussed in turn.

Community Health Intervention

Community health interventions engage health practices through programs that may decrease risk factors across a community, as well as in the cases of individuals. Two research projects in the early 1970's—the North Karelia Project in Finland, and the Three Community Study in California—helped create the basic framework for what is thought of as community health intervention (Merzel & D'Afflitti, 2003; Altman, 1995). Since that time, community health interventions have gained significant credibility and traction among health care practitioners (Merzel & D'Afflitti, 2003). Community health interventions typically address chronic diseases, which often reflect ongoing health behaviors and environmental risk factors anchored at both the individual and community levels. Community strategies are also heavily used to address the spread of sexually transmitted diseases, given the heavy behavioral component to STDs.

The community health intervention idea incorporates an ecological model of health, which moves from "individually focused explanations of health behavior to ones that also encompass social and environmental influences" (Merzel & D'Afflitti, 2003, n. pag.). The ecological model recognizes that a person's behaviors, including health behaviors that may produce or limit risk, arise in interaction with the social environment, including interpersonal relations, organizational dynamics, community norms and relationships, and policy decisions (Merzel & D'Afflitti, 2003). Typically community health interventions involve an educational component. They may also involve advertising strategies to promote awareness of a risk, measures to encourage participation by community members in addressing the risk, and efforts to remove infrastructural or normative barriers to behavioral changes. Community "ownership"

(Merzel & D'Afflitti, 2003, n. pag.) is a key concept in community-based interventions; the idea is that once communities take ownership of a problem, they will be more likely to support program efforts and build capacity around risk-reduction efforts.

Medically speaking, the target of community health intervention is "population attributable risk," which is health risk as measured and understood across a population. Population attributable risk is "the *amount of disease* produced by a risk factor among individuals with therisk factor compared with those without" (Altman, 1995, p. 227, emphasis in original). Population attributable risk is both conceptualized and interpreted in terms of the profile of a population, rather than the profile of an individual, based on the observation that certain mass diseases, particularly chronic diseases, are the product of population susceptibilities as they interact with environmental influences (Altman, 1995). Therefore, while the clinician treating the individual will typically focus narrowly on that individual's own susceptibilities and hereditary or lifestyle risk factors, the policy maker, epidemiologist, or community health interventionist will focus on a target population as a whole, attempting to improve the health of individuals by improving the environmental and behavioral risk factors among that population.

This is not to say that clinicians do not also recognize the role of community health risk in the lives of their patients. As Altman (1995) has suggested, the most ethical and efficacious way to promote health would be to address disease at both the individual and population or community levels. However, the distinction is important to elucidate because the two approaches have different effects. Direct intervention in the life of one individual may have a profound effect on that individual's physical health, whereas a community-based intervention may have a broad impact overall, but a

relatively slight effect on individuals when measured at the mean (Altman, 1995). This is what Altman (1995), following Rose (1992, as cited in Altman, 1995), describes as the "prevention paradox" (Altman, 1995, p. 227). For instance, if a community health intervention lowered blood pressure at the mean by 3 mm Hg, the overall public health impact would be significant, although the implications for any one individual may not be promising.

> The same logic applies to sexually transmitted diseases. Across a population, for example, a slight reduction in the number of sexual partners or a small increase in condom use would result in substantial public health benefit. For a particular individual making such small changes, however, the benefits are less certain. (Altman, 1995, p. 227)

This paradox becomes extremely important when policy makers attempt to decide how health care dollars will be spent, as well as when clinicians consider the types and range of interventions they will suggest for any one patient.

Cardiovascular disease stands out as one of a certain class of diseases that may be particularly well suited to community-based approaches. There are two reasons for this. The first, as described by Altman (1995), has to do with the distribution of risk and outcome among patients with cardiovascular disease. Research indicates that individuals at moderate levels of risk, who represent the bulk of those suffering from cardiovascular disease and its effects, are most affected by population attributable risk (Altman, 1995). Therefore, there may be particularly high efficacy in applying a community-based health intervention approach to cardiovascular disease, as opposed to, for instance, genetic disorders or certain types of cancer.

A second and related reason to single out cardiovascular disease for community-based approaches is at the heart of the present research effort. Exercise, as described in depth above, is a significant component of risk reduction in the case of cardiovascular disease. Yet there is little evidence that individual, clinician-based approaches facilitate patient exercise in a meaningful and consistent fashion. The problem is not at all akin to administering pharmacological measures that will yield predictable results across a population, even if certain individuals may, due to predispositions or specifics of the course of their disease, not respond as well as others. In the case of promoting exercise, incremental changes may have broad effects both for individuals and across a community. Moreover, as also described above, there may be a synergistic effect, so that changes by individuals who participate in a health program encourage changes among others in the community, barriers to exercise are reduced community-wide, and/or the overall profile of exercise shifts on a community basis, reinforcing individual attempts at change.

Merzel and D'Afflitti (2003) conducted a meta-study of community-based medical interventions and found that, even given the prevention paradox, results from such interventions are not as robust as might be hoped. Some of the disappointing results appear to accrue to methodology (Merzel & D'Afflitti, 2003). However, even where the methods appear sound, program effects were far less than would be associated with a successful, direct medical intervention:

> The California 5 a Day program found that fruit and vegetable consumption increased by 1.3% per year in the state. Project Freedom obtained a 13% decrease in regular alcohol use among high school seniors in the intervention schools, while

> the Midwestern Prevention Project reduced past-month alcohol use by 4%. The effect on drug use among males was about 3% lower in Center for Substance Abuse Prevention (CSAP) intervention communities than in comparison sites. Infant mortality decreased by an average 2.8% per year in Healthy Start communities. These examples indicate that relatively small effects are to be expected from community-level programs, due in part, perhaps, to the less intensive nature of these kinds of interventions. (Merzel & D'Afflitti, 2003, n. pag.)

This makes it all the more important to understand the promise of community based interventions where they appear most desirable—such as in the case of promoting exercise. It also points to the importance of further exploration of the community context for learning new behaviors, separate and apart from the mere provision of information.

Self-efficacy

The self-efficacy concept is attributed to Bandura, who argued that there is an important relationship between the acquisition and retention of new patterns of behavior and one's own sense of ability to effect outcomes (Hattie, 1992). The crucial distinction for Bandura was between outcome expectancy and efficacy expectation. Outcome expectancy is the belief that a particular behavior will lead to a particular result (Hattie, 1992). Outcome expectancy represents a fundamental cognitive basis for behavioral patterns, insofar as a rational actor generally will undertake a behavior with the assumption that the behavior will yield a desired result. Efficacy expectation, on the other hand, is an actor's belief that he or she can successfully execute the desired

behavior (Hattie, 1992). This makes the picture of choice and action more complex, since individuals may foreclose on behaviors they believe to have benefit because they do not believe in their own capability to see the behavior through. Self-efficacy thus becomes an important component of behavioral change in this account.

In order to fully appreciate the power of the self-efficacy construct, it is necessary to recognize, at a more basic level, that self-concept is implicated in behavior. Each individual has a tacit understanding of his or her own self (Hattie, 1992). Certain behaviors will be consonant with this self-concept, and other behaviors will not. However, because self-concept is dynamic and evolving, the individual's propensity to undertake certain behaviors is also subject to change. As Hattie (1992) notes, this ever-evolving sense of self "interprets and organizes self-relevant actions and experiences; it has motivational consequences, providing the incentives, standards, plans, rules, and scripts for behavior; and it adjusts in response to challenges from the social environment" (p. 99, quoting Markus &Wurf, 1987).

Self-concept may be particularly important to behavior where there is some element of tension or cognitive dissonance (Hattie, 1992). For instance, when there is a break in an individual's linkages with a group, self-concept is more likely to guide behavior (Hattie, 1992). This may well be because the tacit norms of group behavior have been disrupted and therefore more conscious (or self-conscious) direction is called for. Similarly, when there is dissonance between self-concept and behavior, or tension between two aspects of self-concept, the individual may struggle to redefine his or her self and act in accordance with newly emerging self-concepts (Hattie, 1992).

Self-efficacy may be viewed as one aspect of this deep-seated role of self-concept

in behavior. Efficacy as a construct, in Bandura's formulation, depends on four major sources of information and feedback, by which the individual forms opinions on his or her own ability to perform a certain type or class of behaviors. These are performance accomplishments, vicarious experience, verbal persuasion, and emotional arousal (Hattie, 1992, p. 32). Performance accomplishments are, simply put, the experience of doing something right. Themore complex and demanding the task, the more that self-efficacy is likely to rise in response (Hattie, 1992). Vicarious experience is the process of watching someone else master a skill or behavior. The act of observation may enhance an individual's sense that he or she, too, can affect the behavior. Verbal persuasion is a fairly straightforward concept that encompasses the various types of praise, explanation or encouragement that can boost a person's sense of being able to undertake a behavior. And finally, emotional arousal speaks to the degree and kind of emotion that a person experiences when performing a behavior. Strongly positive emotional arousal may well encourage further participation.

Implicit in the sources of self-efficacy is a social component. Modeling is thought to have an important impact on self-efficacy, because it provides the vicarious experience of mastery of a behavior or skill. Verbal persuasion is also social in nature. Being told by a teacher, friend, or neighbor, that one can or cannot perform a specific task or adhere to a particular behavior will influence the individual's own measure of his or her ability. Implicit, too, are a number of potential social feedbacks, forms of reciprocal influence and potentials for transmission. For instance, if an individual sees a behavior modeled in his or her community and then goes on to perform the behavior successfully, the individual may then become a model for others and/or reinforce the

behavior in the individual who originally was the model. Indeed, recently both Bandura and others who have adopted his approach have come to recognize the potential that self-efficacy exists in collective form. Bandura himself has offered a definition of group efficacy as "a group's shared belief in its conjoint capabilities to organize and execute the courses of action required to produce given levels of attainments" (p. 477), and a number of studies have since supported his conjecture (Lightsey, 1999, n. pag., quoting Bandura).

In addition to a social component to self-efficacy, there is a manifestly physical component when the behavior to be mastered is itself physical. Self-efficacy is best understood not as a global construct (although an individual may experience generally high or generally low levels of self-efficacy), but rather a construct that comes into play around sets of behaviors or tasks (Lightsey, 1999). That is to say, self-efficacy is specific and embodied, arising and being reinforced—or diminished—through practice. When a specifically physical behavior is involved, merely formal knowledge is unlikely to translate to self-efficacy (Lightsey, 1999). As Bandura has pragmatically noted,

> A novice given complete factual information about how to ski and a full set of procedural rules, then launched from a mountain top, would most likely end up in an orthopedic ward or intensive care unit of the local infirmary. Procedural knowledge alone will not convert novices into proficient violinists, captivating orators, or graceful ballerinas." (Bandura quoted in Lightsey, 1999, n. pag.)

Although self-efficacy was theorized only fairly recently, it has rapidly become a central and relied-upon concept in psychological and studies of behavior. Over a decade ago, Lightsey (1999) found that entering “self-efficacy” into the PSYCLIT database

yielded over 2,500 articles (n. pag.). The power of the construct has been demonstrated in relation to behaviors and conditions as diverse as phobia reduction, depression and choice of career (Lightsey, 1999). The relevance to exercise behaviors appears powerful. In order to follow-through on changes in exercise behaviors, individuals must feel that they have the capacity to effect the change—they have to imagine their capability to become exercisers. Theoretically, moreover, there should be both a social and a physical component to exercise self-efficacy, both of which weigh heavily in favor of a community-based health intervention approach.

Definition of Terms

Following are key terms used in the study:

Aerobic exercise: Any form of rhythmic exercise that involves major muscle groups and is maintained for a sustained period of time (i.e.: not a single spurt of activity), during which the heart and lungs continuously work harder than they do when at rest.

Cardiovascular disease: A class of diseases affecting the heart and blood vessels, including arteriosclerosis, coronary artery disease, heart failure, hypertension, and diseases of the peripheral vascular system, among others.

Comorbidity: A disease or a condition that coexists with and/or often accompanies a primary disease, but that also exists as a condition in its own right.

Coronary heart disease: Any type of heart disorder that caused by arteries that are diseased, becoming narrowed or partially or fully blocked.

Community health program: A health intervention that attempts to lower disease prevalence by promoting health-related behaviors (e.g., getting vaccinated, quitting smoking, eating healthy foods) across a specified community or population. Community health programs address population attributable risk, rather than individual risk of disease.

Exercise-related self-efficacy: A form of self-efficacy (see definition below) that facilitates maintenance of an exercise program.

Population attributable risk: Where disease is concerned, PAR indicates the amount of the incidence of a disease among a defined population that can be traced to a specific risk to which the population is exposed. The PAR is typically not the total rate of incidence of that disease in the population; it is only the amount by which the total rate would be reduced if exposure to the risk factor were eliminated.

Self-efficacy: An individual's confidence in her own ability to succeed in a given situation or in carrying out a type of behavior. As theorized by Bandura (1997), self-efficacy is a "multifaceted" (p. 352) phenomenon, with interrelated components of efficacy nested within it. With regard to exercise, for instance, self-efficacy may turn on more than the individual's confidence in her own ability to carry out the physical tasks that the exercise entails (e.g., being able to lift a weight). Other components may include belief in her own ability to consistently and effectively schedule time for exercise or to persevere in exercise behaviors when circumstances change and barriers arise (e.g., her work demands increase in her sedentary office job).

Assumptions

There are a number of important assumptions and limitations inherent in the study. The most important is both a limitation and an assumption. Given the modest scale of this project, the group of women recruited will be relatively small, and only one community-based health program will be conducted in one community. There is an assumption going in that even such a modest research endeavor will yield important insights that can be extrapolated across other communities and other initiatives.

This is not to say that the study assumes that all women in all cultural and socioeconomic contexts are similarly situated with regard to the acceptability of exercise. In fact, part of the rationale of a community-based intervention is to move beyond generic assumptions and consider the specific strengths and weaknesses present in a community when launching the program. However, the limitation of one program in one community significantly raises the risk that endogenous variables (e.g., advertising campaigns being run concurrently by a municipal or community organization) will affect results. Therefore, the interpretation of results will be carefully delimited with this in mind.

Limitations

A limitation arises with respect to how carefully the program can be tailored to community specifics. Ideally, a community-based health intervention will involve various stakeholders and include a policy component, whereby the community determines ways to reduce barriers to the desired behavior. So, for instance, where exercise is concerned, a broad, well-funded program might include consideration of

ways to enhance access to exercise equipment or reduce difficulties in exercising outside—for instance, by providing better paths, increased lighting, and so on. Such endeavors are beyond the scope of the present study. However, the limitation should not directly affect the variables under evaluation. Rather, it allows for the conclusion that whatever effect is measured is a conservative one and could be enhanced through broader funding and community involvement.

Delimitations

Every attempt was made to include one or more key community stakeholders in the delivery of the health program. This was critical, since the goal was to promote engagement and buy-in and to promote the sense that community leaders desire new health behaviors and support them. However, given the short span of the study, it was not be possible to engage a broad range of stakeholders or "tastemakers" in delivering the program. As with the factor discussed immediately above, this limitation should allow for the conclusion that whatever effect is measured in the study is a conservative one that could be enhanced through broader community involvement.

Finally, there are risks to any analysis based on self-reporting. This issue is discussed further in Chapter 3, Methodology. Clearly, there may be a temptation for participants in both the control and experimental groups to over-report their exercise behaviors, since the behavior is desired. Attempts will be made to counteract this effect by seeking specific information about the nature and type of exercise (including start and end times), and by emphasizing to participants that the goal is not to judge them, but to understand what is realistic in the context of their lives. By framing the research so

that participants understand their candid responses will be of help to future researchers and other women, it may be possible to reduce this potential source of bias.

Significance of the Study

This study is poised to contribute both to the knowledge of how to develop a community-based program targeted at women for exercise. Few studies directly address the potential impact of community health interventions on exercise behaviors among women in the U.S. context. The study provided control group members with all the same information, in written form, that the experimental group members received through their participation in the program. Hence, the control group participants had the same potential for a response based on their assessment of risk and knowledge of appropriate exercise behaviors. This is critical, because it allowed the researchers to test the importance, specifically, of the group setting and community-involvement aspect of the program for promoting the adoption and maintenance of new exercise behaviors.

By the same token, the study will make a novel contribution to the literature on community health program effectiveness in general. Exercise presents something of a conundrum for doctors and therapists alike. Even where individuals are aware of the importance of exercise in an overall healthy lifestyle, they may find it difficult to adopt and maintain new exercise routines. Exercise is a behavior with obvious physical properties as well as important social components (Anshel, 2006): For instance, people may well receive admiration for implementing an exercise routine and they may enjoy exercising with others (Khanam & Costarelli, 2008).

All of these factors weigh in favor a community-based health intervention approach, yet the efficacy of such an approach has not been well demonstrated. It is important to understand more fully what a community-based program can achieve in order to understand how health care dollars may best be spent.

Summary

Cardiovascular disease is the top killer of American women. Regular, aerobic exercise has a thoroughly well documented role in reducing women's risk of cardiovascular disease as well as other chronic diseases and comorbidities. Yet less than 30% of American women exercise regularly, and it is notoriously difficult to promote adoption and maintenance of new exercise behaviors. This controlled, quantitative study will make a new contribution to the literature by studying the potential of a community-based health intervention to promote regular exercise behaviors among women at risk of cardiovascular disease. Using a pre-test, post-test design, the study describes the effect of the community-based health program on 10 dependent variables: a) women's awareness of the role of exercise in limiting risk of cardiovascular disease, b) knowledge of specific recommendations and guidelines for exercise to promote cardiovascular health, c) knowledge of exercise opportunities within one's own community, d) general and exercise-related self-efficacy scores, e) the ripple effects of a community-based health program, as participants discuss exercise with others and/or involve others in their exercise routines, f) exercise behaviors over the course of three months from the start of the study, g) blood pressure, as measured at the start of the study and at three months out, h) blood glucose as measured at the start of study and at three months out, i)body

weight as measured at the start of the study and at three months out, j) LDL cholesterol as measured at the start of the study and at three months out.

This is the first such study to attempt to gauge the "ripple effects" of a community-based health program, by asking about participants' involvement of others in exercise-related conversations and behaviors. It is hoped that the study will make a positive contribution to the lives and health of the women who participate. More broadly, the study is poised to assist in the implementation of exercise-related policies and to serve as the platform for further research.

Chapter 2: Literature Review

Women and Cardiovascular Disease

Sedentary lifestyles contribute significantly to cardiovascular disease, the leading cause of death among women in the United States (Coulter, 2011). Indeed, sedentary lifestyles are a prime predictor of health problems among women overall, while regular exercise reduces risks from coronary heart disease, colon cancer and diabetes, and strongly correlates with reduced morbidity from chronic diseases (Rimer, McBride and Grump, 2001). As women age, physical activity is additionally linked to decreased risk of stroke, osteoporosis, depression and disability (Tannenbaum & Shatenstein, 2007). Beyond the purely physical aspects of women's health, evidence suggests that regular exercise improves women's psychosocial and functional statuses and leads to higher self-reports of quality of life (Rimer, McBride and Grump, 2001). Research consistently indicates, moreover; that exercise can elevate mood levels for several hours after an individual engages in it (Berger, et al., 2010).

Despite the benefits, however, 73% of adult women in the United States do not report regular participation in aerobic exercise (Coulter, 2011). Research suggests that women may not view physical exercise as important in lowering their risk for cardiovascular disease and may not feel able to engage in such activity (Parks, et al., 2011). Troublingly, minority women and those with lower levels of education are the most likely to be sedentary (Rimer, McBride and Grump, 2001), suggesting that exercise is one important facet of demographic health gaps.

There is something very powerful about the fact that such a low-tech and entirely non-invasive practice as aerobic exercise may hold the key to increasing women's health. As others have observed, "[m]any of the deadliest conditions for women are stopped not only by knowing more molecular medicine but knowing better how to help our patients to shed unhealthy habits and adopt healthy ones" (Rimer, McBride and Grump, 2001, quoting Fletcher, 1995).

Yet forging broader exercise practices is a multifaceted challenge. Resources, time, knowledge, body image, culture and community may all factor into whether and how a woman exercises (Berger, et al., 2010). In certain ways, the challenge of promoting increased exercise among women closely parallels the challenge of promoting weight loss. However, where weight loss is concerned, the scholarly literature is hardly reassuring, suggesting that "a person is more likely to recover from most forms of cancer than from obesity" (Cogan & Rothblum, 1992, p. 388, quoting Brownell, 1982).

In the context of promoting exercise, community health programs emerged as a highly attractive health intervention option. Since the 1970s, when landmark experimental studies were conducted in California and Finland, the medical community has become increasingly aware of the unique potential for community health interventions to promote shifts in risky health behaviors (Altman, 1995). It should be noted that the entire communities were targeted for change. This is different from the focus of the research presented here which targets a defined segment of the population which is based in a community setting. Unlike individual treatment options, community health interventions encourage changes across a targeted population within a specific

geographic area. Targeted community interventions have multilevel programming and community involvement. They provide support for ongoing awareness as well as opportunities for behavior change which is motivated. They also have a goal of reaching those who may not be motivated when the intervention begins. This is also slightly different from the intervention proposed here which focuses on a single intervention targeting a specific group within the population.

There are good reasons to embrace a notion of community when it comes to health practices. This is the arena in which people live their lives, share stories and information via social networks, form options and contemplate actions. In short, community health programs target health behaviors where they are rooted: in the everyday practices of communities, with their own particular norms, values and policies (Altman, 1995).

Exercise is a personal choice, but it is also a behavior that is closely interrelated with the social world and community options. Lack of facilities available for exercise can negatively influence the choice to exercise, as can perceptions of unsafe conditions out-of-doors (Anshel, 2006). Conversely, benefits from social interaction can positively influence exercise habits (Anshel, 2006). At a deeper level, Anderson and Cychosz (2004) hypothesize that role identities, the social face of the individual, mean a great deal when it comes to exercise. They suggest:

> As people perform rituals associated with their role-identities or act out some aspect of the role of exerciser, they may, through social interaction, have their identity as exerciser reinforced and validated. Simultaneously, this validation of the role-identity could increase the likelihood of exercise-related behaviors in the future. (Anderson & Cychosz, 2004, n. pag.)

Self-efficacy and weight loss have emerged as correlates over a number of studies (see, e.g., Dennis et al., 2001), and self-efficacy also has a significant social component. Self-efficacy may be briefly described as the confidence in one's own ability to effectively follow through on a targeted behavior (Dennis et al., 2001). In one study that specifically targeted exercise as a weight loss strategy for post-menopausal, obese women, researchers reported that women who demonstrated greater sense of self-efficacy lost more weight than the women who demonstrated lower self-efficacy, while women who made the switch from lower to higher levels of self-efficacy over the course of the study lost equivalent amounts to the first group (Dennis et al., 2001). Others have reported that an exercise regime may in fact promote self-efficacy, which in turn may enhance continued follow-through (Berger et al., 1995).

Even given the highly psychological nature of self-efficacy as an internal construct, self-efficacy has been linked in the weight loss literature with social networks and support (Dennis et al., 2001). In the classic formulation by Bandura, two of the major sources of support for self-efficacy have social components: modeling and social persuasion (Boyd &Vozikis, 1994, citing Bandura, 1982; Wood & Bandura, 1989). These may be operating within the intervention group for this study since it is based on a social network among spouses and their families. The idea that social support enhances self-efficacy accords with treatments of self-efficacy across a number of subject matter areas, including self-efficacy in troubled teens (Vaisman-Tzachor & Thames, 2010), self-efficacy among adult students (Lundberg, McIntire, &Creasman, 2008), and self-efficacy among entrepreneurs (Boyd &Vozikis, 1994). Moreover, a reciprocal, mutually reinforcing tendency has been noted, as Vaisman-Tzachor and Thames comment:

> There is ample support for the notion that perceived social support greatly increases personal efficacy and self-esteem. It is also widely accepted that personal efficacy increases self-esteem and that self-esteem also increases personal efficacy in a reciprocal fashion. Likewise, it is probably true that higher self-esteem and greater personal efficacy make the acquisition of social support more likely and more easily attainable. (n. pag.)

All of these factors bode well for a community-based format for education and intervention in promoting exercise. Within the context of a community program, information and suggested practices can be targeted to a community's specific opportunities and constraints. A group education format allows community members to share information and concerns. It also raises the potential for engaging the social role of individuals, so that they will seek positive reinforcement from the knowledge that other community members know of and approve of their exercise. Participants' increased sense of self-efficacy, in turn, may help them to seek out more relationships that enhance exercise activities and/or encourage others to participate. All of these are potentials of the community education model, which integrates interventions "into thecommunity infrastructure thereby enhancing sustainability via local competency, control and ownership" (Altman, 1995, p. 226).

Despite the promise of community-based health interventions for promoting exercise among women, little systematic research has been applied to the topic. Pazoki, Nabipour, Seyednezami, &Imami (2007) have shown that a community health lifestyle intervention aimed at increasing physical activity resulted in decreased blood pressure, a major risk factor for cardiovascular disease, and increased healthy heart related

knowledge in women (Pazoki, Nabipour, Seyednezami, &Imami, 2007); however, this is a standout in the literature. The only comparable research appears to be Tannenbaum and Shatenstein's (2007) study of enhancing exercise habits of among post-menopausal women in Canada through community health intervention.

A significant portion of the literature on exercise and women focuses on individual attitudinal determinants (e.g., Khanam & Costarelli, 2008; Annesi, 2007; Thomsson, 1999; Overdorf & Gill, 1994). While this research creates a rich set of psychological insights that may be used in further testing and employed in therapeutic or behavioral programs, it does not help to elucidate the social component of exercise; nor can it help to approach exercise patterns as a community issue, even though lack of exercise has a demonstrable community dimension. Even work that finds and analyzes the social components of exercise may foreclose on the logical consequence of those findings: that a social intervention may be particularly effective in promoting adaption of healthy exercise behaviors. For instance, in their study of obese women exposed to an exercise and educational module, Berger et al. (1995) note that social interactions may help to motivate and sustain positive exercise behaviors; however, they do not build on this insight to suggest the potential of a community-based approach, which could reflect and enhance existing patterns of social interaction.

Exercise and Cardiovascular Disease

Three of the major risk factors for heart disease are obesity, sedentary lifestyles and smoking. However, there is a problematic interrelationship among the three. Over the past four decades, smoking rates have declined dramatically (CDC, 2010, p. 12).

(Over the period of 1990-2009 alone, smoking rates among all Americans declined nearly ten percent, from 27.9% to 18%. [CDC, 2010, p. 232].) However, obesity rates have increased significantly over the past half century—from 44.8% in Americans over age 20 in the period 1960-62 47.7 to 67.7% in the period 2005-2008 (CDC, 2010, p. 263). Meanwhile, rates of physical activity have increased only slightly. For instance, the rates of men over age 18 who met the 2008 aerobic activity and muscle-strengthening guidelines increased from 19% to 22% over the decade 1999 to 2009 (CDC, 2010, p. 21). Rates for men aged 65 and over increased more slowly than this (CDC, 2010, p. 21). In 2009, just 12% of men 65 years and over met the guidelines (CDC, 2010, p. 21). Over the same period, meanwhile, female populations were consistently less likely to meet the guidelines. Rates for women aged 18 and over went from 12% to 16% over the same period (CDC, 2010, p. 21). A disappointing 9% of women aged 65 and older met the guidelines, as compared with 19% of women aged 18-44 (CDC, 2010, p. 21). These trends suggest that whatever benefits might be reaped from declines in smoking in the U.S. population is being counteracted to some degree by increases in obesity, which is in turn linked to both diet and sedentary lifestyle.

That said, there is important scholarship indicating that sedentary lifestyle does not simply "act through" other risk factors in contributing to mortality, but has an overall salutary effect. Blair et al. (1996) conducted an eight-year observational cohort study of CVD and other causes of death among over 25,000 men and over 7,000 women. All participants were given preventive medical screenings and participated in stress tests (Blair et al., 1996). Study results indicated that fitness has a significant risk preventive effect, regardless of other behaviors and risk factors. When cross-tabulated with other

risk factors, such as smoking, high blood pressure or elevated cholesterol levels, fitness produced an inverse gradient effect, indicating that fitness actually protects against the influence of these other factors (Blair et al., 1996). Yet more strikingly, the researchers found that "[f]it persons with any combination of smoking, elevated blood pressure, or elevated cholesterol level *had lower adjusted death rates than low-fit persons with none of these characteristics*" (Blair et al., 1996, n. pag., emphasis added). This finding led researchers to conclude that low fitness, in and of itself, is an important precursor of mortality, while even moderate fitness appears to produce a protective benefit (Blair et al., 1996).

Rimer, McBride and Grump (2001) cite similar evidence concerning synergistic effects of health behavior among, specifically, female populations. They note, first, that health promotive behaviors tend to affect multiple diseases at once. For instance, cessation of smoking reduces risk of cancer, heart disease and stroke, as well as complications from diabetes (Rimer, McBride & Grump, 2001). Similarly, an active lifestyle that incorporates aerobic exercise can reduce risk from breast and colon cancers and osteoporosis, as well as cardiovascular disease (Rimer, McBride, & Grump, 2001). Beyond the ability of one health promotive behavior to decrease risk across multiple diseases, the authors also note that health habits interact within the lives of women. For instance, according to several studies, smokers appear to be less likely to receive mammograms and engage in regular exercise (Rimer, McBride, & Grump, 2001, citing Orleans, Rimer, Salmon, & Kozlowski, 1990; Rimer et al., 1990; McBride, Curry, Taplin, Anderman, &Grothaus, 1993). In addition, smokers are more likely than nonsmokers to quit new exercise programs (Rimer, McBride, & Grump, 2001, citing

Dishman& Sallis, 1994). Meanwhile a sedentary lifestyle correlates with a number of other risk factors, including being overweight, and smoking (Rimer, McBride, & Grump, 2001, citing Bild et al., 1993; Blair, Powell et al., 1993). In short, "[n]either health behaviors nor their consequences exist in a vacuum" (Rimer, McBride, & Grump, 2001, p. 519).

Despite the benefits, however, and as noted in Chapter 1, over 70% of adult women in the U.S. do not report regular participation in aerobic exercise (Coulter, 2011). Research suggests that women may not view physical exercise as important in lowering their risk for cardiovascular disease and may not feel able to engage in such activity (Parks, et al., 2011). Minority women and those with lower levels of education are the most likely to be sedentary, a finding that is troubling, but that is also used in scholarship such as that by Rimer, McBride and Grump (2001) to help illustrate the interconnectedness of exercise with other demographic and environmental factors, as well as other risk correlates.

The finding, as of 1995, was that 29% of white women engaged in routine, aerobic exercise of the sort that would lower health risks, whereas African American women were "physically active at a health enhancing level, according to data from the 1992 Behavioral Risk Factor Surveillance System" (Rimer, McBride & Grump, 2001, p. 156, citing BRFS; CDC, 1995). Meanwhile, a number of demographic factors, including lower socioeconomic status and lower levels of education, are independently correlated with low levels of physical activity and may help to drive sedentary lifestyles among African American women. Indeed, just 17% of African American and white women who possessed less than a high school education engaged in regular levels of aerobic activity

Rimer, McBride & Grump, 2001, p. 156, citing BRFS; CDC, 1995). The rate for women possessing at a high school education is 24%; college graduates, 34% (Rimer, McBride & Grump, 2001, p. 156, citing BRFS; CDC, 1995).

There is no debate in the literature that regular, aerobic exercise—typically 30 minutes a day, is a key to reducing risk for cardiovascular disease. Moreover, there are clear and robust findings that exercise promotes a range of health attributes in both women and men, including social functioning. Where the literature becomes most interesting is where it notes the global effects of exercise, as in Blair et al. (1996), and where it shows how multifaceted the issue of exercise adoption can be, as in Rimer, McBride & Grump (2001). That said, actual approaches to weight loss do not do well in reflecting a multifaceted approach to regular exercise.

Interventions into Weight Loss and Exercise: Behavioral Approaches

The issue of exercise is heavily interconnected with issues of weight loss, both as a matter of physiological fact, and as a matter of scholarly approach. Therefore, the present literature review includes a review of approaches to weight loss. This is illuminating, because it shows the extent to which both weight loss and exercise have been conceived of as a behavioral issue at the individual level.

Within the weight loss literature, two approaches reign supreme: direct medical intervention via surgery or medication, and behavioralism. Medical interventions are generally not applicable to weight loss (although loss of weight through surgery may remove barriers to regular exercise, thus promoting it indirectly). However, the emphasis on a behavioral approach to weight loss is incredible instructive. The approach stems

from a good deal of research demonstrating a behavioral component to weight gain and obesity, some of which is epidemiological in nature. For instance, historical studies indicate that obesity rises in a population as car ownership and television viewing rise (Ogden, 2007). On the individual level, studies of physical activity indicate that, for instance, obese children move less when engaged in sports activities than non-obese children do, and obese adults tend to eat more fat than non-obese adults do (Ogden, 2007). However, while there is clearly a behavioral component at work in cases like these, there appears to be little understanding of causality. For instance, while the link between automobiles and less walking seems straightforward, it also seems reasonable to suspect that there may be other shifts at work in weight gain—e.g., how individuals relate to one another in the age of the car, how relatively isolated they might feel, whether the car not only decreases walking but engenders a shift in body perceptions, which in turn might affect overall physical activity. In brief, there is a fairly crude understanding of "behavioralism" at work even in scholarly approaches to weight loss. Because specific behaviors are involved with weight gain does not mean that behavioral approaches to weight loss will be effective.

Perhaps it is not surprising, then, that the behavioral weight loss programs (BWLPs) which dominate both practice and study have been shown repeatedly to be ineffective. One meta-analysis of weight loss studies of women from the 1980's showed that BWLPs simply had no discernible relationship to successful and sustained weight loss (Cogan & Rothblum, 1992). As authors of the meta-analysis noted, participants were "obese before treatment, still obese after treatment, and continued to be obese as long as they were followed up" (Cogan & Rothblum, 1992, p. 408).

The findings of Cogan and Rothblum (1992) are supported by studies of dieting, which can be seen as the behavioral approach at its most direct and unidimensional. (After all, as Carrier, Steinhardt and Bowman [1994] point out, the essence of dieting, or "restrained eating programs" is to teach individuals to restrict and monitor eating behaviors through the use of external "eating directives" such as use of scales, lists of good and bad foods, calorie counting and portion control [p. 522]). In 2007, researchers from the University of California, Los Angeles produced a meta-analysis of 31 studies of dieting indicated that diets were not only ineffective but generally led to increased weight gain (American Psychotherapy Association, 2007). The study included every research report that followed dieters for two to five years, allowing for a glimpse into how attempts to shift behaviors fare over time (American Psychotherapy Association, 2007). The meta analysis revealed that most dieters would simply have been better off not going on a diet at all (American Psychotherapy Association, 2007). Indeed, participation in weight-loss programs was actually shown to be a consistent predictor of *weight gain* (American Psychotherapy Association, 2007). The only hopeful note in the results—one that is particularly useful for the present study—was that exercise appears to be a key factor to sustained weight loss. Those who exercised showed the most consistent and the longest-lasting losses in weight (American Psychotherapy Association, 2007).

Notably, there is almost no recent scholarly literature on the application of sustained psychotherapy to weight loss. It does appear, however, that issues such as abuse sustained in childhood or adulthood can lead to disordered eating and unhealthy forms of weight gain or weight loss (Ferrier, Martens, & Cimini, 2005). Sexual abuse, in

particular, may lead to disordered eating (Ferrier, Martens & Cimini, 2005). Moreover, obesity is associated with "high levels of depression, suicidal ideation, anxiety, stress, low levels of self-esteem, and childhood teasing" (Berger, Darby, Owen, & Carels, 2010, n. pag.). This makes it seem possible to hypothesize a sort of circuit between weight gain, outside stress (e.g., bullying), and increased weight gain—a sort of continuous feedback loop among obesity, traumatic stressors, and poor dietary/exercise habits. Yet a study of various databases reveals very little recent work that attempts to consider multiple psychological dimensions and/or socio-psychological factors in approaching weight loss. This may well indicate the conviction that, despite the manifest failure of BWLPs, behavioral approaches are somehow still the most appropriate. The sense emerges that behavioral approaches dominate because they have dominated—not because they show good results.

There are, nevertheless, individual studies that take a more nuanced approach to dieting and exercise. For instance, Carrier, Steinhardt and Bowman (1994) conducted a three year study of 79 participants through one workplace who took part in a program that was specifically designed to focus on attitudes, feelings and perceptions of food, and to enhancing enjoyment of eating, rather than a bluntly behaviorist approach (Carrier, Steinhardt & Bowman, 1994). Their overall goal was to improve self-acceptance and self-esteem and thereby circumvent negative media stereotypes and unpleasant social feedback that can cause overweight individual to retreat further into unhealthy eating habits and/or unhealthy cycles of dieting and weight gain (Carrier, Steinhardt & Bowman, 1994). Notably, Carrier, Steinhardt and Bowman (1994) also approached exercise and eating separately, in order to maintain exercise as a field of

enjoyment and competence separate from negative body images (Carrier, Steinhardt & Bowman, 1994). The program lasted 6 months (Carrier, Steinhardt & Bowman, 1994). Assessment at 3 months, 6 months, and at 3 years suggested that program participants were significantly able to improve their relationship to healthy eating through a program that took into account not only desired behaviors and prompts for those behaviors, but the larger psycho-social context in which eating and exercise take place (Carrier, Steinhardt & Bowman, 1994). Unfortunately, the researchers did not appear to use quantitative health measures in the study, which could have yielded a wealth of insight into the physiological outcomes of such an integrative approach.

Another study that stands out is Berger, Darby, Owen, & Carels' (2010) work on walking as an activity for sedentary, post-menopausal women. The goal in this study was not to study weight loss as a lone variable, though the walking program that was studied was in fact a behavioral weight loss program (BWLP). Instead, the goal was a broader one that comprised a more complex understanding of the underpinnings of behavior.

Berger et al. (2010) began by noting that while exercise is widely recognized as an important component to weight loss, many obese people have difficulty beginning or maintaining an exercise program. There is a good deal of research indicating that exercise can elevate mood levels for several hours after an individual engages in it (Berger, et al., 2010). Nevertheless, until Berger, et al. (2010) set out to study the relationships among exercise, mood, and obesity, little to no research had been conducted in this area. This may well be because emphasis has been on a fairly 'flat' model of behavioral dynamics. By contrast, Berger, et al. (2010) hypothesized that

psychological mechanisms such as self-efficacy, improved self-image, increased social interactions or sheer feelings of physical enjoyment experienced during the right type of exercise might lead obese participants to sustain an exercise program, thereby contributing to weight loss.

In order to test their hypotheses, Berger, et al. (2010) recruited obese, post-menopausal women who had reported having 20 minutes of exercise or less per week. They introduced a moderate program of treadmill walking for these women, accompanied by educational modules over the course of six months and studied their responses and experiences throughout the period (Berger, et al., 2010). The researchers found that the women, far from disliking the exercise, enjoyed mood enhancement effects from the first sessions, and that these mood enhancement effects continued over the six month period unabated (Berger, et al, 2010). Moreover, they concluded that the enhanced mood effects would facilitate follow-through on continued exercise and continued weight loss (Berger, et al., 2010).

What Berger et al. (2010) help to document is the fact that integrative approaches that address the whole life world of the participant may be the key to diet. Unfortunately, research on women and exercise appears to reflect some of the narrow thinking that is implicit in the diet research. For instance, as Rimer, McBride and Grump (2001) point out, very little research has been conducted into the real-world barriers that contribute to women's lack of participation in exercise. Nor is there much research that helps to elucidate the problematic role that media plays in twinning unachievable body images with exercise, thereby causing discouragement (Carrier, Steinhardt & Bowman, 1994). Yet the research that does exist shows that socio-psychological as well as

environmental factors play a key role in women's participation in exercise (Rimer, McBride & Grump, 2001).

> Psychological dispositions such as social anxiety, self-consciousness, low will power, low self- efficacy, and perceived lack of coordination and fitness level can inhibit women's participation in physical activities, as can social factors such as a lack of companionship or a lack of role models. (Rimer, McBride & Grump, 2001, p. 519, citing Benedict, 1996; Dishman&Sallis, 1994; Dubbert, 1995; Ebrahim& Rowland, 1996)

Beyond Behavioral Approaches

There are two important trends in moving beyond bluntly behavioral approaches to exercise (Anshel, 2006). The first can be described as health promotion. The second can be described as community-based health intervention. These concepts are highly interrelated conceptually (Ogden, 2007). Each will be described in turn, and their conceptual connections explored. This is followed by a review of the literature that does exist suggesting that community-based approaches can be a key in fostering increased exercise behavior among women.

Chapter 3: Research Methods

Introduction

The purpose of this study was to evaluate a church-based health promotion program aimed at increasing aerobic exercise and cardiovascular health in an enrolled population. It compared the effectiveness of written information versus an educational program. This project seeks to advance knowledge concerning the most effective ways to help women incorporate regular, aerobic exercise into their daily lives as a means of promoting cardiovascular health.

This study is a program evaluation of a health promotion program fielded in a community setting. It is directed at women between the ages of 25 and 65 in the Miami Beach area who exercise on or near the Miami Beach Boardwalk. It evaluated the extent to which the exercise intervention worked in a real-life setting as opposed to a controlled laboratory. While no strategy stands out as singularly effective in promoting exercise, Chapters 1 and 2 of this dissertation have built a case for the potential of community health programs to leverage the social dimensions of exercise in order to encourage increased participation. These social dimensions range from the concrete and infrastructural (e.g., lack of facilities and unsafe conditions outdoors can negatively affect exercise behaviors (Anshel, 2006]), to the psychosocial (e.g., Anderson and Cychosz [2004] hypothesize that role identities exert a great deal of influence on decisions to initiate and maintain exercise regimes).

Research Design

This study used primary data which was collected as part of a church-based community program called NEW START. The data werereevaluated through a secondary data analysis and a search was done for additional relevant conclusions. This program is used at both the Wildwood Health Institute and Weimar Institute. It is used at these facilities as a method of encouraging women to increase their levels of exercise and cardiovascular health. The data were collected as part of a study involving both a control and experimental group. The control group was provided with written materials containing substantially the same information conveyed in the community program but did not take part in the community program itself. Measurements were collected through quantitative pre-test, post-test design, used in tandem with a brief questionnaire, follow-up exercise logs, exercise-related self-efficacy inventory, blood pressure, blood glucose, body weight, and blood cholesterol measurements at enrollment and at 3 months after the community program.In addition to eliciting basic demographic data, questionnaire items charted the social components of exercise and whether and how these are reconfigured in response to the community program (e.g., do women receive praise from community members for enhanced exercise regimes?; do they seek out exercise partners; have they shared their knowledge concerning exercise with others?). Data from the two groups were compared in order to test a series of hypotheses concerning the effect of the community program on women's exercise behaviors. The IRB approval number for this research is 01-28-15-0080035.

The background to the hypotheses is considered in more detail in Chapter 1. Here the 10 research expectations are formulated as 10 null hypotheses, all related to

measurement of differences between the experimental group (participates in the community health program) and control group (does not participate in the community health program but receives comparable information via written materials) after the community health program and follow-up were completed. The independent variable is the way in which information has been provided. This can be either written information or an educational program. The dependent variables are awareness of the links between cardiovascular health and aerobic exercise,knowledge of specific recommendations and guidelines for exercise to support cardiovascular health,awareness of exercise possibilities within their own community,levels of self-efficacy in exercise as measured by the New General Self-Efficacy Scale (NGSE) (Chen et al., 2001) and a modified NGSE tailored to measure exercise self-efficacy, likelihood of discussing exercise with friends, neighbors or relatives, and/or taking part in exercise with them,likelihood of participating in regular aerobic exercise, blood pressure, blood glucose, body weight, and blood cholesterol, from the date of enrollment to the 3 month measurement.

Null hypothesis #1: Members of the experimental group at post-treatment will not demonstrate significantly greater awareness of the links between cardiovascular health and aerobic exercise than will members of the control group as measured by a knowledge assessment questionnaire.

Null hypothesis#2: Members of the experimental group at post-treatment will not demonstrate significantly greater knowledge of specific recommendations and guidelines for exercise to support cardiovascular health than will members of the control group as measured by a knowledge assessment questionnaire.

Null hypothesis#3: Members of the experimental group at post-treatment will not demonstrate significantly greater awareness of exercise possibilities within their own community than will members of the control groupas measured by a knowledge assessment questionnaire.

Null hypothesis#4: Members of the experimental group at post-treatment will not demonstrate significantly higher levels of self-efficacy in exercise than will members of the control groupas measured by the New General Self-Efficacy Scale (NGSE) (Chen et al., 2001) and a modified NGSE tailored to measure exercise self-efficacy.

Null hypothesis#5: Members of the experimental group at post-treatment will not demonstrate significantly increased likelihood of discussing (and/ or participating in) exercise with friends, neighbors or relatives, than will members of the control group as measured by exercise questionnaire.

Null hypothesis#6: Members of the experimental group at post-treatment will not demonstrate significantly greater likelihood of participating in regular, aerobic exercise than will members of the control group as measured by log sheet.

Null hypothesis#7: Members of the experimental group at post-treatment will not demonstrate a decrease in blood pressure from the date of enrollment to the 3-month measurement that are significant, as compared to changes in blood pressure among members of the control group as measured by sphygmomanometer and stethoscope.

Null hypothesis #8: Members of the experimental group at post-treatment will not demonstrate a decrease in blood glucose from the date of enrollment to the 3 month

measurement that are significant as compared to changes in blood glucose among the members of the control group as measured by meter, lancet and specific test strip.

Null hypothesis #9: Members of the experimental group at post-treatment will not demonstrate a decrease in body weight from the date of enrollment to the 3 month measurement that are significant as compared to changes in body weight among members of the control group as measured by standardized scale from a medical clinic.

Null hypothesis #10: Members of the experimental group at post-treatment will not demonstrate a decrease in LDL-cholesterol from the date of enrollment to the 3 month measurement that are significant as compared to changes in LDL-cholesterol among members of the control group as measured by meter, lancet, and specific test strip.

Beyond simply contributingsuch a study, the research was meant to achieve two important advances. First, concerns for construct validity (Trochim, 2006) have led to a design where both experimental and control groups receive the same basic information concerning the link between regular aerobic exercise and reduced risk. The literature suggests that something more than provision of information affects behavioral outcomes via community health interventions. In the community health intervention model, social interactions, social identities, community based norms, community-based infrastructural incentives or barriers, and a community's sense of ownership over an issue all may play a role in how that issue is understood and addressed by individuals (Merzel & D'Afflitti, 2003). Therefore, the study attempted to limit the effect that mere provision of information may have on study outcomes. Control group participants received written

materials at enrollment containing information comparable to the information conveyed at the community program.

Efforts were made to ensure that the written material was comprehensive, easy to understand, and pleasantly formatted to encourage reading. Thus, if the null hypotheses are rejected at statistically significant levels, it will be possible to eliminate mere provision of information as a variable influencing the results. This is important not only for construct validity, but because policy makers must decide carefully where to invest public health dollars. If community health programming produces no statistically significant effect beyond what the distribution of informational brochures would produce, then the case for higher-cost community health interventions becomes less persuasive. If no statistical difference is found, it could be that the information provided did not improve the knowledge of the community. Since the data has already been collected, there is no way to go back and have a control group which would ensure that the information provided was useful. Therefore, this becomes a limitation of this study.

Second, a key concept in community-based interventions is that social interaction can multiply the impact of community programming (Merzel & D'Afflitti, 2003). Ideally there should be an observable "ripple effect" from the experimental group outwards, as participants share information and involve others in their exercise. This is one of the few studies to attempt to document the differences in social interaction produced by community programming versus provision of information. (As noted, thequestionnaireasked both sets of participants to rank items such as: praise from community members for enhanced exercise regimes, attempts to find exercise

partners,and sharing of information with others in the community. In that sense, the study may lay the foundation for more ambitious research at a later date.

Participants and Recruitment

This church based community program consisted of two groups of forty two healthy women between the ages of 25 and 65. Many of the women were sedentary at baseline. Most of the participants in both groups were women whose friends, spouses, and families supported exercise and had multiple exercise role models. The women were randomly chosen to be in the written information only or educational program.

The demographic is also useful because it includes both younger and older subjects. Older women may be more likely to be sedentary (Dennis et al., 2001). Furthermore, women over age 50 may be more likely than younger women to have available personal time, since any children in the household are likely to be older as well. Of course, this assumption will not hold true for all individuals or all communities, particularly since some populations are more likely than others to share childrearing in a multi-generational household. Other inclusion criteria were residence within the specified geographic area and, of course, being female. Exclusion criteria for those who fielded the study included being male, being greater than 65 years of age, lack of fluency or command of written and spoken English, or presence of certain medical factors. These factors included having any of the following: heart disease, hospitalization within past 6-months, lung disease or asthma, liver or kidney disease, arthritis; diabetes, AIDS, atherosclerosis (hardening of the arteries), or any other disease, heart defect, or

insufficiency that would prevent the individual from engaging in normal, low-impact, aerobic exercise.

The area from which participants were recruited comprised a recognized community of those who lived near the Miami Boardwalk, so that community-specific information could be provided in the written materials and programming. This allowed for matching of the experimental and control group populations in terms of age, education, race, and income. Without a matched control group such as this, it would be difficult to ascertain whether the educational program truly had an impact upon the results, or whether the differences between pretest and posttest scores were due to a confounding variable such as education (Jackson, 2008).

Sample Size

A post-hoc power analysis was done to determine if an appropriate sample size was used. The first step in a power analysis is to determine the minimum desired effect size. Cohen (1992) describes effect size as the difference between the null hypothesis and the alternate hypothesis tested in the experiment, and he uses the interval rankings "small," "medium," and "large" to categorize effect size. A medium effect size is described as one that is readily observable, while a small effect size requires more careful discrimination to discern. The large and small effect sizes are equidistant from the medium category, although in opposing directions (Cohen, 1992).

The present study involves 10null hypotheses. Effect size and sample size are in inverse proportion (Cohen, 1992). Therefore, in order to calculate a conservative (i.e.,

larger rather than smaller) sample size, an analysis was made of the hypothesis likely to yield the smallest effect. A medium effect level is desired approximated at .3.

Sample size is a function of effect size and statistical reliability. Step two, therefore, involved determining the desired level of statistical reliability. Statistical reliability may, in turn, be broken down into significance criterion (the probability of a Type I error, or rejecting the null hypothesis when it is true), and power (the probability of a Type II error, or accepting the null hypothesis although it is false at the minimum effect size level). Cohen (1992) recommended that the significance criterion be set at 0.05 and the power set at 0.80. The latter of these values allows for a four-fold possible occurrence of a Type II error, or false negative, over that of a Type I error, or false positive. Cohen (1992) explained that, while this number is somewhat arbitrary, it stresses the importance of avoiding false positives.

In order to calculate the powerof the study, the researcher used the GPowerMuirhead, 2009 program. Based upon an ANCOVA of the intervention and control groups, an effect size of 0.3, a significance criterion of 0.05, and a power of 0.80, the recommended sample size is 64, or 32 individuals per group. Since the study included 42 participants, including 42 controls, it is deemed to have had sufficient statistical power.

Instruments and Administration of Instruments

The instruments used in this study included a brief demographics questionnaire administered at pre-enrollment, an assessment of knowledge concerning the links between exercise and cardiovascular fitness (pretest and posttest), a

questionnaireconcerning community links and exercise behaviors (pretest and posttest), an exercise-related self-efficacy assessment (pretest and posttest), and a log concerning exercise habits that participants were asked to complete. Additionally, blood pressure, body weight, blood glucose and blood cholesterol of all participants was measured at enrollment and then reported (via doctor's visit) 3 months after the administration of the community health program. The present section discusses each of these assessments in turn.

Demographics Questionnaire

The demographics questionnaire was administered at pre-enrollment. First the individual was provided a written list of exclusion criteria and asked whether she belongs to any of the categories on the list, without identifying any specific health condition. A positive response will warrant exclusion from the study and the individual was thanked for her time. For those who are not excluded, the printed demographic questionnaire will solicit the individual's home address, telephone number and email address (if applicable), age, race and ethnicity (with instructions to select all categories that apply), highest educational level attained, and household income (split into ranges).

Responses to the demographic items will be used to preliminarily sort interested individuals into experimental and control groups. Responses were coded as they were received and, when enrollment reached capacity, a series of chi-square tests were performed to ensure that—despite assignment based on address—the experimental group and control group exhibit statistically similar levels of variance along demographic variables. Questions regarding educational attainment and language

proficiency were used to ensure that the reading level of the materials presented matches the reading level of the participants.

Knowledge Assessment

The knowledge assessment was a central study component. The study seeks to ascertain whether there is an advantage to a community health program over provision of written materials in promoting awareness of the role that exercise plays in promoting cardiovascular health. The knowledge assessment was the key tool for comparison of the control and experimental groups in this regard.

Both the written materials provided to control group participants and the community health program contained specific information regarding the definitions of cardiovascular disease and the risk of cardiovascular disease among American women. The information provided to the participants was prepared by medical experts such as physicians specializing in cardiovascular health. This information has been approved by agencies such as the American Medical Association. Information was also provided regarding the evolution of risk over the life course, gender and racial disparities in cardiovascular risk of death from a cardiovascular event, the role of exercise in limiting risk from cardiovascular disease, and the importance of seeking advice from a care provider before beginning a new exercise regime. There were specific recommendations and guidelines for exercise to promote cardiovascular health; the documented range of benefits from regular exercise outside of cardiovascular health (including benefits for diabetes management, reduction of cancer risk, and improved psychosocial functioning, as well as exercise opportunities within the community.

There was a major difference in how the control and experimental group participants received this information. Control group participants received a packet of information that they chose to use as they wished (read, throw away, share). Experimental group participants received materials that were substantially the same as those provided to the control group.However, the materials were incorporated into the presentation and actively discussed. The program included visual and tactile presentations, opportunities for discussion and sharing of concerns, and tailored responses to questions. When possible, well-respected community insider-health care providers took part in the program, and the program was held at a community facility.

Questionnaire Concerning Community Links and Exercise Behaviors

The questionnaire concerning community links and exercise behaviors was used to assess whether respondents preferred exercising in private or in public. It also measured the extent to which participants included others in their exercise behaviors, shared knowledge of exercise and cardiovascular risk, took advantage of community facilities for exercise, and experienced positive or negative feedback from family and community when they engaged in exercise. Sample questions include:

1. *When I engage in exercise I typically receive*
    a. Strong positive feedback from family members
    b. Mild positive feedback from family members
    c. Mild negative feedback from family members
    d. Strong negative feedback from family members

e. No feedback from family members.

2. *When I engage in exercise I typically receive*

   a. Strong positive feedback from neighbors, friends, or other members of the community

   b. Mild positive feedback from neighbors, friends, or other members of the community

   c. Mild negative feedback from neighbors, friends, or other members of the community

   d. Strong negative feedback from neighbors, friends, or other members of the community

   e. No feedback from neighbors, friends, or other members of the community

This brief questionnairewas administered once at enrollment and again at three months after the date of the community health program. Results will be analyzed to determine if there is any change over that period in the levels at which participants seek and receive feedback, involve others, teach others, or take advantage of community facilities for exercise. Changes between control and experimental groups will be compared. It should be noted that a limitation of this approach is that participants who were sedentary when the study began would have little information on which to base their pretest answers. In these cases, an increase in the frequency of comments may reflect increased activity as opposed to meaning with regard to the ripple effect.

Assessment of Exercise-Related Self-Efficacy

Various self-efficacy scales exist. One of the most often used has been the Scherer General Self-Efficacy Scale (SGSES) developed in the early 1980's by Sherer et al. (Imam, 2007). According to Imam (2007), the SGSES was initially developed for use in clinical settings and personality research, although it also came to be widely used in organizational settings (p. 3). In 2001, Chen, Gully, & Eden introduced a variation of the scale, the New General Self-Efficacy Scale (NGSE), which draws on the SGSES but refines the language and condenses overlapping items, reducing the overall number of items from 17 to 8 (Imam, 2007; Chen, Gully, & Eden, 2001). Because both scales have research confirming strong construct validity and reliability, the more compressed NGSE is drawn on here. "Although shorter than the SGSE scale, the NGSE scale demonstrated high reliability [and] predicted specific self-efficacy (SSE) for a variety of tasks in various contexts . . ." (Chen, Gully & Eden, 2001, p. 62).

Table 1 Reliability and validity of the SGSE and NGSE

Variable	*Mean*	SD	*1*	*2*	*3*	*4*	*5*	*6*
1. NGSE (T1)	4.14	0.48	(.85)					
2. SGSE (T1)	4.06	0.46	.78	(.88)				
3. Leadership SSE (T1)	4.15	0.34	.68	.68	(.92)			
4. NGSE (T2)	4.16	0.41	.86	.77	.70	(.86)		
5. SGSE (T2)	4.08	0.48	.73	.90	.68	.75	(.91)	
6. Leadership SSE (T2)	4.14	0.34	.73	.69	.90	.75	.70	(.94)

Note. $N = 42$ to 48 for the correlations. Reliability coefficients (alpha) are on the diagonal. NGSE = New General Self-Efficacy Scale, SGSE = Sherer et al. (1982) General Self-Efficacy Scale, SSE = specific self-efficacy, T1 = Time 1, T2 = Time 2. All correlations are significant ($p < .01$).

From (Chen, Gully & Eden, 2001)

Like the SGSES (Imam, 2007; Chen, Gully, & Eden, 2001), responses to the

NGSE are arrayed along a 5-point Likert scale, from strongly agree to strongly disagree. Items include:

1. I will be able to achieve most of the goals that I have set for myself.
2. When facing difficult tasks, I am certain that I will accomplish them.
3. In general, I think that I can obtain outcomes that are important to me.
4. I believe I can succeed at most any endeavor to which I set my mind.
5. I will be able to successfully overcome many challenges.
6. I am confident that I can perform effectively on many different tasks.
7. Compared to other people, I can do most tasks very well.
8. Even when things are tough, I can perform quite well.

For the study, these items were modified in simple ways to create an exercise-related self-efficacy scale (ERSE). For instance, Item 1 was modified to read: "1. I will be able to achieve most of the exercise goals that I have set for myself." The tailoring was important because the study did not seek to measure the community health program's effect on general self-efficacy. Nor did it seek to investigate the relationship between general self-efficacy and exercise behavior, as in Faan, et al. (2001). Rather, the study sought more limited information on how the program might affect participants' sense of self-efficacy as related specifically to exercise. This instrument has yet to be validated.

It would have been ideal to pretest the modified NGSE scale in order to determine reliability. Indeed, as research into the relationships between self-efficacy and exercise behaviors becomes deeper, this would be a useful undertaking. For the study, the

modified NGSE was assumed to be a reliable instrument for the limited purposes of the study. The inherent self-reporting problems that attend all self-reported self-efficacy instruments is presumed to have existed.

The ERSE scale was administered to all participants upon enrollment. At the three month mark,following administration of the CHP, participants will be asked to re-take the ERSE and return it together with other posttest materials in the self-addressed prepaid envelope provided.

Log Sheet

Participants were provided with an easy-to-read daily log that enabled them to quickly record each daily exercise activity that lasted more than 10 minutes and was perceived to raise their heart rate. Experimental group participants were given logs at the close of the community health program and asked to begin recording on it the following day. Control group participants were provided with logs upon enrollment and asked to begin filling them out as soon as they reviewed the informational materials. The day after the Community Health Program, control group participants were contacted to prompt them to begin filling out the log if they have not started already, regardless of whether or not they had reviewed the informational materials.

Participants were asked to post the log in a prominent place in their home (e.g., on the refrigerator), along with a pen, for ease of recording. The logs were designed to look attractive and be easy to use. Dates were pre-printed so there was less for participants to fill out. There were several spaces on each date to record exercise, since participants may choose to exercise in chunks throughout the day. For each entry, the

individual was asked to circle the approximate duration of exercise (10-15 minutes, 15-30 minutes; 30-45 minutes; >45 minutes). Notations at the top of the page reminded them of the importance of exercise for cardiovascular health and prompted them to record only exercise activities of 10 minutes or greater duration that "cause your heart to beat faster and you to breathe faster." This was done so that participants did not have to monitor their heart rates before and after every exercise activity. Bold notations on each pagealso reminded participants to consult their health care providers before beginning a strenuousexercise regime and to seek medical attention if any of the following occurred:

- Pain or discomfort in the chest, neck, jaw or arms during physical activity
- Dizziness or loss of consciousness
- Shortness of breath with *mild* exertion or at rest, or when lying down or going to bed
- Ankle swelling, especially at night
- A heart murmur or a rapid or pronounced heartbeat
- Muscle pain when walking upstairs or up a hill that *goes away when at rest*

(Adapted from Mayo Clinic Staff, 2010, n. pag.).

Blood Pressure Measurement

Blood pressure was measured at enrollment by the churches medical team. Blood Pressure was measured using sphygmomanometer and stethoscope instrument. The unit of measurement used to measure blood pressure was (mmHg) millimeter of mercury. Participants were asked to record a blood pressure reading at three months after the

CHP. They were advised on how to receive an easy, free blood pressure reading in their area (i.e., through a map of The Church medical team clinic/hospital locations).

Body Weight Measurement

Weightwas measured at enrollmentby the churches medical team.Body Weight was measured using standardized scaleinstrument from a medical clinic. The unit of measurement used to measure body weight was (lbs) pounds. Participants were asked to record a weight reading at three months after the CHP. They were advised on how to receive an easy, free weight reading in their area(i.e., through a map of The Church medical team clinic/hospital locations).

Blood Glucose Measurement

Blood glucosewas measured at enrollment by the churches medical team. Blood glucose was measured using meter, lancet and specific test strip instrument. The unit of measurement used was (mg/dl) milligrams per deciliter. Participants were asked to record a blood glucose reading at three months after the CHP. They were advised on how to receive an easy, free blood glucose reading in their area (i.e., through a map of The Church medical team clinic/hospital locations).

Blood Cholesterol Measurement

Blood cholesterol was measured at enrollment the churches medical team. Blood Cholesterol was measured using meter, lancet, specific test strip instrument. The unit of measurement used was (mg/dl) milligrams per deciliter. Participants were asked to

record a blood cholesterol reading at three months after the CHP. They were advised on how to receive an easy, free blood cholesterol reading in their area (i.e., through a map of The Church medical team clinic/hospital locations).

Statistical Analysis

The statistical analysis to be used for this study is a multivariate analysis of variance (MANOVA). This is a statistical procedure capable of comparing the means of two or more groups. Its use as a multivariate statistic allows for there to be multiple dependent variables. In the case of this study there is a single independent variable which is participation in the community health program. There are 10 dependent variables consisting of awareness of the links between exercise and cardiovascular health, recommendations and guidelines for exercise, exercise possibilities in the community, self-efficacy, discussing exercise, exercise frequency, blood pressure,blood glucose, body weight, and blood cholesterol. The use of multiple t-tests is not acceptable as this would increase the risk of committing a type I error.

Ethical Considerations

The study involved the churches medical intervention. One potential physical risk: a study participant may, in response to the information they receive on exercise and heart disease, undertake an overly strenuous exercise regime and suffer an adverse medical event. The risk is not a major one. The Mayo Clinic advises that “moderate physical activity, such as brisk walking, is safe for most people” (Mayo Clinic Staff, 2010, n. pag.). Consultation with a doctor before undertaking a new exercise program is advised

for patients who have heart disease; asthma or lung disease; diabetes; liver or kidney disease; or arthritis (Mayo Clinic Staff, 2010). However, the American College of Sports Medicine is somewhat more cautious, suggesting that a woman over the age of 55 should consult a doctor before beginning a new exercise regime if she:

- Has a family history of heart disease before age 55;
- Smokes or quit smoking within the past six months;
- Has been sedentary for three months or longer;
- Is overweight or obese;
- Has high blood pressure;
- Has high cholesterol; and/or
- Has impaired glucose tolerance (prediabetes).

(Adapted from Mayo Clinic Staff, 2010, n. pag.).

Ideally, a study such as the one used here for primary data would have been run through a clinic. However church doctors, registered nurses and medical associates wereable to clear individuals for new, moderate exercise regimes as part of their enrollment. Without a built-in mechanism for medical guidance, consultation with a doctor could create a barrier or mental excuse to avoid exercise. The informational materials and/or community health program offered to the control group and to participants full details ofthe need for medical consultation and the types of risk factors that make consultation particularly helpful. Theyalso described moderate exercise routines and the benefits of building up endurance over time. Finally, the materials/CHP and the log sheet presented warning signs that medical attention is needed, as described above under “Log Sheet.”

In order to enroll in the study, participants were required to review and sign two copies of an informed consent form. This form detailed any potential risks and benefits from participation; defined confidentiality and described confidentiality procedures;explained that participantscould withdraw from the study for any reason at any time over the course of the research; andprovided the researcher contact information. The researcher retained one signed copy, and the other was given to the participant.

Only the researcher knew the participants' names and identifying information. As participants were enrolled, their names were linked with a number, and all data collection from that point on used the numerical identifiers. The researcher maintained a coded list of names as a password-protected Excel file. The researcher also stored a hard copy of the coded list in a locked file cabinet or similar secure location, along with the consent forms, original copies of pretests and posttests, and any materials that may have participants' names. When conveying findings from the study, the researcher presented data in the aggregate, so that no participant's responses were identifiable. The confidentiality of the study participants is secure as their names are no longer associated with the data.

Summary

This study presents a unique opportunity to review, within an experimental framework, the capacity of a community health program to promote exercise among women between the ages of 25 and 65. This is one of the first studies to attempt to isolate and study the effect of participation in a community health program,

separatefrom the mere provision of information. It is also one of the first studies to attempt to document the community "ripple effects" of participation in a CHP. The foregoing chapter describes how the experimental design was developed to address these unique research goals. It also describes the rationale for using a primary data analysis. Additionally, this chapter describes, step by step, the development of inclusion and exclusion criteria; the recruitment process; the determination of sample size; the instruments that were administered, including the CHP; data analysis strategies; and ethical safeguards and considerations. The following chapter presents findings of the study and threats to validity.

Chapter 4: Results

Chapter Introduction

This chapter presents the results of the data analysis. The MANOVA was used to determine if there was a statistically significant difference in the scores of the treatment versus control group (Harris, 2014). The three test statistics used indicated that they were significant at the P <0. 05 level. There was a single independent variable that was participation in the community health program. Subjects either participated in the program or were in the control group. There were 10 dependent variables. The three test statistics used were Pillai trace, Wilk's Lambda, and Hotelling trace (Muirhead, 2009).

Each of the 10 research questions had a hypothesis and null hypothesis (Grimm & Yarnold, 2000). Each question was also associated with one of the 10 dependent variables used in the MANOVA. The dependent variables included awareness of the links between exercise and cardiovascular health, knowledge of specific guidelines and recommendations for exercise supporting cardiovascular health, and knowledge of exercise possibilities in the community. Additional dependent variables included in the MANOVA were self-efficacy, discussing exercise, likelihood of exercising, blood pressure, blood glucose, body weight, and blood cholesterol. The findings of the MANOVA and examinations of the data are discussed in relation to the 10 research questions and hypotheses (Muirhead, 2009).

Table 2 Average Values

	H1 Links	H2 Knowledge	H3 Possibilities	H4 Self-efficacy	H5 Discussing	H6 Exercising	H7 Blood pressure	H8 Glucose	H9 Weight	H10 Cholesterol
Experimental Group Mean	157	209	111	135	73	66	72	103	165	98
Control Group Mean	140	196	104	126	61	52	76	108	172	101

Table 3-Correlations between the Dependent Variables

	H1 Links	*H2 Knowledge*	*H3 Possibilities*	*H4 Self-efficacy*	*H5 Discussing*	*H6 Exercising*
H1 Links	1					
H2 Knowledge	0.1898	1.0000				
H3 Possibilities	0.2706	0.2050	1.0000			
H4 Self-efficacy	0.2797	0.1624	0.1381	1.0000		
H5 Discussing	-0.1252	-0.1162	0.0440	-0.0018	1.0000	
H6 Exercising	0.0774	-0.0139	0.1163	0.0120	-0.1284	1.0000

ANOVAs for each Dependent Variables
(C indicates the control group)

Table 3 Links (Hypothesis 1)

Anova Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
H1 Links	40	6283	157.075	253.6096154
H1 Links C	40	5610	140.25	113.3717949

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	5661.612	1	5661.612	30.85503702	3.71585E-07	3.963472051
Within Groups	14312.28	78	183.4907			
Total	19973.89	79				

Table 4 Knowledge (Hypothesis 2)

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
H2 Knowledge	40	8362	209.05	340.6641
H2 Knowledge C	40	7833	195.825	953.0712

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	3498.012	1	3498.012	5.407617	0.02265	3.963472051
Within Groups	50455.68	78	646.8676			
Total	53953.69	79				

Table 5 Possibilities (Hypothesis 3)

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
H3 Possibilities	40	4439	110.975	58.07628
H3 Possibilities C	40	4142	103.55	100.5103

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	1102.612	1	1102.612	13.9055	0.000363	3.963472051
Within Groups	6184.875	78	79.29327			
Total	7287.487	79				

Table 6 Self-efficacy (Hypothesis 4)

Anova: Single
Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
H4 Self-efficacy	40	5408	135.2	73.90769231
H4 Self-efficacy C	40	5027	125.675	284.225

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	1814.513	1	1814.513	10.13318549	0.002092	3.963472051
Within Groups	13967.18	78	179.0663			
Total	15781.69	79				

Table 7 Discussing (Hypothesis 5)

Anova: Single
Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
H5 Discussing	40	2928.442	73.21106	353.9043
H5 Discussing C	40	2427.965	60.69913	289.8275

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	3130.966	1	3130.966	9.727548	0.002543	3.963472
Within Groups	25105.54	78	321.8659			
Total	28236.5	79				

Table 8 Exercising (Hypothesis 6)

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
H6 Exercising	40	2629.159	65.72897	444.3815
H6 Exercising C	40	2050.587	51.26466	318.2179

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	4184.324	1	4184.324	10.97384	0.001402	3.963472051
Within Groups	29741.38	78	381.2997			
Total	33925.7	79				

The results of the MANOVA are presented in the following table:

Table 9 Results of the MANOVA

	stat	*F*	*df1*	*df2*	*p-value*	*eta-sq*
Pillai Trace	0.3747616	7.29257748	9	73	3.98284E-06	0.3747616
Wilk's Lambda	0.6252384	7.29257748	9	73	3.98284E-06	0.3747616
Hotelling Trace	0.59938993	7.29257748	9	73	3.98284E-06	0.3747616

Pillai Trace

The Pillai trace statistic yielded a value of 0.375. The value of the F statistic was 7.29. This represents a p value <0.05. Therefore, this represents a level statistical significance that indicates the treatment and control groups have different means on the

dependant variables included in the MANOVA. The Pillai trace is often considered to be the most important statistic for determining significance with MANOVA (Harris, 2014).

Wilk's Lambda

The Wilk's Lambda statistic was 0.625. The F statistic was 7.29. This represents a statistical significance of $p < 0.05$. This means that there is a significant difference between the experimental and control groups with regard to the variables included in the MANOVA.

Hotelling Trace

This statistic yielded a value of 0.599 and the F statistic was 7.29. This is also representative of a difference between the treatment and control group which is significant at the $p < 0.05$ level.

Research Question #1

How does a community health program that describes cardiovascular risk and promotes exercise among women, affect awareness of the links between cardiovascular health and exercise?

Hypothesis #1

It is expected that answers to a post-test by participants who engage in the community health program will reveal stronger awareness of the links between cardiovascular health and exercise than answers to a post-test by members of the control group.

Null hypothesis #1

Members of the experimental group at post-treatment will not demonstrate significantly greater awareness of the links between cardiovascular health and aerobic exercise than will members of the control group as measured by a knowledge assessment.

Findings

Awareness of the links between cardiovascular health and exercise was measured as one of the dependent variables in the MANOVA (Harris, 2014). The women in the treatment group had a superior level of awareness of the links between exercise and cardiovascular health than the women in the control group (see Table 4).

Research Question #2

How does a community health program that describes cardiovascular risk and promotes exercise among women affect knowledge of specific recommendations and guidelines for exercise to support cardiovascular health?

Hypothesis #2

It is expected that answers to a post-test by participants who engage in the community health program will demonstrate stronger knowledge of specific recommendations and guidelines for exercise to support cardiovascular health than answers to the post-test by members of the control group.

Null hypothesis #2

Members of the experimental group at post-treatment will not demonstrate significantly greater knowledge of specific recommendations and guidelines for exercise to support

cardiovascular health than will members of the control group as measured by a knowledge assessment.

Findings

Knowledge of specific guidelines and recommendations regarding exercise and its support of cardiovascular health was measured as one of the dependent variables in the MANOVA (Manly, 2004). While it cannot be known for certain the amount that this specific variable played in the finding of significance, the average scores of the treatment group were higher than those of the control (Stevens, 2012). This indicates that the treatment group had better knowledge regarding exercise and its effect on the cardiovascular system than the control group (see Table 5).

Research Question #3

How does a community health program that describes cardiovascular risk and promotes exercise among women affect knowledge of exercise possibilities within one's own community?

Hypothesis #3

It is expected that answers to a post-test by participants who engage in the community health program will demonstrate stronger knowledge of exercise possibilities within their own community than answers to the post-test by members of the control group.

Null hypothesis #3

Members of the experimental group at post-treatment will not demonstrate significantly greater awareness of exercise possibilities within their own community than will members of the control group as measured by a knowledge assessment.

Findings

Knowledge regarding exercise possibilities within the subject's community was measured as one of the dependent variables in the MANOVA. An examination of the data revealed that women who participated in the community health program had a higher level of knowledge regarding exercise possibilities within their community when compared to the control group (Harris, 2014) (see Table 6).

Research Question #4

How does a community health program that describes cardiovascular risk and promotes exercise among women with specific guidance concerning exercise programs affect self-efficacy in exercise as measured by the New General Self-Efficacy Scale (NGSE) (Chen et al., 2001) and a modified NGSE tailored to measure exercise self-efficacy?

Hypothesis #4

It is expected that answers to a post-test by participants who engage in the community health program will demonstrate stronger self-efficacy scores than will answers to the post-test by members of the control group as measured by the New General Self-Efficacy Scale (NGSE) (Chen et al., 2001) and a modified NGSE tailored to measure exercise self-efficacy.

Null hypothesis #4

Members of the experimental group at post-treatment will not demonstrate significantly higher levels of self-efficacy in exercise than will members of the control group as measured by the New General Self-Efficacy Scale (NGSE) (Chen et al., 2001) and a modified NGSE tailored to measure exercise self-efficacy.

Findings

Self-efficacy regarding exercise was measured as one of the dependent variables in the MANOVA. The data revealed that women who participated in the community health program had higher levels of self-efficacy for exercise than women in the control group (Manly, 2004) (see Table 7).

Research Question #5

How does a community health program that describes cardiovascular risk and promotes exercise among women affect women's likelihood of discussing(and/ or participating in) exercise with friends, neighbors or relatives?

Hypothesis #5

It is expected that answers to a post-test by participants who engage in the community health program will demonstrate greater likelihood of discussing (and/ or participating in) exercise with friends, neighbors or relatives than answers to the post-test by members of the control group.

Null hypothesis #5

Members of the experimental group at post-treatment will not demonstrate significantly increased likelihood of discussing (and/ or participating in) exercise with

friends, neighbors or relatives, than will members of the control group as measured by exercise questionnaire.

Findings

The likelihood of discussing exercise with relatives, friends, or neighbors was measured as one of the dependent variables in the MANOVA. A perusal of the data indicates that the women who participated in the community health program were more likely to discuss(and/ or participating in) exercise with neighbors, friends, or relatives than the subjects in the control group (Harris, 2014) (see Table 8).

Research Question #6

How does a community health program that describes cardiovascular risk and promotes exercise among women affect women's likelihood of exercising as reflected by entries in a personal log kept by participants over the course of three months?

Hypothesis #6

It is expected that entries in a personal log kept over the course of three months participation in the community health program will posttest reflect increased likelihood of exercising, when compared to personal log entries maintained over the course of three months by members of the control group.

Null hypothesis #6

Members of the experimental group at post-treatment will not demonstrate significantly greater likelihood of participating in regular, aerobic exercise than will members of the control group as measured by log sheet.

Findings

The number of entries in the journal as an indication of how often the subjects exercisedwere measured as one of the dependent variables in the MANOVA. A comparison of the data between those in the treatment and control groups indicated that participants in the community health program tended to exercise more frequently (Manly, 2004) (see Table 9).

Research Question #7

How does a community health program that describes cardiovascular risk and promotesexerciseamong women affect blood pressure levels?

Hypothesis #7

It is expected that post-testmeasurements of the women who participate in the community health program will reveal lowerblood pressure levels than post-test measurements among members of the control group.

Null hypothesis #7

Members of the experimental group at post-treatment will not demonstrate significantly lower levels in blood pressure than will members of the control group as measured by sphygmomanometer and stethoscope.

Findings

Blood-pressure measurements were measured as one of the dependent variables in the MANOVA (Muirhead, 2009). The data indicates thatwomen who participated in the community health program tended to have lower blood pressure than women in the control group.

Research Question #8..

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How does a community health program that describes cardiovascular risk and promotes exercise among women affect women's blood glucose levels?

Hypothesis #8

It is expected that post-test measurementsof the women who participate in the community health program will reveallower blood glucose levels thanpost-test measurementsamong members of the control group.

Null hypothesis #8

Members of the experimental group at post-treatment will not demonstrate significantly lower levels in blood glucose than will members of the control group as measured by meter, lancet, and specific test strip.

Findings

Blood glucose levels were measured as one of the dependent variables in the MANOVA. The data revealed that women who had participated in the community health program had lower blood glucose levels than women in the control group.

Research Question #9

How does a community health program that describes cardiovascular risk and promotes exercise among women affect women's body weight?

Hypothesis #9

It is expected that post-test measurements of the women who participate in the community health program will reveal lower body weightlevels than post-test measurements among members of the control group.

Null hypothesis#9

Members of the experimental group at post-treatment will not demonstrate significantly lower levels inbody weight than will members of the control group as measured by standardized scale from a medical clinic.

Findings

Body weight was measured as one of the dependent variables in the MANOVA. The data indicates that women who participated in the community health program had lower body weight than women inthe control group.

Research Question #10

How does a community health program that describes cardiovascular risk and promotes exercise among women affect women's low-density lipoprotein (LDL) cholesterol levels?

Hypothesis #10

It is expected that post-test measurements of women who participate in the community health program will reveal lowerLDL cholesterol levels than post-test measurements among members of the control group.

Null hypothesis #10

Members of the experimental group at post-treatment will not demonstrate significantly lower levels in LDL-cholesterol than will members of the control group as measured by meter, lancet, and specific test strip.

Findings

The LDL cholesterol level was measured as one of the dependent variables in the MANOVA. The data indicates that women who participated in the community health program had lower LDL cholesterol levels than women in the control group.

Chapter Conclusion

The primary statistical analysis used in this study was a MANOVA (Muirhead, 2009). This statistic is appropriate when there is one or more independent variables and multiple dependent variables. In the case of this study, there was one independent variable and 10 dependent variables. The only independent variable was participation in the community health -program or being in the control group (Grimm & Yarnold, 2000). It is important to note that the MANOVA included three statistics for significance. All three of these statistics indicated that there was a significant difference among the dependent variables of the treatment group when compared to the control group. The statistical significance was set prior to the study at $p < 0.05$ (Manly, 2004).

While the MANOVA is a powerful statistical technique when there are multiple dependent variables, it does have limitations (Muirhead, 2009). The most significant of these limitations for this study is the lack of indication regarding how much each of the dependent variables is affected by the independent variable. In other words, we can conclude that there was a statistically significant difference between the dependent variables for the treatment versus the control group. However, this is a pooled group effect which may have been due to the independent variables effect on one or more of the dependent variables (Muirhead, 2009).

Tests for the Assumptions of the MANOVA

This study made use of the one-way MANOVA. This statistical technique involves making a number of assumptions regarding the data being used. The first assumption is that at least two of the dependent variables are measured at the ratio or interval level. In other words, they must be continuous variables. The dependent variables of self-efficacy and the amount of exercising meet this criterion.

The second assumption is that the independent variable consists of at least two categorical and independent groups. In this case, one group participated in the CHP, while the other did not. This meets the criteria for categorical and independent groups.

The third assumption is that there is an independence about stations. This means that different participants are members of each of the groups. No participant can be a number of more than one group. In this instance, it means that none of the subjects in the control group is also in the experimental group. The study meets this assumption, as each of the subjects is only a member of one group.

The fourth assumption is that the data represents a sufficient sample size. There need to be more cases for the MANOVA than the number of dependent variables that are being investigated. In this case, there were ten dependent variables. There were 42 cases in each of the groups fourth assumption is met.

The fifth assumption is that there are now multivariate outliers. There are to be no univariate outliers within each of the groups representing the independent variable. This should be true for all of the dependent variables. This group of data meets this criterion, as there are no outliers. The multivariate outliers occur when there is an

unusual combination of the scores for the dependent variables. The data was examined and there were none of these types of outliers. Therefore, assumption five is met.

The sixth and seventh assumptions are that there is multivariate normality and a linear relationship between the pairs of dependent and independent variables. The Wilk's Lambda score indicates that multivariate normality this was not a problem. It is not necessary to test for this settled assumption. If this assumption is not met, the power of the statistical test will be reduced. When this occurs, a type II error will occur. This means that the null hypothesis will not be rejected even though it is false. For this study, this cannot occur since all of the null hypotheses were rejected.

Another assumption regarding data when a MANOVA is being used is that there is not multicollinearity. This occurs when the correlations between the dependent variables are too high. This was examined using a correlation matrix that is presented in Table 2. The highest of these correlations was 0.2797. This is not a strong correlation.

A final assumption is that there is homogeneity in the variance-covariance matrices. This was evaluated using Box's M test of equality of covariance. The results of this test indicated homogeneity of the variance-covariance matrices.

Chapter 5: Discussion, Conclusions, and Recommendations

Chapter Introduction

This chapter discusses the findings of the study. The findings of the study are discussed in relation to awareness, recommendations and guidelines, exercise possibilities, self-efficacy, discussing exercise, exercise frequency, blood pressure, blood glucose, body weight, and blood cholesterol. It is noted that the MANOVA indicates that there is a statistically significant difference between the measures of interest among the treatment and control groups. The participants in the community health program were found to be more aware of the links between exercise and improved cardiovascular health. Participants in health program also have better knowledge with regard to the specific guidelines and recommendations for exercise in relation to cardiovascular health (Thow, Graham & Lee, 2013).

The community health program was associated with a number of additional benefits. Women who participated in the community health program had increased knowledge regarding the possibilities for exercise in their community. They also had increased levels of exercise self-efficacy. The participants were more likely to discuss exercise and engage in the practice of exercising more frequently. Frequent exercise can result in an increase in beneficial cytokines. The community health program was associated with lower blood pressure, blood glucose, body weight, and blood cholesterol as well (Thow, Graham & Lee, 2013).

Awareness

Related Research Question: How does a community health program that describes cardiovascular risk and promotes exercise among women, affect awareness of the links between cardiovascular health and exercise?

The data indicated that the community health program was associated with an increased awareness of the links between exercise and cardiovascular health. This is important for a number of reasons (Thow, Graham & Lee, 2013). For over 40 years, there have been a number of scholarly investigations and articles indicating that there is a relationship between physical fitness, exercise, and cardiovascular health. There have been several panels filled with experts concerned with the association between exercise and cardiovascular health. These organizations have consisted of the American Heart Association, the American College of Sports Medicine, and the Centers for Disease Control and Prevention. These groups have published opinions that reinforce the idea that regular physical exercise is associated with improvements in cardiovascular health. Overall, the opinion of the medical community is that being more physically active decreases the risk of coronary artery disease and other cardiovascular ailments (Smith & Fernhall, 2011).

While it is not known precisely how many deaths occur due to lack of physical activity, it is estimated that more than 200,000 deaths per year due to a lack of physical exercise occur in United States (Smith & Fernhall, 2011). A number of longitudinal studies have indicated that regular physical exercise has a protective effect against a number of chronic diseases. These diseases include: cancer, osteoporosis, hypertension, and Type II diabetes. Among individuals who lead sedentary lives, there is a higher rate

of death due to cardiovascular problems and other physical ailments. Even people who do not exercise until their middle age can increase their physical activity and reduce mortality. While this knowledge is widely accepted many people do not exercise. Therefore, the finding of this study that the community health program increased the awareness of the association between physical exercise and cardiovascular health is important (Smith, 2009).

Leading a sedentary lifestyle is one of the primary risk factors for developing heart and cardiovascular disease (Thow, Graham & Lee, 2013). The other risk factors are obesity, smoking, abnormal blood lipid levels, and high blood pressure. A reduction in any of these risk factors, including a sedentary lifestyle, is associated with a decreased risk for experiencing a heart attack or other pathologic cardiac event. Other problematic events include stroke and heart disease. Higher levels of exercise reduce the chance of requiring coronary revascularization procedures such as coronary angioplasty or bypass surgery (Smith, 2009).

People who engage in regular exercise often experience favorable effects on multiple risk factors for developing cardiovascular disease (Smith & Fernhall, 2011). The increased exercise tends to reduce weight and lead to reductions in blood pressure. Regular exercise can reduce the low-density lipoproteins and increase high-density lipoproteins. Exercise will generally reduce the symptoms of Type II diabetes and encourage the body to use insulin more efficiently to control the levels of glucose in the blood stream. Even though the effect of exercise on singular risk factors tends to be small, the overall effect can be substantial. This is especially true when the exercise is

combined with lifestyle changes which are healthy such as smoking cessation (Smith, 2009).

Recommendations and Guidelines

Related Research Question: How does a community health program that describes cardiovascular risk and promotes exercise among women affect knowledge of specific recommendations and guidelines for exercise to support cardiovascular health?

This data indicated that the community health program was associated with increased knowledge regarding the guidelines and recommendations related to exercise for cardiovascular health (Thow, Graham & Lee, 2013). Part of the health program consisted of an informational approach to increasing physical exercise levels. The information provided was meant to both motivate as well as enable the subjects to change their behaviors and maintain these habits over time. Educational approaches were used to present general information regarding methods of reducing the risk of cardiovascular disease. There was also specific information provided regarding exercise and physical activities (Smith & Fernhall, 2011).

The information provided in this study was meant to increase the knowledge of the subjects regarding recommendations and guidelines for exercise in relation to cardiovascular health (Smith, 2009). Information was provided on negative attitudes toward physical activity as well as overcoming barriers to regular exercise. The subjects were provided with information on how to improve their chances of continuing healthy exercise behaviors once they are established (Smith, 2009).

The subjects were provided with information on how to develop their own point of decision prompts (Sagiv, 2012). These primarily consist of motivational signs that can be placed in strategic locations should the individual to continue their health practices. For example, a sign might be placed in their car remind them to park farther away from their destination so that they will walk more. The prompts act has reminders for simple actions that can be taken to increase activity levels (Smith, 2009).

The point of decision prompts tend to increase the level of activity among subjects in daily activities such as taking stairs instead of riding an escalator or using an elevator (Thow, Graham & Lee, 2013). This type of simple intervention is often effective with a diverse group of people in a wide range of settings. This approach also represents an intervention which is relatively inexpensive (Smith, 2009).

The health education program included information for the subjects on how to develop health behavior change programs that are individually adapted (Sagiv, 2012). These behavior change programs can be used by subjects in their home, school or work site. They are complementary to any environmental or policy options which may already be present. When healthcare organizations and communities create policies and environments supporting individual behavior changes the individualized programs are especially effective (Smith & Fernhall, 2011).

The subjects were also provided with information on incorporating their individual activity intervention within a setting that includes the built environment for increasing physical activity (Smith, 2009). Examples of this type of environment are buildings that encourage people to use the stairs and offices that allow people to work

while standing up rather than sitting at a desk. Another example would be parking lots located at a distance from the building (Sagiv, 2012).

The responses of the subjects indicated that they had learned the material which was presented by the community health programwith regard to recommendations and guidelines for physical activity to reduce cardiovascular problems. This appears to be an important factor with regard to the success of this health program (Thow, Graham & Lee, 2013).

Exercise Possibilities

Related Research Question: How does a community health program that promotes exercise among women affect knowledge of exercise possibilities within one's own community?

The data from this research indicates that the community mental health program added to the knowledge of exercise possibilities within the subject's community. This is important for a number of reasons (Smith, 2009). Regularly participating in an exercise program is known to reduce the risk of many chronic health conditions such as cardiovascular disease. While this fact is well known, more than 50% of adults in the United States and other developed countries fail to engage in a significant amount of exercise. It is also known that the level of exercise participation is partially dependent on the location (Smith, 2009).

Many people choose to exercise close to their neighborhood (Smith & Fernhall, 2011). This means that accessibility to the exercise location is especially important. It has been established that people living in neighborhoods which are close to parks, gyms,

and other types of physical recreation facilities tend to exercise more frequently. It has also been established that individuals need to be aware of these community exercise possibilities in order to take advantage of them (Thow, Graham & Lee, 2013).

Self-Efficacy

Related Research Question: How does a community health program that describes cardiovascular risk and promotes exercise among women with specific guidance concerning exercise programs affect self-efficacy in exercise as measured by the New General Self-Efficacy Scale (NGSE) (Chen et al., 2001) and a modified NGSE tailored to measure exercise self-efficacy?

The data provided by this research study indicates that the community health program increased levels of self-efficacy among the participants relative to the control group. Self-efficacy is an important factor in participating in exercise and maintaining the practice (Smith, 2009). Individuals who have high levels of self-efficacy for exercise have less chance of dropping out of exercise programs, increased goal achievement levels, better general fitness, and better outcomes with regard to health factors associated with exercise. Self-efficacy has become a fundamental component for predicting exercise behavior (Smith & Fernhall, 2011).

Self-efficacy has two roles in relation to exercise. It is both a predictor of participating in exercise and one of the outcomes of exercise (Thow, Graham & Lee, 2013). There are a number of strategies which can improve self-efficacy. These include behavioral monitoring and goal setting. Before delving further into the implications of

the community health program increasing self-efficacy levels, there needs to be a discussion to enhance the reader's understanding of self-efficacy (Sagiv, 2012).

Self-efficacy is the confidence an individual has in their ability to complete tasks and develop strategies in a wide range of endeavors (Smith, 2009). In this case, the primary concern is with the self-efficacy of the subjects in relation to exercise. Self-efficacy can be understood as the individual's belief regarding their capabilities to successfully carry out practices to achieve their goals. The level self-efficacy can affect the thought pattern of an individual and either help or hinder their success. Individuals who have high levels of self-efficacy for exercise are likely to believe they have the ability to be successful in activities related to exercise (Thow, Graham & Lee, 2013).

Self-efficacy can be understood as being affected by four primary sources of information (Smith, 2009). These information sources include physiological states, verbal persuasion, vicarious experience, and personal accomplishments. Mastery experience includes a history of personal accomplishments as well as successes related to exercise. This is a powerful source for self-efficacy. Vicarious experience occurs when the subject observes others exercising and increases their perception of personal success. Verbal persuasion occurred when the subjects were led to believe they would be successful with regard to the exercise. The physiological state involves personal interpretation of the experience related to exercise (Thow, Graham & Lee, 2013).

It is important to understand the benefit of the subjects increasing their exercise self-efficacy level secondary to participation in the community health program (Smith & Fernhall, 2011). Their self-efficacy can affect their exercise activity choices as well as the effort they exert toward the tasks involved. Self-efficacy can also have an influence

on the level of persistence the subject's exhibit when they experience obstacles to their exercises. People with high levels of exercise self-efficacy will tend to engage in more difficult physical activities and exert more effort toward their successful completion. They are also more likely to be persistent when faced with exercise obstacles (Smith, 2009).

It has been discovered that self-efficacy for exercise has a strong and positive correlation to engaging in vigorous physical activities (Sagiv, 2012). People with high levels of exercise self-efficacy will report lower levels of perceived exertion than people with low levels of exercise self-efficacy. This effect has been found to be relatively strong and account for in excess of 10% of the variance regarding physical exertion (Wakabayashi, 2014).

It is interesting to note that exercise and self-efficacy have a relationship which is reciprocal (Smith, 2009). Self-efficacy often determines if a person will begin engaging in an exercise program. People with high levels of self-efficacy are more likely to begin an exercise program. In addition, engaging in the exercise tends to increase the level of self-efficacy. This means people who have their self-efficacy increased by the community health program will be more likely to begin participating in community exercise programs. After they begin participating in programs, they are likely to further increase their exercise self-efficacy (Smith & Fernhall, 2011).

Discussing Exercise

Related Research Question: How does a community health program that describes cardiovascular risk and promotes exercise among women affect women's

likelihood of discussing (and/ or participating in) exercise with friends, neighbors or relatives?

Women who participated in the community health program were more likely to discuss how exercise reduces cardiovascular risk. This is important as human actions operate in a complex network of social interactions. For the majority of people, their health habits are embedded within their social lives (Thow, Graham & Lee, 2013). Both social constraints and inducements can place a strain on self-regulatory efforts. The same social factors may also make it easier for an individual to engage in an exercise program and maintain participation. The most recent interventions to induce exercise take into account the social perspective of human change and adaptation (Sagiv, 2012).

It is interesting to note that psychological programs which increase the success rate of exercise programs by creating social and structural supports are only rarely used (Wakabayashi, 2014). Excuses for not using these programs include their being problematic to create and manage. Many people report that psychological approaches to increasing exercise levels do not fit well with their daily lives. This is problematic since social technologies cannot be easily made into products amenable to the traditional forms of marketing (Wakabayashi, 2014).

Self-help groups consisting of people who are experiencing similar problems regarding exercise are likely to create social systems that are beneficial for increasing exercise levels (Sagiv, 2012). Some of these group programs are similar to alcoholics anonymous or other self-help groups for assisting drug abusers. These groups are based on enablement models that can provide the socio-structural framework necessary to

increase exercise levels. With this approach, individuals are conceptualized as being addicted to a sedentary lifestyle (Thow, Graham & Lee, 2013).

The social approach to modifying behavior has a history of substantial success (Wakabayashi, 2014). For example, there was a successful reduction of the HIV rate in San Francisco. This was accomplished largely through social factors aimed at changing behaviors. This was done using social approaches to increase self-empowerment within the homosexual community. This program was found to have long-term success (Sagiv, 2012). Longitudinal studies indicate that the reduction in the amount of risky sexual practices was secondary to perceived self-efficacy for engaging in healthier behaviors. This self-efficacy was found to be secondary to the social factors associated with the HIV reduction efforts. It was discovered that social groups composed of homosexuals were essential to the success of the program. It was the social network among these individuals which led to prolonged social factors associated with behavioral change. In a similar fashion, the increased level of discussing the benefits of exercise as it relates to cardiovascular health is likely to improve the exercise levels (Smith & Fernhall, 2011).

Another example of the importance of social factors in promoting healthier behaviors is provided by successful programs for reducing alcoholism (Thow, Graham & Lee, 2013). Many recovering alcoholics must deal with a life which has been stripped of social ties and activities. This is especially problematic when they are attempting to change their lives to incorporate a healthier behavioral repertoire. These people require a supportive environment to aid them with the transition to a new way of living. This is thought to be the reason for many traditional alcohol treatment programs failing as a method of long-term treatment. On the other hand, Alcoholics Anonymous is a self-help

group that often leads to long-term changes. Many believe it is the social nature of the Alcoholics Anonymous groups that is responsible for their success. Like the recovering alcoholics, by discussing exercise benefits with individuals in their social circle, women are more likely to continue their increased levels of exercise through social support (Smith & Fernhall, 2011).

Exercise Frequency

Related Research Question: How does a community health program that describes cardiovascular risk and promotes exercise among women affect women's likelihood of exercising as reflected by entries in a personal log kept by participants over the course of three months?

Women who participated in the community health program were more likely to exercise regularly based on the entries in their personal logs. This is important as there are many health benefits to regular exercise. One of these benefits is the reduction of inflammation (Smith & Fernhall, 2011). Inflammation is a primary factor in the pathogenesis for atherosclerosis and other cardiovascular diseases. Low-grade inflammation which is chronic leads to increased levels of pathologic cytokines and C-reactive proteins. A number of articles appearing. The journals have noted that systemic inflammation is associated with atherosclerosis and other cardiovascular problems (Wakabayashi, 2014).

Recent studies have demonstrated that physical activity can increase the level of beneficial cytokines that have anti-inflammatory properties (Wakabayashi, 2014). When this occurs, skeletal muscle has acted as a type of endocrine organ producing and

releasing benevolent cytokines known as myokines. When considered as an organ, skeletal muscle is the largest in the human body. Regular exercise induces the contracting muscles to produce myokines. These substances not only reduce inflammation, but can have a positive effect on metabolism and the production of benevolent cytokines in other organs and tissues (Wakabayashi, 2014).

There is strong evidence for regular physical exercise having beneficial effects for individuals suffering from coronary heart disease (Sagiv, 2012). Physical training needs to improve survival. This is thought to be due to regular exercising having direct benevolent effects on the pathogenesis of coronary heart disease. The regular exercise also serves to reduce the rates of myocardial infarction. This exercise reduces systolic blood pressure, triglyceride levels, and total cholesterol. Many patients who are involved in regular exercise will cease smoking with no further intervention (Wakabayashi, 2014).

There is none to be an association between lack of activity and low-grade types of systemic inflammation (Smith & Fernhall, 2011). This is true in patients of any age. Wanted to know studies indicate that regular exercise needs to the reduction on systemic low-grade inflammation. Sedentary individuals injected with an E. coli endotoxin will have increased circulating levels of harmful cytokines. However, if the E. coli is injected into individuals who exercise regularly, there is nearly no inflammatory response (Sagiv, 2012).

The long-term effects of regular exercise on the progression of several diseases, including those of the cardiovascular system, is almost certainly due to anti-inflammatory responses (Wakabayashi, 2014). When an individual exercises regularly,

their system produces cytokines which have anti-inflammatory properties. These are myokines and are produced by the skeletal muscles (Sagiv, 2012). When exercise is not regular, the beneficial anti-inflammatory response is muted. In order to gain the full beneficial effects of exercise on the cardiovascular system the exercise must be relatively regular. This means the individual needs to exercise for a minimum of 20 to 30 minutes three times per week. Even if the exercise is intense, if it is done only once or twice per week, the same beneficial effects are not present. Therefore, if the community health program leads to a higher rate of regular exercise it is likely to stimulate beneficial effects (Wakabayashi, 2014).

Blood Pressure

Related Research Question: How does a community health program that describes cardiovascular risk and promotes exercise among women affect women's blood pressure?

The blood pressure readings were lower among the group of women who participated in the community health program as compared to the control group (Sagiv, 2012). The finding that the community health program was associated with lower blood pressure readings is important (Wakabayashi, 2014).

Hypertension is a public health challenge in developed countries including the United States. There is a relatively high prevalence rate of blood pressure problems and associated cardiovascular and renal diseases. It is estimated that more than 40 million people in the United States suffer from hypertension. Hypertension is usually defined as

a systolic blood pressure in excess of 140mm Hg and a diastolic blood pressure that exceeds 90 mm Hg (Sagiv, 2012).

The estimated cost of high blood pressure in the United States alone exceeds $21 billion annually (Smith & Fernhall, 2011). This cost includes antihypertensive medications, hospital stays, and visits to healthcare providers. Hypertension is considered to be the primary modifiable risk factor in coronary heart disease. This type of heart disease is the leading cause of death in the United States and many other developed countries. Hypertension is also associated with the third leading cause of death in most developed nations which is strokes. Hypertension is also associated with peripheral vascular disease, end-stage renal disease, and congestive heart failure (Sagiv, 2012).

Progressively higher levels for blood pressure is associated with a greater risk of renal insufficiency, stroke, and cardiovascular disease. There is a continuous and positive correlation between blood pressure and end-stage renal disease, heart failure, stroke, and coronary heart disease. The association between high blood pressure and these multiple pathologies is stronger for systolic blood pressure than the diastolic pressure (Wakabayashi, 2014).

Traditionally, the blood pressure level was the only factor used for treatment decisions regarding hypertension (Sagiv, 2012). This was a practice based on elevated blood pressure being an indicator of risk for cardiovascular disease in nearly all patient groups studied. This approach to treatment was successful for decisions made regarding patients with severe and moderate forms of hypertension. However, the approach is less successful for those with mild forms of blood pressure elevation. Individuals suffering

from mild forms of hypertension tend to have better responses to changing modifiable behaviors. These behaviors include the reduction of smoking, reducing intake of sodium, and reducing weight which is above optimal. Behavioral change also includes increasing the level of physical exercise (Wakabayashi, 2014).

There are now more than 22 million people in the United States who are prescribed medications for treating high blood pressure (Smith & Fernhall, 2011). This is a relatively small proportion of the estimated 55 million adult residents of the United States who are likely to be suffering from high blood pressure. The same is true in most other developed nations. Part of the reason for this low rate of treatment is that most cases of high blood pressure are asymptomatic. Therefore, any intervention such as the community health program presented here which reduces blood pressure is almost certain to decrease the pathologies associated with this disorder (Wakabayashi, 2014).

Blood Glucose

Related Research Question: How does a community health program that describes cardiovascular risk and promotes exercise among women affect women's blood glucose level?

Blood glucose levels that are abnormally high are referred to as hyperglycemia. If this is a condition which is acute, it is often benign and without symptoms. However, there are a wide range of problems that are complications of chronic hyperglycemia (Smith & Fernhall, 2011).

These problems include diabetic neuropathy, damage to the retina, neurological damage, kidney problems, damage to the legs and feet due to poor circulation, and

damage the cardiovascular system leading to cardiovascular disease. The finding that the community health program was associated with lower blood glucose levels is a strong argument for continuing these programs.

Body Weight

Related Research Question: How does a community health program that describes cardiovascular risk and promotes exercise among women affect women's body weight?

Women participating in the community health program tended to have a lower weight than those in the control group. This is important as obesity is associated with a number of physical pathologies (Wakabayashi, 2014).

These problems include osteoarthritis, cancer, obstructive sleep apnea, type II diabetes, and heart disease. In fact, obesity is associated with a wide range of cardiovascular problems. These include congestive heart failure, high blood pressure, cholesterol levels which are abnormal, pulmonary embolism, deep vein thrombosis, myocardial infarction, angina, and ischemic heart disease. Any program, such as the community health program being investigated here, that lowers weight is likely to have a wide range of health benefits.

Blood Cholesterol

Related Research Question: How does a community health program that describes cardiovascular risk and promotes exercise among women affect women's low-density lipoprotein (LDL) cholesterol level?

The women who participated in the community health program tended to have lower levels of LDL cholesterol. This is important as this type of cholesterol is associated with a number of cardiovascular problems (Thow, Graham & Lee, 2013). These problems include atherosclerosis, peripheral vascular disease, stroke, and myocardial infarction. The LDL often clings to the artery walls resulting in atherosclerosis. This is the most common reason for individuals suffering from cardiovascular disease. Since the women who participated in the community health program tended to have lower LDL levels than those in the control group, it is likely that the community health program will be associated with a reduction in cardiovascular problems due to atherosclerosis.

Social Change

Individual Benefits

This study has significant implications for positive social change at both the individual and societal levels. Women who participated in the community health program experienced a number of personal benefits that were not present with the control group. Women who had participated in the community health program were more aware of the links between their cardiovascular health and exercise. It is now widely accepted in the medical community that individuals who are more physically active are less likely to suffer from coronary artery disease and a wide range of other cardiovascular pathologies (Smith & Fernhall, 2011). Increasing physical exercise tends to reduce weight leading to lower blood pressure. The lower blood pressure decreases the probability of coronary artery disease and heart attacks.

Women who participated in the community health program were more knowledgeable of specific guidelines and recommendations for exercise that would support their cardiovascular health. It was discovered that the point of decision prompts increased the activity level of the subjects with regard to daily activities such as taking stairs rather than riding an elevator (Thow, Graham & Lee, 2013). The women who participated in the program also exhibited knowledge on how to include health interventions in their built environment to increase their physical activity level. This is an important part of healthy living (Smith, 2009).

The individuals who participated in the community health program had an increase in their knowledge level regarding exercise possibilities within their community. This is important for several reasons (Smith, 2009). It is known that regular participation in exercise programs will reduce the number of chronic health conditions. One of these health problems is cardiovascular disease. Since most individuals prefer to exercise closer to home (Smith & Fernhall, 2011), knowledge of exercise activities nearby will lead to increased activity levels.

Women who participated in the community health program had higher levels of self-efficacy in relation to exercise than the control group. This is an important factor for people to participate in exercise programs and maintain the practice (Smith, 2009). People who have high levels of self-efficacy in relation to exercise are less likely to drop out of the exercise programs. They also tend to have better goal achievement levels and general fitness status. Those with high levels of exercise self-efficacy also have better outcomes for health factors related to exercise.

Another benefit to those who participated in the community health program was an increased level of discussing the exercise benefits with others. These discussions usually focused on how exercise can reduce risk of cardiovascular illness. This is important, as people are social beings. Most people have health habits that are embedded within their social network (Thow, Graham & Lee, 2013). Social factors can discourage or encourage participation in exercise programs. The women who participated in the community health program became supportive of other people working to improve their physical well-being through exercise.

Participants in the community health program were more likely to exercise on a regular basis than individuals who were in the control group. This is important since many of the benefits of exercise are increased if the activities are frequent and consistent (Smith & Fernhall, 2011). One benefit of regular exercise to the individual is the reduction in inflammation. Inflammation is one of the primary factors that lead to atherosclerosis and many other types of cardiovascular disease. Low-grade inflammation can lead to an increase in the levels of several pathogenic compounds in the body (Wakabayashi, 2014).

Another benefit of the community health program was a reduction in blood pressure. This is an important factor as hypertension is a primary cause of a wide range of cardiovascular ailments. Problems that can result from untreated chronic hypertension include heart attacks and strokes (Sagiv, 2012). High blood pressure can also lead to renal insufficiency and other kidney problems. There is a significant positive correlation between hypertension and end stage renal disease, coronary heart disease, stroke, and heart failure. Since people who participated in the community health program had lower

blood pressure levels than the control group, they are likely to be at a reduced risk for the health problems associated with hypertension (Wakabayashi, 2014).

Participating in the community health program was associated with lower blood glucose levels. This is important as hyperglycemia can lead to a number of problems including neuropathy, neurological damage, retinal damage, cardiovascular disease, and kidney problems (Smith & Fernhall, 2011).

Another benefit of participation in the community health program was a reduction in body weight. This is significant since being overweight is associated with a wide range of physical pathologies (Wakabayashi, 2014). Some of the illnesses that are common among those who are obese are high blood pressure, and congestive heart failure, abnormal cholesterol levels, deep vein thrombosis, pulmonary embolisms, myocardial infarctions, ischemic heart disease, and angina.

Participating in the community health program tended to reduce the subjects levels of LDL cholesterol. This is significant since cholesterol is known to be associated with several cardiovascular diseases (Thow, Graham & Lee, 2013). The LDL cholesterol tends to stick to artery walls and cause atherosclerosis. Other problems associated with high levels of LDL cholesterol are peripheral vascular disease, and myocardial infarction.

Societal Benefits

Community health programs will not only benefit individuals, but society as well. There are immense costs associated with cardiovascular diseases. For example, in the United States alone during 2010 the cost of cardiovascular diseases amounted to

$444 billion (Heiderich et al., 2011). Coronary heart disease amounted to roughly $109 billion of this cost. Hypertension had both in direct and indirect costs amounting to $93.5 billion. Heart failure cost $34.4 billion in 2010. Strokes amounted to $53.9 billion in cost. A staggering one in six of all dollars spent on health care within the United States is related to cardiovascular problems.

Considering the vast amounts of money that are spent on treating cardiovascular diseases, community health programs are likely to be a cost-effective method for reducing these expenditures. While the community health programs do require some resources, they are small in relation to the amount of caring for someone with a cardiovascular disease.

Conclusions

The MANOVA indicated that there was a statistically significant difference between the women who participated in the community health program and the control group. Specifically, the women who participated in the community health program had a better awareness of the links that exist between cardiovascular health and exercise. They also were more informed regarding recommendations and guidelines for exercise to increase their cardiovascular health. Participants in the community health program were also more aware of exercise possibilities in their community and had higher levels of self-efficacy in relation to exercise. Self-efficacy has been shown to be a primary factor in individuals engaging in regular exercise activities (Smith & Fernhall, 2011). The health program participants discussed exercise more frequently and increased their

frequency of exercise. The participants had lower blood pressure levels, blood glucose levels, body weight, and amounts of LDL cholesterol.

Given the vast amounts of money that are spent on caring for individuals with cardiovascular disease, community mental health programs have the potential to benefit society. The amount of resources necessary for a community health program is relatively small compared to caring for someone suffering from a cardiovascular illness.

Limitations

It is important to remember that the MANOVA detected a statistically significant difference between the treatment and control groups. However, this is not specified with regard to any particular dependent variable. While the MANOVA is a powerful statistical technique, it does not specify the precise amount that the independent variable affected each of the dependent variables.

Another limitation of this study is that it used data from a church-based community program. The data was collected as part of that program and this study consisted of a secondary analysis of the information. While this approach saved resources, it has the disadvantage of the researcher having no control over the study nor how the data was collected. In addition, there is no way to know how accurately the data was recorded.

Recommendations

It is recommended that future research be done to determine the precise nature of the relationship between a community health program and each of the dependent variables. This can consist of 10 additional studies. Each study would isolate a single dependent variable and its relationship to the independent variable of participation in the community health program**.**

It is recommended that studies be done for the amount of cost savings for communities as a result of the benefits to the health of residents through community health programs. A cost-benefit analysis can then be done and recommendations made to communities on the amount of money they would save by having a health program. The studies will need to be done on specific communities as there are likely to be differences. For example, people living in areas that have a wide range of exercise opportunities may already be engaging in regular exercise. These communities may not benefit as much from a community health program as areas that do not have as many opportunities for exercise.

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