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THE PRELIMINARY EXAMINATION OF THE INTEGRATION
OF AN INDOOR-WALKING DVD IN
NJ SNAP-ED AND EFNEP NUTRITION EDUCATION CLASSES

By

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ABSTRACT OF THE DISSERTATION

The Preliminary Examination of the Integration of an Indoor-walking DVD in NJ SNAP-Ed and EFNEP Nutrition Education Classes

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Obesity has been identified as a significant cause of death and disease among Americans. Therefore, increasing the prevalence of physical activity is a public health goal. The literature has pointed towards the efficacy of walking programs to increase physical activity. However, there is a need for more-inclusive, theory-driven interventions among larger, more diverse audiences. Using an indoor-walking digital video disc (DVD) with a diverse cast, this dissertation project aimed to contribute towards closing gap in adult physical activity education research.

The research aim of this project was to assess the viability of using the DVD in NJ SNAP-Ed and EFNEP classes which serve limited-resource, diverse adults. Study participants' change in barriers to physical activity, stage of exercise, and dietary intake were tested using a randomized, repeated measures design. As a result of exposure to the DVD, participants' barriers to physical activity decreased and exercise habits were maintained without detriment to the primary purpose of nutrition education. These findings bode well for the future use of the DVD as a strategy to promote sustainable, moderate-intensity, leisure time physical activity among limited-resource adults.

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Chapter 1: Introduction

At the time of this writing, weight reduction and obesity prevention is a public health goal. One strategy for addressing these goals has been the provision of nutrition education programs, specifically those targeting limited-resource audiences. The purpose of this project was to assess the promotion of physical activity using a digital video disc (DVD) in nutrition education classes for adults. In this introduction, a brief overview of obesity in the United States (US) and a historical perspective of the national plan for prevention will be presented, followed by the rationale for the proposed project and the hypotheses upon which this work was based.

The Obesity Epidemic

Obesity has been defined as a complex disease of excess body fat.⁽¹⁻³⁾ In 2005-2006, the Centers for Disease Control and Prevention (CDC) reported that in the United States (US) 67% of adults over 20 years of age were overweight, and that the proportion of obese adults had reached 34%.⁽⁴⁾ The prevalence of obesity has been associated with other nutrition-related chronic diseases including: cardiovascular disease, type 2 diabetes, stroke, and some cancers.⁽⁵⁻¹⁰⁾ The US Surgeon General has declared obesity to be the fastest growing cause of death and disease among Americans and a burden to the US health care system.⁽¹¹⁾ Those at greatest risk for obesity included minorities, women, the food insecure, and the poor.⁽¹²⁻¹⁴⁾ Even though no significant increase in the proportion of obese adults had been observed within certain groups since 2004, the goal set by Healthy

People 2010, that is a 15% reduction in the proportion of obesity in the US, has not been met and remained in the 2020 edition.^(3; 13)

At the writing of this dissertation, a paradigm shift in obesity reduction strategies away from individual to community-based interventions was underway.⁽¹⁵⁾ The evidence suggested that traditional diet therapies and behavioral change education programs for weight loss were proving to be ineffective in the prevention of obesity.⁽¹⁶⁻¹⁹⁾ As a result, nutrition research was refocusing on obesity prevention through the development of alternative strategies for reducing and maintaining healthy body weight.⁽²⁰⁾

Work towards meeting national recommendations for diet or exercise has been insufficient to prevent overweight and to protect the public against the chronic diseases associated with being overweight/obese. Healthy People 2020 and others call for multiple strategies, including nutrition education, to reduce the prevalence of overweight and obesity, and nutrition education programs driven by behavioral change theories replaced traditional, less effective, knowledge based programs.^(14; 21-24) At the time this project was completed, work towards providing behaviorally-focused nutrition education to reduce caloric intake had been studied, but work to increase caloric expenditure via physical activity education to address the second portion of the energy balance equation, that is, calories in must equal calories out for weight maintenance, had not.

Project Rationale

Two established nutrition education programs that use an experiential learning model for behavioral change are the Supplemental Nutrition Assistance Program Education (SNAP-Ed, formerly the Food Stamp Nutrition Education Program), and the Expanded Food and Nutrition Education (EFNEP), which are funded through the United States Department of Agriculture's (USDA's) Food and Nutrition Service and the National Institute of Food and Agriculture (formerly the Cooperative State Research, Education and Extension Service), respectively. These programs serve limited-resource, diverse audiences. Since physical activity had become a strong component of federal nutrition education guidance, SNAP-Ed and EFNEP have been challenged to provide physical activity education to program participants.⁽²⁵⁾

Many SNAP-Ed and EFNEP programs use paraprofessional educators to teach healthy food and nutrition-related behaviors. The paraprofessionals are indigenous to the communities they serve, and those in New Jersey are trained by SNAP-Ed/EFNEP professional staff to teach children and adults within these communities. The curricula used include practical experiences regarding basic nutrition, food safety, shopping, and food preparation. Generally, the lessons are designed to be interactive, and use teaching materials appropriate for diverse audiences. However, prior to 2010, physical activity education had primarily been limited to the less effective knowledge-based method for adults because the paraprofessionals were neither qualified to lead physical activity

demonstrations, nor to ensure the safety of program participants engaged in classroom physical activities.

Previous Related Research

At this writing, few behaviorally focused, physical activity interventions for adults had been performed among limited-resource, diverse populations. Even fewer evaluations of the viability and acceptability of including physical activity in federally-funded nutrition education programs had been published. As such, more research was called for, particularly among programs that served underserved populations, that is racial/ethnic minorities or people of low-income backgrounds.^(21; 26-28) In response to this need, two studies were undertaken (2007-2009) by our research team which laid the groundwork for this project.

First, to ensure that physical activity education could be made sustainable after effective interventions, the capability of various instructional media venues, in terms of their availability were assessed among NJ SNAP-Ed/EFNEP target populations.⁽²⁹⁾ Surveys administered among limited-resource adults represented throughout NJ (n=455) showed that, of those interviewed, only 36% owned home computers (n=162) for accessing instructional media via the internet. Yet, 82% of the study participants (n=358) owned digital video disk (DVD) players.⁽³⁰⁾ This finding supported another study which was simultaneously underway to examine the benefits and limitations of commercially available exercise DVDs in terms of their potential for use among the target populations and in

nutrition education classes, since DVDs had been acknowledged as inexpensive, portable, and readily available.

A prediction had been made that the use of exercise DVDs in the classroom and at home had the potential to overcome a number of the physical activity barriers that were experienced by limited-resource, diverse adults, such as SNAP-Ed/EFNEP participants.⁽³¹⁾ Such barriers included: unsafe neighborhoods, no place to exercise, embarrassment, poor weather, expense of gym memberships, and lack of childcare, equipment, and space.⁽²⁶⁾

Thus, the aforementioned study had been designed to evaluate aerobic exercise DVDs to assess: 1) if they were appropriate for people with diverse fitness levels, 2) if racial, ethnic, body size, and gender diversity, reflective of NJ SNAP-Ed/EFNEP participants, was evidenced in locally available DVDs, 3) if the DVDs were appropriate for and short enough for classroom use, and 4) if the instruction and exercises included on the DVDs were adequate to predict that the DVD workouts provided safe instruction.⁽³¹⁾

Findings suggested that indoor walking DVDs were the most appropriate and safe for use with audiences that had a wide range of physical fitness needs, for example SNAP-Ed/EFNEP participants. These findings were consistent with the 2008 Physical Activity Guidelines that “strongly” encouraged adults to “consider walking as one good way to get aerobic activity.”^(32, p 26) However, this study concluded that although indoor walking DVDs did appear, in many ways, to be appropriate for classroom and home use by SNAP-

Ed and EFNEP participants, neither these, nor any of the DVDs from the entire study sample, that is those available for purchase in local NJ discount department stores (n=124), were found to be appropriate for use among diverse audiences, or short enough for classroom use.⁽³³⁾

Based upon the findings from these investigations, in which this author participated as a research assistant, a USDA National Research Initiative Grant was applied for by the author's advisor, with both the author of this dissertation and another researcher identified as the project's co-investigators. The project (#15903) was funded to support the production of an indoor-walking DVD to be piloted in NJ SNAP-Ed/EFNEP classes with adults varying in gender, ages, body sizes and cultures. An instructional DVD which demonstrated moderate-intensity walking indoors was to be developed, in collaboration with a nationally renowned indoor-walking producer and star of more than 100 indoor walking DVDs (Leslie Sansone), for piloting in SNAP-Ed and EFNEP classrooms in a manner based upon the previous research and the existing literature.

The Indoor-walking DVD

The DVD cast was purposely chosen to be diverse, that is, varying in gender, ages, body sizes and cultures. Seven out of the twelve cast members were either SNAP-Ed or EFNEP employees. The DVD contained six brief (approximately 15 minute) segments, which demonstrated indoor-walking techniques. As required by SNAP-Ed Plan Guidance,⁽²⁵⁾

each of the following exercise segments was designed to vary in focus, that is to demonstrate low-impact, moderate-intensity walking while meeting a different fitness goal:

1. “Walking Indoors” was meant to provide a simple aerobic workout and demonstrate four basic steps for walking indoors that would be used throughout the DVD.
2. “Adding Upper Body Movement to Your Indoor Walk” was meant to demonstrate how to increase muscle movement using the upper body while walking indoors.
3. “Strengthen with Weights” was meant to demonstrate how to increase the level of resistance to muscles while walking indoors.
4. “Doing Intervals” was meant to demonstrate how to increase the level of exercise intensity by changing pace while walking indoors.
5. “Stretching” was meant to demonstrate various stretching movements to do after walking indoors.
6. “Intensify Your Walk as You Get Stronger” was meant to demonstrate a variety of techniques for increasing exercise intensity by exaggerating movements while walking indoors.

Project Proposal

This project was designed to assess the use of an exercise DVD in adult nutrition education classes to promote physical activity. The indoor-walking DVD was expected to mediate the barriers of engaging in physical activity experienced by the target audience of limited-resource, diverse adults in NJ SNAP-Ed/EFNEP classes, thereby facilitating the voluntary adoption of exercise behaviors. The educational goal of this project was to promote

sustainable, moderate-intensity, leisure time physical activity among limited-resource adults.

The experimental design used in this investigation was driven by the Transtheoretical Model, which had been used for exercise interventions since the 1990s among diverse populations.⁽³⁴⁻³⁷⁾ This model provided a conceptual framework for identifying the patterns of study participants' experiences engaging in physical activity, and their motivational mechanisms, or stages, of exercise before and after exposure to the indoor-walking DVD.

Research Aim

The research aim of this project was to assess the viability of an indoor-walking DVD that promoted physical activity among limited-resource, diverse adults.

Hypotheses

This project had three research hypotheses.

Hypothesis 1: As a result of piloting the DVD in NJ SNAP-Ed/EFNEP classes, study participants' perceived barriers to engaging in physical activity will be reduced.

Hypothesis 2: As a result of piloting the DVD in NJ SNAP-Ed/EFNEP classes, study participants' physical activity behavior will show evidence of improvement according to the Transtheoretical Model.

Hypothesis 3: As a result of the DVD's use, which displaced some nutrition education in NJ SNAP-Ed/EFNEP classes, no difference will be found between control and experimental group study participants' intent to engage in healthy food- and nutrition-related behaviors.

Dissertation Format

Rutgers Graduate School-New Brunswick accepts dissertation formats with data chapters written in manuscript form ready for submission to peer reviewed journals. In this case, the following introduction and concluding chapters (Chapters 1-3 and 7) are written and referenced separately from the stand-alone data chapters (Chapters 4-6). The bibliography at the end of this dissertation is subdivided by the chapters. The reference lists for the data chapters are formatted according to the author guidelines of the intended journals footnoted in each chapter.

Summary

Limited-resource and minority populations have been identified as being at increased risk for diet-related chronic diseases, including obesity. Lack of appropriate levels of physical activity contributes to obesity in these populations. This preliminary research, regarding

the piloting of an indoor-walking DVD in NJ SNAP-Ed/EFNEP classes, was designed to assess one method to help nutrition educators address a major behavioral risk factor for obesity by providing education aimed at increasing physical activity among adults. Thus, the long-term goal of this project was to aid in the prevention and reduction of obesity via exercise DVDs that could be institutionalized in USDA nutrition education programs in a manner that can be sustained by program participants at home.

Chapter 2: Literature Review

In 2009, an indoor-walking, digital video disc (DVD) was produced with an ethnically, gender and age diverse cast with varying body shapes for use in community-level programs. To use the DVD as proposed was a novel approach for preventing obesity among limited-resource audiences. Thus, the purpose of this project was to assess the viability of using the DVD in NJ SNAP-Ed and EFNEP adult classes. This chapter reviews the literature on obesity, and physical activity and exercise interventions for adults.

Obesity and Energy Metabolism

As stated in Chapter 1, obesity has been defined as a complex disease of excess body fat.⁽¹⁻

³⁾ From 1985 to 2008, the Centers for Disease Control and Prevention (CDC) documented the increased prevalence of obesity in the US from one in ten to one in three adults.⁽¹²⁾

Overweight and obesity are most commonly evaluated and expressed in terms of Body Mass Index (BMI), or body mass in kilograms (kg) per height in meters squared (m^2).^{(12; 14;}

³⁸⁾ While BMI does not directly measure body fat, it has been correlated with body fat.⁽³⁹⁾

Obesity and its Related Outcomes

According to the World Health Organization (WHO) and the CDC, BMI may not be appropriate for use among muscular adults and some ethnicities.^(38; 39) However, in the US the CDC has recommended its use for targeting participants for community-level interventions.⁽⁴⁰⁾ A BMI between 18.5 kg/m^2 and 24.99 kg/m^2 has been classified as a

“healthy weight” and “normal” by the CDC and WHO, respectively. Those with a normal BMI have been found to have lower mortality rates than those who were underweight or overweight. BMI greater than 25 kg/m^2 and greater than 30 kg/m^2 , have been classified as overweight and obese, respectively.^(38; 39)

The mortality rates for obesity have been confounded by the mortality rates of other chronic diseases associated with obesity including cardiovascular disease, type 2 diabetes, stroke and some cancers.⁽⁵⁻¹⁰⁾ In 2000, researchers reanalyzed the existing data and narrowed the number of deaths from obesity, independent of other diseases, from 280,184 to 111,909 adults.^(41; 42) In a recent report, obese adults were found to be 7.37 times more likely to have type 2 diabetes, 6.38 times more likely to have high blood pressure, and 1.88 time more likely to have high cholesterol compared to normal weight adults.⁽⁴³⁾

Obesity and Energy Balance

In general, maintaining body mass has been attributed to maintaining energy balance, that is the amount of energy consumed in the form of food (diet) equaling the energy needed by the body to perform metabolic and physical activities. For example, the average male adult has been found to require 2500 kilocalories of energy per day (kcal/day). As such, a sustained positive energy balance (intake $>2500 \text{ kcal/day}$) would result in weight gain, and a sustained negative balance (intake $<2500 \text{ kcal/day}$) would result in weight loss.⁽⁴⁴⁾ Thus, both levels of food intake and activity come into play in the maintenance of energy balance.

Individual body composition and location of fat stores have been found to affect the efficiency of energy expenditure; however, the evidence has shown that individuals who consistently balance dietary intake with physical activity have prevented chronic weight gain, despite their body composition.⁽⁴⁴⁻⁴⁷⁾ Cohort studies among men have shown that energy expended through moderate physical activity, amounting to 2500 kcals per week, prevented weight gain.⁽⁴⁸⁾ Additionally, clinical trials among the overweight and obese have shown that a negative balance created by restricting calories and increasing physical activity resulted in beneficial weight loss including the loss of fat mass.⁽⁴⁹⁾ Obesity researchers have posited that small behavioral changes resulting in a 50 to 100 calorie deficit per day may be all that is needed to arrest weight gain in the current generation and to prevent obesity in the next.⁽⁵⁰⁾

Based upon the prevailing scientific evidence, “dietary and physical activity recommendations for healthful living are inextricably intertwined” such that “adequate physical activity provides protection against chronic diseases and helps to balance energy expenditure and intake.”^(45, p 921S) The first reference to physical activity occurred in the 1995 Dietary Guidelines; in 2000 it became an independent guideline (see Figure 2.1: Dietary Guidelines for Americans, 1980-2000).⁽⁵¹⁾ By 2005, the Guidelines included four recommendations advising physical activity to reduce risk of chronic disease, and improve health, and to manage and to sustaining weight loss.⁽⁵²⁾

Figure 2.1: Dietary Guidelines for Americans, 1980-2000

<u>1980</u>	<u>1985</u>	<u>1990</u>	<u>1995</u>	<u>2000</u>	
7 Guidelines	7 Guidelines	7 Guidelines	7 Guidelines	10 Guidelines, clustered into 3 groups	
Eat a variety of foods	Eat a variety of foods	Eat a variety of foods	Eat a variety of foods	Aim for a healthy weight Be physically active each day	Aim for Fitness
Maintain ideal weight	Maintain desirable weight	Maintain healthy weight	Balance the food you eat with physical activity—maintain or improve your weight		
Avoid too much fat, saturated fat, and cholesterol	Avoid too much fat, saturated fat, and cholesterol	Choose a diet low in fat, saturated fat and cholesterol	Choose a diet with plenty of grain products, vegetables, and fruits	Let the Pyramid guide your food choices	Build a Healthy Base
Eat foods with adequate starch and fiber	Eat foods with adequate starch and fiber	Choose a diet with plenty of vegetables, fruits and grain products		Choose a variety of grains daily, especially whole grains	
				Choose a variety of fruits and vegetables daily	
				Keep food safe to eat	
			Choose a diet low in fat, saturated fat and cholesterol	Choose a diet that is low in saturated fat and cholesterol and moderate in total fat	
Avoid too much sugar	Avoid too much sugar	Use sugars only in moderation	Choose a diet moderate in sugars	Choose beverages and foods to moderate your intake of sugars	Choose Sensibly
Avoid too much sodium	Avoid too much sodium	Use salt and sodium only in moderation	Choose a diet moderate in salt and sodium	Choose and prepare foods with less salt	
If you drink alcohol, do so in moderation	If you drink alcoholic beverages, do so in moderation	If you drink alcoholic beverages, do so in moderation	If you drink alcoholic beverages, do so in moderation	If you drink alcoholic beverages, do so in moderation	

Shading indicates how the order in which the guidelines are presented has changed over time.

Resource: Dietary Guidelines, 1980 to 2000 available at
http://www.health.gov/dietaryguidelines/1980_2000_chart.pdf

Overconsumption

Reports from the National Health and Nutrition Examination Survey, 1999-2000, showed that men who were 30 years of age consumed an average of 2,475 kcals/day.⁽⁵³⁾ All of those interviewed also usually consumed $\geq 20\%$ of their kcals/day as fat, alcohol and sugar.⁽⁵³⁾ In 2010, the Dietary Reference Intakes recommended that active men with BMIs in the normal range should consume 2215-3200 kcals/day. Inactive men should consume 1848-2635 kcals/day.⁽⁵⁴⁾ Similarly, women who were 30 years of age have been reported to consume an average of 1,833 kcals/day,⁽⁵³⁾ but it has been recommended that those who are inactive should consume 1625-2211 kcals/day.⁽⁵⁴⁾ In light of the prevalence of obesity

the addition of physical activity to counter-balance the average US caloric intake may be prudent.

Insufficient Physical Activity

Warburton and colleagues' review of 35 investigations (1984-2004) of the role of physical activity in chronic disease concluded that "there is irrefutable evidence of the effectiveness of regular physical activity in the primary and secondary prevention of several chronic diseases" including obesity, regardless of age, gender or race/ethnicity and suggested that those who adopt lifestyles which include regular, moderate-intensity physical activity lose weight.^(55, p 801) Thus, it is likely that increased activity levels are key to obesity prevention and reduction.

More than 60% of adults do not engage in the recommended amounts of physical activity, and 25% of adults are inactive.⁽⁵⁶⁾ These statistics, from the US Surgeon General's office in 1999, continued to be reported by the CDC's website in 2010, even though modest increases in physical activity were reported to have occurred among non-Hispanic white men between 2001 and 2005).⁽⁵⁷⁾ The CDC has suggested that caution should be taken when reviewing national physical activity statistics. Differences in format year to year on the National Health Interview Survey, such as recall timeframe and activity choices, may have been biased against minorities; thus, the BRFSS data could not be generalized to individual races.⁽⁵⁷⁾ While improvements in self-reported data collection would appear to be needed, the results of national surveys have adequately demonstrated that regardless of

age, gender or race/ethnicity Americans have not exercised enough to meet the goals of Health People 2020 that 30% of the population should engage in regular physical activity and that 80% of the population should engage in leisure time physical activity (LTPA).⁽¹⁴⁾

Obesity and Limited-resource, Diverse Adults

Between 1960 and 2004, those living in poverty were found to be at the greatest risk of obesity.^(13; 59) Historically, the majority of those living in poverty have been unemployed and low-income earning minorities and women.^(60; 61) Additionally, women's lower socioeconomic status has affected those for whom they care.⁽⁶²⁾ For example, BMIs have been correlated between woman and their children ($r=0.43$, $p=0.0002$).⁽⁶³⁾ Therefore, minorities and women, including those for whom they care, are at the greatest risk for obesity and chronic disease. For this research project, these *limited-resource, diverse adults* were identified as the target population.

Overconsumption Among Limited-resource, Diverse Adults

In many poor households a paradox has been observed.⁽⁶⁴⁾ In a study of 200 families, the "food insecure" were found to be 2.45 times more likely to be obese than the food secure.^(62, p 31) Several rationales explain why food insecurity, or a lack of access to sufficient, safe and nutritious food at all times, has been positively related to overweight among minorities and women.⁽⁶⁵⁻⁷⁰⁾ First, those with limited resources manage food such that "quality is reduced first, then quantity."^(67, p 14) In the neighborhoods of limited-resource, diverse adults, healthy foods, such as whole grains, fruits and vegetables, have

been perceived as expensive when they are available.⁽⁶⁷⁾ As a result, those living in poverty will purchase low-cost foods which are high in fat and sugar resulting in nutrient-poor, calorie-dense diets.⁽⁶⁵⁻⁷⁴⁾ Second, parents have been found to affect the food choices and eating behaviors of their children.^(75; 76) Parents' modeling of dietary behaviors has been identified as a "clear influence" on child behaviors^(76, p 269) Parental pressure overriding children's internal cues to regulate their dietary intakes may be another,^(77; 78; 81; 82) as children of obese parents have also been observed to be overweight.⁽⁶²⁾ Independently or interactively, these factors may play a role in overconsumption by limited-resource, diverse adults.

Lack of Physical Activity Among Limited-resource, Diverse Adults

Similar to the obesity statistics, income and education have been associated with levels of physical activity.^(14; 56; 57; 80; 81) It has been generally accepted that activity has been lower among minorities and women than among non-Hispanics and white males.⁽⁵⁷⁾ Further, according to the CDC non-Hispanic whites (32%) more often engage in regular physical activity three times a week or more compared to non-Hispanic African Americans (23%) and Hispanics (23%), two minorities that have been over-represented among limited-resource audiences.⁽⁵⁷⁾

There has been research suggesting that significant improvements in physical activity were observed between 2001 and 2005 among minorities compared to non-Hispanics. Physical activity improved among non-Hispanic African American men by 12.4%, from 40.3% to

45.3%, and among non-Hispanic African American women by 15.0%, changing from 31.4% to 36.1%. Physical activity also improved among Hispanic women 11.6%, changing from 36.3% to 40.5%. Among non-Hispanic white men and women, physical activity improved at a slower rate, that is 3.4%, from 50.6% to 52.3% and 7.8%, from 46.0% to 49.6%, respectively.⁽⁵⁷⁾ Again, however, the CDC has cautioned that this data had limitations. For example, “the various surveys differ in the means by which they were conducted, in the wording of questions, in the time of year administered, in population sampling frames, in response rates, and in definitions of physical activity.”^(79, p 177) Regardless, even if these findings are true, activity rates among these minority populations remain lower than those among non-Hispanic whites.

In some of these studies above, physical activity included all activities performed throughout the day, including activity reported at work. However, a lack of LTPA also relates to higher rates of obesity.^(79; 80) The Physical Activity Guidelines have encouraged LTPA, that is, planned exercise not part of work or home activities, to achieve cardiovascular fitness.⁽³²⁾ Once again, limited-resource adults of all races/ethnicities have been identified as the least likely to engage in LTPA, but especially Mexican-Americans, non-Hispanic African Americans, and women.^(79; 80) The National Health and Nutrition Examination Survey and the National Health Interview Survey provided the baseline statistics reported in Healthy People 2010, that is, among adults (≥ 18 years old) more than half of the non-Hispanic African Americans (52%) and Hispanics (54%) did not engage in any LTPA.⁽³⁾ Additionally, the 2007 BRFSS survey showed fewer women (74%) than men

(78%) self-reported engagement in LTPA, which was described as “running, calisthenics, golfing, gardening, or walking.”⁽⁷⁹⁾

Therefore, the documented evidence has shown that obesity rates, and insufficient physical activity rates have been highest among low-income, minority audiences. Since the focus of this work addresses the challenge of increasing physical activity among limited-resource, diverse adults in New Jersey, the remainder of this literature review will be limited to physical activity with special attention given to literature pertinent to the target audience.

Physical Activity Guidelines for Americans

Since the late 1990s, the relationship between fitness and body fatness to disease found in epidemiologic studies has been questioned in that physical fitness has continued to be associated with the risk of mortality within the US population, that is all-cause mortality.⁽⁸¹⁻

⁸³⁾ In 2002, the President’s Council on Physical Fitness and Sports was chartered and began to advise that “moderate daily physical activity can reduce substantially the risk of developing or dying from cardiovascular disease, type 2 diabetes, and certain cancers, such as colon cancer.”⁽⁸⁴⁾

The US Department of Health and Human Services and the United States Department of Agriculture (USDA) jointly published physical activity recommendations in the 2008 Physical Activity Guidelines for Americans.⁽³²⁾ These guidelines were the first to provide the daily duration and intensity of physical activity to be performed from adolescence

through adulthood in a single source and reflected the evidence-based physical activity recommendations developed concurrently by the CDC, the American College of Sports Medicine, the American Heart Association, and the American Diabetes Association. In general, adults should engage in at least 30 minutes of moderate-intensity physical activity, above their usual activity, at work or home most days of the week.”^(32; 85-91)

According to multiple national organizations, the evidence suggested that inactive adults should work towards reaching a minimum of 150 minutes of moderate-intensity exercise per week, and those seeking to lose weight should reduce their intake by 300-500 kilocalories per day or exercise up to 300 minutes per week while or.^(86-89; 92; 93) The 2008 Physical Activity Guidelines added, “...or an equivalent combination of moderate- and vigorous-intensity aerobic activity.”^(32, p vii)

Physical Activity Interventions for Adults

A search for physical activity inclusive nutrition education interventions conducted between 2000 and 2009 was performed using PubMed, GoogleScholar, and relevant “.gov” and “.org” websites, including the websites of the CDC and the USDA National Institute of Food and Agriculture. The key words used were: nutrition education, physical activity, adults, poverty, lifestyle, and words describing various chronic diseases.

Physical Activity Programs among Limited-resource, Diverse Adults

In 2005, the USDA spent \$600 million on nutrition education for the underserved, mostly minorities and women. Education to increase consumption of low calorie, nutrient rich fruits and vegetables as replacements for foods higher in fats and sugars has been provided through: the Child Nutrition Program, the Eat Smart, Play Hard campaign, the Farmer's Market Nutrition Programs, the Supplemental Nutrition Assistance Program, the Fresh Fruit and Vegetable Program, Food Distribution Programs, the Special Supplemental Nutrition Assistance Program for Women, Infants and Children, and Team Nutrition. However, more inclusive federal programs, that is, those including physical activity, have been limited. For example of all the educational programs listed above, only the Eat Smart, Play Hard campaign had a substantial physical activity component; but, it was designed for families, that is adults and their children, instead of adults only.⁽⁹⁴⁾

Comparable in size to those of the USDA was the "Well-Integrated Screening and Evaluation for Women across the Nation" (WISEWOMAN) projects.⁽¹⁰⁴⁾ Even though physical activity was found to be a small component of the WISEWOMAN projects, it was one of the most significant inclusive community programs targeting diverse adults that could be found in the scientific literature.

WISEWOMAN. WISEWOMAN projects were funded by the CDC in communities throughout 14 states. Each project used different lifestyle interventions to improve health behaviors to prevent or delay chronic diseases among disadvantaged

women. WISEWOMAN was significant because of its investigation of the various approaches to promoting physical activity, including: the provision of discount passes to a community swimming pool, computer-generated tailored health messages, and organized exercise groups.⁽⁹⁶⁻¹⁰⁰⁾ Of all the projects' interventions, using trained counselors to promote physical activities appeared to be WISEWOMAN's most effective strategy.

One example of the program in Arizona specifically targeted Hispanic women over the age of 50 for cancer screening, but also provided health education counseling.⁽⁹⁸⁾ According to Staten and colleagues, WISEWOMAN Arizona resulted in increased levels of physical activity among its participants.⁽⁹⁸⁾ Similarly, the Massachusetts project specifically targeted uninsured women for cardiovascular screening, but also provided physical activity counseling. According to Stoddard and colleagues, WISEWOMAN Massachusetts resulted in a significant increase in physical activity among its participants.⁽⁹⁹⁾

Additionally, the "New Leaf" enhancement of WISEWOMAN projects showed promise. First implemented in North Carolina, counselors helped participants develop their own practical strategies for including daily physical activity in their lives. California's "Vida Saludable, Corazon Contento," and Alaska's "Traditions of the Heart" mirrored New Leaf but were more culturally appropriate. In Connecticut, South Dakota, and Vermont, "Active Living Every Day" was a similar WISEWOMAN enhancement that used group counseling specifically among older adults.⁽⁹⁷⁾ Overall, Marcus and colleagues reported in their review of these WISEWOMAN projects that physical activity increased among all participants.⁽²¹⁾

Marcus and colleagues concluded from their studies that “given the many benefits of physical activity and the low prevalence rates [of adequate physical activity among adults earning low incomes], it is imperative that interventions be designed to effectively promote the adoption and maintenance of active lifestyles in large numbers of people.”^(21, p 2748) As previously stated, few adult programs other than WISEWOMAN extensively reported on the impact of physical activity in the literature, and fewer programs were found among the underserved. For example, a multi-state survey of the characteristics of over 2,110 exercise programs across the US, revealed that they served primarily older adults, only reached an average of 10.7% adults earning low incomes, and did not consistently include adult minorities.⁽¹⁰¹⁾

USDA Programs. Nationally, SNAP-Ed and EFNEP serve families in every state who receive supplemental nutrition assistance, formerly food stamps, and other forms of public assistance as determined by the poverty threshold. The impact of these programs has been that for every dollar spent on nutrition education, over \$10 was saved in national health care costs.⁽¹⁰²⁾ Therefore, physical activity has become an additional component driven into federal nutrition education.⁽²⁵⁾

Most notable of the programs charged with addressing federal nutrition education guidance was EFNEP’s curriculum, “Eating Smart; Being Active,” which included a supplemental booklet depicting muscle resistance exercises using inexpensive stretch bands. However,

the booklets and bands were originally meant to be distributed to program participants for their own use rather than integrated into the lessons.⁽¹⁰³⁾ Another USDA funded program, “Wellness in the Rockies, A New Day: Health for Every Body,” provided experiential fitness lessons for adults. However, this intervention was solely reliant on group discussions.⁽¹⁰⁴⁾ Thus, both of these programs relied on knowledge-based rather than behavioral-change paradigms, which have been documented as being less effective.^(14; 21-24)

New Strategies in Adult Physical Education

An alternative strategy recommended by the CDC has been to use lay leaders trained by certified fitness instructors to engage older adults in physical activity.⁽¹⁰⁵⁾ A secondary search of the literature using the key words “trained instructor” revealed that, as recently as 2009, millions of dollars have been spent primarily by private foundations to support professionally-led, as opposed to lay leader-led, aerobic, strength training and Tai chi classes for low-income, medically underserved adults.⁽¹⁰⁶⁾

Most notable was “Healthy Weight/El Camino Saludable.” Funded by the United Way as a grassroots approach to partner a community with a university, low-income minority families were targeted with nutrition and physical education classes taught according to the Dietary Guidelines for Americans. The physical activity lessons included walking, low impact aerobics, and chair exercises led by trained aerobics instructors.⁽¹⁰⁷⁾

Lessons Learned from Previously Designed Interventions

Marcus and colleagues' review of 128 physical activity interventions found "scant" literature among underserved adult populations.^(21, p 2741) The three studies of effectiveness they described were "sparse and fraught with methodological problems" making their evaluation difficult.^(21, p 2747) Similarly, Hughes and colleagues found nearly all the samples of 2110 studies were taken among the upper-middle class and have taken place in university or health care settings.⁽¹⁰¹⁾ Banks-Wallace and Conn pointed out that of the 18 studies among African American women they reviewed, few used rigorous study design.⁽²⁷⁾ Additionally these investigators found most interventions did not randomize study participants, have control groups, use valid and reliable instruments, or have comparable timeframes.^(21; 27) According to Finkelstein and colleagues, even evaluations of WISEWOMAN could not be generalized because of a lack of statistical power and inconsistent outcome measures.⁽¹⁰⁰⁾ The CDC's Task Force on Community Preventive Services found that of the 6,238 physical activity studies that took place between 1980 and 2000, few were found to be effective models for informing the design of future physical activity interventions.⁽¹⁰⁸⁾

Theories and Models Used in Physical Activity Interventions

Theories and models are useful for driving the design and evaluation of interventions. The CDC identified that the most often used behavioral change theories and models used to change physical activity behavior were: the Health Belief Model, the Theories of

Reasoned Action and Planned Behavior, the Social Cognitive Theory, Ecological Models, and the Transtheoretical Model.⁽¹⁰⁹⁾

Health Belief Model (HBM)

The HBM was developed in the 1950s by psychologists working for the US Public Health Service to explain why people did not follow their physicians' recommendations when faced with a health issue or disease.⁽¹⁰⁹⁾ The conceptual framework of the model was based upon a value expectancy theory, that is learning the risk and seriousness of a behavior will be perceived by an individual as a threat to one's health and will cause a change in behavior to reduce or prevent the threat. The theoretical constructs, or components, of the HBM include one's perceived susceptibility to a threat, perceived severity of a threat, perceived benefits and barriers to performing a behavior which will reduce or prevent a threat. As the model was used, the constructs of cues to action and self-efficacy were added to explain what triggered a behavior and one's perceived ability to engage in a behavior, respectively.⁽¹⁰⁹⁾ A limitation of the HBM is that it does not include the effect of social influences on behavior.⁽¹¹⁰⁾

Theory of Reasoned Action (TRA)

The TRA was developed in the 1970s by Fishbein and Ajzen.^(111; 112) The conceptual framework of this theory was based upon intention as a predictor of individual behavior. The constructs of the TRA include one's attitude towards performing a behavior, and perceived subjective norms, that is personal and social importance given to a behavior. A

limitation of the TRA is that it does not include the effect of an individual's belief that the behavior can be performed.^(111; 112)

Theory of Planned Behavior (TPB)

Ajzen later extended the conceptual framework of the TRA to include the construct of perceived behavioral control, that is a concept similar to self-efficacy. A limitation of the TRA and TPB is that they do not include the effect of personal agency, that is freewill.⁽¹¹³⁾

Social Cognitive Theory (SCT)

The SCT was developed from learning theory in the 1980s by Bandura.⁽¹¹⁴⁾ The conceptual framework for the theory was based on social learning theory and reciprocal determinism, that is the equally shared affect of multiple determinants of behavior. The constructs of the SCT include the cognitive and biological individual, the individual's behavior, and the environment surrounding the individual. As the theory was used, the constructs of outcome expectations, outcome expectancies, behavioral capability, observational learning or modeling, self-efficacy, reinforcement, self-regulation or self-control, and emotional control were added to explain behavior.⁽¹¹⁵⁾ A limitation of the SCT is that it is difficult for researchers to develop interventions which use the model in its entirety.⁽²¹⁾

Ecological Models

The primary constructs of Ecological Models include spheres, or layers, of influence on behavior beginning from within an individual, that is the intrapersonal sphere, and

progressing outward, to the interpersonal relationships sphere towards the affect of the community and public policies spheres on behavior. According to the CDC and Glanz and co-authors, the limitation of ecological models is that it is difficult for researchers to develop interventions which use them in their entirety.^(85; 109)

Transtheoretical Model (TTM)

The TTM was developed in the 1980s by Prochaska and DiClemente, and is characterized by a conceptual framework based on behavior change as a series of stages. The five constructs of the TTM, or an individual's stages of change, include:

1. Pre-contemplative, that is, not considering a change;
2. Contemplative, that is, being aware of a threat to health but not taking any action;
3. Preparation, that is making changes to prepare to act out a specific behavior;
4. Action, that is, engaging in a specific behavior to reduce or prevent a threat; and,
5. Maintenance, that is, repeatedly acting out a specific behavior over time.

As the model was used, ten common processes of change were added to explain the cognitive and behavioral experiences of individuals as they progressed through the stages of change, for example, from pre-contemplation to contemplation and to preparation.^{(116;}

¹¹⁷⁾ A limitation of the TTM is that it originally explained behavioral change as a linear process without regressions.⁽¹⁰⁹⁾ However, the TTM was found to be the most often used theory by researchers for tailoring physical activity interventions among diverse adult populations.^(26-28; 85; 117-121)

Transtheoretical Model and Exercise Behavior

While all theories and models have various benefits for use in physical activity research, the conceptual framework of the TTM provides the motivational mechanisms an individual goes through during cognitive-behavioral change.^(116; 117) Based upon the literature, the model has been conceptualized below in Figure 2.2 and described in detail for promoting the recommended amounts of physical activity, that is moderate-intensity exercise performed at least 30 minutes per day, most days of the week.^(118; 122-126)

Stages of Exercise

Individuals have been successfully matched to five stages of exercise which have been validated against levels of exercise adoption, energy expenditure and cardio-respiratory fitness.^(26; 37; 117; 121-125)

Stage 1. “Pre-contemplative” individuals are those who have not considered the importance of physical activity to their health and are consequently sedentary. For example, pre-contemplators do not regularly participate in LTPA, or are not cognizant of the prevailing recommendations for physical activity.

Stage 2. “Contemplative” individuals are those who are contemplating exercising, have become aware of the benefits of physical activity, and are consequently gathering information from authority figures, friends, family, or the media. For example, as one learns and accepts that exercising is a means of preventing weight gain or disease, contemplators would be expected to become cognizant of national recommendations to exercise.

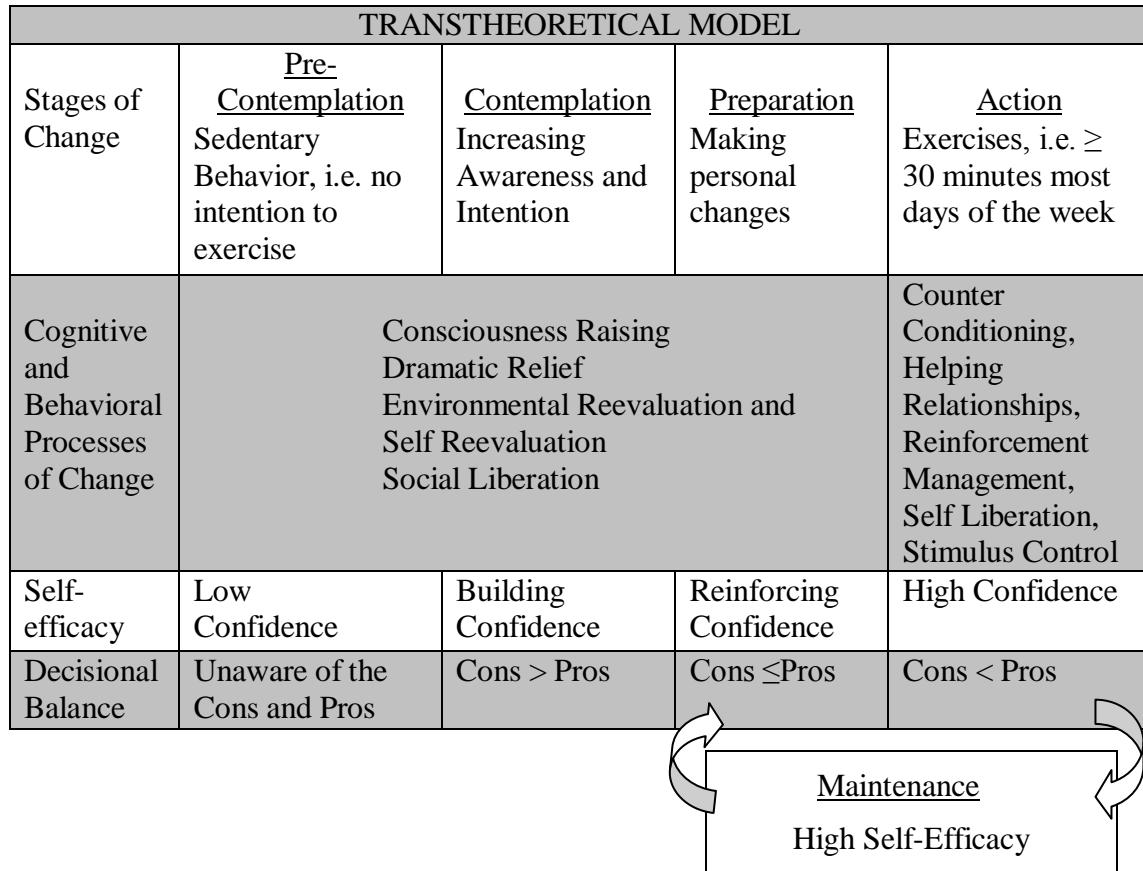
Stage 3. Individuals in “preparation” are those who have accepted that physical activity is important for maintaining or improving their health will begin to make personal changes in preparation for incorporating physical activity into their daily lives. For example, individuals may prepare by buying a pair of running shoes or exercise clothes, setting a date to exercise or signing up for a class, or making space at home for exercise equipment. Those in the preparation stage may increase their physical activity or sporadically exercise in response to strong cues, such as beautiful outdoor weather, but have not consistently exercised according to the recommendations (the measurable outcome in this example).

Stage 4. Individuals in “action” are, for example, those who do engage in moderate physical activity for 30 minutes or more most days of a week.

Stage 5. Individuals in “maintenance” are, for example, those who engaged in moderate physical activity most days of the week over time and remain active despite experiencing new and recurring barriers to exercise.

When the stages are temporally defined: pre-contemplating individuals have no intention to exercise at all; contemplating individuals intend to start exercising within the next six months; individuals in preparation intend to begin exercising regularly within the next 30 days; individuals in action have been exercising regularly for six months or less; and individuals in maintenance have been exercising for six months or more.⁽¹¹⁷⁾

Figure 2.2: Transtheoretical Model and Exercise Behavior



Processes of Change

Throughout the stages of exercise, individuals have been found to experience ten common cognitive and behavioral processes.

1. Pre-contemplative individuals are most likely to experience “consciousness raising” or increased awareness of the importance of exercising to maintain or improve their health. For example, health caregivers who provide pamphlets to their patients describing symptoms of their health conditions which can be ameliorated by increased physical activity may encourage the patients to learn more about the benefits of exercising.

2. Pre-contemplative individuals are also likely to experience “dramatic relief” when they are affected by someone else’s experience with exercising. For example, health educators who facilitate discussions among aging adults using examples of those who have exercised regularly and had enhanced quality of life may inspire class participants to learn more about being active.

3. Contemplative individuals are most likely to experience “environmental reevaluation” or to assess how their surroundings support their behavior. For example, a documentary on obesity may cause an individual to seek the location of their closest gym, city park, or childcare.

4. Contemplative individuals are also likely to experience “self reevaluation” or to imagine exercising as a different self-image. For example, a dietitian who assigns clients to keep activity diaries may promote their reflection on how exercise is related to a personal feeling of health.

5. While preparing to exercise regularly, individuals may experience “social liberation,” that is to think about exercise as a lifestyle change. For example, a local recreation center offering free introductory exercise classes may help individuals find role models to emulate.

6. Individuals in action are most likely to experience “counter-conditioning” or increased recognition of the benefits of exercising. For example, the longer individuals are in a recovery program with a mandatory recreation hour the more they may find that exercising prevents boredom and relapses in unhealthy behavior.

7. Throughout the stages of change, individuals who are aware of the importance of physical activity will seek “helping relationships” or the support of others to begin or maintain their behavior. For example, individuals may join a blog established by the makers of an exercise product and may find other people with similar interests which they continue to write to for support.

8. Throughout the later stages of change, individuals who are aware of the benefits of physical activity will experience “reinforcement management,” that is, to continue receiving the rewards of exercising. For example, an individual may set a personal goal to participate in a community 5K race which may result in receiving a free t-shirt from the organizers.

9. Throughout the later stages of change, individuals who are aware of the benefits of physical activity will experience “self liberation,” that is to make commitments to exercise. For example, a group therapist uses goal setting exercises which may help individuals begin exercising.

10. Individuals in action will experience “stimulus control,” that is replace cues to be sedentary with cues for taking action which can include changing friends and environments. For example, a corporate wellness program that encourages the formation of walking groups may provide employees with the support they need to exercise regularly together during lunch.

Few researchers have attempted to use the processes of change to match individuals to the stages of exercise. However, Findorff and colleagues added to the literature with their

findings among sedentary women that during the earlier stages of change (pre-action) individuals utilize more cognitive processes and during the later stages of change (action) individuals experience more behavioral processes.⁽¹¹⁹⁾

Barriers to Exercise

According to the American Diabetes Association, those who are not active give at least one reason why.⁽¹²⁹⁾ In one study, more than half of the participants (63%) expressed that a “lack of time” was their primary barrier.⁽¹³⁰⁻¹³²⁾ Other common objections have included a lack of: proper clothing, equipment, family support, transportation, confidence, energy, fitness or health, and places to workout with convenient schedules.⁽¹³²⁻¹³⁴⁾ For some, especially mothers, the lack of affordable childcare has been a factor.^(26; 70; 133) For others, exercise has been perceived as simply un-enjoyable.⁽¹³⁵⁻¹³⁷⁾ To a lesser extent, the weather has been identified as an environmental barrier, which may be more significant for immigrants who have moved from one climate to another.^(26; 138-141)

The majority of the literature addressing limited-resource, diverse adults and exercise barriers has consisted of epidemiological studies focused on assessing correlations between environmental variables and LTPA.⁽¹⁴³⁻¹⁴⁹⁾ Compared to more affluent neighborhoods, limited-resource neighborhoods have been found to have more crime, neighbors who fear one another, uneven sidewalks, and roaming dogs.⁽¹⁴⁵⁾ Also, those living in limited-resource neighborhoods have been found to have “more depressing” facilities and poorer physical activity education programs.⁽¹⁴³⁾ The distance to public recreation facilities, parks

and trails, especially without transportation, may be other barriers that are compounded by a society that has promoted sedentary behaviors.⁽¹⁴⁵⁾

However, the literature has also shown some contradictions regarding environmental barriers and their effects on particular people. For example, most of those living in limited-resource neighborhoods with the aforementioned barriers to physical activity were African Americans;^(145; 147) yet African Americans, in other works, have indicated that walking, presumably outdoors, was their primary form of exercise and their preferred LTPA.^(57; 140)

Select Measures Used in Physical Activity Interventions

According to the literature, prior to 2000, cardio-respiratory fitness was the primary research interest studied in clinical settings.^(45; 48; 52; 55; 81-83; 85; 150; 151) The common measures of change in physical activity and fitness included: energy expenditure, maximum oxygen uptake, heart rate during fitness tests, and actual or self-reported activity using daily logs, pedometers, accelerometers or surveys. Most of the beneficial effects of physical activity were seen with moderate- to high-intensity exercise. Thus, researchers have been looking for instruments to measure the minimum dose effect of low-intensity exercise which maintains good health among sedentary and/or overweight and obese adults.⁽¹²⁵⁾

Since 2000, measures have been put into place for use in community settings among diverse populations. As such “half of the studies employed measures of physical fitness

other than physical activity”^(150, p e26) and fitness including: changes in anthropometrics; body composition; biological markers including glucose, insulin, lipids, and c-reactive proteins; and, psychometric testing.^(152; 153) However for research in community settings, instruments need to be sensitive, inexpensive, portable, and easy to use in community settings.^(35; 125)

Physical Measures Associated with Walking Interventions

As adults age, reduced walking speed has been correlated with the body’s functional and physiological changes.⁽¹⁵⁵⁾ Brisk walking, that is moderate- to high-intensity exercise reaching 70-85% maximum heart rate, has been found to decrease the risk factors of cardiovascular disease, including high blood pressure.^(32; 156-159) However, more research is needed among the sedentary and obese.⁽¹⁶⁰⁻¹⁶²⁾

Heart Rate. Exercise intensity has been measured by heart rate, or heart beats per minute, which has been validated against treadmill tests for maximum oxygen uptake (Pearson Correlation, $r=0.84$; Test-retest reliability, $r=0.98$).⁽¹⁶³⁾ An age-adjusted formula has been accepted for use to calculate the targeted heart rate range for moderate-intensity exercise, that is 70-85% maximum heart rate, during exercise: $([220 - \text{age}] \cdot .70)$ to $([220 - \text{age}] \cdot .85)$.⁽¹⁶⁴⁾

Blood Pressure. Blood pressure has been found in epidemiologic studies and reviews of clinical research trials to change among diverse adults after engaging in low- to

moderate-intensity physical activity.⁽¹⁶⁴⁾ One review of clinical research trials showed that physical activity has an independent capacity to lower blood pressure in interventions as short as four to eight weeks.⁽¹⁶⁵⁾ Systolic blood pressure has been observed among adults with normal pressure participating in a self-paced walking programs.^(166; 167) In another review, both systolic and diastolic blood pressures were found to be reduced in sedentary, minority women, even when no changes in BMI were evidenced.⁽⁹⁹⁾ Measuring blood pressure is non-invasive, and has been used in studies with large samples among free-living subjects.⁽¹⁶⁷⁾

Psychometric Measures Associated with the Transtheoretical Model

To summarize the theoretical framework of the TTM, individuals between the stages of pre-contemplation and contemplation have been found to experience greater emotion and increased awareness through consciousness raising or dramatic relief. From contemplation to preparation, individuals have been found to experience a reevaluation of themselves and their environment and to perceive social changes of acceptance of exercising as they begin weighing the pros (benefits) and cons (barriers) of engaging in physical activity. Those in the later stages of change, that is, action and maintenance, have been found to engage in other behaviors which control, support, substitute, reward and commit to exercising.⁽¹¹⁷⁾

Stage of Exercise. In the 1990s, Marcus and colleagues developed a single question about physical activity stage- match behaviors (Test re-test reliability=0.59).⁽³⁶⁾ The measure originally tested in a community setting asked participants, “What is the one

item that best describes you? I'm not very active, I don't exercise and I don't plan to; I've been thinking about being more active but I just can't get started; I exercise once in awhile but could do more; I've started exercising regularly but it's tough to keep up.”⁽³⁵⁾

Exercise Experiences. The Stages of Change: Continuous Measure (Cronbach's $\alpha=0.50$) has been used to measure, in 28 questions, progression through ten cognitive and behavioral processes, or experiences, throughout the stages of exercise using a 5-point Likert-type Scale.⁽¹⁶⁸⁾ The instrument is detailed Table 2.1 at the end of this chapter.

Decisional Balance. The Exercise Benefits/Barriers scale (Cronbach's $\alpha=0.95$) has been widely used in research to measure, in 42 questions, the theoretical constructs of perceived pros (benefits) and cons (barriers) of engaging in physical activity according to the Transtheoretical Model.⁽¹³²⁾ While the scale was developed in the 1980s in a health care setting in the Midwest, the Barriers subscale has since been used among limited-resource, diverse adults.⁽²⁶⁾ Both subscales are detailed in Table 2.2 at the end of this chapter.

Summary

This literature review focused on obesity, physical activity and exercise interventions for adults. Overall, the evidence has suggested that the promotion of walking as LTPA improves intervention effectiveness by improving participants' self-efficacy, that is the confidence to engage in physical activity.^(32; 130; 160; 167) The literature clearly pointed towards the need for developing behavior change strategies more-inclusive of physical

activity among larger, more diverse audiences.^(21; 101; 108) It also suggested that use of the Transtheoretical Model was appropriate for guiding the design and evaluation of such interventions.^(34-37; 85)

Of the programs for adults currently in place, national, federally funded nutrition education programs, such as SNAP-Ed and EFNEP, appeared likely to have the greatest potential to impact obesity by implementing more behaviorally focused, that is experiential, physical education. Thus, an indoor-walking DVD was produced to assess its viability in nutrition education classes and its acceptability among limited-resource, diverse adults.

Table 2.1: Exercise Stages of Change – Continuous Measure

1. Consciousness Raising Sub-scale
I read articles about exercise in an attempt to learn more about it.
I look for information related to exercise.
I find out about new methods of exercising.
2. Dramatic Relief Sub-scale
I get upset when I see people who would benefit from exercise but choose not to exercise.
I am afraid of the consequences to my health if I do not exercise.
I get upset when I realize that people I love would have better health if they exercised.
3. Environmental Reevaluation Sub-scale
I realize that if I don't exercise regularly, I may get ill and be a burden to others.
I think that my exercising regularly will prevent me from being a burden to the healthcare system.
I think that regular exercise plays a role in reducing health care costs.
4. Self-reevaluation Sub-scale
I feel more confident when I exercise regularly.
I believe that regular exercise will make me a healthier, happier person.
I feel better about myself when I exercise.
5. Social Liberalization Sub-scale
I have noticed that many people know that exercise is good for them.
I am aware of more and more people who are making exercise a part of their lives.
I have noticed that famous people often advertise the fact that they exercise regularly.
6. Counter Conditioning
When I feel tired, I make myself exercise anyway because I know I will feel better afterwards.
Instead of taking a nap after work, I exercise.
Instead of relaxing by watching TV or eating, I take a walk or exercise.
7. Helping Relationships Sub-scale
I have a friend who encourages me to exercise when I don't feel up to it. I have someone who encourages me.
My friends encourage me to exercise.
8. Reinforcement Management
One of the rewards of regular exercise is that it improves my mood.
I try to think of exercise as a time to clear my mind as well as a workout for my body.
If I engage in regular exercise, I find that I get the benefit of having more energy.
9. Self-liberation Sub-scale
I have noticed that many people know that exercise is good for them.
I am aware of more and more people who are making exercise a part of their lives.
I have noticed that famous people often advertise the fact that they exercise regularly.
10. Stimulus Control Sub-scale
I keep a set of exercise clothes conveniently located so I can exercise whenever I get the time.
I use my calendar to schedule my exercise time.
I make sure I always have a clean set of exercise clothes.

Resource: Cancer Prevention Center Measures Exercise: Stages of Change Scale available at <http://www.uri.edu/research/cprc/Measures/Exercise03.htm>

Table 2.2: Exercise Benefits/Barriers

Exercise Pros (Benefits Sub-scale)	Exercise Cons (Barriers Sub-scale)
<ol style="list-style-type: none"> 1. Is enjoyable; 2. Decreases stress and tension; 3. Improves mental health; 4. Prevents heart attacks; 5. Increases muscle strength; 6. Gives sense of personal accomplishment; 7. Relaxing; 8. Provides friendships; 9. Prevents high blood pressure; 10. Increases physical fitness; 11. Improves muscle tone; 12. Improves cardiovascular system; 13. Increases feelings of well being; 14. Increases stamina; 15. Improves disposition; 16. Improves sleep at night; 17. Increases longevity; 18. Decreases fatigue; 19. Is a good way to meet new people; 20. Increases physical endurance; 21. Improves self-concept; 22. Increases mental alertness; 23. Normal activities done without tiredness; 24. Improves quality of life; 25. Is good entertainment; 26. Increases acceptance of others; 27. Improves overall body functioning; and 28. Improves how the body looks. 	<ol style="list-style-type: none"> 1. Takes too much time; 2. Is tiring; 3. Places to exercise are too far away; 4. Is embarrassing; 5. Fatiguing; 6. Cost too much money; 7. Facilities' schedules are not convenient; 8. Takes time from family relationships; 9. Spouse does not encourage; 10. Takes time from family responsibilities; 11. Others look funny in exercise clothes; 12. Family members do not encourage exercising; 13. Is hard work; and 14. Places to exercise are too few.

Resource: Exercise Barriers/Benefits Scale available at
<http://www.nursing.umich.edu/faculty/penderinstruments/EEBS.pdf>

Chapter 3: Methods

The goal of this project was to examine the viability of using an exercise DVD to provide physical activity education in nutrition classes among limited-resource; diverse adults. To accomplish this goal, an exercise DVD produced with a diverse cast demonstrating moderate-intensity walking indoors was piloted into NJ SNAP-Ed/EFNEP classes by paraprofessional educators. The research protocol was approved by Rutgers Office of Research and Sponsored Programs Institutional Review Board (#09-226M).

Study Design

A randomized, repeated measures design was employed. Data were collected using survey instruments administered pre- and post-intervention. Collection took place according to the seasonal schedule of NJ SNAP-Ed/EFNEP adult classes. As such the DVD was piloted during spring 2009, fall 2009, and spring 2010, which are Phases I, II, and III of the research protocol, respectively. In general during Phase I, the target population was identified, that is limited-resource, diverse adults from NJ SNAP-Ed/EFNEP adult classes were characterized by socio-demographics, exercise experiences and behaviors, BMI and blood pressure. Also in Phase I, changes in study participants' barriers to exercise began to be measured in both the control and experimental groups. In Phase II, changes in study participants' stage of exercise according to the Transtheoretical Model began to be measured in both the control and experimental groups. In Phase III, only changes in stage of exercise were measured in an experimental group.

Setting

Most often NJ SNAP-Ed/EFNEP adult classes are scheduled by program supervisors for eight weeks at sites which provide public assistance to limited-resource, diverse adults, such as county social services offices, drug and alcohol rehabilitation centers, job training and general education programs. The host sites provide intact groups of participants and classroom space in exchange for nutrition education provided to their groups by NJ SNAP-Ed/EFNEP paraprofessionals.

Class Selection

To recruit classes for this project, an email was sent out from the NJ SNAP-Ed Director/EFNEP Coordinator to all NJ SNAP-Ed/EFNEP supervisors to request adult class participation (see Attachment 1: Example Email Solicitation). Multiples of two adult classes were needed to be randomized into the control and experimental groups. Classes were included if:

- The two adult classes were taught in the same county.
- The same paraprofessional educator taught the matched classes (control and experimental).
- The classes were scheduled for a minimum of six weeks.

Additionally:

- Matched classes that were scheduled on the same day in the same building had to be separated to minimize group contact such that the matched classes were held

either in different classrooms or scheduled with a break in time between the two classes.

- The paraprofessional educators could not be DVD cast members so study participants would not change their behavior to please their educators if they recognized them in the DVD.

Unmatched classes from different counties could be included if:

- The classes were in two geographically similar counties, either both in urban or both in rural locations.
- The classes served the same populations, for example, demographically similar counties in race and ethnicity.
- One paraprofessional educator traveled between the counties to teach the matched classes.

As they were recruited, matched classes were randomized into control and experimental groups. The control groups received the traditional SNAP-Ed or EFNEP adult nutrition curriculum. The experimental groups received the traditional curriculum plus exposure to the exercise DVD.

Control Group. Standard protocol for NJ SNAP-Ed/EFNEP adult classes is for paraprofessional educators to conduct a series of six nutrition classes within four, six, or eight weeks. Classes are for one to two hours depending upon the number of weeks in a series and the needs of the host sites. Typically, the first class is administrative. All the

educators must collect socio-demographic and dietary intake data from new program participants using SNAP-Ed /EFNEP forms (see Attachment 2: Getting to Know You and Attachment 3: 1-Day Diet Recall).

Before the start of the first class, the educators introduce class participants to more than a dozen nutrition topics in the traditional curriculum which is based upon the US Dietary Guidelines. The topics which interest the participants most, usually determined by a vote, guide the series of classes. For example, one class may be most interested in learning to make snacks with their children, while another class may be most interested in learning to cook or managing their weight. Thus, the educators organize varying combinations of basic nutrition lessons for each series that they teach. The first nutrition class in a series always introduces My Pyramid. The subsequent classes which are determined by the participants are designed to provide experiential learning opportunities to improve participants' food- and diet-related behaviors.

The last class is again administrative when the educators again collect dietary intake data from the class participants. Those who attend six different nutrition classes graduate and earn a certificate of completion. There is no requirement for participants to attend classes consecutively.

Experimental Group. Classes randomized into the experimental group followed the standard protocol for NJ SNAP-Ed/EFNEP adult classes. However, the traditional

curriculum was shortened by 15-20 minutes to allow for physical activity education via the DVD at the end of each class. Before exercising, class participants in the experimental classes were required to view the disclaimer recorded on the DVD before each exercise segment. The disclaimer began, “The producers, its distributors, the performers, and the educator(s) using this DVD for instruction are not liable for any injury...” (see Attachment 4: Disclaimer). To remain in the study, exercising to the DVD was not required.

Paraprofessional Educators

The paraprofessional educators who participated in this project were advised by the principal investigator of two expectations. First, the educators were expected to preview the entire DVD, including the “Introduction and Instructions for Educators” before they started a class series. Second, the educators were expected to prevent contamination of the control group by the experiment group.

The Introduction was recorded at the beginning of the DVD to explain the rationale for producing the DVD and how it should be used in SNAP-Ed/EFNEP adult classes.

Educators were told in the Introduction that: each segment of the DVD was 15 minutes long; to show a segment before the end of each class; to remind participants to be careful; and not to “force” participation but to “have fun.” The educators were expected to show the segments in the order that they were recorded.

The educators were expected not to mention the DVD to participants in their control classes or to mention the curriculum change to participants in their experimental classes. If study participants in a control class were exposed to the DVD or to study participants in an experimental class, then both the data from the control and matching experimental classes were required to be excluded unless another matching control class could be found.

Study Participants

To be included in the data collection of this project, study participants were required to be adults between 18 and 55 years old and to be able to speak and read English. Data collected from anyone who was: less than 18 years old; over 55 years old; cognitively impaired; pregnant; or, prison inmates were excluded from the data analyses. Study participants were not required to exercise to the DVD segments to remain in the study.

According to the study protocol, data collection took place during the class time paraprofessional educators used for administration. Research assistants read from an oral assent script to potential study participants in both the control and experimental groups to inform them that the study: posed no risk to anyone; was not invasive; was not physically exhausting; and, did not involve deception. Those who assented to answer the pre- and/or post-intervention survey questions thereby acknowledged that they understood that their participation was voluntary; that they could stop answering the questions at anytime; and, that their personal information would be reported anonymously; that is that their identities would not be revealed. A written consent was not required. However, the Rutgers

Institutional Review Board requested each subject be given a “Participant Information” sheet before any data could be collected. Similar to an informed consent, the information sheet repeated the oral assent script and provided the contact information for the principal investigator and the Institutional Review Board (see Attachment 5: Oral Assent Script and Attachment 6: Participant Information).

Sample Size. The number of study participants was expected to be commensurate to the number of NJ SNAP-Ed/EFNEP adult classes taking place during the phases of this project. The potential number of study participants was based upon a report from fiscal year 2007 when 3809 adults graduated from NJ SNAP-Ed and EFNEP classes, that is they attended six nutrition classes or more (see Table 3.1: 2007 NJ SNAP-Ed and EFNEP Adult Class Participation). Using an online sample size calculator, a sample of 350 adult participants were found to be needed for this project ($\alpha=0.05$).⁽¹⁶⁹⁾

Table 3.1: 2007 SNAP-Ed and EFNEP Adult Class Participation

NJ Programs and NJ Counties	Number of Adults Seen via Classes FY 2007	Number of Adult Graduates FY 2007	Number of Adult Classes Held in FY 2007
SNAP-Ed			
Burlington	185	53	11
Cumberland	1102	690	116
Essex	387	268	33
Hudson	4	0	38
Hunterdon	107	99	14
Mercer	301	162	8
Middlesex	60	38	19
Monmouth	36	18	5
Ocean	268	67	20
Passaic	872	564	68
Salem	34	14	1
Union	65	41	5
Warren	36	16	1
EFNEP			
Camden	968	493	130
Cape May	90	30	14
Essex	446	297	24
Gloucester	67	33	13
Hudson	157	47	1
Mercer	554	336	85
Middlesex	346	211	43
Passaic	578		
		332	73
TOTALS	6,663	3,809	689

Instrumentation and Data Collection

The paraprofessional educators helped collect the socio-demographic, nutrition behaviors and dietary intake data in all three phases of the project. Research assistants collected survey data pre- and post-intervention in Phases I and II; whereas, the educators collected the survey data in Phase III. Among a subset of study participants in Phase I only, research assistants collected anthropometric and blood pressure data. The data collection scheme for Phases I-III is summarized below in Table 3.2. Details about the development and collection methods of the pre- and post-intervention survey instruments follow in a manner corresponding to the components of the table.

Table 3.2: Data Collection Scheme

Data Collected from Study Participants	Control Group Intervention Period		Experimental Group Intervention Period	
Socio-demographics	Pre ^{1; 2; 3}		Pre ^{1; 2; 3}	
Dietary Intake/Behaviors	Pre ^{1; 2; 3}	Post ^{1; 2; 3}	Pre ^{1; 2; 3}	Post ^{1; 2; 3}
Exercise Barriers	Pre ^{1; 2}	Post ^{1; 2}	Pre ^{1; 2}	Post ^{1; 2}
Exercise Experiences	Pre ¹	Post ¹	Pre ¹	Post ¹
Stage of Exercise	Pre ^{2; 3}	Post ^{2; 3}	Pre ^{2; 3}	Post ^{2; 3}

Pre = pre-intervention; Post = post-intervention; 1 = Phase I; 2 = Phase II; 3 = Phase III

The pre- and post-intervention survey instruments were revised throughout the project. In general the approved instruments included the aforementioned standard SNAP-Ed/EFNEP forms used by the paraprofessional educators to collect socio-demographic and dietary intake data along with various tools found in the literature which were adapted for low-

literacy audiences. Descriptions of each component of the survey instruments and when they were used are detailed below.

Socio-demographic Characteristics

To identify the target audience, that is, limited-resource, diverse adults, study participants' socio-demographic data were collected with the SNAP-Ed/EFNEP Getting to Know You form as part of the pre-intervention survey instrument used in Phases I-III. This portion of the instrument was used to collect from study participants': age; gender; educational achievements; monthly incomes; number of children and adults in their household; race/ethnicity; and, federal assistance program benefits received (see Attachment 2).

Dietary Intake and Nutrition Behaviors

To identify participants' nutrition behaviors and to estimate study participants' intake of fruits, vegetables, grains, meats, and dairy, 24-hour diet histories were collected with the SNAP-Ed/EFNEP 1-Day Diet Recall (also known as the Homemaker's 24-hour Food Recall) and Nutrition Behavior Checklist forms as part of both the pre- and post-intervention survey instruments used in Phases I-III (see Attachment 3).

Associated with this form was one open-ended question which was asked by research assistants post-intervention in Phases I and II only, "Since you have taken this class, have you made any changes, or are you thinking about doing anything different, that is thinking about making a change?" This question was designed to be interpreted as either nutrition-

or exercise-related, thereby allowing the researchers to see the degree to which the DVD had impressed the participants' in comparison to their nutrition education.

Exercise Barriers

To assess barriers to study participants engaging in physical activity, the Exercise Barriers subscale of the Exercise Benefits/Barriers Scale was included as part of both the pre- and post-intervention survey instruments administered by research assistants in Phase I and II only. This sub-scale is a psychometric test to measure commonly accepted barriers to physical activity in 14 questions using a 4-point Likert-type scale. This subscale had been found to be reliable among adults (Cronbach's alpha; $\alpha=0.89$)⁽¹³²⁾ (see Attachment 7: Phases I and II Exercise Barriers).

Associated with this subscale was one open-ended question which was asked by research assistants pre-intervention in Phases I and II only, "Are there any other things that keep you from exercising regularly?" This question was designed to potentially determine if the instrument used was sensitive to the barriers perceived by the target audience.

Exercise Experiences

To assess study participants' cognitive and behavioral experiences participating in physical activity, the Exercise: Stage of Change – Continuous Measures scale was included as part of the pre- and post-intervention survey instruments administered by research assistants in Phase I only.⁽¹⁶⁸⁾ This scale is a psychometric test that measures the ten processes, or

experiences, of participating in physical activity that affect exercise habits: consciousness raising; dramatic relief; environmental reevaluation; self reevaluation; social liberation; counter conditioning; helping relationships; reinforcement management; self liberation; and, stimulus control. It included 28 questions using a 5-point Likert-type scale. This scale had been found to be reliable among low-income women (Pearson $r=0.73$; $p<0.05$)⁽²⁶⁾ (see Attachment 8: Phase I Exercise Experiences).

After initial use of the pre-intervention survey instrument during Phase I, the researchers determined that the study participants did not appear to interpret the meaning of “exercise” as leisure time physical activity as “not part of an occupation, housework or transport such as aerobics, jogging, or biking”⁽³²⁾ as the researchers had intended. Therefore, both the pre- and post-survey instruments were revised to include this qualifier: “exercise in addition to what I normally do as part of my work, my household chores, or the walking I do to get from one place to another”. However, questions about participant burden and the overall usefulness of the scale to match dropped from the survey instruments.

Stage of Exercise

To assess study participants’ exercise behaviors, the Exercise: Stage of Change (Short Form) was included in both the pre- and post-intervention survey instruments administered by research assistants in Phases II and III. This scale is a psychometric test that measures the five stages of participating in physical activity which affect exercise habits according to the Transtheoretical Model: pre-contemplation; contemplation; preparation; action; and,

maintenance. It included one question which was designed for use in community interventions and was found to have fair to good reliability among young adults engaged in moderate physical activity (Cohen's kappa; $k=0.45-0.50$)^(35; 127) (see Attachment 9: Phases II and III Stage of Exercise).

Associated with this scale was one open-ended question administered pre-intervention only during Phase II, "What types of exercise do you do?" This question was designed to determine the usual physical activity of the target audience.

After initial use of the pre-intervention survey instrument, the research assistants noted that the study participants appeared to be consistently stating that they walked as exercise when it was assumed that they walked as transportation or at least not at a level of intensity that would raise their heart rates. Therefore, the post-intervention survey instrument was revised with an algorithm for the research assistants to probe for responses to assess study participants' stage of exercise (see Attachment 10: Revised Stage of Exercise). However after an analysis of the data collected, the findings were inconclusive and the algorithm was dropped from the survey instruments.

Challenges to Phase II data collection also included recruitment of classes and attrition of study participants. After an initial analysis of the data, more subjects in the experimental group who completed both the pre- and post-intervention surveys were needed to measure a statistical difference. Based upon the work of Fahrenwald, it was estimated that an

additional 78 subjects would be needed to stage-match 40% of all participants to pre-contemplation and contemplation for comparisons to the literature.⁽²⁶⁾

Thus, data collection continued into a third phase. The research protocol was the same as in Phase II except all recruited classes were assigned to the experimental group and the paraprofessionals collected all the data. In addition collecting the socio-demographic and dietary intake data as previously described, they collected pre- and post-intervention exercise behavior data using only of the Exercise: Stage of Change (Short Form) as it was originally developed (see Attachment 9).

Body Mass Index and Blood Pressure

To further identify the target audience, anthropometric and blood pressure measures were taken among a subset of study participants post-intervention only during Phase I.

According to the research protocol, all study participants were invited to stay after their classes to have their height, weight, and blood pressure measured and recorded by one or two research assistants. Because of the limited amount of time and manpower to perform these tasks, measures were only taken once unless there was a problem with the equipment.

Those who agreed to participate were offered five dollars and required to sign a subject payment form (see Attachment 11: Phase I \$5 Subject Payment). This was the only subject payment offered during the project since the pre- and post-intervention survey

instruments were integrated into regular classroom activities. Inclusion of these measures with the whole sample was cost prohibitive.

Height. Height was measured using a Seca model 214 stadiometer. This tool is a portable, standalone stadiometer and accurate to the nearest one-tenth centimeter (0.1 cm).⁽¹⁷⁰⁾ According to the manufacturer's instructions, the equipment was set up on a flat, hard surface and study participants were asked to removed their shoes before being measured.

Weight. Weight was measured using a Detecto DR550 scale. This tool is a portable, electronic floor scale with a 400 pound capacity and accurate to the nearest one-tenth pound (0.1 lb).⁽¹⁷¹⁾ According to the manufacturer's instructions, the equipment was set up on a flat, hard surface. Study participants had removed their shoes for the height measurement but otherwise all remained dressed as they were in class.

Weights were later converted to kilograms using www.worldwidemetric.com.htm and used with matching heights transformed into individual BMI data using www.nhlbisupport.com/bmi.

Blood Pressure. Systolic and diastolic blood pressures were measured using an Omron HEM-650 monitor. This tool is a portable, wrist pressure monitor and accurate to the nearest millimeter of mercury (1 mmHg).⁽¹⁷²⁾ At the time of this research project, the

HEM-637IT model had been found both to be accurate and reliable when tested against the traditional upper arm sphygmomanometer among adults in a clinical setting.⁽¹⁷³⁾ The Omron HEM-650 was the updated version of this model. According to the manufacturer's instructions, a research assistant helped the study participants wherever they may have been sitting or standing to put the equipment on their wrists and position their wrists level with their hearts. Otherwise, the equipment automatically measured study participants' blood pressure to be recorded. However, questions about the overall usefulness of this measure without also collecting medical histories, which was beyond the scope of this project, resulted in the data being excluded from analysis.

Process Data Collection

To assess how the paraprofessional educators integrated the exercise DVD into the traditional SNAP-Ed/EFNEP curriculum and how class participants' accepted the DVD, qualitative data was also collected during this project as part of a process analysis. In Phase I, research assistants attended the experimental classes for one to two hours depending upon the length of a class and recorded their observations of participants' behavior before, during and after exercising to the DVD. According to the research protocol, the assistants could not be a member of the cast of an exercise segment being viewed; therefore, a guide was designed to standardize note taking since it was not possible for the same assistant to attend all six experimental classes in a series (see Attachment 12: Phase I Field Notes).

Additionally in Phases I and II, participating paraprofessional educators were interviewed as soon as possible after each experimental class series was completed. The interviews were completed by phone and took approximately 30 minutes each. The 10-question structured interview guide used was designed by the researcher based upon their experiences and perceptions observing the experimental classes (see Attachment 13: Paraprofessional Interview Guide). According to protocol, the researcher took detailed notes during interview only recording the most salient quotes from the educators.

Data Analyses

Sample size calculations were determined using www.raosoft.com/sample_size.html.

Descriptive data was managed using Microsoft Excel (Redmond, OR; 2007). Survey data was analyzed using SAS v9.1 (Cary, NC; 2008) to test the following hypotheses:

Research Hypothesis 1

Barriers to study participants' engaging in physical activity will be reduced as a result of exposure to the exercise DVD. Thus, data collected from the Exercise Barriers portion of the survey instruments were analyzed using repeated measures analysis of variance.

Research Hypothesis 2

Study participants' exercise behaviors will improve according to the Transtheoretical Model as a result of exposure to the exercise DVD. Thus, pre- and post-intervention data

collected from the Stage of Exercise portion of the survey instruments was analyzed using a repeated measures analysis of variance.

Research Hypothesis 3

No difference will be found between the control and experimental study participants' dietary intake as a result of exposure to the exercise DVD. Thus; analysis of variance was used to identify any significant differences in change in intake of each food group and in change of nutrition behaviors between the control and experimental groups.

Process Data Analyses

The process of using the DVD in SNAP-Ed/EFNEP classes was analyzed by three researchers using the qualitative data collected in Phases I and II. Two techniques were employed. A holistic method of coding was used "to capture a sense of the overall contents"^(174; p 118) from the field notes. A constant comparative method^(175; 176) of systematically coding the paraprofessional interview data and new questions that emerged from the data about the project. The resulting themes were then supported by the findings from the field notes.

Chapter 4: Process Analysis of Using an Exercise DVD with Limited-resource, Diverse Adults in Nutrition Education Classes

Abstract

This study assessed a professionally produced digital video disc (DVD) designed to incorporate physical activity into paraprofessional-delivered Supplemental Nutrition Assistance Program–Education (SNAP-Ed) and Expanded Food and Nutrition Education (EFNEP) adult classes. Both classroom observations wherein a convenience sample of NJ SNAP-Ed and EFNEP participants (n=84) were exposed to six brief video segments of different physical activities (one segment/week) and open-ended individual interviews with their paraprofessional educators (n=7) were performed during 2009. The study participants were primarily urban, low-income minority women, 18-55 years old. Three researchers independently coded field notes and interviewer's notes. Constant comparative and holistic methods were utilized in data analysis. The DVD was successfully integrated into classes and well received by the majority of participants. Exercise behaviors were affected by classroom leadership, equipment, and the classroom environment. Participants appeared most likely to exercise when they perceived exercise was fun, when there were encouragers among the class participants, and when educators were well-prepared and showed confidence and conviction during the activity. Exercise DVDs appear to be a viable means

This chapter was written according to the author guidelines for submission to the *Journal of Community Health* which publishes practices and teaching in community health. of integrating physical activity into SNAP-Ed and EFNEP small group, adult classes; however, additional testing is needed to assess their long-term behavioral impact.

Introduction

Federally-funded nutrition education programs, such as Supplemental Nutrition Assistance Program – Education (SNAP-Ed) and the Expanded Food and Nutrition Education Program (EFNEP) are designed to provide nutrition education based upon the Dietary Guidelines to limited-resource, diverse adults. Such individuals are often at high risk for obesity and may be unlikely to adhere to physical activity recommendations, that is, to engage in at least 30 minutes of moderate-intensity activity most days of the week [1-3]. A paucity of research addresses the need to identify physical activity experiences that are:

1. appropriate for a broad array of fitness levels;
2. appealing to diverse audiences in terms of ethnicity, age, gender and body size; and,
3. capable of being performed despite barriers such as: inclement weather; lack of time and childcare; expensive gym memberships; insufficient social support; unsafe neighborhoods; limited transportation, and exercise equipment and space at home [4-9].

To date, most SNAP-Ed/EFNEP physical activity education has remained knowledge-based, an approach shown to be only modestly effective in eliciting behavior change [10-13].

Professionally produced exercise digital video discs (DVDs) may be a viable means for providing behaviorally-focused education, as well as overcoming many of the aforementioned challenges. DVDs that present a variety of low-impact activities may be particularly suited for sedentary audiences, especially those safely demonstrating walking [14]. However, existing commercial DVDs have been found to be too time consuming, too intense, and lacking in cast diversity to potentially appeal among the target audience in nutrition education classes [15].

The aim of this investigation was to perform a process evaluation to assess the feasibility of integrating an exercise DVD into SNAP-Ed and EFNEP adult classes. The objectives were to evaluate the strengths and weaknesses of using a walking DVD. How the activity was implemented, challenges that arose during the integration process, and the appeal and acceptability of the DVD design among participants and educators were assessed. These variables reflected both participants' and educators' actions, since both affect program efficacy [16-19].

The "Walk Indoors!" DVD was designed following an extensive review of the literature with regard to the aforementioned physical activity and walking recommendations, activity barriers commonly encountered by low-income individuals, and the strengths and weaknesses of existing exercise DVDs. Also, the DVD was designed in accordance with SNAP-Ed Plan Guidance, that is, it constituted an educational and reinforcement material of "nominal value" providing "information and encouragement to exercise" in "one-time,"

“brief” demonstrations that do not detract from the primary purpose of SNAP-Ed to provide nutrition education [20].

The research protocol for DVD use in classrooms allowed for approximately 40 minutes of traditional nutrition education followed by approximately 20 minutes of physical activity education. Three study questions were asked:

1. Did the DVD meet its design objectives?
2. How did the educators integrate the DVD into the nutrition activity?
3. How was the DVD received by the study participants?

Methods

This was a qualitative study approved by Rutgers University’s Institutional Review Board for the Protection of Human Subjects. The study design included observations and interviews using a sample of SNAP-Ed/EFNEP adult classes where the DVD could provide physical activity education. Classes were selected from a convenience sample of New Jersey (NJ) SNAP-Ed/EFNEP classes scheduled as a part of normal programming efforts, via contact with program supervisors. Typically, the size of NJ SNAP-Ed/EFNEP adult classes varies from week to week with a minimum of 4 participants needed.

SNAP-Ed participants are required to attend a minimum of six, one-hour classes of nutrition education, ideally in a series of classes scheduled over a six-week period. In this

study, each series of classes were shortened by 20 minutes to allow for exercising along with a different indoor walking brief video segment each week.

The DVD opens with instructions on how educators should use the video, followed by the six video segments featuring five different aerobic segments demonstrating moderate intensity physical activity and one non-aerobic stretching segment.

Data Collection

Male and female participants between the ages of 18 and 55 years were included in the study. Exercising was not a requirement for study inclusion. In-class observations were conducted by three researchers who recorded participant behavior, for example, their reactions and engagement before, during and after a video segment. Researchers were instructed to be unobtrusive and to take notes in a field guide developed to maintain uniform data collection. Each observation took one to two hours depending upon the classes' scheduled durations.

Telephone interviews were conducted with the class paraprofessional educators after the conclusion of the sixth class to glean insight into their integration of the DVD into the nutrition activities. These interviews were conducted by the same researcher using a semi-structured interview guide developed from the observations. Each interview took one-half hour during which the researcher took notes interspersed with salient quotes.

Participant socio-demographic data, including age, gender, income, education, ethnicity/race and benefits received, were obtained from the SNAP-Ed/EFNEP records that are required to be maintained by the educators.

Data Analyses

The researchers independently coded the field and interview notes then met to discuss the data using two methods of analysis. To assess the DVD's adherence to its design and the participants' behaviors before, during and after exposure to the DVD, the observational data were grouped by video segment and analyzed using a constant comparative method [21]. To assess how the educators integrated the DVD into their nutrition activity, the interview data were analyzed using a more holistic approach, that is, the educators' perceived challenges and how they overcame them were identified, compiled, then triangulated with the field notes.

Results

Classroom observations (n=42) occurred throughout 2009 at seven sites that provided services for eligible adults in five of NJ's 21 counties (four urban; one rural). The participants (n=84) were 18-55 years old and minority men and women with five of the seven classes comprised of 100% women (see Table 4.1).

Table 4.1: Classroom Sites and Minority Participant Descriptions

Site	Description	Class Size	Women	Hispanics	African American ¹
1	Homeless Shelter for Women	5-11	100	66	17
2	Non-residential Rehabilitation Center	5-10	25	0	100
3	Non-residential Rehabilitation Center	7-15	100	0	40
4	Parenting Skills Development	11-20	100	20	32
5	Residential Rehabilitation Center ^R	9-14	86	8	16
6	Workforce Development	6-8	100	0	87
7	Workforce Development	6-8	100	99	1

¹ Other minority ethnic groups, i.e. American Indian, Asian, and Pacific Islanders, were negligible.

^R Located in a rural county compared to all others being in urban city centers.

SNAP-Ed/EFNEP records indicated that more than 90% of the participants in each class received Supplemental Nutrition Assistance and the remaining 10% participated in other federal assistance programs, such as Temporary Assistance for Needy Families. The paraprofessional educators (n=7) were women who were 27 to 49 years old and who self-identified as Hispanic (33%) and non-Hispanic African-American (42%).

DVD's Design Adherence and Effects

In general, all the educators followed the NJ SNAP-Ed/EFNEP nutrition education protocol and showed the video segments (approximately 15 minutes each) at the end each class.

No injuries were reported during the study period. Each video segment appeared to encourage the target audience to exercise. In response to the choice of actors in the cast, one participant remarked "...big, small! That's good!" After seeing one of the cast

members use a chair in one segment, an exerciser commented, “I’m doin’ what the fat lady doin’” and continued to move.

In terms of the DVD meeting diverse fitness needs, the participants’ comments of perceived physical exertion suggested success:

- “This is not hard. It’s good.”
- “I can feel that”/“Feel the burn”
- “I feel a little winded.”
- “I’m getting tired man.”
- “I ‘gotta’ quit.”

Some participants quit walking before the end of the segments, while others overcame personal challenges by walking at their own pace (as instructed in each video segment) or using a chair for support (as demonstrated in the fifth segment). Some participants expressed concern over the segments’ durations, for example, “Is this 15 minutes or an hour?” or “This is more than 15 minutes.” Participants who quit most often stated:

- “Ok, I think that’s enough for me.”
- “They don’t want to do the easy stuff.”
- “I can’t exercise no more.”
- “I almost did a mile.”

In classes predominated by young adults or males, some initially perceived the activity as unnecessary, saying they usually walked, climbed stairs, or lifted weights. Yet at the DVD's conclusion, some of the men made comments such as "That's a good workout," including one of the weight lifters who surprisingly found, "My back is sweating."

DVD Audience Appeal

Generally, the more walkers there were, the more "chatter" there was. Sometimes this caused distraction. Comments, when taken out of context, could be negatively construed; however, classmates appeared to enjoy teasing each other.

- "If you zipped your mouth you wouldn't get so tired so quick."
- "You can do it if my fat butt can do it."
- While one woman admitted, "It's kind of fun" and another said, "We're doing walking this week? All right!" most joked.
- "Why we have to do this one? Why can't we do one where we eat?"
- "Anyone got any oxygen?"
- "Lots of walking; going nowhere."
- "Thank you for killing us; I mean, helping us exercise."
- "I'm going to come back when you have a meditation class."

Mocking/mimicking the fitness expert was common and sometimes laced with sexual innuendo and suggestive movements. More often than not, however, the participants appeared to be laughing with the video, not at the video. Likewise, the attitude of the

exercisers appeared to be supportive, for example, “Come on [overweight cast member] you can do it. If she can do it, you know we can.”

Repeatedly the field notes described the exercisers as “having fun” and “making fun,” “laughing” and “carrying on” about their selves, each other, the fitness expert and cast. Participants were observed creating movements as one exerciser said, “I can make it fun,” and followed by adding arm movements and changing pace (as demonstrated in the video segments). Those who did not like the music were observed donning headphones and moving to their own beat. Dancing in all forms was noted, including the “Mambo,” “Electric Slide” and chorus line. Still others shuffled, shadowboxed or “wiggled” with purpose.

Engagement

Those most eager to participate appeared to be those who already exercised regularly or those who had been intending to become more active. One middle-aged woman said, “I exercise every day. I love it!” One class that had a regular exercise group, including its educator, asked the educator to play two segments in one day. The educator agreed, but as the activity cut into the participants’ lunch hour, she repeatedly asked if they should quit. The consensus voiced by one exerciser was “No, I want to finish.” At the other extreme, a class comprised of mostly non-exercisers, including its educator, once had only one participant walking along with the DVD. Eventually the participant asked, “How come I’m the only one up?” then sat down.

Most often non-exercisers walked out of class or busied themselves with other activities, for example, talking, texting, or sleeping. The field notes did not identify any demographic characteristics that might differentiate exercisers from non-exercisers. Further, decisions not to exercise did not appear to be linked to any particular video segment.

Those who refrained from engaging expressed a variety of rationales, that is, limitations precluding them from exercise such as asthma, back pain, arthritis, a recent surgery, or heart trouble. A few women said they had to watch their children, even while the children slept. Others gave excuses:

- “I just drank a whole cup of coffee and can’t.”
- “I smoke three packs a day. I have 55 year old lungs;”
- “It’s that time of the month.”

At many sites participation was compulsory, so some made a pretense of engaging. For example, one man was observed taking his place among the exercisers but standing with his arms across his chest and swaying throughout an entire video segment. Another leaned against a table at the back of class until he could sit down without notice. Where it was observed that acceptance of the physical activity increased over time, one educator explained that exercising in class was an “unexpected” activity and that “it took [participants] to the second or third week for them to open up to it.” Another agreed, “They definitely got into it after a second time.”

Leadership. Although there appeared to be increased acceptance of the activity, engagement tended to be mediated by leaders who affected engagement either by giving positive feedback to exercisers (encouragers) or discouraged the exercise groups (dominators). Both paraprofessional educators and class participants served in these roles (see Table 4.2).

Table 4.2: Exercise Group Leadership

Encouragers' Positive Feedback ¹
<ul style="list-style-type: none"> + "Get ready to walk." + "Come on you are young." + "Show the others how it's done." + "Keep walking class." + "Don't give up." + "Come on ladies, we can do it." + "I'm not tired." + "Remember everyone hold your stomach in." + "This is the best part." + "I'm proud of you guys. Keep going."
Dominators' Discouraging Remarks ¹
<ul style="list-style-type: none"> - "You got to exercise." - "We have to exercise." - "Suck it up, suck it up now!" - "Kick like a dog man." - "How come the nutritionist 'ain't' participating?" - "Teacher when are you going to join us?" - "I couldn't walk for 2 days after last week." - "You quit, you aren't suppose to quit."

¹ Based upon the theory of group roles (Benne & Sheats, 1948)

Encouraging Educators. The educators who were most successful in engaging participants walked with their class and offered praise, for example, “You did a mile. Give yourself a hand class,” and “Thank you for walking.” In these cases, engagement was more common and comments such as “I’m going to walk this evening,” were heard more often. During their interviews, these educators reported focusing on being “positive” and “enthusiastic;” making the activity “fun” and “interesting;” and, building a “rapport” with the participants. Some identified the activity as a teachable moment. For example, one who taught a class of young women purposely dressed as if she was coming from a job interview or church to show she could still exercise. Another who taught recovering addicts shared with her class that she was suffering from a migraine but still exercised at her own pace. Yet another stated, “I need to get my exercise too.”

Encouraging Participants. Among the class participants who exercised, encouraging leaders emerged too. For example, if one participant asked, “You look forward to this?” an encourager would reply, “Yes, I do. I missed my workout yesterday.” The most influential participant leaders recruited non-exercisers to join them in exercising, and convinced fellow exercisers not to quit, for example, “Come on [name deleted] pretend you are chasing after a man!” When needed, encouraging leaders would voluntarily repeat the fitness expert’s instructions, for example, count aloud and clap to the beat without mocking or making fun of others. Some were heard offering advice such as what type of shoes and clothing to wear to class, or to “Pick up that baby [and exercise].” Still others

shared their convictions, such as: “You need to sweat; that’s exercise;” and “I like this one. I can’t do most videos.”

Discouraging Educators. While all the educators indicated they were concerned about participant engagement, one educator remarked in her interview, “The DVD won’t work everywhere.” She was referring to her small classroom and her participants recovering from substance abuse. However, a comparison of observations among the sites did not support this assertion. Instead when faced with the same challenge in similar sites, for example, rehabilitation facilities, it was the educators who were found to determine whether or not the DVD “worked.”

The educators who had the most negative impact on engagement made negative comments in their classes or failed to lead exercise groups. The field notes cited examples wherein one educator called the activity “hokey” and another called the non-exercisers “terrible.” If these were attempts at humor, in the absence of encouraging remarks, the humor resulted in poor engagement. The most extreme examples were observed when an educator left during a video segment to wash utensils and when a participant asked, “Teacher why ain’t you exercising with us.”

Discouraging Participants. Some participants also negatively impacted participant behavior. Most often non-exercisers encouraged classmates to leave class before the video segments or engaged them in conversations. A few monopolized their groups as

dominators. For example in one large, diverse class, a Hispanic man repeatedly objected to the activity, saying it was unnecessary, one day managing to get all of his classmates to leave class a few minutes prior to the end of the video segment, despite a proctor's presence. The following week, the dominator was absent and all the exercisers dutifully completed the video segment. In another large, diverse class, an African-American woman led a small clique of exercisers who reportedly "acted silly" and repeatedly criticized the fitness expert, cast, and fellow-walkers; when she was absent a new group of exercisers became engaged in the activity. All appeared to enjoy the segment after which the educator said, "This has been the best class so far." When the dominator returned the following week and said she was too tired to exercise some who exercised the previous week participated despite her negative influence.

Challenges Associated with DVD Use

Aside from leadership, the factors found to affect the integration of the DVD into the nutrition activity, included: educator preparedness; DVD playback; and, classroom temperature and distractions. Table 4.3 delineates these challenges according to the issuing entity, that is, the DVD, the site, the educator, or the participants.

Table 4.3: Challenges Associated with Successful Inclusion of the DVD in Nutrition Education Classes by Responsible Entity

Moderators of Behavior	DVD	Sites	Educators	Participants
Classroom Leadership	■		■	■
Educator Preparedness	■		■	
DVD Playback	■	■		
Missing Equipment		■		
Classroom Temperature		■		
Distractions		■		■

Educator Preparedness. The extent to which educators were prepared to implement physical education impacted participant engagement. During their interviews, most of the educators admitted to not having watched the DVD before using it, an observation noted in the field notes. Also, transitions from the nutrition activity to the physical activity portion of the class were modest. A couple of educators used their knowledge about physical activity or MyPyramid to introduce the video; however, such practices were inconsistent. Typically educators simply ended the nutrition activity by saying, “Ok, it’s time for some exercise.” As a result, no discernible link between the nutrition or physical activities was made. Otherwise, those well prepared educators were:

- Familiar with the contents of the DVD;
- Sensitive to the time needed for the activities;
- Able to operate the equipment.

Equipment. A television, a DVD player, and sometimes a remote control were needed to play the DVD. However, the equipment was often not available or broken. A

persistent lack of working equipment at two sites caused classes to be excluded from the study. Equipment problems occurred at least once in most classrooms, usually resulting in delays or the class running overtime. Often televisions could not be adjusted loud enough for participants to hear the fitness expert or exercise music that provided the walking tempo. Even when the exercisers moved quietly, on “tip toe,” complaints such as, “I don’t like this. I can’t hear ‘nothing’” were justifiable. A few of the educators expressed concern about their participants “losing interest” because of the equipment. To overcome this challenge, some relied on someone else to set up and operate the equipment.

Temperature. Many exercisers complained about the heat in their classrooms while walking. Exercisers wiped sweat from their faces, held long hair up, fanned themselves, and quit. One woman said about the fitness expert, “She’s got too much hair to walk that fast.” Another complained, “My hair goes ‘pfft’ when I sweat.” Others commented:

- “Anyone got any deodorant?”
- “Is the heat on in here?” and,
- “It’s like 85 degrees in here.”

Heat was a contributing factor to objections and disengagement before video segment conclusions.

Distractions. An array of distractions competed for the participants’ attention and affected engagement. These included: noises, extraneous activities, and classes held in

temporal proximity of lunch. Topping the list was talking among classmates, as well as conversations on cell phones at sites where cell phone use was permitted. In one class, participants who talked more than exercised were labeled by their classmates as “chatties,” few of whom chatted about exercise. Additionally, exercisers acting “goofy” dominated participants’ attention.

Some site characteristics posed challenges, for example, noises from facility entrances, ringing phones, and working staff. The less private the classroom the more distractions that came from supervisors, counselors, and visitors (welcome and unwelcome). Except for one staff member who came to exercise on her break, many were curious but left immediately if they were invited to join in the activity.

In classes where no onsite daycare was provided, participants were often distracted by children vying for their attention, which often resulted in their sitting with their children during the video segments. New mothers were the most easily distracted but also the most interested in getting “back into shape” after pregnancy. To remedy this situation, mothers: held their infants in their arms or put them in baby swings; had toddlers walk along with them; left their children with non-exercisers; or, only stopped exercising long enough to change a diaper.

Discussion

To date, few reported community nutrition education programs have engaged limited-resource, diverse adults (18-55 years old) in behaviorally-focused physical activity [22-25]. Fewer have used exercise videos in lieu of trained instructors [26]. Thus, this “Walk Indoors!” DVD pilot project in SNAP-Ed/EFNEP adult classes was unique.

Did the DVD meet its design objectives?

True to the DVD’s design and according to SNAP-Ed Plan Guidance, the fitness expert safely demonstrated moderate-intensity exercise by walking one mile in 15 minutes, or a moderately intense pace of 3-4 miles per hour, in the aerobic video segments [14, 20]. Repeated exposure to the DVD appeared to encourage participants to make the activity fit their varied fitness needs, for example, by using arm movements while walking to increase intensity; thus overcoming the barriers to physical activity that the participants may experience.

For those educators who felt anxious that their classrooms were not appropriate for the study, little evidence was found to support their concerns. Even a lack of space in the smaller classes where exercisers were observed bumping into each other or the furniture did not seem to deter activity or reduce DVD acceptability. A lack of childcare at sites did often limit engagement, but this was found to be resolved when children were pacified in various ways or engaged in the activity.

If classroom temperature can be a proxy for weather, then heat may continue to serve as a barrier to activity both inside and outside the classroom setting; however, since sweating indicates moderate-intensity activity, this may be valuable information to share with sedentary participants.

How did the educators integrate the DVD into the nutrition activity?

The paraprofessional educators were pivotal to the successful integration of the DVD. All the educators in this study overcame challenges associated with integrating the DVD, but none were beyond what they typically experience when teaching nutrition at these same sites. Those who were engaged in the activity increased the efficacy of the DVD especially when clearly demonstrating “enthusiasm” to make the exercise experience more “positive,” “fun” and “interesting.” Additionally, showing conviction that physical activity was important may have improved participant acceptance of the DVD and demonstrating confidence may have increase participants’ self-efficacy in completing the activity. These findings reinforce the importance of paraprofessional educators’ work as peers among limited-resource, diverse adults compared to professional educators who when teaching are perceived by the target audience to be less trustworthy [16, 27-29]. In this study, the educators’ etic perspective of the participants’ situation may account for their choosing an inter-personal teaching style to integrate the DVD into the nutrition activity instead of a traditional knowledge-based approach.

Most perplexing, however, was when educators disengaged during the activity, in effect letting the DVD do the teaching and making it unclear who was leading. As observed, encouragers stepped up as valuable adjuncts to the DVD, but where discouragement predominated, the virtual fitness expert and cast were unable to compete within prevailing social norms.

How was the DVD received by study participants?

When the participants were asked to exercise in their nutrition education classes, most expressed surprise with varying levels of acceptance and participation. Similar to diverse adults' fitness instructor preferences found in the exercise literature, they appreciated the appearance and personality of the fitness expert, the physical and racial diversity of the cast, and the walking theme [30-32]. Additionally when participants' perceived the activity as "fun," their engagement was found to increase or sustain over time as previous studies have reported regarding adult group exercise [33-36]. More specifically, the social aspect of group exercise and the enthusiasm of fitness instructors and group leaders has been shown to motivate women most, as was the case in this investigation [34, 37].

Why some participants engaged but were recorded as reacting negatively was of particular interest to the investigators. Participants' disparaging comments and resistance to the activity appeared to have multiple rationales. First, it was evident that many of those who refrained from engaging in the activity did so because they suffered from low personal function, a broad term used to describe those who are medically underserved by

preventative healthcare [6, 38]. Income, education and race have all been identified as social determinants of health and risk factors for diet-related diseases such as obesity that will have imperceptible consequences on engagement, for example, high blood pressure and diabetes [39, 40]. When participants' health challenges are considered with the number in rehabilitation for alcohol abuse, which is found to be associated with insomnia and fatigue, new meaning is given to participants' complaints of, for example, tiredness and heat, that limited their engagement [8, 41, 42].

Also, the class environment clearly had a negative effect on participant behavior. Problems with equipment, temperature and distractions were all situational reminders that those participating in social welfare programs are often relegated to environments not conducive to optimal learning. Unlike exercise groups which are joined voluntarily, such as at community recreation centers, these participants were required to attend nutrition education classes in order to receive their benefits. Consequently, it seemed that where participants were not allowed to express their resistance physically, for example by ignoring the opportunity to exercise or by leaving class, they expressed their displeasure through body language or verbally. The observed resisting movements, grimacing, and ridiculing behavior of individuals in exercise groups was categorized as lack of interest, overconfidence, resentment, and low self-efficacy which are the classic barriers to adult learning identified by Jarvis [43] and Knowles [44].

Limitations

Although this evaluation took place in representative SNAP-Ed/EFNEP classes and included heterogeneous groups, the participants were mostly urban and female, so the findings may not be applied across subgroups with different psychosocial and demographic factors [45]. Additionally, several programmatic aspects may have dampened this study's findings. First, overarching events created by the management of program participants prevented exposure to the DVD for six consecutive weeks to a greater extent than events like holidays and inclement weather. Participants missing or leaving class to go to doctor/dentist/counseling appointments, job interviews, on-site work duties, etc., were scheduled by site staff in conflict with the nutrition classes and beyond the educators' control.

Also beyond their control was the DVD's volume, found inadequate for all types of equipment which at most social service sites is donated and outdated. However, short of re-engineering the DVD's audio playback, educators can familiarize themselves with the available equipment before class or bring a laptop with speakers, if possible, to avoid frustrating delays.

Last, being observed may have resulted in atypical integration of the DVD into the nutrition classes. More likely, the instructions at the beginning of the DVD are not explicit enough to prepare all paraprofessionals for using the DVD. Paraprofessional educators often teach in classes to the relief of site staff who use the time to catch up and organize or

take a break. To prevent this paradigm being followed by the paraprofessionals during the activity, more direction is recommended, at least to: 1) be familiar with the DVD's contents; 2) be sensitive to the time needed for each video segment; and, 3) be engaged in the activity. Even SNAP-Ed/EFNEP program supervisors can provide space in their offices for staff to exercise to the DVD, that is, during lunch, to promote the expected exercise behavior.

Future Direction

Walking interventions are a preferred and safe exercise for people of all activity levels and recommended for community-level physical activity interventions [7, 14, 46-51]. However prior to institutionalizing exercise DVDs in federally funded nutrition education programs, rigorous randomized controlled trials are needed to assess their effect on program participants' dietary and exercise behaviors [10, 25, 52].

To meet the programmatic challenge of maintaining program effectiveness over time, Glanz and colleagues have recommended training "delivery staff" [45]. From the above limitations, SNAP-Ed/EFNEP paraprofessional physical education training comparable to the knowledge and skills training they receive in basic nutrition is warranted, and the instructions provided for DVD use should be modified to address the challenges identified in this investigation. Educators also need to be made technically competent in using the available equipment [27]. Further, applicable to both the nutrition and physical activity education provided, more formal training in adult education principles and group

management theory is recommended to: 1) promote individual self-direction through goal setting; 2) empower the encouragers; and, 3) marginalize the dominators by creating classroom environments that are safe and free of coercion [53-57].

In conclusion, the DVD was well received and appeared to be anticipated more enthusiastically over time. Any lack of engagement was not found to be specific to the DVD and did not equate to dislike of the DVD. Instead, the challenges to using of the DVD were found to be innate to paraprofessional-led programs often out of educators' control (see Tables 4.1 and 4.3). Therefore, use of exercise DVD in small group, adult nutrition education classes appears to be a viable means for promoting physical activity particularly when the audio and visual instruction is supplemented by the use of trained paraprofessional educators.

Chapter 5: Use of an Exercise DVD to Reduce Physical Activity Barriers and Improve the Exercise Behaviors of Limited-resource, Diverse Adults

Abstract

Novel educational approaches, such as exercise digital video discs (DVD), are needed for physical activity interventions for groups such as low-income, diverse adults. The objective of this study was to evaluate the use of a walking DVD (the intervention) in established educational venues to increase activity among the target audience in an experimental group compared to a control group . The majority of program participants who volunteered to complete both pre- and post-intervention surveys (N=139) were urban, non-white women between the ages of 18 and 55 years old. The surveys measured participants' perceptions of 14 common barriers to physical activity and staged participants' reported activity levels of exercise according to the Transtheoretical Model. The participants reported few barriers to physical activity and being active. Exposure to the DVD significantly reduced participants' barriers to physical activity ($n=72$; $F(2, 131) = 2.03$, $p < .05$). The effect of the DVD on exercise habits was found to be large ($d > 0.8$). Further, it helped maintain participants' exercise habits ($n=56$; $t(23) = -2.57$, $p < 0.05$), among those who were exercisers pre-intervention. Use of the DVD

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was found to be promising, but anecdotal evidence suggested that the surveys employed failed to measure perceived barriers to physical activity specific to the participants, such as laziness and health status, or to measure participants' reported moderate level activities, such as transportation and working around the house; thus, possibly limiting the magnitude of these results.

Introduction

The promotion of physical activity through adult education is an aim aligned with public health goals, particularly among low-income, minority individuals who exhibit high rates of obesity and its comorbidities (Department of Health and Human Services [DHHS], 2010; Ogden, Carroll, McDowell, and Flegal, 2007; Kim and Popkin, 2006). The 2008 Physical Activity Guidelines for Americans recommend that adults engage in at least 2.5 hours of moderate-intensity exercise each week for substantial health benefits including weight management (DHHS, 2009). While the evidence has shown that this amount of activity for an average man is equivalent to expending about 2500 kilocalories/week or 350 kilocalories/day (Lakka and Bouchard, 2005), researchers have suggested that a deficit of as little as 50-100 kilocalories per day may arrest weight gain (Hill, Peters and Wyatt, 2009). Still, most adults (25%) remain physically inactive (Centers for Disease Control and Prevention [CDC]; 2007).

Less than one-third of non-Hispanic whites and one-quarter non-Hispanic African Americans and Hispanics engage in recommended physical activity levels (CDC; 2007).

According to Marcus and colleagues, "...Given the many benefits of physical activity and its low prevalence rates, it is imperative that interventions be designed to effectively promote the adoption and maintenance of active lifestyles in large numbers of people" (Marcus, et al., 2006, p 2748). However in addition to universal barriers to physical activity, those with limited resources more acutely experience barriers, such as adequate fitness, convenient places to exercise, social support, and, confidence (Sechrist, Walker and Pender, 1987). They may also face a lack of: childcare and transportation for exercising in gyms; safe neighborhoods for exercising outdoors; and, personal equipment and space for exercising at home (Palmer and Ryan, 2008; Bennett et al, 2007; Fahrenwald, 2003). Even the weather can be a factor, especially for immigrants who have moved from one extreme climate to another (Chan, Ryan and Tudor-Locke, 2006; Belza et al, 2004; Fahrenwald, 2003; Humpel, Owen and Leslie, 2002).

Many social service programs provide sustainable venues for incorporating physical activity education; however, programmatic limitations require brief, one-time demonstrations that do not detract from therapeutic and educational interventions. An approach that addresses the physical activity barriers limited-resource audiences face and that increases physical activity should be integrated into adult education classes to precipitate needed behavioral changes.

Exercise digital video discs (DVDs), which are popular among individuals who exercise at home, have been considered because they may meet these criteria. However, one

assessment of commercially available aerobic DVDs found none short enough for use in adult education classes, or appropriate for use among racially/ethnically diverse audiences (Ryan, Adler and Palmer, 2008).

Among existing DVDs reviewed, indoor walking DVDs appeared to be the safest for use among audiences with diverse fitness needs (Ryan, Adler and Palmer, 2009). Since brisk walking for 10 minutes a day is accepted as the easiest and safest leisure-time physical activity and “strongly” recommended (DHHS, 2009, p 26) for its health benefits to all regardless of age, gender, race/ethnicity, and physical fitness levels (Warburton, Nicol and Brendin, 2006; American College of Sports Medicine, 2007; Ford, Heath and Mannino, 2003; Poirier and Despres, 2001; Hootman, et al, 2001) and because walking has been identified as the most preferred activity among all race/ethnicities (Belza, et al, 2004; CDC, 2000), it was hypothesized that an indoor walking DVD may constitute the best sort of DVD to alleviate perceived barriers to exercise and elicit behavior change. Consequently, a walking DVD was produced for testing in adult education classes.

“Walk Indoors!” was designed to ensure safety and cultural appropriateness, and characteristics supporting their integration into adult education classes. These criteria were addressed through: attention to the 2008 Physical Activity Guidelines for Americans recommendations for adults (DHHS, 2009); and the inclusion of a fitness expert safely leading a diverse cast in low-impact, moderate-intensity exercise. The DVD includes six, 15-20 minute indoor walking segments (IWSs) addressing different fitness goals. Five are

aerobic demonstrating how to vary walking pace and intensity, for example, by adding arm movements or household weights; and, one is a stretching segment.

This study's objective was to determine if exposure to the walking DVD (the intervention) in adult education classes: 1) reduced participants' barriers to engaging in physical activity; and, 2) improved participants' stage of exercise according to the Transtheoretical Model (TTM). For this investigation exercise was defined as any physical activity not part of work, household chores, or walking to get from one place to another.

Methods

This study was part of a larger, quasi-experimental project to evaluate the use of the walking DVD. It engaged a repeated measures (pre-/post-intervention) design guided by the literature on barriers to physical activity and the TTM stages of change for exercise (Marshall and Biddle, 2001; Sechrist, Walker and Pender, 1987; Marcus, et al, 1992; Cancer Prevention Research Center, n.d.). The research protocol was approved by Rutgers University's institutional review board. Survey data were collected from a convenience sample of classes in multiple phases (2009-2010).

Intervention

Two federally funded programs for limited-resource, diverse adults, the Supplemental Nutrition Education Program – Education (SNAP-Ed) and the Expanded Nutrition Education Program (EFNEP), were chosen for DVD testing because they are among the

many adult education programs that could present sustainable means of providing physical education. In New Jersey SNAP-Ed/EFNEP, paraprofessional educators teach where social services programs are provided, like drug and alcohol rehabilitation centers, minimum security prisons, workforce development classes, and Temporary Assistance for Needy Families offices. The classes were recruited in pairs through contact with program supervisors. Each pair was taught by the same paraprofessional educator and in the same geographical setting to ensure that the intact groups were matched by their educators' teaching style and overall socio-demographic characteristics. Each class in a pair was randomized into either the control group or experimental group and scheduled as part of normal programming efforts for a minimum of one hour/week for six weeks. Over time, additional classes were added to the experimental group to increase sample size.

The control group received the existing curriculum. The experimental group received the existing curriculum shortened by 15-20 minutes to allow for physical education via the DVD, that is one video segment per week for the six weeks of a class series. To prevent contamination, classes held consecutively in the same room were excluded. Additionally, the educators were instructed: 1) not to discuss the DVD in their control classes; and, 2) not to discuss the DVD as "new" to the curriculum in their experimental classes.

Study Participants

Pre and post intervention, program participants between 18 and 55 years old were recruited to complete a survey administered orally, one-on-one, by trained research assistants in less

than 10 minutes. Survey completion was voluntary and walking to the DVD was not required. At the end of each class series, the researchers obtained participant socio-demographic and attendance records from the educators who collected this information according to their teaching protocol.

Survey Instruments

Two survey instruments were employed to meet the study objectives.

Barriers Survey. To assess participants' barriers to physical activity, the universally-accepted Exercise Barriers sub-scale of the Exercise Benefits and Barriers Scale was used (Sechrist et al, 1987). This psychometric test measures 14 previously identified barriers to physical activity with a 4-point Likert-type scale and has been found reliable (Cronbach's alpha, $\alpha=0.89$) among women in a moderate-intensity walking intervention (Murphy, Nevill, Biddle, and Hardman, 2002). The subscale was adapted to improve its readability for low-literacy participants (see Figure 5.1).

Figure 5.1: Adapted Exercise Barriers Subscale

Barriers to Physical Activity Sub-Scale Statements	
Original Statement	Statement Adaptation
1. Exercise takes too much time.	1. Exercise takes too much time.
2. Exercising is tiring.	2. Exercise makes me sleepy.
3. Exercise costs too much money.	3. Exercise costs too much money.
4. Exercise is fatiguing.	4. Exercise makes my body feel tired.
5. Exercise takes time from family relationships.	5. Exercise takes too much time from family relationships.
6. Exercise takes time from family responsibilities.	6. Exercise takes too much time from family responsibilities.
7. Exercise is hard work for me.	7. Exercise is hard work for me.
8. Places to exercise are too far away.	8. Places for me to exercise are too far away.
9. Facilities' schedules are not convenient.	9. Exercise facilities do not have convenient schedules.
10. Exercise is hard work. Places to exercise are too few.	10. There are too few places to exercise.
11. My spouse does not encourage exercising.	11. My spouse does not encourage me to exercise.
12. Family members do not encourage exercising.	12. My family members do not encourage me to exercise.
13. Exercise is embarrassing.	13. I am too embarrassed to exercise.
14. Others look funny in exercise clothes.	14. I think people in exercise clothes look funny.
Flesch-Kinkaid Readability Score: 8.8	Flesch-Kinkaid Readability Score: 6.3

Stage of Change Survey. To assess participants' voluntary exercise adoption, the Exercise: Stage of Change (Short Form) was employed. This one question psychometric test, based upon the TTM, was developed by researchers at the Cancer Prevention Research Center for use in community settings (n.d.). The test matches participants to one of five stages which explain their exercise habits (Prochaska and Marcus, 1994). The question has been used among low-income populations with fair to good reliability (Cohen's kappa, $k=0.45-0.50$) among adults engaged in moderate-intensity physical activity (Findorff,

Stock, Gross, and Wyman, 2007; Carmack Taylor, Boudreaux, Jeffries, Scarinci, and Brantley, 2003; Marcus et al, 1992). The question was adapted to further define each stage of exercise adding the dimension of time (see Figure 5.2).

Figure 5.2: Adapted Exercise: Stage of Change (Short Form)

Question: Do you exercise regularly?	Matching Stage of Change:
No; and I do not intend to in the next 6 months.	Pre-contemplation
No; but I intend to in the next 6 months.	Contemplation
No; but I intend to in the next 30 days.	Preparation
Yes; I have been for less than 6 months.	Action
Yes; I have been for more than 6 months.	Maintenance

Open-ended Questions. Post intervention, two open-ended questions were administered to the intervention group. They were: “Are there any other things that keep you from exercising regularly?” and “What types of exercise do you do?”

Statistical Analyses

Sample characteristics were analyzed using descriptive statistics of demographic variables in terms of frequencies, means and standard deviations. Participant responses to the open-ended questions were categorized by theme and counted as anecdotal evidence.

The Wilcoxon-Mann-Whitney test ($p < 0.05$) was used to assess sampling distribution variances; and consequently one-within and one-between analysis of variance (ANOVA)

were used to assess differences. Only data from class participants who completed both pre- and post-intervention surveys were included in these analyses. Matching barriers data were analyzed as both the 4-point Likert-type scale and as dichotomous variables, either agreed or disagreed, for each barriers statement. A sample size calculation was performed based upon the number of program participants (3809) who attended six nutrition education classes in 2007 (<http://www.raosoft.com/samplesize.html>). Matching stage of change survey data were analyzed as both the five TTM stages of exercise and as dichotomous variables, either active or inactive. Cohen's d was calculated to determine the effect size of the DVD (www.uccs.edu/~faculty/becker). Correlations using data from inactive participants only were performed to examine relationships between their barriers and stage of exercise as a result of exposure to the DVD. All statistical analyses were conducted using SAS v9.1 (Cary, NC) with significance set at $\alpha=0.05$.

Results

This work encompasses findings from two non-mutually exclusive samples: the first to assess DVD use and its impact on barriers to physical activity; the second to measure its impact on stage of exercise.

Barriers to Physical Activity

The barriers survey was administered to program participants (N=133) from seven class pairs. Sixty-one participants (46%) were in the control group and 72 (54%) were in the experimental group.

Sample Characteristics. No significant differences in demographic variables were found between groups except for age. From the available data, the participants' mean age in the control group (n=56) was 37 (SD=11) years old and in the experimental group (n=66) was 32 (SD=10) years old. See Table 5.1.

Most participants were urban, non-white females, and slightly less than one-third completed high school. Nearly all participants (94%) reported participation in one or more social service programs, such as SNAP. The sample's mean monthly income fell below the poverty threshold (M=\$572/month, SD=\$4100). Half the participants either lived alone (20%) or with only one other adult (30%); one-third lived in traditional or extended families including multiple adults and/or children (33%); and the remainder lived with one or more children but no other adults (17%).

Table 5.1: Descriptive Statistics for Physical Activity and Stage of Exercise Samples

Descriptive Statistics for Physical Activity and Stage of Exercise Samples							
Demographic Variables	Physical Activity Barriers Sample				Stage of Change Sample		
	Control (n=61)		Experimental (n=72)		Control (n=30)		Experimental (n=56)
Gender							
Male	28	46%	28	39%	14	42%	18 23%
Female	33	54%	44	61%	16	57%	38 68%
Ethnicity							
Hispanic	8	25%	12	41%	6	33%	9 26%
Non-Hispanic	24	75%	24	59%	12	67%	26 74%
Race							
Native	4	9%	2	4%	1	5%	2 4%
American/Alaskan	0	0%	0	0%	0	0%	0 0%
Asian	34	72%	35	64%	15	71%	27 59%
African-American	1	2%	1	2%	1	5%	0 0%
Hawaiian/Pacific Islander	8	17%	17	31%	5	19%	17 37%
White							
Education							
No High School Diploma	18	33%	17	26%	10	36%	16 30%
GED ¹	10	18%	11	17%	6	21%	8 15%
High School Diploma	10	18%	10	15%	5	18%	6 11%
Some Post-secondary Ed	5	9%	7	11%	2	7%	10 19%
Technical School	6	11%	13	20%	2	7%	8 15%
2-yr College Degree	3	5%	6	9%	3	11%	5 9%
4-year College Degree	2	4%	0	0%	0	0%	0 0%
> 4 years Post-secondary	1	2%	1	2%	0	0%	0 0%

¹ General Equivalency Diploma

Impact on Barriers to Physical Activity. Three-quarters of participants attended six consecutive classes, 74% in the control group and 75% in the experimental group. Repeated measures ANOVAs showed a significant difference between the control and experimental groups in terms of change in number of perceived barriers, $F(1, 131) = 4.12$, $p < 0.05$). Experimental group participants' mean barriers decreased from $M = 2.43$

(SD=1.75) to $M=1.78$ (SD=1.40), while control participants' mean barriers increased from $M=2.06$ (SD=1.91) to $M=2.13$ (SD=2.34). An 8.35% margin of error was calculated. The statement "My spouse doesn't encourage exercising" was excluded from analyses because of the proportion of participants living alone.

When the pre-intervention barriers data were transformed into dichotomous variables, a majority of all participants were found to disagree with every barrier statement ($\geq 73\%$) except "Exercise makes my body feel tired." Participants responded to this statement nearly equally, 56% agreed and 44% disagreed. In the experimental group, over one-third of those who initially agreed exercise was tiring changed their response after exposure to the DVD ($n=17$; 36%). No other notable change in the barriers was found.

Analysis of the barriers open-ended question showed being "lazy" was a common barrier. A few participants stated a lack of "motivation" and "low self-esteem" were their barriers, with more women than men describing feelings of being "afraid" or "intimidated." Those participants with children in their households most often repeated the survey statements that a lack of "time" and being "too busy" or "tired" were barriers. Other participants, primarily recruited in drug and alcohol rehabilitation sites, described their medical/health conditions, illness, and prescription or illegal drug use as barriers.

Table 5.2: Change in Barriers to Exercise from Pre- to Post-intervention

Barriers Statements	Control (n=61)		Experimental (n=72)	
	Mean \pm SD		Mean \pm SD	
1. Exercise takes too much time.	0.00	± 0.89	-0.10	± 0.84
2. Exercise makes me sleepy.	0.11	± 0.61	-0.04	± 0.54
3. Exercise costs too much money.	-0.03	± 0.63	-0.12	± 0.79
4. Exercise makes my body feel tired.	-0.03	± 0.84	-0.26	0.95
5. Exercise takes too much time from family relationships.	-0.03	0.68	-0.01	0.62
6. Exercise takes too much time from family responsibilities.	0.07	0.60	-0.13	0.56
7. Exercise is hard work for me.	-0.15	0.98	-0.03	0.75
8. Places for me to exercise are too far away.	-0.08	0.78	-0.11	0.81
9. Exercise facilities do not have convenient schedules.	0.05	0.74	-0.04	0.70
10. There are too few places to exercise.	0.11	0.82	-0.08	0.78
11. My spouse does not encourage me to exercise.	0.04	0.78	-0.10	0.83
12. My family members do not encourage me to exercise.	0.02	0.70	-0.14	1.01
13. I am too embarrassed to exercise.	0.07	0.68	-0.13	0.72
14. I think people in exercise clothes look funny.	0.11	0.80	-0.04	0.86

Scale Ranging 1 to 4 (1=Strongly Disagree; 2=Disagree; 3=Agree; 4=Strongly Agree)

Stage of Change

The exercise survey instrument was administered to program participants (N=86) in 15 classes that were oversampled in the experimental group. Thirty participants (37%) were in the control group and 56 (62%) in the experimental group.

Sample Characteristics. No significant differences in demographic variables were found between groups. The mean age of participants who willingly reported their ages ($n=81$) was 35 ($SD=17$) years. Most of the participants were urban, non-white females, and slightly over one-third had completed high school. See Table 5.1.

Nearly all the participants (93%) reported participation in social service programs. The mean monthly income fell below the poverty threshold ($M=\$693/\text{month}$, $SD=\$7507$). Thirty-one percent of participants lived alone; 17% lived with one other adult; 14% lived alone with children; and over one-third (38%) lived in traditional or extended families including multiple adults and/or children.

Impact on Exercise Habits. The majority of the participants attended all classes, 87% and 89%, in the control group and experimental group, respectively. When participants were matched to one of the five TTM stages of exercise, over half (58% controls; 52% experimental) were found to be “active” before the intervention (see Table 5.3). Participants’ mean stage of exercise decreased more among those in the control group than in the experimental group, $M=-1.3684$ ($SD=-1.8016$) and $M=-0.2333$ ($SD=0.8584$), respectively. The difference in change of stage between the groups was significant, $t(23)=-2.57$, $p<0.05$.

Table 5.3: Voluntary Adoption of Exercise from Pre- to Post-intervention

Transtheoretical Model Five Stages of Change	Control (N=33)		Experimental (N=56)	
	Pre-	Post-	Pre-	Post-
Exercise Habit: Inactive				
1. Pre-contemplation	6 (18%)	13 (40%)	8 (14%)	4 (7%)
2. Contemplation	1 (3%)	3 (9%)	8 (14%)	8 (14%)
3. Preparation	7 (21%)	1 (3%)	10 (18%)	7 (13%)
Exercise Habit: Active				
1. Action	6 (18%)	6 (18%)	15 (26%)	20 (36%)
2. Maintenance	13 (40%)	10 (30%)	15 (26%)	17 (30%)

When the stage of exercise data were transformed into dichotomous variables, the between group difference was not significant, $t(23)=-1.25$, $p>0.05$). The mean change was smaller in the control group than in the experimental group, $M=0.2857$ ($SD=1.6375$) and $M=0.9231$ ($SD=1.3542$), respectively, and the DVDs effect on stage of exercise was found to be large, $d=0.8044$, evidenced by participant patterns of regression. Further examination, found over one-third of participants in the control group (36%) regressed in TTM stage, most often from action to pre-contemplation; but, less than one-fifth of participants in the experimental group (16%) regressed and none with the same extreme. For inactive participants at pre-intervention, no significant relationship between change in individual barriers to physical activity and change in stage for exercise could be found.

Responses to the open-ended question showed “walking” as the participants’ primary physical activity. Many indicated they walked for transportation to shop, to catch the bus or subway, and to class. The participants described their leisure-time physical activities as jogging, biking, skating, and dancing. Some played group sports or games. Those with children in their households counted chasing after and playing with them as exercise. Four participants named DVDs they used to exercise at home. More men than women engaged in non-aerobic exercises, primarily calisthenics and weight training. Some participants stated that their jobs, household chores, and walking up and down apartment stairs should count as exercise.

Discussion

As a result of exposure to the exercise DVD, which was designed for use in adult education classes, there was a reduction in participants’ perceived barriers to physical activity and a positive impact on participants’ exercise habits. It stands to reason that when barriers are reduced exercise habits improve; however, the findings in this study counter the existing literature. Pre-intervention, the participant had few barriers to physical activity and most were active.

With regard to the first discrepancy, it appeared that few of the identified barriers to physical activity, that is those of the scale employed, were common to these participants. Further, post-analysis research found that other investigators have also questioned these barriers among working women, diabetes patients and older adults. Possibly, barriers more

salient to study participants should be incorporated into a survey that, when used with low-income individuals, will result in more robust findings (Brazeau, Rabasa-Lhoret, Strychar, and Mircescu, 2008; Dube, Valois, Prud'homme, Weisnagel and Lavoie, 2006; Osuji, Lovegreen, Elliott and Brownson, 2006; Thomas, Alder and Leese, 2004; Juarbe, Turok, and Perez-Stable, 2002).

Regarding the second discrepancy, between pre-intervention activity levels among this audience and reported national activity levels (CDC, 2007) may be attributed to the venues of this investigation. Possibly, despite efforts to adapt the survey instrument for various literacy levels, the class participants may have lacked understanding the term “exercise.” Powell and colleagues have pointed out that “in both common and scientific usage [of exercise] varies considerably from user to user, inviting misunderstanding” (Powell, Paluch and Blair, 2011, p 361). If so, then there may have been a training effect.

Physical activity recommendations are discussed in SNAP-Ed/EFNEP classes. It is also possible that pre-intervention reporting was inflated due to “lack of trust” between the participants and researchers. If this improved over time, then truer yet reduced activity levels would have been reported post-intervention. If either of these hypotheses is true, then a retrospective pre-/post-intervention test may have resulted in more robust findings. Additionally, post-analysis observations revealed that some classes made exercise facilities available to program participants. This ancillary finding suggests that where exercise

facilities are available to low-income individuals activity levels are greater. Further research is needed to examine the extent to which this finding is true.

These discrepancies aside, participants exposed to the DVD maintained their exercise habits . Since similar findings have been evidenced in other “outdoor” walking interventions (DHHS, 2009; Eyster, Brownson, Bacak, and Housemann, 2003; Ogilvie, et al, 2007), these findings suggest that indoor walking reduces barriers for those without access to exercise facilities or lack the ability to exercise outdoors and improves exercise habits.

These results have enough statistical power to suggest they are valid. Since limited-resource adult audiences in New Jersey are demographically similar to other segments of adults in urban areas, these findings can likely be of value nationally among these similar target audiences.

Finally, contemporary, albeit smaller, physical activity interventions among similar audiences did not result in the regression in stage of exercise that was found in this study (Fahrenwald, Atwood and Johnson, 2005). Again, since it appeared that more participants in this investigation initially perceived themselves as active, this finding indicates a training effect and additional work needs to be done to assess rates of regression among low-income exercisers.

Limitations

This study has several limitations which may have dampened the results. First, the number of participants not exposed to all six IWSs was less than planned. For example, participants in the experimental groups, 25% and 11% in the barriers and stage of exercise samples, respectively, were not exposed to the entire DVD due to absents from classes. Second, the brevity of exposure, that is 15 minutes per week, is not enough exercise for inactive participants to become active according to recommendations if they do not engage in physical activity outside their classes. Lastly, the samples reflected the heterogeneous nature of participants in SNAP-Ed/EFENP classes; however, had there been more community programs representing more homogeneous groups to test the DVD, a greater impact may have been measured.

Implications for Research and Practice

This study adds to the literature which has called for interventions with more rigorous quasi-experimental designs using randomized groups; samples among large numbers of diverse people; use of valid and reliable instruments; and, measurement of effect (Fahrenwald, Atwood and Johnson, 2005; Banks-Wallace and Conn, 2002).

Prospective research over a longer period of time is needed to test the long term effects of using exercise DVDs, that is to discern their potential to reduce barriers to physical activity and increase voluntary adoption of exercise among limited-resource, diverse adults. Specifically, walking interventions need to be tested among even larger groups for their

results in order to generalize findings to other diverse audiences (Parks, Housemann and Brownson, 2003). However, caution of bias against this target population is warranted until new tools sensitive to their barriers and exercise habits and tools able to measure the effect of low-intensity exercise are developed (Powell, Paluch and Blair, 2011; CDC, 2007).

In practice, knowing a target audience's barriers to physical activity will help promote voluntary adoption of exercise where the DVD is used. For example, educators may find promoting work-related movements in workforce development classes (Van Domelen, et al, 2011; Wilbur, Vassalo, Chandler, McDevitt, and Miller, 2005) and "unstructured" and "spontaneous" play with children in parenting class (Dunton and Schneider, 2006) may have an additive effect on improving stage of exercise desired in community adult education classes.

Chapter 6: Should Physical Activity Be Included in Nutrition Education?

A Comparison of Nutrition Outcomes With and Without In-class Activities

Abstract

Nationally, limited-resource, diverse adults' dietary intakes and nutrition behaviors improve with exposure to nutrition education based upon the Dietary Guidelines, that is SNAP-Ed and EFNEP curriculum; however, to improve health more physical education is needed. This investigation measured salient differences between participants in control and experimental groups of NJ EFNEP/SNAP-Ed classes without and with physical activity demonstrations, respectively. Data from Nutrition Behavior Checklist and 24-hour Food Recalls lacked any significance in change in dietary intake between groups and showed greater behavioral changes by the experimental group. Thus, it appears that nutrition education can be shortened 15-20 minutes for physical activity demonstrations without an adverse effect on program participants' healthy food- and nutrition-related behaviors.

This chapter was written according to the author guidelines for submission to the *Journal of Extension* which publishes information for US Extension professionals.

Introduction

The United States Department of Agriculture (USDA) maintains a commitment to improving individuals' dietary behaviors through nutrition education offerings consistent with the Dietary Guidelines for Americans. Since the 1960's, the USDA's National Institute of Food and Agriculture (formerly the Cooperative State Research, Education and Extension Service) has provided nutrition education to limited-resource families through the Expanded Food and Nutrition Education Program (EFNEP) (USDA, 2009a). In 1988, the USDA's Food and Nutrition Service extended provisions for nutrition education to those eligible for Supplemental Nutrition Assistance Program (SNAP; formerly Food Stamps) benefits (USDA, 2009b). In many states, both EFNEP and SNAP-Education (Ed) employ paraprofessional educators to model "positive nutrition, health, and food safety behaviors" (Baker and Pearson, 2010; Baker, Pearson and Chipman, 2009) and to engage program participants in interactive food shopping, food safety and food preparation lessons and to promote physical activity (USDA, 2011; 2008b). Both EFNEP and SNAP-Ed have shown improvement in participants' fruit, vegetable and dairy food intake and their intentions to engage in healthy dietary and exercise behaviors as a result of these nutrition education programming (Koszewski et al, 2011; USDA, 2008a; 2008b).

Still, the prevalence of obesity among the SNAP-Ed/EFNEP target population, i.e., low-income audiences, continues to increase. In fact, a paradoxical relationship, wherein those who are the least food secure have the highest rates of obesity, has been identified (Dinour, Bergen and Yeh, 2007). Martin and Ferris (2007) found that those who are food

insecure are nearly two and a half times more likely to be obese than are those who are food secure.

As the evidence that diet and exercise are “inextricably intertwined” has grown (Brooks et al, 2004, p 921S), the Dietary Guidelines have increasingly recommended that physical activity should balance dietary intake (USDA and DHHS, 2010) as a means of reducing risk for obesity. Also, in 2008, the Physical Activity Guidelines for Americans were published for the first time with concurrent recommendations that adults engage in 30 minutes of moderate-intensity exercise most days of the week (US Department of Health and Human Services [DHHS]). Of primary concern is that in addition to disproportionately high rates of obesity among the low-income adults, low socio-economic status has also been associated with little or no leisure-time physical activity which has, in part, been attributed to a multitude of interpersonal and community level barriers, for example, a lack of: money, childcare; gyms and/or transportation for exercising at gyms; safe neighborhoods and consistently pleasant weather for exercising outdoors; and, equipment and space for exercising at home (Fitzgerald and Spaccarotella, 2009; Palmer and Ryan, 2008; Bennett et al, 2007). Despite this preponderance of evidence that supports the need for physical activity education among low-income individuals, the integration of physical activity into SNAP-Ed/EFNEP adult classes has been limited, and that existing curricula that does address activity has largely remained knowledge-based, a less effective paradigm (Marcus et al, 2006; Contento et al, 1995).

SNAP-Ed/EFNEP impact studies have demonstrated that a minimum of six behaviorally-focused nutrition education classes, traditionally one to two hours per week for six weeks, are needed to promote behavior change in nutrition. (Hoerr et al, 2011; Luccia, Kunkel and Cason, 2003) Similarly, anecdotal data regarding an intervention in which SNAP-Ed/EFNEP adult classes offered behaviorally focused physical activity education for approximately 15 minutes per class over six classes suggested that (like nutrition education findings) a minimum dose of two to four exposures to the intervention were needed before the effect on exercise behavior could be measured.

Both nutrition and physical activity education are important to improving the health of limited resource individuals. Yet to produce measureable results, it is clear that in both these areas educational endeavors require behaviorally-focused education offered over multiple class offerings. As such, nutrition and physical activity educational offerings may compete for the same educational time and resources. This investigation seeks to answer the question: If EFNEP and SNAP-Ed adult nutrition education classes are reduced by 15-20 minutes for the provision of physical activity education, what is the impact on participants' nutrition-related behavior changes and nutritional outcomes?

Methods

This investigation was part of a larger quasi-experimental research project involving 21 EFNEP and SNAP-Ed adult classes recruited in nine out of a possible 19 counties

throughout New Jersey (NJ). All classes were held at least one hour per week for six weeks. Each class was comprised of an intact group of program participants that were assigned to either a control or experimental (intervention) group. Towards the end of the study period, classes were oversampled in the experimental group to increase the sample size of participants exposed to all six segments of the physical activity intervention. The research protocol was approved by the Rutgers Office of Research and Sponsored Programs Institutional Review Board (IRB Protocol #09-226M).

Sample

To be included in this study, class participants had to be between 18 and 55 years. No one was excluded because of gender, race/ethnicity or willingness to exercise during class.

Intervention

Traditional NJ SNAP-Ed/EFNEP nutrition education programming was offered to both the control and experimental groups (www.njsnap-ed.rutgers.edu); however, class activities were reduced by 15-20 minutes in each of the experimental classes to allow for the integration of the physical activity portion of the intervention. The activities that were deleted were left to the discretion of the educator, based on class members' nutrition education needs (as is the case more globally for the nutrition education curricula offered to each class).

The physical activity intervention was offered using a digital video disc (DVD) entitled *Walk Indoors!* This DVD had been designed according to the literature of exercise DVDs; SNAP-Ed Plan Guidance; and, national physical activity guidelines, which recommend walking for people of all fitness levels (DHHS, 2008). The DVD contains six, 15 minutes video segments, featuring a fitness expert safely leading a diverse cast, including SNAP-Ed/EFNEP staff, in low-impact, moderate-intensity physical activity. Five segments are aerobic walking demonstrations with varying fitness themes and one segment is stretching. The DVD was previously tested in NJ SNAP-Ed/EFNEP adult classes in 2009-2010 and its effect on exercise behaviors bode well for its use among limited-resource, diverse adults.

Data Collection

Data used were primarily derived from surveys paraprofessional educators administered as part of their usual practice. These were: demographic survey questions; standardized Nutrition Behavior Checklist questions, 24-hour food recall results; and, class sign-in sheets (www.njsnap-ed.rutgers.edu).

The Nutrition Behavior Checklist. Nutrition-related behaviors were assessed using a 10-item checklist NJ EFNEP/EFNEP participants complete pre and post intervention (Hoer et al, 2011). This instrument includes nutrition, food resource management, and food safety questions. Responses use a 5-point Likert-type scale, ranging from one, “Do Not Do,” to five, “Almost Always [Do].” It has been found easy to administer in group settings; have a 4.0 Flesch-Kincaid readability score and low participant response burden;

and, be reliable and sensitive to change among low-income, minority women (Townsend et al, 2003). See Table 6.1.

1-Day Food Recalls. To estimate short-term food group consumption in large groups, pre and post 24-hour food recalls were performed using a derivative of the USDA's multiple-pass method found to maximize memory capabilities to achieve recall accuracy (Conway, Ingwersen and Moshfegh, 2004; Conway et al, 2003; McClelland et al, 2001). The multiple-pass method requires educators to first ask participants to make a quick list of all the foods they consumed before class working backwards 24 hours. Next, participants are asked to recall snacks and beverages. Then, participants review their lists for anything they may have missed and are asked to add descriptive detail, such as ingredients, brand names, condiments, and preparation methods. To improve estimates of serving sizes, the educators provide participants with models. Then, the educators review the participants' recalls for completeness and to ask for clarification of any entry. Fidelity to this method, and therefore the data collection protocol for this investigation, was maintained by the NJ SNAP-Ed/EFNEP staff. Only the amount of one-on-one assistance varied depending upon the size of class being managed.

Table 6.1: Behavior Checklist and Change in Nutrition Behavior by Intervention Group

Item	Control Mean Change \pm SD	Experimental Mean Change \pm SD	p-value
1. How often do you plan meals ahead of time?	-0.3 \pm 1.2	0.3 \pm 1.2	0.11
2. How often do you compare prices before buying food?	0.1 \pm 1.6	0.3 \pm 1.5	0.72
3. How often do you run out of food before the end of the month?	0.2 \pm 1.2	0.0 \pm 1.0	0.55
4. How often do you shop with a grocery list?	0.4 \pm 1.4	0.6 \pm 1.4	0.68
5. How often do you let meat or dairy foods sit out for more than 2 hours?	0.2 \pm 0.9	0.2 \pm 0.9	0.93
6. How often do you thaw frozen foods at room temperature?	0.1 \pm 1.0	-0.9 \pm 1.6	0.04*
7. When deciding what to feed your family, how often do you think about healthful food choices?	0.5 \pm 1.4	0.2 \pm 1.4	0.61
8. How often do you prepare foods without adding salt?	0.7 \pm 0.8	0.2 \pm 1.6	0.75
9. How often do you use the "Nutrition Facts" on the food label to make food choices?	-0.2 \pm 0.8	0.6 \pm 1.4	0.03*
10. How often do your children eat something within 2 hours of waking?	-0.2 \pm 0.9	-0.2 \pm 1.7	0.98

*Significant ($\alpha=0.05$)

Statistical Analysis

SNAP-Ed/EFNEP staff processed all participants' socio-demographic and dietary recall data using the Nutrition Education Evaluation and Reporting System (NEERS) SRS5 Software (University of Georgia, 2008) to produce personalized summaries, including estimated and recommended dietary intakes of kilocalories and food groups per day. NEERS5 recommendations are based upon self-reported gender, age, height, weight and activity level matched to one of 14 USDA food patterns (USDA, 2011). If any of these data were missing, recommendations were based upon a 2000 kilocalorie per day diet for the average EFNEP participant, that is, a female, 19-25 years old who exercises <30 minutes per day (NEERS5 Diet Summary Committee, 2006). Data gleaned from these diet summary reports, behavior checklists, and demographic survey data were used for nutrition-related behavior and nutrient intake analyzes. One question was added to qualitatively capture the changes participants said they had made as a result of nutrition education programming.

Descriptive findings were reported, by intervention group, as frequencies and percents. Pre-post-intervention change in nutrition behaviors, were examined as means with standard deviations of estimated dietary intakes, and changes in intakes by food group. Analysis of Variance was used for hypothesis testing, that is, between group differences. To identify the expected error in these results, a power calculation was performed based upon the total number of Program graduates (1162) during the study period (<http://www.raosoft.com/samplesize.html>). Unless otherwise stated, these analyses were

performed using SAS v 9.1 (Cary, NC) with significance set at $p < 0.05$. Qualitative data was analyzed for themes by group.

Results

Although 255 participants attended the classes examined, only 53 participants were included in the analyses due to class attrition prior to post-testing (61%) and the elimination of those with missing values (18%). There were 17 subjects in the control group and 36 in the experimental group. No significant differences in gender, age, race/ethnicity, education or income were found between these groups. Overall, more than half of the participants were non-white females under the age of 26 who lived alone and received incomes below the poverty thresholds for individuals. See Table 6.2.

A 13.2% error could be expected in the following results. Between intervention groups, only two significant nutrition-related behavior change differences were found, i.e., participants in the experimental group reported thawing foods at room temperature significantly less often and reading Nutrition Facts labels significantly more often than those in the control group. See Table 6.1. While the control group evidenced improved intake of fruits and vegetables, and the experimental group evidenced increased intake of fruits and dairy foods, no significant food group differences were found. See Table 6.3.

Participants responded to the open-ended question, “Since you have taken this class, have you made any changes, or are you thinking about doing anything different, that is, thinking

about making a change?” with both nutrition- and exercise-related intentions as the question was designed. In general, participants in both groups cited specific behaviors which could have been learned.

Table 6.2: Descriptive Characteristics by Intervention Group

Socio-demographic Variables	Study Sample	
	Control n (%)	Experimental n (%)
Gender (n=53)		
Male	11 (65%)	12 (33%)
Female	6 (35%)	24 (66%)
Ethnicity (n=28)		
Hispanic	0 (0%)	4 (20%)
Non-Hispanic	8 (100%)	16 (80%)
Race (n=45)		
Native American/Alaskan	0 (0%)	0 (0%)
Asian	0 (0%)	0 (0%)
African-American	10 (63%)	18 (62%)
Hawaiian/Pacific Islander	0 (0%)	0 (0%)
White	6 (37%)	11 (38%)
Education (n=50)		
No High School Diploma	3 (19%)	4 (11%)
General Equivalency Diploma	3 (19%)	7 (21%)
High School Diploma	5 (31%)	4 (11%)
Some Post-secondary Ed	0 (0%)	8 (24%)
Technical School	1 (6%)	6 (18%)
2-yr College Degree	2 (13%)	5 (15%)
4-year College Degree	1 (6%)	0 (0%)
> 4 years Post-secondary Ed	1 (6%)	0 (0%)

*Significant ($\alpha=0.05$)

Table 6.3: Food Group Intake from the Five Food Groups by Intervention Group

Food Group	Control (n=17)			Experimental (n=36)		
	Entry Mean±SD	Exit Mean±SD	Mean Change	Entry Mean±SD	Exit Mean±SD	Mean Change
Fruit (c)	1.4±1.2	1.5±1.8	+0.1	1.0±1.5	1.3±1.3	+0.3
Vegetable (c)	1.4±1.2	1.5±0.9	+0.1	2.1±1.8	1.4±1.3	-0.7
Grain (eq)	8.6±4.7	6.5±3.3	-2.1	7.6±8.4	5.5±4.0	-2.1
Protein (eq)	7.2±4.3	5.7±4.2	-1.5	7.3±4.7	6.9±3.7	-0.4
Dairy (c)	1.6±1.2	1.5±1.5	-0.1	1.2±1.0	1.3±1.2	+0.1

Servings in c=cups, eq=ounce equivalents

*Significant ($\alpha=0.05$)

Discussion

Since 2005, the Dietary Guidelines for Americans have included clear recommendations for exercise to balance dietary intake and improve health. In order to maintain consistency with these Guidelines, USDA funded nutrition education programs need to increase offerings of behaviorally-focused physical activity lessons in all classes, including those for adults. This was a preliminary investigation of making such offerings via the inclusion of 15-20 minutes of moderate-intensity, physical activity demonstrations in NJ SNAP-Ed/EFNEP classes via an exercise DVD designed specifically for limited-resource, diverse audiences. Of primary concern for SNAP-Ed and EFNEP stakeholders is the impact of such offerings on program efficacy.

This investigation, which reached the intended target audience, that is, those were primarily young, minority women (NEERS5 “average EFNEP participant”) who receives SNAP

benefits, showed that a comparison of the nutrition changes between participants in classes with and without the demonstrations failed to identify any harmful effect on salient nutrition behavior changes. There were no significant differences between the control and experimental groups in mean changes of dietary intake from any of the five food groups. Additionally, the findings reflected the national reports that SNAP-Ed/EFNEP participants improved their intake of foods from the fruit, vegetable and dairy groups (USDA, 2008a; 2008b), for example, both intervention groups showed improvements in mean servings from two of these three food groups.

Interestingly, the findings from the analyses of the Nutrition Behavior Checklists showed participants in the experimental group were more likely than participants in the control group to change certain food shopping and safety behaviors. These are likely due to the small sample size, and should be further examined to eliminate the possibility of these being false positive results.

Of significance are the results of the open ended question. Those who received the physical activity intervention said they intended to exercise “more” and in particular “walk” more. According to the 2008 Physical Activity Guidelines, a larger body of research has shown community-level walking interventions improve participants’ self-efficacy to engage in regular exercise, as well as the easiest and safest activity with health benefits to all regardless of age, gender, race/ethnicity, and physical fitness levels (DHHS, 2008; Isaacs et al, 2007; Ogilvie et al, 2007; Eyler et al, 2003). The findings from this

investigation further support walking demonstrations as a strategy to promote moderate-intensity physical activity in federally funded nutrition education programs because the activity can be performed in class by existing staff and existing resources.

This investigation was not without challenges typical to intervention research. The participant attrition rate and short study period weakened these results. A larger sample size would help reduce the question of error in these results. To overcome these limitations, longitudinal research in multiple states using more novel practices that promote physical activity among limited-resource, diverse adults are needed to show sustainability of behavior. Advances in the literature such as this investigation will improve current methodologies which compete for the same educational time and resources.

This investigation supports the notion that the institutionalization of behaviorally-focused physical education in SNAP-Ed and EFNEP adult classes augments these programs' documented dietary improvement outcomes. Ultimately, the inclusion of physical activity education in the programs will contribute to the USDA's long-term priority to prevent obesity by improving the nation's nutrition and health.

Chapter 7: Conclusion

Prior to the development of “Walk Indoors!” preliminary research identified exercise DVDs as a practical and potentially effective means of promoting moderate-intensity physical activity in community-level programming. The long-term goal of the project described in this dissertation was to test the use of exercise DVDs as a viable strategy in nutrition education to help achieve two long-term public health goals: to reduce the prevalence of overweight/obesity in the US; and, to increase the proportion of Americans engaged in leisure-time physical activity.

Project Overview

Given that the integration of physical activity into nutrition education is likely to compete for the same program resources, three hypotheses pertinent to this concern were tested during the piloting of the DVD in NJ SNAP-Ed/EFNEP classes. The first investigation was the DVD’s effect on participants’ barriers to engaging in physical activity; the second was its effect on participants’ stage of exercise; and, the third was its effect on participants’ food and nutrition-related behaviors. The results discussed in the previous chapters provide evidence to explain how and why this projects’ research aim was reached. As presented in further detail below, these findings are likely to open doors for research opportunities in physical activity and community/adult health education. In summary:

Hypothesis 1. As a result of piloting the DVD in NJ SNAP-Ed/EFNEP classes, study participants' mean score of barriers to engaging in physical activity were *significantly* reduced. Further, some participants elucidated barriers specific to the target audience that have yet to be universally recognized or included in the most widely-used exercise barrier assessment. For example, undiagnosed and/or treatment of medical conditions related to overweight/obesity may cause fear that exercising will be painful or lower blood sugar. A lack of childcare preventing engagement is another example found throughout the barriers literature and observed at specific research sites such as Temporary Assistance for Needy Families offices and women's' homeless shelters. Such issues are likely more pronounced among people traditionally underserved by preventative health care than among people with private health insurance or ample financial support.

Beyond the scope of this project is identifying the need for the development and validation of a more appropriate survey instrument to examine barriers to engaging in physical activity specific to limited-resource, diverse adults. This may be a judicious next step in evaluating the use of the DVD. Such a tool could also be used as a screener in a prospective study designed to follow sedentary participants as they are exposed to physical activity interventions or to measure the dose needed to elicit change in behavior. Future research could examine the rationale for why participants do and do not engage in in-class physical activity.

Hypothesis 2: As a result of piloting the DVD in NJ SNAP-Ed/EFNEP classes, study participants' physical activity behavior showed evidence of maintaining exercise habits, albeit self-reported. The hypothesis initially proposed that stage of exercise would improve remains unaccepted possibly because of the proportion of participants at the beginning of the investigation who perceived themselves as active with few barriers to engaging in physical activity. These findings suggest that there may be a difference in the activity levels of the largely urban, minority audience reached in NJ compared to national reports that more than three-quarters of non-white minorities have sedentary lifestyles.^(57; 178; 179) Discussed previously was the possibility of a training effect that the in-class demonstrations changed participants' perception of their activity levels. While "reevaluation" is a theoretical process of change, researchers recognize that non-linear movement between the stages cannot be explained by the Transtheoretical Model.⁽¹⁷⁷⁾

The development of more non-evasive tools sensitive to measuring low-intensity physical activity in community-level research have been called for,^(35; 125) but the need for tools designed for use among people with low literacy skills and for whom English is a second language was demonstrated each time this project's survey instruments had to be adapted to reduce the response burden on the target audience.

At this time, evaluation of the DVD's design appeal to participants regardless of their gender, age, race/ethnicity and fitness level was through mixed methods data collection and triangulation.⁽¹⁸²⁾ Observations showed overweight participants' behavior in class was not

mediated by their body size as much as repeated exposure to the confidence and conviction to engage in the activity modeled by the DVD cast, educators and other class participants. No better indicator of the DVD's potential to impact behavior was found than in participant's testimony including, "I'm going to walk this evening." In the future, a longitudinal study should be designed to measure retention of the exercise behavior of SNAP-Ed/EFNEP participants after exposure to in-class physical education as opposed to just intention.⁽¹⁸²⁾

Hypothesis 3: As a result of the DVD's use, which displaced some nutrition education in NJ SNAP-Ed/EFNEP classes, no difference was found between control and experimental group study participants' intent to engage in healthy food- and nutrition-related behaviors. This investigation was the heart of this project. Unlike the Exercise Barriers and Stage of Exercise data collection which exposed the limitations of the tools when used among limited-resource, diverse adults, diet recalls are the standard for SNAP-Ed and EFNEP nationwide. Overall the results, which showed that use the DVD did not alter the nutrition outcomes, infer that the integration of behaviorally focused nutrition education and physical education reinforces a principal message of the Dietary Guidelines, that is, that maintaining calorie balance sustains health; thereby fulfilling the mission of federally funded nutrition education programs. Whether or not the effect of exercise on dietary intake and behavior is additive and differs by mode of delivery in adult nutrition education classes is for future investigations.

Application

This project was unique because it was a community-level, physical activity intervention designed for adults only. It adds to the physical activity literature because of its attention to research design by including a control group and repeated measures of behavior using widely-accepted tools. Despite the challenges of conducting research in educational venues where participants' freewill was observed to be restricted and class attendance was disrupted by, for example, mandatory job interviews and medical appointments, the results bode well for the DVD's continued use in NJ SNAP-Ed/EFNEP classes.

However, this research was formative and meant to evaluate the DVD in its early stage of development. The investigations were to determine its strengths and weaknesses and a process evaluation was to inform changes to its design, if needed. Since piloting of the DVD, changes were made, such as digitally improving the volume, adding captions to improve message delivery, and re-recording the DVD's introduction to add advice to the educators on how to optimize its use in their classes. Meriting recognition is the DVD's reproducibility, that is, ease and cost (less than three dollars) to copy and distribute. This is significant in that this is below the four dollar regulation established by the SNAP-Ed guidance for the amount of money that can be spent on participant incentives.⁽²⁵⁾ As such, these results can be used to drive policy change at the institutional level to accept use of exercise DVDs in federally funded nutrition education programs.

Future Outreach

All or part of this project can be replicated as longitudinal and prospective studies or cost-benefit analyses. However, instead of trying to design one DVD for everyone, substantive changes to the DVD or producing new exercise DVDs based upon the observations made during this project would appear useful. For example, tailored demonstrations of physical education could include modeling parents exercising with children or even lower intensity activities for sedentary “beginners.” To improve impact, copies of the DVD used in class or new versions demonstrating a full 30 minutes of moderate-intensity exercise can be given as program incentives for participants to use at will. Thus, the reach of SNAP-Ed/EFNEP benefits could be extended.

Concluding Thoughts

Because there are few precedents in the literature about use of exercise DVDs or examples of physical education among limited-resource, diverse adults, the potential for outreach, research and development of other behaviorally focused physical education materials related to this work appears limitless. At the time of this dissertations’ completion, already thousands of copies of the DVD have been acquired for use in SNAP-Ed and EFNEP classrooms, and hundreds have been distributed for use in research. Harking back to the initial concerns of providing behaviorally focused physical activity in nutrition education classes, the issues of staff, resources and space were unfounded after piloting the DVD. The choice of walking demonstrations for the DVD was supported throughout the exercise literature as a basic activity that anyone can do and receive benefit. Interestingly, a primary

lesson learned from this project was that as long as the activity was perceived as “fun,” the participants willingly exercised with the DVD regardless of their barriers to physical activity, exercise habits or current diet. Thus, delivery of the message that *exercise can be done anywhere* was received.

The strength of this study can be captured by one personal anecdote. After piloting the DVD had been completed, the author found herself on other business at one of the original research sites for this project, an inner city drug rehabilitation center, where she asked the educator if she could sit in on her class. Not expecting the educator to still be using the DVD, she was surprised when the educator said, “Ok, It’s time to exercise.” The author found herself automatically getting up with a dozen African American men, the size and shape of football players, and falling into formation with them in front of the television in their “living room.” While waiting for the video to start, one guy leaned over to the author and said, “You’re really going to like this.” It did not take long, somewhere between kicks and knee lifts, when it happened. The guys recognized the author in the video, “Hey! That’s you!” That day, the author didn’t know who had more fun, her or the guys...walking indoors.

APPENDIX

I

List of Attachments

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Attachment 1: Example of Email Solicitation

Classes Needed for Intervention

Page 1 of 1

From: "Debrah M. Palmer" <Dpalmer@NJAES.Rutgers.edu>
 Subject: Classes Needed for Intervention
 Date: Tue, January 27, 2009 9:46 pm
 To: nutrisuper_L@email.rutgers.edu
 Cc: "Audrey Adler" <adler@NJAES.Rutgers.edu>,kcorda@Eden.Rutgers.edu,"Georgie Fear" <georgiefear@hotmail.com>,deepikas@Eden.Rutgers.edu

Hi All! This is one of two very important messages I have to send you.

As you may or may not know, we have received funding from the NRI to test in our classes the use of DVDs we are developing with Leslie Sansone. We are in desperate need of finding CAs who can be scheduled to teach at least 2 classes/different groups (4 would be better) beginning no earlier than March 15, and ending no later than the end of May (maybe the first week of June).

The classes would need to be:

1. Comprised only of adults, 18-55 years old.
2. Taught in English.
3. Eight weeks in length with fairly good retention; OR lasting six weeks, but in situations where the people are onsite the week before and the week after we teach, and we can access them for surveys.

If you can make this happen I will love you FOREVER! Try your best, and email me ASAP with as many CAs as you can make such arrangements for. Again, my thanks - Deb

Attachments:

untitled-[2]
Size: 3.8 k
Type: text/html

https://webmail.eden.rutgers.edu/src/printer_friendly_bottom.php?passed_ent_id=0&mailb... 1/27/2009

Attachment 2: Getting to Know You

Getting to Know You Form		
Name: _____	Date: ____/____/____	
Street: _____	City: _____	
Zip Code: _____	County: _____	Phone (optional): () _____ - _____
Age: _____	Gender: Female _____	Male _____
I am :	Pregnant _____	May be Pregnant _____ Breastfeeding _____
Highest Grade Completed (K-12): _____		
I finished:	GED _____	Some College _____ Technical School _____
	2-Year College _____	4-Year College _____ More _____
My Monthly Household Income (including cash benefits): _____		
Ages of Children Living with You:		
1) _____	2) _____	3) _____ 4) _____ 5) _____ 6) _____
Number of Adults Living in Household (do not count yourself): _____		
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> Check the ethnicity you identify with: _____ Hispanic or Latino _____ Non-Hispanic or non-Latino </div> <div style="width: 45%;"> Check the race you most identify with: (you may check more than one) _____ American Indian or Alaskan Native _____ Asian _____ Black or African American _____ Native Hawaiian or other Pacific Islander _____ White </div> </div>		
Check All You Receive:		
___ Free school lunches	___ Food Stamps	___ TANF
___ Reduced price school lunches	___ Head Start	___ Foods from Pantries
___ Summer lunch programs for kids	___ Other _____	___ WIC
Nutrition Educator/Site/Site #: _____		
Thank You For Completing This Form		

Attachment 3: 1-Day Diet Recall

Diet Recall Form



Name: _____

Do you take vitamin supplements? ☐ yes ☐ no

If "yes," List types and how often: _____

Amount spent on food last month: _____ What is your: Height _____ Weight _____

Activity Level:

☐ Less than 30 minutes

☐ 30 to 60 minutes

☐ More than 60 minutes

Would you like to see a Pyramid to show you how to:

☐ stay at the weight you are at now

☐ lose weight slowly

If you want to see both, check both.

What did you eat and drink in the last 24 hours?

Food Item and Description List all foods and beverages. List separately each food in main dishes.	Amount Tbl - tablespoon c - cup tsp - teaspoon lb - pound oz - ounce sl - slice
1 – Breakfast	
2 – Mid-morning	
3 – Lunch	

1-Day Diet Recall (Page 2)

Food Item and Description List all foods and beverages. List separately each food in main dishes.	Amount Tbl - tablespoon C - cup tsp - teaspoon lb - pound oz - ounce sl - slice	
4 – Mid-afternoon		
5 – Dinner		
6 - After Dinner		

Sometimes we have food in class. Do you have any food allergies? If so, what are they?



Attachment 4: Disclaimer

(Recorded for 40 seconds before each Indoor Walking Brief segment)

“The producers; its distributors; the performers; and the educator(s) using this DVD for instruction are not liable for any injury; health impairment or accident befalling any viewer of this DVD; or any injury; health impairment or accident that may befall any person utilizing techniques suggested in this DVD. Viewers can choose to consult a physician or fitness expert before attempting any of the exercises that are illustrated in this DVD; without penalty.”

Attachment 5: Oral Assent Script

“Effectiveness of an indoor walking program”

Good morning/afternoon. I am _____ from Rutgers. We are trying to learn ways to include simple exercises that people like in our classes. We are also trying to learn more about what helps people exercise and what keeps people from exercising at home. Are you willing to answer a few questions before class? It will take 15-20 minutes of your time.

- *If the individual declines; say: “Thank you for your time.”*
- *If they say they can talk now; provide the following information; then ask the questions in the order listed.*

Answering the questions is voluntary. You may choose not to answer the questions; or you can stop at any time during the survey without any penalty. Also; you may choose not to answer any question you do not want to answer.

This survey poses no risk to you; and there is no risk of harm to you because you answer the survey questions. Your benefits cannot be changed by what you say. Your answers will be anonymous; that means your name is not being written down or given to anyone.

When you answer these questions today you will be agreeing to let us include your answers with everyone else’s in this project. All the answers we get from people who take the survey will be kept for 5 years.

If you have any questions about this survey you can call Kirsten Corda at (732) 932-3779. Any questions about your rights as a participant may be directed to the Institutional Review Board at Rutgers University at (732) 932-0150 ext. 2104.

Before we begin; do you have any questions?

Attachment 6: Participant Information

PARTICIPANT INFORMATION

We are trying to learn ways to include simple exercises that people like in our classes. We are also trying to learn more about what helps people exercise and what keeps people from exercising at home. Thank you for sharing with us. We have a few questions for you to answer before class starts. It will take 15-20 minutes of your time.

You do not have to answer any question you do not want to; and you can stop at any time. There is no risk of harm to you because you answer the survey questions. Your benefits cannot be changed by what you say. Your answers will be anonymous; that means your name is not being written down or given to anyone.

When you answer these questions today you will be agreeing to let us include your answers with everyone else's in this project. All the answers we get from people who take the survey will be kept for 5 years.

If you have any questions about this survey you can call; email; or write to:

Kirsten Corda
26 Nichol Avenue
220 Davison Hall
New Brunswick; NJ 08901
phone: (732) 932-3779
email: kcorda@eden.rutgers.edu

If you have any questions about your rights as a research subject; you may contact:

The Office of Research and Sponsored Programs
Institutional Review Board
Rutgers University
ASB III; 3 Rutgers Plaza
New Brunswick; NJ 08901

(732) 932-0150 ext. 2104

Thank you for your time.

Attachment 7: Phase I and II Exercise Barriers

READ: When I think about doing any exercise in addition to what I normally do as part of my work; my household chores; or the walking I do to get from one place to another; I think that to do it:	I Strongly Agree	I Agree	I Disagree	I Strongly Disagree
1. Takes too much of my time.				
2. Makes me sleepy.				
3. Costs too much money.				
4. Makes my body feel tired.				
5. Takes too much time away from family relationships.				
6. Takes too much time from my family responsibilities.				
7. Is hard work for me.				
READ: When I think about doing any exercise in addition to what I normally do as part of my work; my household chores; or the walking I do to get from one place to another; I think that:	I Strongly Agree	I Agree	I Disagree	I Strongly Disagree
8. Places for me to exercise are too far away.				
9. Exercise facilities do not have convenient schedules for me.				
10. There are too few places to exercise.				
11. My spouse (or significant other) does not encourage exercising.				
12. My family members do not encourage me to exercise.				
13. I am too embarrassed to exercise.				
14. I think people in exercise clothes look funny.				

Are there any other things that keep you from exercising regularly?

Attachment 8: Phase I Exercise Experiences

	Never	Seldom	Sometimes	Often	Very Often
1. I read articles about exercise to learn more about it.					
2. I look for information about how to exercise.					
3. I find out about new exercise methods.					
4. I get upset when I see people who would be helped if they chose to exercise but who choose not to.					
5. I am afraid of what will happen to my health if I do not exercise more than what I normally do as part of my work; my household chores; or the walking I do to get from one place to another.					
6. I get upset when I realize that people I love would have better health if they exercised.					
7. I realize that if I don't exercise regularly; I may get ill and be a burden to others. I think that my exercising regularly will prevent me from being a burden to the healthcare system.					
8. I think that regular exercise plays a role in reducing health care costs.					
9. I feel more confident when I make exercise in addition to what I normally do as part of my work; my household chores; or the walking I do to get from one place to another; a habit.					
10. I believe that regular exercise; in addition to what I do normally as part of my work; my household chores; or the walking I do to get from one place to another will make me more healthy and happy.					
11. I feel better about myself when I exercise more than I do as part of my work; my household chores; or the walking I do to get from one place to another.					
12. I have noticed that many people know that exercise is good for them.					

Phase I Exercise Experiences (Page 2)

13. I am aware of more and more people who are making exercise; more than what they normally do as part of their work; their household chores; or the walking they do to get from one place to another a part of their lives.					
14. I have noted that famous people often make known the fact that they exercise on a regular basis.					
15. When I feel tired; I make myself exercise anyway because I know I will feel better afterwards.					
16. Instead of taking a nap after work; I exercise.					
17. Instead of relaxing by watching TV or eating; I take a walk or exercise.					
18. I have a friend who encourages me to exercise when I don't feel up to it. I have someone who encourages me to exercise.					
21. I try to think of exercise as a time to clear my mind as well as a workout for my body.					
22. If I engage in regular exercise; in addition to the exercise I do as part of my work; my household chores; or the walking I do to get from one place to another; I find that I get the benefit of having more energy.					
23. I tell myself that I can keep exercising if I try hard enough.					
24. I make commitments to exercise.					
25. I believe that I can exercise regularly.					
26. I keep a set of exercise clothes handy so I can exercise when I get the time.					
27. I use my calendar to schedule my exercise time.					
28. I make sure I always have a clean set of exercise clothes.					

What types of exercise do you do; in addition to the exercise you do as part of your work; your household chores; or the walking you do to get from one place to another?

Attachment 9: Phase II and III Stage of Exercise

READ: I want you to think about the exercise you do in addition to your work; your household chores; or the walking you do to get from one place to another. Now; I want you to think about regular exercise. It is any planned physical activity (e.g.; aerobics; jogging; bicycling; swimming; etc.) performed to increase physical fitness. Such activity should be performed 3 to 5 times per week for 20-60 minutes per session. Exercise does not have to be painful to be effective but should be done at a level that increases your breathing rate and causes you to break a sweat.

ASK: Do you exercise regularly according to that definition? (Circle One)

YES; I have been for MORE than 6 months.

YES; I have been for LESS than 6 months.

NO; but I intend to in the next 30 days.

NO; but I intend to in the next 6 months.

NO; and I do NOT intend to in the next 6 months.

Attachment 10: Revised Stage of Exercise

READ: What types of exercise do you do; NOT part of your work; NOT your household chores; or NOT the walking you do to get from one place to another?

1) I want you to think about the exercise you do 3-5 times per week for 20-60 minutes at a time.

Do you do this? Yes No If they say **yes** GO TO 2

A) If they say **no**; ask: Do you plan to? Yes No

B) If they say **yes**; ask: Do you think it will be in the next 6 months? Yes No

C) If they say **yes**; ask: Do you think it will be in the next 30 days? Yes No

If B or C; ask: What kind of exercise you think you will do?

2) Now; the exercise I am talking about does not have to be painful; but it should be difficult enough that it increases your breathing rate and causes you to break out in a sweat; and to become more physically fit. I am NOT talking about any activities you do at work. I am NOT talking about the work you do as part of your household chores; and I am NOT talking about the walking you do to get from one place to another. When you think about doing this kind of exercise on a regular basis; would you still say that you do this? Yes No If they say **no**; GO BACK TO A.

D) If they say yes; ask: Have you been doing it for more than 6 months?
Yes No

If D; ask: What kind of do you do exercise?

If he/she responds "walking;" ask: "Are you walking because you need to get someplace?"

If yes; say: "That's not part of what we are talking about today."

If no; ask: "Do you walk fast enough to breathe hard and break out in a sweat?"

Attachment 11: Phase I \$5 Subject Payment**Documentation for Participant Payment**

On _____; I volunteered to have my height; weight;
and blood pressure measured by a researcher from Rutgers, The State University
of New Jersey. I received \$5 in cash.

Name: _____

Signature: _____

APPENDIX

II

List of Attachments

Attachment 12: Phase I Field Notes 144

Attachment 13: Paraprofessional Interview Guide 146

Attachment 12: Phase I Field Notes

Field Notes

Location (Group Name; County):

Community Assistant (CA):

Indoor-walking Brief (Circle or Box One)

- | | |
|--------------------------|------------------------|
| 1. Walking Indoors | 4. Doing Intervals |
| 2. Adding Upper Body | 5. Stretching |
| 3. Strengthen w/ Weights | 6. Intensify Your Walk |
-

Instruction: The purpose of field notes is to document the body language and comments of the Community Assistants and participants during the Indoor-walking Briefs. Please provide a description of each participant; i.e. color; body shape; and unique attributes; so any researcher observing a class can identify the participants and continue with the notes throughout the research period. Thank you.

List of Participants:

How does the CA present the video?

Strengths:

Weaknesses:

Rate before; during and after the Brief segment for enjoyment; interest and approval with 5 being like Leslie and 1 being neutral or indifferent. Then; provide any notes.

Phase I Field Notes (Page 2)

Enthusiasm of the Community Assistant before the Brief segment

Enthusiasm of the participants before the Brief segment

Enthusiasm of the Community Assistant during the Brief segment

Enthusiasm of the participants during the Brief segment

Enthusiasm of the Community Assistant after the Brief segment

Enthusiasm of the class as a whole after the Brief segment

At what point does anyone stop walking with the video?

What are their comments?

Cue the Community Assistant; if necessary, to ask for a show of hands:

1. Who felt that you could sing during the video; if you had wanted to? (low-intensity)
 2. Who was still able to talk; but not sing; during the video? (moderate-intensity)
 3. Who thinks you would have had to take a breath after saying a few words during the video? (vigorous-intensity)
-

Attachment 12: Paraprofessional Interview Guide

1. When you first started adding these DVDs to what you normally taught; how did you feel about it; and has that changed? If so; how?
2. Were there any DVD segments that were better or worse than others? If so; why? (probe if necessary)
3. What was one of the biggest challenges you experienced in integrating the exercise DVD into your nutrition lessons?
4. Is there anything special that you did to overcome the challenge(s) or to make things easier for you?
5. Did you think using these DVDs in class made your job any harder; and if so; how?
6. How do you think your participants felt about doing the exercise briefs each week?
 - a. In thinking about those participants who refused to get up and walk with DVDs; why do you think they did not?
7. Is there anything special you did to change your participants' attitudes or beliefs?
 - a. When you think about using the DVDs; is there anything that we could have provided that would have made you feel better prepared?
8. Is there more that you needed to know?
9. Do you exercise regularly; i.e. above and beyond your activities at home and work?
10. Did you exercise to the DVD at home? If no; did you watch the introduction and any of the brief segments?

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Abbreviated Curriculum Vitae

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Education

2006	M.A., Adult & Higher Education University of Texas at San Antonio
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Research

USDA; National Research Initiative. Effectiveness of an indoor walking protocol for use by EFNEP & FSNE programs to increase physical activity. Co-Investigator (with Palmer D and Adler A); USDA NRI 15903; \$271 652; 3//09 - 3/11.

Publications

Corda KW; Palmer D; Fear G; Adler A. Use of DVD and VHS players as opposed to computer and the internet by limited resource audiences. *J Nutr Educ Behav.* 2009;41(4):S46-S47.

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Awards

2008; Society for Nutrition Education Student Research Award
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