PHYSICAL ACTIVITY IN PUERTO RICAN ADULTS WITH TYPE 2 DIABETES MELLITUS

by

Nancy Dávila

A Dissertation Submitted to the Faculty of the

COLLEGE OF NURSING

In Partial Fulfillment of the Requirements
For the Degree of

DOCTOR OF PHILOSOPHY

In the Graduate College

THE UNIVERSITY OF ARIZONA

2 0 1 0

THE UNIVERSITY OF ARIZONA
GRADUATE COLLEGE

As members of the Dissertation Committee, we certify that we have read the dissertation prepared by Nancy Dávila entitled "Physical Activity in Puerto Rican Adults with Type 2 Diabetes Mellitus" and recommend that it be accepted as fulfilling the dissertation requirement for the Degree of Doctor of Philosophy.

_____ Date: April 13, 2010
Janice D Crist, PhD, RN, FNGNA
Associate Professor

_____ Date: April 13, 2010
Elaine G Jones, PhD, RN
Associate Professor

_____ Date: April 13, 2010
Deborah A Vincent, PhD, RN, APRN-BC, FAANP
Associate Professor

_____ Date: April 13, 2010
Farah A Ramirez-Marrero, PhD, MSc, CSCS, FACSM

Final approval and acceptance of this dissertation is contingent upon the candidate's submission of the final copies of the dissertation to the Graduate College.

I hereby certify that I have read this dissertation prepared under my direction and recommend that it be accepted as fulfilling the dissertation requirement.

_____ Date: April 13, 2010
Dissertation Director: Janice D Crist, PhD, RN, FNGNA
Associate Professor

STATEMENT BY AUTHOR

This dissertation has been submitted in partial fulfillment of requirements for an advanced degree at The University of Arizona and is deposited in the University Library to be made available to borrowers under rules of the Library.

Brief quotations from this dissertation are allowable without special permission, provided that accurate acknowledgment of source is made. Requests for permission for extended quotation from or reproduction of this manuscript in whole or in part may be granted by the copyright holder

SIGNED: Nancy Dávila

ACKNOWLEDGMENTS

Throughout my personal and professional experiences I have built my conceptualization of the human being as a bio-psycho-social and spiritual being with a purpose in life. The human being has some innate abilities or resources and others are acquired through the interaction with other human beings in the environment, which makes them capable of making decisions. One of my purposes at a professional level, which I discovered during my childhood, was to serve through nursing. In 2005 I discovered that I wanted to contribute to the body of knowledge of my profession, to the development of research in nursing in Puerto Rico and above all to the health and well being of the Puerto Rican population with diabetes.

I have given myself the opportunity to wish and dream throughout my life. I have reached my professional goals, not only because of my innate abilities, but because I have had the opportunity of meeting wonderful human beings that have contributed to my life with knowledge, words of support, and motivation.

First of all I thank you God, for life, health, and the energy that you have given me to reach my professional goals. Thanks to all the adult Puerto Rican patients with type 2 Diabetes Mellitus who participated in this research, without you I could not have finished this work. To the health providers who are committed with the well being of this population and allowed me to use their facilities to recruit participants. To the personnel of the Program "Salud a tu Alcance," thank you for being excellent in health service, thanks for made me feel part of your team work. To Dr. Maria de Lourdes Miranda thank you for opening the doors of your office in such a spontaneous and accommodating way. To Dr. Miriam Allende and her work team of the Endocrinology Clinics in the University Hospital, thank you for supporting the research in our university campus. To the personnel of the Manuel A. Pérez Center my most sincere thanks for your genuine support and commitment towards the patients.

To my dissertation committee, my sincere thanks for sharing your knowledge and being excellent at what you do. To the president of my committee Janice Crist, thank you for sharing your expertise, you were always available to answer my questions. I will never forget your interest and patience. You are a very humanitarian professor, thank you for being so special.

Dr. Elaine Jones, thank you for your excellent recommendations especially in the area of psychometrics of research instruments. Dr. Deborah Vincent, your recommendations to improve the synthesis of literature were vital in the development of this skill. To Dr. Farah Ramírez, you accepted to be a member in my committee without giving it a lot of thought, your expertise in the physical activity area was important in the development of my ideas.

To Dr. Sandra Cromwell, who was with me at the beginning, and to the rest of the professors throughout the courses of the curriculum, I want to thank you for your dedication, commitment with education, research, and practice in nursing. You are role models.

Thank you, Dr. Suane Sánchez, Dean of Nursing School, Medical Sciences Campus, University of Puerto Rico and Prof. Gladys Vélez for your motivating words that month of April 2005 when I had doubts in requesting admittance at the Arizona University. Thank you for your trust in me and for your support.

To Dr. Marta Rivero, thank you for being an example of firmness, you always have the right answer for my questions. Your career in research is admirable but above all your courage, firmness, and love for research is a source of motivation for me. To my colleague Janet

Rodríguez, thank you for sharing so many educational experiences, your company dried my tears every summer we traveled to the University.

To my editor, friend, and psychologist Solymar Solis, you were very special; you gave me the motivating words I needed to continue. You know how much I value your time, knowledge, and friendship, I genuinely thank you.

Mom and Dad thank you for your words “keep studying, keep studying.” Thank you for always being present.

Nelly, my special mother in law, thank you for always being available to take care of my kids when I had to write a paper. Your prayers, good wishes, and interest are specially treasured in my heart.

Thank you my beloved husband for your comprehension, time and effort. To my children thank you because just your presence was enough to keep me on the right track. We did it!!

DEDICATION

Commitment, effort, and dedication were fundamental elements for the completion of my doctoral dissertation, but even more was the support of my family. To my husband and the two greatest projects of my life: my son José Enrique Jr. and my daughter Alondra Sofía, today I dedicate them this important professional achievement because without their presence, support, and comprehension I would have not achieved my goal. I love you.

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS 11

LIST OF TABLES 12

ABSTRACT 13

CHAPTER I: INTRODUCTION 15

Background of Puerto Rico 15
- Geography 15
- History 16
- Culture 16
- Population 17
- Socio-economic Situation 18
- General Health Status 18
- Healthcare System 19

Statement of the Research Problem 19
Knowledge Gaps and the Relationship with the Research 22
Statement of the Purpose 25
Research Questions 25
- Descriptive Questions 25
- Relational Questions 26

Qualitative Research Aim and Questions 26
Significance of the Study to Nursing 27
Vulnerability of Puerto Rican Adults with Type 2 Diabetes Mellitus 28
Summary 29

CHAPTER II: THEORETICAL FRAMEWORK AND LITERATURE REVIEW 30

Type 2 Diabetes Mellitus 30
Overweight and Obesity 32
Physical Activity 34
- Physical Activity and Type 2 Diabetes Mellitus 35
- Physical Activity Recommendations 36

Self-efficacy – Social Cognitive Theory 38
- General Description 38
- Theory Concepts Definitions 39
  - Self-efficacy. 39
  - Outcome expectancies. 40
- Conceptual Linkages 41
  - Relationships between principal concepts. 41
  - Self-efficacy sources. 42
    - *Enactive mastery experiences.* 42
    - *Vicarious experiences.* 42
    - *Verbal persuasion.* 43

TABLE OF CONTENTS – *Continued*

Physiological and affective state. 43
Self-efficacy mediating processes....44
Cognitive process. 44
Motivational process....44
Affective process. 45
Selection process. 45
State of the Science....46
Self-efficacy....46
Outcome Expectancies (Perceived Benefits)....49
Outcome Expectancies (Perceived Barriers) 50
Self-efficacy and Outcome Expectancies 52
Theoretical Model of Physical Activity....53
Conceptual and Operational Variables Definition....55
Summary....56

CHAPTER III: METHODOLOGY....57

Research Methodology and Design 57
Sample....58
Sample Size....59
Setting 59
Human Rights Protection....60
Sample Recruitment....61
Data Collection Procedure 62
Instruments....63
Demographic Data Questionnaire 63
Exercise Benefits/Barriers Scale (EBBS) 64
Exercise Self-efficacy Scale (ESS) 66
International Physical Activity Questionnaire (IPAQ) 68
Pilot Test 70
Data Analysis 70
Exploratory Data Analysis....72
Qualitative Data Analysis 73
Summary 73

CHAPTER IV: RESULTS....74

Pilot Study....74
Sample Characteristics of Pilot....74
Exercise Self-efficacy Scale (ESS) 76
Exercise Benefits/Barriers Scale (EBBS) 76
Descriptive Correlational Study....77
Sample Characteristics....77
Descriptive Correlational Study (Descriptive Questions)....79

TABLE OF CONTENTS – *Continued*

Physical Activity Level....79
Self-efficacy and Outcome Expectancies....80
Associations Between Principal Study Variables (Relational Questions)....81
Exploratory Data....81
Physical Activity....82
Self-efficacy....82
Outcome Expectancies....82
Exploratory Regressions....84
Qualitative Data....86
Summary....88

CHAPTER V: DISCUSSION....89

Pilot Study....89
Descriptive Correlational Study....90
Physical Activity Level....90
Self-efficacy....92
Outcome Expectancies....93
Benefits....93
Barriers....96
Self-efficacy and Outcome Expectancies....100
Limitations of the Study....102
Implications for Nursing Practice....104
Recommendations for Future Nursing Research....105
Summary....106

APPENDIX A: UNIVERSITY OF ARIZONA – HUMAN SUBJECTS PROTECTION PROGRAM APPROVAL LETTER....107

APPENDIX B: UNIVERSITY OF PUERTO RICO – MEDICAL SCIENCES CAMPUS – HUMAN SUBJECTS PROTECTION PROGRAM APPROVAL LETTER...109

APPENDIX C: UNIVERSITY OF ARIZONA – HUMAN SUBJECTS PROTECTION PROGRAM SUBJECT'S DISCLOSURE FORM (ENGLISH VERSION)....111

APPENDIX D: UNIVERSITY OF ARIZONA – HUMAN SUBJECTS PROTECTION PROGRAM SUBJECT'S DISCLOSURE FORM (SPANISH VERSION).....113

APPENDIX E: UNIVERSITY OF PUERTO RICO – MEDICAL SCIENCES CAMPUS – HUMAN SUBJECTS PROTECTION PROGRAM SUBJECT'S DISCLOSURE FORM (SPANISH VERSION – HOJA INFORMATIVA)....115

APPENDIX F: APPROVAL LETTER FROM THE UNIVERSITY OF PUERTO RICO DISTRICT HOSPITAL....117

APPENDIX G: APPROVAL LETTER FROM DR. MARIA DE LOURDES MIRANDA PRIVATE MEDICAL OFFICE....120

TABLE OF CONTENTS – *Continued*

APPENDIX H: APPROVAL LETTER FROM THE CENTER FOR PROMOTION AND MAINTENANCE OF COMPREHENSIVE HEALTH OF MANUEL A PEREZ COMMUNITY 122

APPENDIX I: APPROVAL LETTER FROM THE EDUCATIONAL PROGRAM "SALUD A TU ALCANCE".....124

APPENDIX J: ENGLISH RECRUITMENT FLYER 126

APPENDIX K: SPANISH RECRUITMENT FLYER.....128

APPENDIX L: DEMOGRAPHIC DATA QUESTIONNAIRE (ENGLISH VERSION).....130

APPENDIX M: DEMOGRAPHIC DATA QUESTIONNAIRE (SPANISH VERSION) 133

APPENDIX N: EXERCISE BENEFITS AND BARRIERS SCALE (ENGLISH VERSION).136

APPENDIX O: EXERCISE BENEFITS AND BARRIERS SCALE (SPANISH VERSION) .140

APPENDIX P: EXERCISE SELF-EFFICACY SCALE (ENGLISH VERSION).....144

APPENDIX Q: EXERCISE SELF-EFFICACY SCALE (SPANISH VERSION) 148

APPENDIX R: INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE (ENGLISH VERSION).....151

APPENDIX S: INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE (SPANISH VERSION).....156

REFERENCES 161

LIST OF ILLUSTRATIONS

FIGURE 1. Research Model of Physical Activity Self-efficacy Belief, Outcome Expectancies (Perceived Physical Activity Benefits and Barriers) and Physical Activity Level ...27

FIGURE 2. Theoretical Model of Physical Activity Self-efficacy Belief, Outcome Expectancies (Perceived Physical Activity Benefits and Barriers) and Physical Activity Level ...54

FIGURE 3. Simple Linear Regression Between Self-efficacy Beliefs and Physical Activity Level 85

LIST OF TABLES

TABLE 1. Variable Definitions....55
TABLE 2. Pilot Sample Characteristics....75
TABLE 3. Descriptive Correlational Study Sample Characteristics....77
TABLE 4. Physical Activity in Minutes per Week....80
TABLE 5. Exploratory Results – Parametric Tests....83
TABLE 6. Exploratory Results – Non-Parametric Tests....84
TABLE 7. Main Themes from Qualitative Data on Perceived Physical Activity Benefits....86
TABLE 8. Main Themes from Qualitative Data on Perceived Physical Activity Barriers....87

ABSTRACT

Diabetes mellitus (DM) has been the third leading cause of death in Puerto Rico (PR) since 1989. According to the PR Diabetes Center for Data Management, the prevalence of complications associated with diabetes in PR include: ischemic heart disease, renal failure and cerebro-vascular events, among others. Although physical activity has been identified as an integral part of preventing diabetes disease and complications in people already diagnosed, only 32.6% of the population engages in 30 minutes of moderate physical activity daily.

The purpose of this descriptive-correlational study was to explore physical activity self-efficacy beliefs and outcome expectancies (perceived physical activity benefits and barriers) as possible factors that affect physical activity level in Puerto Rican adults diagnosed with type 2 DM. The guiding theoretical foundation was Self-efficacy-Social Cognitive Theory (SCT). An exploratory data analysis was conducted to determine the effects of socio-demographic variables on the principal variables. The contribution of socio-demographic factors, body mass index and the medical diagnosis to the prediction of principal variables were also explored.

A sample of 110 Puerto Rican men and women between 40-60 years of age, with a mean of 52.2 years were recruited from four settings. Data was collected through a Demographic Data Questionnaire, Exercise Self-efficacy Scale, Exercise Benefits/Barriers Scale and International Physical Activity Questionnaire. Qualitative data were gathered to identify additional benefits and barriers that were not included in the questionnaire.

The median for the moderate to vigorous physical activity reported by the sample was 82.5 minutes per week. The relationship between self-efficacy beliefs and physical activity was significant but moderate (r_s=.32, p = .001). No significant association was observed between perceived benefits and physical activity (r_s =.09, p = .38). Also, no significant association was

observed between perceived barriers and physical activity level (r_s = ˉ.17, p = .07). The correlation between self-efficacy beliefs and perceived benefits was significant and moderate (r_s = .46, p < .001). The correlation between self-efficacy beliefs and perceived barriers was significant, moderate and negative (r= -.40, p <.001). Self-efficacy was the only significant predictor of physical activity.

The low physical activity and the high rate of overweight and obesity are significant risk factors for the development of chronic complications and low quality of life that threaten Puerto Rican adults with type 2 DM. Physical activity is an essential component of a healthy life-style and important to achieve a better self-management of diabetes disease. Self-efficacy had relevance to the enhancement of physical activity in this population. The research findings support the importance of SCT in both nursing research and practice. SCT is important in future research because, as exemplified in this study, it provides an approach to explain physical activity behavior. SCT is important for practice; because addressing principal variables of the theory can promote the development of innovative interventional programs for Puerto Rican adults with type 2 DM.

CHAPTER I: INTRODUCTION

The focus of this research study was physical activity in Puerto Rican adults diagnosed with type 2 diabetes mellitus (DM). The study addressed the exploration of three variables: physical activity level, physical activity self-efficacy beliefs and outcome expectancies (perceived physical activity benefits and barriers), and the possible associations among them. This chapter begins with a background about Puerto Rico (PR), including geography, history, culture, population, socio-economic situation, general health status and healthcare system of the population. Also, it describes the statement of the research problem, gaps in the literature, research purpose and questions, and the significance of the study to nursing. The vulnerability of Puerto Rican adults diagnosed with type 2 DM according to their socio-demographic characteristics is also explained at the end of the chapter to support the importance of conducting research in this population.

Background of Puerto Rico

Geography

Puerto Rico is an island located in the northeastern Caribbean, east of the Dominican Republic and west of the Virgin Islands. It is the most easterly and smallest of the four Greater Antilles (Cuba, Hispaniola, Jamaica and PR), and is widely known as the isle of enchantment or *la isla del encanto*. The north side of the Island is bordered by the Atlantic Ocean, while the Caribbean Sea borders the south side. The island's territory is nearly 100 miles from east to west and 35 miles north to south, with an average temperature of 82.4°F throughout the year. The location of Puerto Rico provides a tropical climate. Puerto Rico is mostly mountainous with large coastal areas. Puerto Rico is an *archipelago*, which means it consists of the main island and several smaller islands: Vieques, Culebra, Mona, Desecheo and Caja de Muertos. The territory is

divided into 78 municipalities or *municipios*. San Juan is the capital city located at the north coast of the main island. Some of the major cities in the metropolitan area are: Carolina, Bayamon and Guaynabo (Rivera, 2008; Scarano, 2000).

History

The Spanish explorer Christopher Columbus arrived on the main island on November 19, 1493. At that time, he encountered a flourishing Taíno Indian culture. The Taíno population was decimated by disease as well as outbreaks of violence with the Spaniards and thus most eventually disappeared. As with other Spanish territories at the time, African slaves were brought to work the land. Puerto Rico was a Spanish colony from 1493 until the Spanish-American War in July 25, 1898 when Spain ceded the island to the United States (U.S.). United States citizenship was conferred to Puerto Ricans in 1917 through the Jones-Shafroth Act; however, most call themselves *Puertorriqueños*. Puerto Rico has been an unincorporated and semi-autonomous territory of the U.S. The government of PR has been officially a commonwealth within the U.S. since 1952. The island is a Free Associated State or *Estado Libre Asociado* which embodies a status which allows its own self-government in internal affairs and local administration while being subject to the Constitution and U.S. jurisdiction and sovereignty. Spanish is the primary language on the island but the official languages of the commonwealth are Spanish and English (Rivera, 2008; Scarano, 2000).

Culture

Puerto Rican culture is influenced by three principal cultures: African (from the slaves), Taíno (indigenous people) and Spanish. Many names of Puerto Rico's municipalities, words, foods and musical instruments were derived from the Taínos. The island is sometimes called *Borinquen*, from *Borikén* the name given to the island by the Indians. Therefore the terms

boricua and *borincano* are commonly used to identify someone of Puerto Rican heritage. Many elements of African culture were also absorbed into the island's heritage, for example, African music and dance. The Spanish language, the Roman Catholic religion, architecture, art, cultural values and traditions are deeply rooted in Spanish culture (Rivera, 2008).

As a territory of the U.S., Puerto Rican culture has also been highly influenced by North American culture. Even still, countless elements from Hispanic/Latino cultures are predominant such as familism or *familismo* and *machismo*. Familism stresses the fact that family unity is highly valued among the population, and the concept is related to family members' roles, child care, elder care and decision making processes. Children are the center of the family, therefore extended family members participate in child care. Grandparents assume an active role in child care, teaching, education and discipline traditions (Purnell & Paulanka, 2003). The *machismo* and patriarchal authority are two key characteristics of Hispanic men's role that are associated with boys' socialization. The *machista* behavior encourages male authority and control over women. Men are considered the financial providers and they are expected to be consulted in family situations and decisions. In traditional Hispanic/Latino families, including Puerto Rican families, male children are socialized to be powerful and strong. The socialization of female children is focused on family dynamics and child care. Women are also considered the caretakers of their parents when they are in advanced ages. Puerto Ricans believe in family care rather than self-care (Galanti, 2003; Purnell & Paulanka, 2003).

Population

According to the 2000 U.S. Census, the population of PR was 3,808,610; one-third of which is concentrated in the metropolitan municipalities San Juan, Carolina and Bayamon. Forty-eight percent (48%) of the population is male while 52% are female. The population

distribution by age is 23.8% in the range of 0-14 years of age, 23.2% between 15-29 years of age, 37.6% between 30-59 years of age and 15.4% who are 60 years of age and over (U.S. Census Bureau, 2000). According to an estimation in 2007, the population of PR increased to 3,942, 375. Also, the population distribution by age had an increase in the range of 30-59 years of age (38.8%) and 60 years of age and over (18.3%) (Puerto Rico Planning Board, 2009).

Socio-economic Situation

Puerto Ricans had a per capita or gross domestic product of $22,058 during 2006 (Government Development Bank for Puerto Rico, 2007). According to U.S. Census Bureau data, 48.2% of the general population in PR lives under poverty levels as defined by the federal government standards in 1999. This represents 44.6% of families living under poverty levels (U.S. Census Bureau, 2000). The American community survey in 2006 showed that the median family income in PR was $20,425, lower than Mississippi, the poorest state of the U.S., which had a median family income of $42,805 (U.S. Census Bureau, 2006).

General Health Status

The five leading causes of death reported by the PR Health Department are: (1) heart disease, (2) cancer, (3) diabetes mellitus, (4) hypertension and (5) accidents (PR Department of Health, 2003). Puerto Rico had the highest prevalence of persons (32.8%) who reported their health status as either fair or poor from all 52 U.S. states and territories that participated in the Behavioral Risk Factor Surveillance System (BRFSS) conducted between 1996 and 2000 (BRFSS, 2002). According to Purnell and Paulanka (2003), Puerto Ricans are at high risk for chronic illness, high mortality and morbidity rates because of poor self-care practices such as alcoholism, illicit drug use, smoking, physical inactivity, sex-related behaviors , poor nutritional practices, physical inactivity and low preventive care utilization.

Healthcare System

In 1995, the government of PR initiated a transformation of the health care services model named Puerto Rico Health Reform. The health reform sought to privatize health care services because they were considered inefficient and highly expensive for the government. The Puerto Rico Health Insurance Administration was developed by the government through Law 72 in September 7, 1993, to coordinate and administer the health insurance contracts and provide the government health plan to eligible medical indigent citizens. The Puerto Rico Health Department is responsible for determining individuals' and families' eligibility for the health plan. The entire process to integrate all municipalities and regions was completed in 2000 (Pan American Health Organization, 2007).

The Puerto Rico Health Reform was developed to guarantee quality health services, satisfy health needs and eliminate health disparity among low income Puerto Rican populations. Health care services are provided by granting access to a closed network of health care providers under a managed care model through a primary care physician. The basic coverage includes medical visits, hospitalizations, obstetrics and gynecology, laboratories, radiology, emergencies and dental services. Other types of coverage include mental health services and pharmacy (Pan American Health Organization, 2007).

Statement of the Research Problem

Diabetes mellitus (DM) is one of the most prevalent diseases globally. In 2005, the prevalence of DM in the U.S. was 7% of total population (20.8 million people) but 6.2 million people remain undiagnosed. The total prevalence of DM among people aged 20 years and older was 9.6% (20.6 million people) and 20.9% (10.3 million people) among people 60 years and older. The national statistics by gender demonstrate that 10.9 million men (10.5%) and 9.7

million women (8.8%) of 20 years or older have this disease. Diabetes mellitus was the sixth leading cause of death in the U.S. in 2002 based on 73,249 death certificates, although diabetes was the underlying cause of death for a total of 224,092 cases according to death certificates. Therefore, DM is underreported as primary cause of death (National Diabetes Information Clearinghouse, 2005). The risk for premature death among people with DM is about two times higher than people without diabetes. Diabetes mellitus total cost in the U.S. for 2002 was 132 billion: 70% in medical costs and 30% related to disability, work loss and premature mortality (National Diabetes Information Clearinghouse, 2005).

Hispanic/Latino Americans are 1.5 times more likely to have DM than non-Hispanic white Americans of similar age. The total prevalence of DM in 2005 among Hispanic/Latino Americans aged 20 years and older was 9.5% (2.5 million). Mexican Americans, the largest subgroup of Hispanic/Latino American, are 1.7 times as likely to have diabetes as non-Hispanic white Americans. Residents of PR are 1.8 times as likely to have DM as non-Hispanic white Americans in the U.S. (National Diabetes Information Clearinghouse, 2005), which makes DM an important public health problem in PR. Since 1989, the PR Health Department has reported DM as the third leading cause of death in the island (PR Department of Health, 2003). The prevalence of DM in PR has been increasing annually from 8.5% in 2000 to 11.9% in 2006 (CDC, 2007a). This increase has placed PR as the 18th country with the highest prevalence of diabetes around the world (Millan-Pabon, 2007).

People who are diagnosed with DM have to deal with a complex package of self-care tasks in order to control the disease and prevent complications. According to the American Diabetes Association (ADA), some of these tasks include nutritional therapy, physical activity, glucose monitoring, administering daily medications and continuous medical follow ups.

Unhealthful lifestyle habits and behaviors increase the risks of poor health status. Regular physical activity helps with weight lose, keeps cholesterol level and blood pressure under control, and helps the body to use insulin properly. Being overweight and physical inactivity is related to the development of type 2 diabetes and chronic complications (ADA, 2006).

Obesity, overweight and physical inactivity are risk factors associated with lifestyles that influence the development of diabetes and also affect the health status of Puerto Rican adults that already have diabetes. The overweight and obesity prevalence in PR for 2000 was 61.0%, which is a considerable increase of the prevalence reported in 1996 (54%) (BRFSS, 2002). The most recent prevalence reported for 2006 and 2008 was 64.1% and 64.5% respectively. The overweight-obese prevalence was higher in men (70.1 and 70.2) than women (58.7 and 59.2) in 2006 and 2008 respectively (BRFSS, 2008).

In 2000, 83.8% of all Puerto Ricans reported that they had not engaged in physical activity for at least 30 minutes, five or more days per week. This prevalence of low physical activity has been rising since 1996 (79.4%). The information by gender showed that 58.5% of women did not engage in physical activity versus 49.1% of men (BRFSS, 2002). The CDC also reported a low prevalence of physical activity in PR, with 32.6% engaging in 30 minutes of moderate physical activity five days at week and 17.7% engaging in 20 minutes of vigorous physical activity three days per week. The prevalence of low physical activity by gender was again lower in Puerto Rican women than in men for both moderate and vigorous physical activity (CDC, 2007b).

Several DM complications include heart disease and stroke, kidney disease, neuropathy, foot amputations, dental disease and retinopathy that may lead to blindness (ADA, 2008; National Diabetes Information Clearinghouse, 2005). These could decrease productivity level

and increase work and school absenteeism, the rate of health care utilization and patients' and governments' medical expenses because health care needs at individual and community levels are high (Disdier, Rodriguez, Perez & Perez, 2001).

Heart disease and stroke account for about 65% of deaths in people with DM in the U.S. About 12,000 to 24,000 new cases of blindness in the U.S. each year are caused by diabetic retinopathy and more than 60% of non-traumatic lower-limb amputations occur among people with diabetes. In 2002, 44,400 people with DM began treatment for end-stage kidney disease and 153,730 people with end-stage kidney disease due to DM were living on chronic dialysis or with a kidney transplant in the U.S. and PR (National Diabetes Information Clearinghouse, 2005). According to the PR Diabetes Center for Data Management (2003), the prevalence of complications associated with diabetes in PR for 2001 reported by private and public medical insurance companies included: heart ischemic disease (40%), renal failure (26%), diabetic retinopathy (13.7%), cerebro-vascular events (11.7%), atherosclerosis (4%) and amputations (2.6%). Diabetes mellitus is also the leading cause of blindness among working-age adults and end-stage renal disease patients (Puerto Rico Department of Health, 2002).

In summary DM is a chronic, life-threatening disease that affects patients' and their families' quality of life and increases the patients' and governments' medical expenses. Definitively, one ongoing challenge to health care and the research problem for this study was the low prevalence of physical activity in PR because of its importance as a factor recommended for controlling DM disease.

Knowledge Gaps and the Relationship with the Research

Despite diverse efforts to prevent and control DM complications, adherence to management guidelines, including physical activity, remains low as documented above.

Therefore, nursing researchers have been exploring determinants of physical activity (PA) in order to maintain or improve the adherence to recommended treatments. Self-efficacy, outcome expectancies (perceived benefits and barriers) are some physical activity determinants studied and are also the principal concepts for the proposed research. These concepts are included as part of Bandura's Self-efficacy-Social Cognitive Theory (Bandura, 1997). This theory has been explored in nursing research to achieve behavioral modification of several health related life style habits such as smoking cessation, eating disorders, drug dependency, cardiac rehabilitation and also PA (O'Leary, 1985; Resnick, 2003).

Several research articles that had studied self-efficacy, outcome expectancies (perceived benefits and barriers) and the relationship with physical activity affirmed sampling limitations (Resnick, Luisi, Vagel, & Junaleepa, 2004; Bernal, Woolley, Schensul, & Dickinson, 2000; Coureya & McAuley, 1994; Hurley & Shea, 1992; Allen, 2004; William & Bond, 2002; McAuley, Bane, & Mihalko, 1995; Skelly, Marshall, Haughey, Davis, & Dunford; 1995). Some limitations that make it difficult to generalize findings were: convenience samples, non probabilistic, homogenous and lack of ethnic diversity. Prospective research is needed to explore whether the findings can be replicated in others populations (Williams & Bond, 2002; Skelly et al., 1995). In addition, the role of age, gender, ethnicity and other socio-demographic characteristics in self-efficacy and outcome expectancies (perceived benefits and barriers) may be sample specific, therefore further investigation is needed (Resnick, Palmer, Jenkins & Spellbring, 2000). Based on these limitations and recommendations, this study was designed to increase the existing knowledge and fill some of these gaps by exploring not only the principal variables, physical activity level, physical activity self-efficacy, physical activity outcome expectancies (perceived benefits and barriers), but also the relationships with socio-demographic

factors specific to Puerto Rican adults with type 2 DM living in PR. Therefore, a different culture and setting was considered.

Several available instruments to measure physical activity make distinctions between different types of physical activity: leisure, occupational and sport activities (Shephard, 2003). Conversely, few instruments address spontaneous or non-leisure time, light and moderate activities such as household duties, family care and occupational activities (Tudor-Locke & Myers, 2001). According to Marquez and McAuley (2006a) PA in Hispanic/Latinos and the role of gender in the activity patterns needs to be further studied. To describe the physical activity level in Puerto Rican adults with type 2 DM, both leisure time and non-leisure time moderate and vigorous physical activities were assessed.

The relationship between self-efficacy and outcome expectancies has a theoretical explanation according to Self-efficacy-Social Cognitive Theory. However, it is not completely clear how these constructs work together in terms of the prediction strength and direct versus indirect effects on health behaviors (Williams, Anderson & Winett, 2005). The research study contributed to fill this research gap by investigating the possible associations among self-efficacy, outcome expectancies (perceived benefits and barriers) and physical activity level in Puerto Rican adults with type 2 DM.

Several studies have examined environmental and socio-cultural barriers in health behaviors but further research concerning the role of environmental barriers to physical activity in Hispanic/Latinos is needed (Marquez & McAuley, 2006b). In addition, each ethnic group may have unique determinant barriers that need to be identified in order to obtain better information of specific cultural variables that will make it possible to design effective health programs (Eyler

et al., 2002). The proposed research study assessed both environmental and socio-cultural barriers to physical activity in Puerto Rican adults with type 2 DM.

The lack of translated and validated instruments in Spanish is a serious limitation when conducting studies with Hispanic/Latino populations with diabetes (Bernal et al., 2000; Marquez & McAuley, 2006a). Because of this limitation, reliability test of selected instruments were conducted.

Statement of the Purpose

The purpose of this descriptive correlational study was to explore self-efficacy beliefs and outcome expectancies (perceived benefits and barriers) as possible factors that affect physical activity level in Puerto Rican adults diagnosed with type 2 DM. The guiding theoretical foundation to conduct this study was the Bandura's Self-efficacy-Social Cognitive Theory.

Research Questions

This study was designed to answer nine quantitative research questions and one qualitative research aim (with two qualitative research questions) based on the previously discussed research gaps and limitations, and on the theoretical propositions of Bandura's Self-efficacy-Social Cognitive Theory. The research questions were classified in two categories: descriptive and relational. The research questions are illustrated in the research model (see Figure 1). The theoretical concepts and relations included in the figure will be explained in the next chapter.

Descriptive Questions

1. What is the level of physical activity in Puerto Rican adults with type 2 DM?
2. What is the level of physical activity self-efficacy beliefs in Puerto Rican adults with type 2 DM?

3. What is the level of outcome expectancies (perceived physical activity benefits) in Puerto Rican adults with type 2 DM?
4. What is the level of outcome expectancies (perceived physical activity barriers) in Puerto Rican adults with type 2 DM?

Relational Questions

5. Is there a relationship between physical activity self-efficacy beliefs and physical activity level in Puerto Rican adults with type 2 DM?
6. Is there a relationship between outcome expectancies (perceived physical activity benefits) and physical activity level in Puerto Rican adults with type 2 DM?
7. Is there a relationship between outcome expectancies (perceived physical activity barriers) and physical activity level in Puerto Rican adults with type 2 DM?
8. Is there a relationship between physical activity self-efficacy beliefs and outcome expectancies (perceived physical activity benefits) in Puerto Rican adults with type 2 DM?
9. Is there a relationship between physical activity self-efficacy beliefs and outcome expectancies (perceived physical activity barriers) in Puerto Rican adults with type 2 DM?

Qualitative Research Aim and Questions

The qualitative research aim was to identify additional benefits and barriers that were not included in the Exercise Benefits and Barriers Scale (EBBS). The research questions were:

1. What benefits not mentioned in the EBBS are obtained during exercise by Puerto Rican adults with type 2 DM?

2. What barriers not mentioned in the EBBS prevent Puerto Rican adults with type 2 DM from exercising?

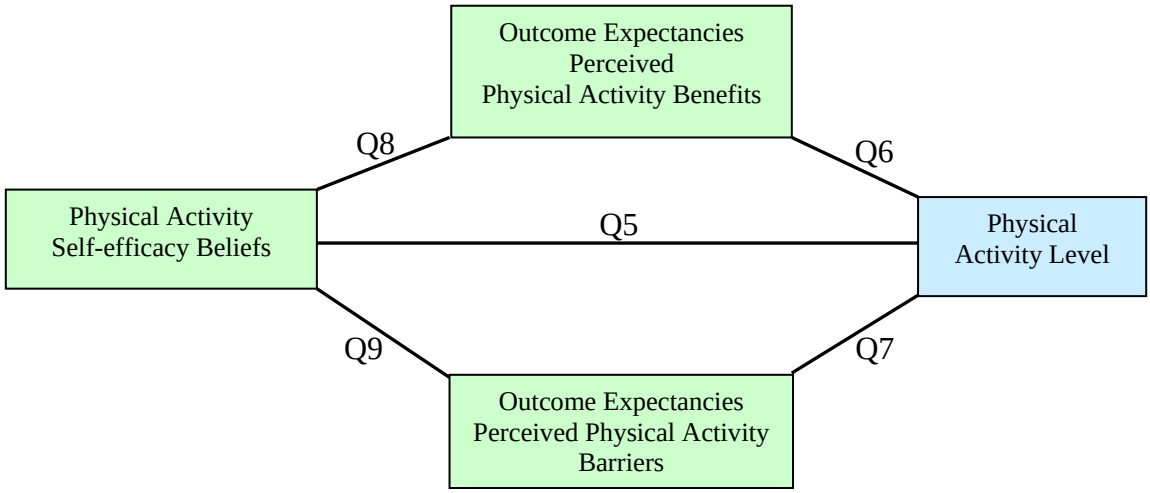


FIGURE 1. Research Model of Physical Activity Self-efficacy Belief, Outcome Expectancies (Perceived Physical Activity Benefits and Barriers) and Physical Activity Level

Significance of the Study to Nursing

This study generated information about physical activity levels among Puerto Rican adults with type 2 DM and the possible relationships with self-efficacy and outcome expectancies (perceived benefits and barriers). More research has been needed to describe physical activity behavior and to identify significant variables that influence this behavior. It is imperative to generate and use the scientific knowledge to develop innovative and effective cultural interventions that improve physical activity patterns in order to achieve disease control and reduce chronic complications among this population.

As previously stated, Puerto Rican adults with type 2 DM are considered a vulnerable population at risk of high morbidity and mortality and low quality of life. Nursing research is extremely necessary to reduce these Puerto Rican adults' degree of vulnerability to adverse outcomes and improve their quality of life.

Vulnerability of Puerto Rican Adults with Type 2 Diabetes Mellitus

Diabetes mellitus as a physical health problem can affect many body systems because of its potential chronic complications. Physical inactivity, overweight and obesity are cumulative risks factors for poor health outcomes in people with or without DM. According to Aday's vulnerability framework (2001), the available material and non material resources are important determinants of cumulative risks of vulnerability. The material resources that influence vulnerability are human capital resources such as education, job, income and housing. The non material resources are related to social status (race, ethnicity, age and sex) and social capital (marital status, family, voluntary organizations and social networks).

The prevalence of DM by scholarly level was higher in the group with less than high school education (22.5% in 2006). Also, the relationship between DM prevalence and family income from 2001 to 2006 has shown that the prevalence of the disease is higher in families with less than $15,000 annual income. Since 2002, the second highest group has been families with $15,000 to $24,999 annual income (CDC, 2007a). The diabetes prevalence when classified by work status has been higher in unemployed people than in employed people since 1996. The prevalence of DM in 2000 was 11.6% in unemployed people versus 4.7% in the employed group (Perez-Perdomo, Perez, Disdier & Rodriguez, 2004).

Age as a social status related to non material resources of vulnerability is a significant factor in DM. The older the individual is, the higher the prevalence of DM. The data of DM prevalence by age provided by CDC-Behavioral Risk Factor Surveillance System from 1996 to 2006 demonstrate this fact. The prevalence was 1.0% for 18-24 year-olds, 2.0% for 25-34 year-olds, 5.7% for 35-44 year-olds, 13.4% for 45-54 year-olds, 21.2% for 55-64 year-olds and 30.3% for 65 year-olds and over. Gender, another social status related to vulnerability, is also an

important factor in DM. The prevalence of DM by gender has been higher in women since 2003. The prevalence by gender was 11.4% in men and 12.4% in women in 2006 (CDC, 2007a). Marital Status, a social capital related to vulnerability has shown influence to DM in PR. For example, divorced, separated and widowed groups have shown higher prevalence of DM (12.7%) (Perez-Perdomo et al., 2004).

The data presented indicate that Puerto Rican adults with DM are a vulnerable population because of their limited social status and social and human capital resources. The general prevalence of DM in PR is consistently higher in individuals with increasing age, in women, in people with a lower family income, in those with a lower level of education and in the unemployed. Not necessarily all individuals that share these social characteristics and limited resources are or will be vulnerable to having diabetes and its associated complications. However, according to Spiers (2000), from the etic perspective or the external evaluation of relative danger, people with these limited resources could be considered vulnerable.

Summary

This chapter supports the real and significant problem of type 2 DM in PR. The necessity of developing strategies for diabetes prevention and self- management to reduce the burden of chronic complications is evident. Physical activity should be a high priority as an essential component for the prevention and management of type 2 DM. The necessity of increasing physical activity level, reducing obesity, and controlling diabetes consequences is imperative in order to increase the holistic well-being and quality of life. Because of the importance of this problem, the research study contributed to the limited existing knowledge about what psychosocial and environmental variables contribute to physical activity in Puerto Rican culture, principally in an adult population diagnosed with type 2 DM.

CHAPTER II: THEORETICAL FRAMEWORK AND LITERATURE REVIEW

The literature review in this chapter includes several topics as background for the proposed study. Topics included are type 2 DM disease and obesity, and physical activity as a preventive behavior. The Self-efficacy-Social Cognitive Theory is described as a theoretical underpinning for this research study and the state of the science for each of its principal concepts is summarized. Finally, a derived theoretical model including the principal concepts (physical activity, self-efficacy and outcome expectancies: perceived benefits and barriers) is explained and conceptual and operational variables definitions are presented.

Type 2 Diabetes Mellitus

Type 2 DM is a metabolic, chronic and systemic disease characterized by hyperglycemia resulting from insulin resistance and impaired insulin secretion. It is characterized by the abnormal metabolism of carbohydrates, proteins and fats. It is the most common type of diabetes, with millions of non-Hispanic white Americans and Hispanic/Latino Americans diagnosed with this disease. In this form of diabetes (previously called non-insulin-dependent diabetes or adult-onset diabetes) the body experiences peripheral insulin resistance. Insulin resistance refers to decreased tissue sensitivity to insulin making insulin less effective at stimulating glucose uptake by the tissue. This results in a need for more insulin production as a compensatory response. However, the beta cells develop a progressive insulin secretory impairment because they cannot keep up the increased demand of insulin. Ultimately there is not enough insulin to meet the body's needs where then a state of hyperglycemia occurs and type 2 DM develops (Andrus, Leggett-Frazier & Pfeifer, 2003; ADA, 2008).

Keller (2006) explained the major role of overweight and obesity to insulin resistance and, subsequently, the development of type 2 DM. The pathogenic mechanisms of free fatty

acids and excessive amount of adipocytes are associated with impaired insulin sensitivity. A study conducted by the Diabetes Prevention Program Research Group (2002) demonstrated that type 2 DM can be prevented or delayed in people at high risk for the disease through weight reduction and increased participation in physical activity. As a result, the increasing in insulin resistance degree can lead to hyperglycemia and type 2 DM diagnosis.

Hyperglycemia plays a significant role in type 2 DM long-term complications. Hyperglycemia may damage blood vessels and nerves as well as others body organs. Microvascular and macrovascular complications increase morbidity and mortality rates and reduce quality of life (Andrus et al., 2003; Fowler, 2008; Varughese, Tomson & Lip, 2005). Coronary and peripheral arterial disease and stroke are considered macrovascular complications. The prevalence of macrovascular complications, especially cardiovascular disease (CVD), is higher in people with type 2 DM than in the non diabetes population (ADA, 2008). Also, macrovascular complications represent the most frequent and serious complications of the disease. Microvascular complications include nephropathy (kidney damage), neuropathy (nerve damage), and retinopathy (retina damage) (Fowler, 2008). The abnormalities in lipid components and blood pressure contribute to accelerating CVD complications (Krauss, 2004). Intermittent claudications, ulcers and amputations are problems associated with a poor circulatory system (Vinicor, 2003).

Multiple modifiable factors explain type 2 DM long-term complications including uncontrolled hyperglycemia, hypertension, dyslipidemia, smoking, eating habits, obesity and physical inactivity. Obesity, particularly abdominal adiposity, is associated with atherogenesis; also, it is linked to hyperglycemia, hypertension, dyslipidemia and hyperinsulinemia (Andrus et al., 2003). Glycemic control is essential to the management of DM and reducing complications.

The recommended level of glycemic control for most patients is having glycosilated hemoglobin ($HbA1_C$) less than 7%. Pharmacological treatment and lifestyle changes in nutrition and physical activity are important aspects to be included in therapeutic goals in order to control hyperglycemia, hypertension, dyslipidemia, and to reduce and maintain body weight (ADA, 2008; Vinicor, 2003).

Overweight and Obesity

Overweight and obesity is related to a person's total body weight. Overweight is defined as an excess amount of body weight that may come from muscle, bone, adipose tissue and water. Obesity specifically refers to an excess amount of body fat or adipose tissue (National Heart Lung and Blood Institute-NHLBI, 2008b). Body composition measurements are important values for estimating weight status and fat distribution, and are useful for the clinical evaluation and therapeutic follow-up of patients. Body mass index (BMI) is the most common index of body fat and measure of overweight and obesity (CDC, 2008; Gallagher & Song, 2003; NHLBI, 2008a).

Overweight and obesity are defined as BMI levels greater than 25.0 kg/m2 and 30.0 kg/m2 respectively. The BMI categories also include underweight (below 18.5 kg/m2) and normal weight (18.5 – 24.9 kg/m2) (CDC, 2008; NHLBI, 2008a). BMI is the relationship between body weight and height; it is a simple and useful test to estimate overweight and obesity. The BMI is not a direct measure of body fat but it is a reliable method because it correlates well with direct measures of body fat (CDC, 2008). The value is calculated by dividing a person's weight in kilograms by his/her height in meters squared (kg/m2), and is used to identify weight categories and risk for health problems. The correlation between BMI and total body fat varies according to gender, race and age. This measurement could over or

underestimate overweight/obesity participants in women, older people and athletes (CDC, 2008; NHLBI, 2008a).

Waist circumference and waist–hip ratio are other measures of body fat distribution (Gallagher & Song, 2003). Waist size is another important measure to determine health risks. The risk of CVD and type 2 DM is higher in people with abdominal obesity or large waist size. A waist size more than 35 inches and 40 inches mean higher health risks for women and men respectively (NHLBI, 2008a).

Obesity is considered a chronic disease and it results from an energy imbalance between the energy ingested and expended (Bray, 2003). The obesity epidemic is a public health problem around the world including the U.S. Sixty-eight percent of the adult population in the U.S. is overweight, 33.8% are obese and 5.7% are extremely obese. Forty-three percent (43%) of Hispanic women are obese compared with 34% of men (Flegal, Carroll, Ogden & Curtin, 2010). Obesity reduces life expectancy as it increases the risk for many serious health conditions such as cardiovascular disease, myocardial infarction, cerebrovascular disease, diabetes, several types of cancer, arthritis, respiratory problems, high blood pressure and psychological problems (Haslam & James, 2005).

The degree and duration of obesity is associated with many serious health conditions as presented in the previous paragraph. In addition, obesity represents a risk factor for developing metabolic syndrome (Bray, 2003). Metabolic syndrome is characterized by a group of several metabolic problems: hypertension, dyslipidemia – high triglycerides, low high density lipoproteins, high low density lipoproteins and hyperglycemia (Bray 2003; ADA, 2010). People with type 2 DM who have some of all of the characteristics of metabolic syndrome are at higher risk of long-term complications. The American Heart Association (AHA) recommends a

diagnosis of metabolic syndrome with three or more of the following characteristics: high waist circumference, elevated triglycerides level, reduced high density lipoproteins, high blood pressure and elevated fasting blood glucose (AHA, 2010).

In summary, obesity is an important risk for several diseases, including type 2 DM, heart disease, stroke, among others. Overweight and obese people with type 2 DM diagnosis are at higher risk of metabolic disorders and chronic complications. Lifestyle modifications including healthful eating habits and physical activity are the first recommendations made in primary and secondary prevention.

Physical Activity

The U.S. Department of Health and Human Services (HHS) defines physical activity as body muscular movements produced by the contraction of the musculoskeletal system that increases energy expenditure (HHS, 2008). Exercise is part of physical activity and it is defined as repetitive body movements in a planned and structured method. Exercise is performed to improve or maintain any of the physical fitness components. The physical fitness components are cardiorespiratory fitness, muscular strength and endurance, flexibility, agility, speed, balance, response time and body composition. Health-related fitness has been distinguished from the general physical fitness to include cardiorespiratory fitness, muscular fitness (strength and endurance) and flexibility (HHS, 1996).

Physical activity could be classified as aerobic and muscle-strength activity. Aerobic physical activity or cardio-activity involves use of the body's large muscles for a sustained period of time (at least 10 continuous minutes). It has three components: intensity, frequency and duration. The absolute intensity is classified as low, moderate and vigorous according to the energy expenditure; the energy expenditure of physical activity is expressed as MET (metabolic

equivalent of task). A low intensity physical activity consists of 1.1 -2.9 METs, moderate intensity is 3.0-5.9 METs and vigorous intensity is 6.0 or more METs. The effect over heart beats and breaths is also considered to determine the physical activity intensity. A person can talk during a moderate intensity physical activity but singing is not possible; during a vigorous intensity physical activity a person needs to take a pause to take a breath before he or she can continue talking (HHS, 2008). Cardiorespiratory fitness is defined as the ability of the circulatory and respiratory systems to supply the oxygen demanded during physical activity. Aerobic physical activity can increase heart rate, muscle work and breathing rate if it is performed at the sufficient duration and contributes to cardiorespiratory fitness (Sigal, Kenny, Wasserman & Castaneda-Sceppa, 2004).

Muscle-strength activities include resistance exercises or activities that use muscular force such as weight lifting or weight machines. These activities increase muscular fitness, which is composed of muscular strength and endurance. Muscular strength is defined as the force that a muscle can perform and muscular endurance is the capacity of the muscle to continue without fatigue (HHS, 2008; Sigal et al., 2004). Flexibility, as part of physical fitness, is described as the ability to move within the full range of motion in the joints (Sigal et al., 2004).

Physical Activity and Type 2 Diabetes Mellitus

Physical activity has been identified as an integral part in primary prevention of type 2 DM in high risk people and in secondary prevention of associated complications in people already diagnosed with diabetes. Physical activity contribute to improve insulin sensitivity, decrease blood glucose and blood pressure level, weight loss, reduce triglycerides and cholesterol, increase muscle tone, improve circulation, stress relief and well being feelings (ADA, 2008). Fourteen controlled trials with exercise interventions including aerobic exercise

3.4 times/week and resistance exercise 2.5 times/week for ≥ 8 weeks in adults with type 2 DM, reduced glycosilated hemoglobin (HbA1C) even with no significant change in body mass index (Boulé, Haddad, Kenny, Wells & Sigal, 2001). A meta-analysis conducted by Boulé, Kenny, Haddad, Wells and Sigal (2003) concluded that as the intensity of physical activity increases, cardiorespiratory fitness improved and HbA1C levels were reduced in patients with type 2 DM.

Resistance training as part of physical activity recommendations has been effective to improve glycemic control because induce the glucose uptake at cellular level in skeletal muscle and increase muscle strength. High-intensity resistance training programs decrease HbA1C levels (Dunstan et al., 2002), abdominal fat and systolic blood pressure and increase fat free mass (Castaneda et al., 2002). Sigal et al. (2007) conducted a randomized control trial and concluded that aerobic physical activity and resistance training improved HbA1C but glycemic control was greater if both activities were combined. In conclusion, physical activity is a valuable strategy for modifying risk factors in order to decrease diabetes incidence and diabetes chronic complications.

Physical Activity Recommendations

According to the U.S. Department of Health and Human Services the physical activity recommendations for adults 18 years of age or over include moderate to vigorous physical activity and muscle-strength activities or resistance training. This means that a minimum of 150 minutes of moderate-intensity physical activity by week (2 hours and 30 minutes) or 75 minutes of vigorous-intensity (1 hour and 15 minutes) or an equivalent combination of both would be optimal. Physical activity should be carried out at least three days a week in time periods of at least 10 minutes to reduce the risk of physical injury and fatigue. Also, it should be spread throughout the week. Muscle-strength activities or resistance training must be performed for two

or more days per week (HHS, 2008). Mullooly and Hanson (2003) stated that exercise's benefits are similar, whether if the duration is 10 minutes accumulated throughout the day or the exercise is done completely continuously.

The Canadian Diabetes Association (2008) recommends that people with diabetes participate in moderate intensity physical activities such as brisk walking, biking, dancing or vigorous-intensity physical activities such as jogging, brisk walking or fast swimming for at least 150 minutes, three days each week with no more than two consecutive days without exercise. The ADA supported 150 minutes of moderate-intensity physical activity per week for people with diabetes but they agree with all U.S. Department of Health and Human Services recommendations for the general adult population. However, the ADA affirms that resistance training should be performed by adults with diabetes in the absence of medical contraindications (ADA, 2010).

A medical evaluation is imperative for identifying complications that might contraindicate several types of exercises and avoiding potential injuries in people with type 2 DM before beginning any sort of physical activity program. Uncontrolled hypertension, severe autonomic or peripheral neuropathy and advanced retinopathy should all be considered. Also, the patient's age, preferences, previous physical activity level and individual exercise capacity should be assessed. Physical activity recommendations should be modest and supported by the patient's abilities and motivation. High-risk and beginner patients should be encouraged to start with low intensity exercise over a short period of time before reaching a higher intensity (ADA, 2010).

Regardless of the significant contribution of physical activity to maintain health and well being, physical activity continues to be an underutilized preventive practice among the

population. Researchers have used multiple theories to explain, promote and maintain physical activity as an integral part of lifestyle behaviors. Bandura's Self-efficacy-Social Cognitive Theory is one such theoretical approach.

Self-efficacy — Social Cognitive Theory

The purpose of the current research was to explore physical activity self-efficacy beliefs and outcome expectancies (perceived physical activity benefits and barriers) as possible factors associated with physical activity level in Puerto Rican adults diagnosed with type 2 DM. The theoretical foundation used was Bandura's self-efficacy-social cognitive theory. The theory's major concepts are defined and the major conceptual linkages between and among concepts are identified in the following section.

General Description

Albert Bandura's theory of self-efficacy is rooted in social cognitive theory. Social cognitive theory (SCT) is a behavioral prediction theory rooted in psychology. It attempts to explain people's ability to exercise control over their life (Bandura, 1997; 1998). The theory proposes that behavior can be explained in terms of triadic reciprocal causation among three determinants that represent the self and society. The visual model of SCT is in a triangle geometric form; its three points represent an individual, the environment and behavior. These determinants are in a continuous, dynamic and interactive bidirectional relationship (Bandura, 1997).

Self-efficacy-social cognitive theory proposes that individual determinants of behavior involve several internal factors such as cognitive, affective and biological events. The capacity to exercise control over one's own cognitive process, motivation, emotions, selection process and action is distinctively a human characteristic. The human agency concept is related to the

individual's capability to choose and execute a course of action (Bandura, 1977; 1982; 1989; 1997; 1998). According to Bandura, the individual is an agent able to exert self-regulation including self-reflection, self-influence and self-organization rather than a person who reacts to environmental forces and inner impulses (Bandura, 1997). Self-regulation is defined as the influence over the thinking process, motivation, emotional states and patterns of behavior. Self-efficacy and outcome expectancies are principal concepts of SCT, which operate as important determinants of human self-regulation (Bandura, 1997; 1998). The evolution of SCT through time brings the name of self-efficacy theory, but its propositions and philosophical claims are the same.

Theory Concepts Definitions

Self-efficacy.

Self-efficacy, or perceived self-efficacy, is the person's beliefs, judgment or conviction in his/her capabilities to organize and execute a course of action, to produce outcomes or to exercise control over events that affect his/her own life. Belief in personal efficacy is a key determinant of human agency. Efficacy beliefs regulate the aspirations, choices, mobilization and maintenance of efforts through four major psychological processes: cognitive, motivational, affective, and selection processes (Bandura, 1977; 1982, 1989; 1997; 1998; Bandura, Adams, & Beyer, 1977).

Self-efficacy beliefs are determined for each particular domain of functioning, making it specific by each type of behavior. Self-efficacy is a multidimensional concept, whose structure includes three parameters that have important implications in performance: level or magnitude, strength, and generality. Perceived efficacy could be measured in terms of these parameters. Level or magnitude refers to the level of difficulty including challenges, impediments or

demands to adopt a specific behavior. Self efficacy strength reflects how convinced a person is of being able to perform a specific task, in other words, it expresses the degree of confidence. The stronger self-efficacy beliefs are the greater perseverance and more success. Finally, self-efficacy also varies in generality or the degree of efficacy across a wide range of activities or to several behavioral domains (Bandura, 1977; 1997; O'Leary, 1985).

Outcome expectancies.

Outcome expectancies are judgments about the possible consequences that will be produced by some performance (Bandura, 1977; 1982, 1989; 1997; 1998; Bandura, et al., 1977). Outcome expectancies can be physical, social and associated with self-evaluation. Each type of outcome encompasses positive and negative expectations. Physical outcomes include experiences of pleasure or discomfort. Positive social outcomes include expressions of interest, recognition, power and monetary compensation. Negative social outcomes include disapproval, social rejection, imposition of penalties and others. Self-evaluation outcomes include positive and negative reactions to one's own behavioral performance based on self-evaluative criteria that could increase or decrease motivation (Bandura, 1997).

In sum, outcome expectancies can be positive or negative and include physical, social and self-evaluative consequences that exert great motivational influence. According to Williams et al. (2005) a number of researchers have studied barriers and perceived benefits as part of outcome expectancies assessment. Although perceived benefits are the same as positive outcome expectancies, perceived barriers are not equivalent to negative outcome expectancies. Barriers are perceived as preventing behavior, while negative outcomes are expected beliefs that will result from the behavior, and it is theorized that both constructs impede behavior. However, the two constructs overlap since perceived barriers are often based in part on expected negative

outcomes. As a consequence of this theoretical relationship, both perceived barriers and benefits have been operationalized as outcome expectancies (Williams et al., 2005).

Conceptual Linkages

Bandura's theory encompasses several linkages considered relational statements between and among concepts. A relational statement affirms a link or relationship between two or more concepts (Walker & Avant, 2005). This section is addressed to identify and explain relationships between self-efficacy and outcome expectancies, self-efficacy sources and self-efficacy mediating processes.

Relationships between principal concepts.

People who judge themselves as highly efficacious (high self-efficacy) expect positive outcomes and perceive fewer impediments or barriers for performing the behavior. On the contrary, those who considered themselves as poorly efficacious will expect negative consequences and perceive more barriers. The relationships between these concepts could vary because individuals can believe that a certain behavior will result in a specific outcome but they may not believe that they have the capabilities to perform the behavior. Outcome expectations are based and depend on the individual's self-efficacy expectations and may not add much to the independent prediction of behavior but, Bandura affirms, outcome expectancies can be dissociated from self-efficacy expectations and influence behavior independently of self-efficacy beliefs. However, people take action when they have high efficacy beliefs and positive outcome expectancies. Self-efficacy and outcome expectancies are predictors of behavioral performance. On the other hand, behavioral performance influences efficacious beliefs and outcomes expected through reciprocal relationship. This reciprocal interaction occurs because continuous behavioral

performance and success increase efficacious judgments about people's abilities and thus, better outcomes will be expected (Bandura, 1997; 1998; Bandura, et al., 1977).

Self-efficacy sources.

Self-efficacy and outcome expectancies are constructed through cognitive and reflective processes (psychological processes) that occur as part of enactive mastery experiences, vicarious experiences, verbal persuasion and according to people's physiological and affective states. These are the four sources of self-efficacy and thus of outcome expectancies (Bandura, 1977; 1997; 1998; Bandura, et al., 1977). After explaining the four sources, several effective strategies to enhance physical activity self-efficacy, based on theory and previous research, will be integrated.

***Enactive mastery experiences*.** These experiences produce strong and more generalized judgments of self-efficacy. Successful outcomes from direct experiences function as one type of motivator, building strong self-efficacy beliefs in contrast to failures. Experiences in overcoming obstacles through perseverant effort are required in order to establish a resilient sense of efficacy (Bandura, 1977; 1997; 1998; Bandura, et al., 1977).

***Vicarious experiences*.** These experiences are based on observation of social modeling and are considered sources of motivation and determine efficacy beliefs. The impact of vicarious experiences is strongly influenced by perceived similarity with the models. Seeing people succeed by sustained effort increases the spectator's efficacy beliefs to succeed in comparable activities. However, observing others fail, despite high effort, undermines observers' self-efficacy beliefs. This source of self-efficacy is generally weaker than direct experiences (Bandura, 1977; 1997; 1998; Bandura, et al., 1977). Behavioral performance could function as

self-modeling in which the persons observe and evaluate their own successes, self-motivations and strength of self-efficacy (Bandura, 1997).

***Verbal persuasion*.** Verbal persuasion consists of verbally influencing people about capabilities they possess to realize certain activities. Persuasive feedback about people's abilities in the early stages of skill development has a positive impact on the development of personal self-efficacy and the amount of implemented efforts. However, people who have been persuaded about their deficient capabilities undermine the beliefs in themselves (Bandura, 1977; 1997; 1998; Bandura, et al., 1977). Persuasive influences also exert great influence over personal efficacy. People feel motivated to avoid possible losses in the present rather than to assure potential benefits in the future (Bandura, 1997).

***Physiological and affective state*.** The degree of self-efficacy and outcome expectancies is also related to people's physical and emotional status. Enhancing both types of efficacy is important because it reduces people's stress and physical reactions and corrects their perceptions and interpretations. People can interpret stress and tension as signs of vulnerability to poor performance. Physical fatigue and muscular pain can be interpreted as signs of physical weakness. Mood also affects people's judgment of their efficacy; positive mood enhances perceived self-efficacy contrary to negative mood. Mood also influences the learning process and self-evaluation (Bandura, 1977; 1997; 1998; Bandura, et al., 1977).

Allen (2004) performed an integrative literature review about social cognitive theory in diabetes exercise research. Through this work she identified several effective strategies to enhance physical activity self-efficacy and thus physical activity behavior. Some strategies of enactive mastery experiences source were developing participants' realistic goals and the use of incremental steps in physical activity plan. Clinicians and peer role modeling through videos and

continuous feedback were examples of vicarious experiences and verbal persuasion. The strategy of emphasizing psychological and physiological physical activity benefits is useful to reduce people's stress and interpretations of physical vulnerability and thus increases their self-efficacy judgments.

Self-efficacy mediating processes.

Self-efficacy beliefs produce their effect in human functioning regulation through four major human processes that are interrelated: cognitive, motivational, affective and selection processes. In other words, self-efficacy is related to how people think, feel, act, and motivate themselves (Bandura, 1989; 1997; 1998).

Cognitive process. Through thinking, people can mentally construct what they can do, predict events, anticipate outcomes, set goals and develop a plan of action. People who have high self-efficacy beliefs take a future perspective, establish a goal plan which they are committed to, and view situations as opportunities and successful scenarios for performance. People who doubt their efficacy, visualize failure scenarios, have lower aspirations and the quality of their performance is deteriorated (Bandura, 1989; 1997; 1998).

Motivational process. Most people's self-motivation is also generated by cognitive or thinking processes. There are three different forms of cognitive motivators: outcome expectancies, proposed goals and causal attribution. Outcome expectancies and proposed goals operate through an anticipatory mechanism while causal attributions are retrospective judgments. Self-efficacy influences all of these cognitive motivators. Outcomes that people expect from the behavior also motivate and guide their actions because they could be considered attractive and valued. People with high self-efficacy beliefs relate their failure to insufficient effort and persist in the face of difficulties. People with low self-efficacy ascribe their failures to deficient abilities

and give up promptly when they encounter difficulties. Perceived self-efficacy determines the challenges, the goals selected, the effort and perseverance in the face of difficulties; perceived self-efficacy influences people's reactions and motivations when presented with obstacles and failures (Bandura, 1989; 1997; 1998).

Affective process. Self-efficacy beliefs exert an important influence in the self-regulation of emotional experiences. These beliefs affect how much stress, anxiety and depression is experienced as well as the level of motivation. Anxiety and stress are emotional responses derived from the perception of the threatening environment. People with high self-efficacy beliefs feel capable of managing threatening situations and are able to decrease anxiety and stress. Depression is another emotional response influenced by low sense of self-efficacy beliefs (Bandura, 1989; 1997; 1998).

Selection process. Self-efficacy plays a key role in shaping life courses through a selection process. People with high self-efficacy beliefs select challenging activities and social environments in which they feel that they are capable of coping. Self-efficacy influences decisions about career, educational preparation interests, social development and personal growth (Bandura, 1989; 1997; 1998). The SCT provides an approach to exercise control over healthy life-style habits in order to facilitate health promotion and maintenance, and disease prevention (Bandura, 2000).

In conclusion, Bandura's Self-efficacy-Social Cognitive Theory describes how self-efficacy and outcome expectancies are built and how their cognitive influences determine behavioral responses. This theory has been used to explain, predict and stimulate human behavioral change in diverse disciplines including nursing (Resnick, 2003). The theoretical propositions have been supported through different research studies. Using this theory as a

guiding theoretical foundation for this study helped to explore the possible relationships among these cognitive processes and physical activity in Puerto Ricans with type 2 DM. The following section, "state of the science," discusses the existing knowledge of the theory's principal concepts in DM self-care including physical activity.

State of the Science

Self-efficacy

Self-efficacy has been studied using different research designs to describe, predict and explore possible relationships with diverse health behaviors in different populations. Various cross-sectional studies have reported significant, moderate associations among self-efficacy and different diabetes care regimen areas (insulin management, diet, physical activity and glucose testing) in adults and older adults' populations of diverse ethnical origins (Bernal et al., 2000; Sarkar, Fisher, & Schillinger, 2006; Williams & Bond, 2002).

Self-efficacy has been highly correlated with physical activity through several cross-sectional studies in older adults (Hays & Clark, 1999; Resnick et al., 2000; Conn, 1998) and adults' populations (Marquez & McAuley, 2006b; Stutts, 2002, Anderson, Wojcik, Winett & Williams, 2006). Higher levels of performance expectations (self-efficacy beliefs) were significantly associated with physical activity participation in low-income older African American adults with type 2 DM (Hays & Clark, 1999). Similar results were found in a sample of older non-Hispanic white adults who lived in a continuing care retirement community, in which self-efficacy was directly related to exercise behavior (Resnick et al., 2000). Stutts (2002) reported that self-efficacy was the only variable that predicted exercise behavior in a group of predominantly non-Hispanic white adults. Self-efficacy in Hispanic/Latino individuals from both sexes also appeared to be an important variable that contributed to high levels of leisure time

physical activity. Hispanic/Latino adults who reported higher levels of physical activity had significantly greater confidence in their abilities to exercise at least four times per week at a moderate intensity for 30 minutes (Marquez and McAuley, 2006b).

Longitudinal, and non-interventional designs related to physical activity in younger adults found significant correlation between SE and PA (Coureya & McAuley, 1994; Petosa & Suminski, 2003; Johnston-Brooks, Lewis & Garg, 2002). The correlation between SE and vigorous PA was 0.39 ($p<.001$) (Petosa & Suminski, 2003). Coureya and McAuley (1994) reported that self-efficacy is the most important determinant for the three components of physical activity (frequency, intensity and duration) in undergraduate students. Self-efficacy was a predictor of all diabetes self-care areas including exercise in insulin dependent younger adults (Johnston-Brooks et al., 2002). Other longitudinal and non-interventional studies using adult participants have been performed and they also report significant associations between self-efficacy and diabetes self-care areas (Hurley & Shea, 1992; Kavanagh, Gooley & Wilson, 1993). Self-efficacy was a powerful predictor of two domains (diet and exercise) over a two month period in a sample of both types of DM in older adults (Kavanagh et al., 1993).

Although self-efficacy appears to predict physical activity initially, longitudinal and interventional studies show a lower predictive role of self-efficacy on physical activity over time (Gleeson-Kreig, 2006; McAuley, Courneya, Rudolph & Lox, 1994; Steptoe, Rink & Kerry, 2000). Gleeson-Kreig (2006) reported an increase in physical activity over a 6-week period but there was no significant change in self-efficacy over time. Furthermore, self-efficacy did not play a predictive role during the last weeks of the five month physical activity program, even though it played a predictive role early in the study (McAuley et al., 1994). Similar findings of Steptoe et al. (2000) indicate that physical activity changes over four months were greater in people with

higher self-efficacy scores at baseline but not at 12 months. The literature review research conducted by Allen (2004) supported that self-efficacy is a predictor of exercise initiation and maintenance over time, but some of the studies discussed here suggest a high variability related to the predictive role of self-efficacy on physical activity.

Several factors such as age, gender, race/ethnicity, educational level, and health history, among others, have been studied as possible variables associated with self-efficacy expectations to diabetes regimen adherence and physical activity. Hays and Clark (1999) found differences in performance expectations according to ethnicity. However, there is evidence that the mean self-efficacy showed no significant differences across race/ethnicity (Sarkar et al., 2006; Stutts, 2002) educational level, blood pressure (Stutts, 2002) and literacy level (Sarkar et al., 2006). Similarly, another study showed that no relationship exists between any demographic variables and self-efficacy (Gleeson-Kreig, 2006).

Bernal et al. (2000) reported an association between DM complications and a lower sense of self-efficacy to manage insulin, diet and general diabetes regimen in a sample that included a large number of Puerto Rican older adults (95%). In this study, gender was not strongly correlated with any of the diabetes self-efficacy scales but other authors reported differences in self-efficacy according to gender and age. Older women had lower self-efficacy for exercise than older men (Resnick et al., 2000) and performance expectations were lower in the oldest age group, female and Caucasian people (Hays & Clark, 1999). The relationship between self-efficacy and DM complications (Bernal et al., 2000) and between age and gender may be sample specific and additional studies are needed to confirm the findings (Resnick et al., 2000).

Outcome Expectancies (Perceived Benefits)

Outcome expectancies were correlated with physical activity (Marquez & McAuley, 2006b; Williams & Bond, 2002; Resnick et al., 2000; De Bourdeaudhuij & Sallis, 2002; Anderson et al., 2006). However, the research findings of Marquez and McAuley (2006b), Williams and Bond (2002) and Anderson et al. (2006) showed low correlations. Outcome expectancies did not contribute to physical activity beyond self-efficacy in African American and Caucasian adults (Anderson et al., 2006). In a sample of older adults in Australia (no ethnicity/race specified), the variance in diabetes care for outcome expectancies was 10% versus 26% for self-efficacy (Williams & Bond, 2002). De Bourdeaudhuij and Sallis (2002) found that outcome expectancies accounted for 2-3% of the variance in physical activity in young males and females and in adult males, versus self-efficacy that accounted for 1-3% of the variance. Similar results reported by Brown (2005) indicate that benefits scale accounted for 4% of the variance in physical activity among undergraduate students. In contrast, Hays and Clark (1999) in a sample of African American and non-Hispanic white adults found that outcome expectancies were not significantly associated with physical activity. These dissimilar results are congruent with the mixed results about predictive ability of outcome expectancies reported by Allen (2004).

Demographic variables did not explain perceived benefits for physical activity in healthy and physically active adults according to Stutts (2002). In contrast, perceived benefits have shown dependency on age and sex (De Bourdeaudhuij & Sallis, 2002). Participants who reported pleasure from physical activity, physical benefits and improvement in daily activities, engaged in higher levels of physical activity behavior; and these relationships increased among men and diminished among women (Brown, 2005). However, adult females indicated higher expectations on each of the physical outcome items than males (Anderson et al., 2006). Age and gender

appeared to indirectly influence physical activity via self-efficacy and outcome expectancies. The youngest older adults had higher outcome expectancies than their older counterparts (Resnick et al., 2000). Resnick et al. (2004) stated that differences in outcome expectancies and self-efficacy might exist among groups due to cultural differences. These findings document the existing differences in perceived benefits according to populations' demographic characteristics.

Outcome Expectancies (Perceived Barriers)

Perceived barriers have been determinant factors for physical activity behavior. Perceived barriers contributed to explain physical activity in four correlational studies (Hays & Clark, 1999; De Bourdeaudhuij & Sallis, 2002; Dutton, Johnson, Whitehead, Bodenlos & Brantley, 2005; Conn, 1998) and one interventional study reviewed (Steptoe et al., 2000). African American and Caucasian older adults with DM type 2 who reported lower motivational barriers reported higher levels of physical activity (Hays & Clark, 1999); adults with similar characteristics placed less importance on exercise behavior when reporting more severe barriers (Dutton et al., 2005). Perceived barriers were associated with physical activity at baseline and also, barriers and benefits interacted with treatment intervention (behavioral-oriented counseling) to predict PA at 12 months (Steptoe et al., 2000). Perceived barriers had negative and moderate correlation (r=-.39) with self-efficacy (Brown, 2005; Conn, 1998). Perceived barriers also had a significant indirect effect on exercise behavior through self-efficacy but at the same time it indirectly influenced outcome expectancies (perceived benefits) through self-efficacy expectations (Conn, 1998).

Similar perceived barriers reported through several cross-sectional studies using different age groups from diverse ethnicity were lack of time and child care (Voorhees & Rohm, 2003; Booth, Bauman, Owen & Gore, 1997; Dutton et al., 2005). Poor health, medical conditions and

physical injury are other perceived barriers that have been reported especially in older adults (Booth et al., 1997; Dutton et al., 2005; De Bourdeaudhuij & Sallis, 2002). Lack of motivation (Booth et al., 1997; von Goeler, Rosal, Ockene, Scavron & De Torrijos, 2003), social support, lack to access to exercise facilities and equipment were other perceived barriers that have been identified (Dutton et al., 2005).

Qualitative studies in minority women from diverse ethnicities divided barriers into two categories: socio-cultural and environmental. Socio-cultural barriers included lack of time, gender role, family importance, language, isolation in the community, motivation, lack of social support and health concerns (Eyler et al., 1998; Evenson, Sarmiento, Macon, Tawney & Ammerman, 2002; Thompson et al., 2002). Safety, lack of available programs and facilities, higher costs, transportation and weather conditions were some environmental barriers frequently described (Eyler et al., 1998; Evenson et al., 2002; Thompson et al., 2002; Lawton, Ahmad, Hanna, Douglas & Hallowell, 2006). Eyler et al., (2002) reviewed 91 research articles and found that few studies explored environmental and policy factors. The current study explored some of the environmental barriers included in the Exercise Benefits/Barriers Scale (Sechrist, Walker & Pender, 1987).

Gender role and family care are barriers reported by young and middle aged Hispanic/Latinas (Evenson et al., 2002). These women also reported more household PA than Latino men (Marquez & McAuley, 2006a). In congruence, Eyler et al. (2002) reported that in Hispanic/Latina women being married was positively related with household or caregiving physical activity but was negatively related to sport or exercise activity. Older Hispanic/Latino individuals from both genders have reported feeling inappropriate because physical activity is unsuitable in older adults (Melillo et al., 2001). In other populations, Indian Pakistani individuals

from both genders reported lack of single-sex facilities, exposure of their bodies, fear and shame as barriers to physical activity (Lawton et al., 2006). American Indian adult women reported different socio-cultural barriers such as acceptance of larger body type, feeling judged by others who are physically active and fear of ridicule (Thompson et al., 2002). These findings support that similar barriers exist among groups but there are also particular barriers according to group's ethnicity, culture and socio-demographic characteristics.

Self-efficacy and Outcome Expectancies

Self-efficacy and outcome expectancies have been correlated in DM disease control and exercise related research. Self-efficacy has also been significantly correlated with outcome expectancies (Stutts, 2002; Resnick et al., 2000; Conn, 1998; Brown, 2005). In theory, outcome expectancies alone do not lead to behavioral changes unless self-efficacy expectancy is increased. Self-efficacy can affect outcome expectancies directly but outcome expectancies can influence the behavior independently of self-efficacy beliefs (Bandura, 1997; 1998; Bandura, et al., 1977). Williams and Bond (2002) found that the relationship between self-efficacy and blood glucose testing was moderated by outcome expectancies. Stronger beliefs in positive outcomes and low levels of self-efficacy were associated with poorer care. These results suggest that outcome expectancies promote self-care but only when combined with level of self-efficacy.

Self-efficacy had a direct effect on exercise and an indirect effect through outcome expectancies (Conn, 1998; Resnick et al., 2000). However, outcome expectancies had a significant effect independently from self-efficacy expectations in older adults samples (Resnick et al., 2000). Jette et al. and Resnick (cited in Resnick et al., 2000) reported that outcome expectancies were better predictors of physical activity in older adults than self-efficacy expectancies. On the other hand, self-efficacy expectancies were more important determinants

than outcome expectancies in physical activity behavior among Caucasian older adults (Conn, 1998). This is congruent with Williams et al. (2005), who stated that it is not clear how self-efficacy and outcome expectancies operate together because some studies have showed that outcome expectancies account for several variations in physical activity beyond self-efficacy in older adult and young to middle age adult populations. Also they declared that it is possible that outcome expectancy influences self-efficacy in physical activity behavior.

In summary, self-efficacy and outcome expectancies (perceived benefits and barriers) are determinants of disease control activities including physical activity in healthy people and those diagnosed with DM across different age groups, ethnicities and genders. These concepts continue to play a significant role in predicting, developing and maintaining physical activity. The following section describes the relationships among the theory's concepts and physical activity behavior based on theoretical propositions and existing knowledge.

Theoretical Model of Physical Activity

According to the theoretical propositions of the Self-efficacy-Social Cognitive Theory and the existing knowledge about its principal concepts and physical activity, self-efficacy and outcome expectancies (perceived benefits and barriers) operate as important determinants of physical activity behavioral change and maintenance (Figure 2). Physical activity self-efficacy beliefs influence people's feelings, thoughts, motivation and performance regarding physical activity. Physical activity self-efficacy can influence physical activity level directly. Also, physical activity self-efficacy influences physical activity outcome expectancies (perceived benefits and barriers) to determine physical activity level.

Outcome expectations can influence the behavior independently of self-efficacy beliefs (Bandura, 1997; 1998; Bandura, et al., 1977). As a result, the relationship between physical

activity self-efficacy beliefs and physical activity outcome expectancies (perceived benefits and barriers) in Puerto Rican adults with DM type 2 was explored in this study. In addition, the contribution of physical activity self-efficacy, physical activity outcome expectancies (perceived benefits and barriers) to the prediction of physical activity level in this population were assessed.

The bidirectional arrow in Figure 2 between physical activity self-efficacy and physical activity level demonstrates the reciprocal relationship among these two concepts. The continuous successful performance in physical activity increases self-efficacy beliefs and thus, better perceived benefits and lower perceived barriers will be expected (Bandura, 1997; 1998; Bandura, et al., 1977).

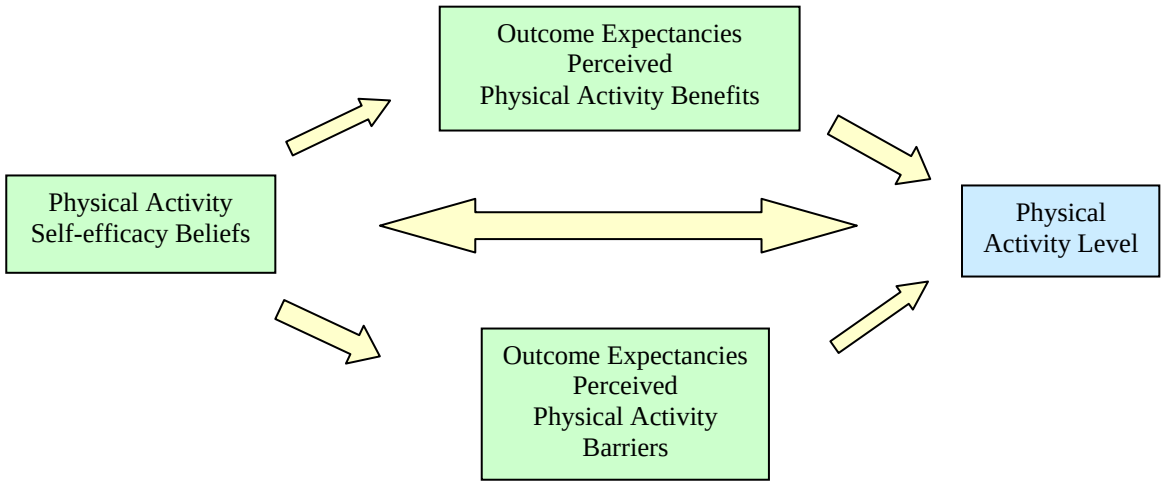


FIGURE 2. Theoretical Model of Physical Activity Self-efficacy Beliefs, Outcome Expectancies (Perceived Physical Activity Benefits and Barriers) and Physical Activity Level

Conceptual and Operational Variables Definition

The principal variables in this study are physical activity, self-efficacy and outcome expectancies. Outcome expectancies consist of two variables: perceived benefits and barriers. Conceptual and operational definitions of study's variables are included in Table 1.

TABLE 1. Variable Definitions

Conceptual Variable	Conceptual Definition	Operational Variable	Operational Definition
Self-efficacy beliefs	People's beliefs or judgments about their capabilities for exercising control over their own functioning, to produce designated levels of performance that influence the events that affect their lives (Bandura, 1977; 1982, 1989; 1997; 1998; Bandura et al., 1977).	Physical activity self-efficacy beliefs	Beliefs of Puerto Rican adults with type 2 DM about their capabilities for performing physical activity regularly, three or more times a week, under challenges or impediments.
Outcome expectancies	Outcome expectancy is a judgment about the possible, positive and negative, consequences that will be produced by some performance (Bandura, 1977; 1982, 1989; 1997; 1998; Bandura, et al., 1977).	Outcome expectancies (perceived physical activity benefits and barriers)	Puerto Rican adults' with DM type 2 judgments about positive consequences (benefits) and barriers of /to performing physical activity.
Physical activity	Physical activity is defined as bodily muscular movements produced by the contraction of the musculoskeletal system that increases the energy expenditure (HHS, 2008).	Physical activity level	The minutes/week of moderate to vigorous intensity physical activity that Puerto Rican adults with DM type 2 engage in.

Summary

Type 2 DM is a significant health problem worldwide. Preventive and disease control interventions are crucial for reducing diabetes chronic complications. Physical activity continues to be a high priority because it is an essential component for preventing chronic complications of diabetes. The existing knowledge about the principal concepts of SCT (self-efficacy and outcome expectancies) demonstrates the significance of this theory to understand and predict human behaviors. Although extensive research literature is available, additional research is needed in other cultures and settings, such as the Puerto Rican adult population with type 2 DM living in PR.

CHAPTER III: METHODOLOGY

This chapter describes the design and research methodology that was implemented to describe physical activity and the relationships between self-efficacy beliefs and outcome expectancies (perceived benefits and barriers) in Puerto Rican adults diagnosed with type 2 DM. It also includes a description of the sample size and characteristics, the research settings, the procedures for sample recruitment, data collection, and human rights protections. Finally, this chapter describes the instruments used as well as the data analysis procedures.

Research Methodology and Design

The purpose of this study was to explore self-efficacy beliefs and outcome expectancies (perceived benefits and barriers) as possible social cognitive factors affecting physical activity levels in Puerto Rican adults diagnosed with type 2 DM. This research was designed to describe these variables and examine possible relationships among them. For the identification and description of potential relationships between physical activity, self-efficacy beliefs and outcome expectancies (perceived benefits and barriers), numerical data was collected through the use of valid and reliable questionnaires. Therefore, this study is classified as quantitative research. According to Burns and Grove (2005), quantitative research uses numerical data and statistical analysis to obtain information about the world, giving the opportunity to describe and examine possible relationship among variables.

The research design of this study was non-experimental, a descriptive correlational study. The main purpose was to describe several variables that had been identified in theories and observed in practice (physical activity, self-efficacy and outcome expectancies), while exploring possible relationships among them in Puerto Rican adults diagnosed with type 2 DM. Correlational studies examine the relationships between two or more variables and provide the

opportunity to determine the pattern and the strength of the existing relationships and also allow for hypotheses generation. A correlational relationship indicates association between variables in a synchronized manner that does not imply causal relationship. Non-experimental studies are very common in nursing discipline because, for natural and ethical reasons, many human characteristics cannot be manipulated experimentally. Studies that combine descriptive and correlational characteristics examine variables and also describe relationships among them (Burns & Grove, 2005; Polit & Beck, 2004; Trochim, 2001).

Sample

This study used a convenience sample of Puerto Rican adult men and women, between 40-60 years of age, diagnosed with type 2 DM. The inclusion criteria for study participation were: Puerto Rican (born in PR or one parent born in PR), living in PR for the last five years, between 40-60 years of age, self-reporting as having type 2 DM for six or more months, able to read and write Spanish and answer questionnaires individually or through personal interviews. The reason for the criteria, of being Puerto Rican and living in PR for the last five years, was to assure that the participants have maintained strong adherence to Puerto Rican culture, rather than having become acculturated to a different culture (Cuéllar, Arnold & Maldonado, 1995). An additional reason was because of the limited existing knowledge about what psychosocial and environmental variables contribute to physical activity in Puerto Rican culture, principally in an adult population diagnosed with type 2 DM living in Puerto Rico. The reason for the age criterion, between 40-60 years of age, was because the older the individual is, the higher the prevalence of DM. The DM prevalence in adults between 35-64 years of age increased from 5.7% (35-44 years old) to 21.2% (55-64 years old) (CDC, 2007a). Subjects with orthopedic or neuromuscular conditions that impede engaging in normal daily physical activity were excluded.

Sample Size

The research questions required correlational and multiple regression analysis to explore the effects of the predictors (self-efficacy beliefs, outcome expectancies - perceived benefits and barriers) on physical activity. According to Field (2005) there are many rules for calculating sample size for regression. One of the most common rules is 10-15 cases for each predictor in the model. According this rule, to obtain statistical significance, the sample size for this study with three predictors could be among 30-45 subjects.

Field (2005) also discussed Green's rules for calculating the minimum acceptable sample size. The first rule is based on the regression model overall test; the minimum sample size is calculated as 50+8k (k = number of predictors). The second rule is based on an individual predictor test; the minimum sample size is 104+k (k = number of predictors). The sample size for this study, set at three predictors, could be 74 (50+24) or 107 (104+3). Green recommends calculating the minimum sample size using both equations and then selecting the largest value. Therefore, the sample size for this study was rounded up to 110 subjects.

Setting

Participants were recruited from four different settings in Puerto Rico: an endocrinology clinic, a private medical office, a community center and an educational program. The endocrinology clinic is located at the University of Puerto Rico District Hospital (UDH), at the Medical Center in San Juan, PR. The endocrinology clinic provides services to adult patients with different endocrinology diseases; the services are sponsored by the faculty and students of the School of Medicine at the Medical Sciences Campus. The private medical office of endocrinologist Dr. Maria de Lourdes Miranda located in Bayamon, PR provides medical services to adult (middle age and older) patients with different endocrinology diseases. Services

are provided Tuesdays and Thursdays to approximately 35 patients that are given appointments for those days.

The community center selected for participants' recruitment was the Center for Promotion and Maintenance of Comprehensive Health of Manuel A. Perez Community. It was established in 2003 by the School of Nursing of the University of Puerto Rico, Medical Sciences Campus in collaboration with the Public Housing Administration. The Manuel A. Perez community is one of the largest public housing projects in PR. The center serves this community, which has an estimated population of 6,000 residents as well as those of surrounding communities, many of which suffer from chronic diseases. The center provides health services through faculty and students of the School of Nursing as well as other health professionals from the Medical Sciences Campus, using the Service Learning Model. The center is available 12 to 16 hours per week and more time can be coordinated as needed.

The educational program "Salud a Tu Alcance" located in Bayamón, PR was also part of the recruitment settings. This program is focused on providing diabetic patients with education to increase their knowledge about the disease, tools for self-monitoring, exercise and nutritional recommendations and pharmacological treatments, in order to enhance their quality of life. The educational program consists of attending 12 hours of group meetings, with approximately 20 adults diagnosed with diabetes, each month. The participants are required to be residents of Bayamón.

Human Rights Protection

Study approval was sought from the Human Subjects Protection Program at the University of Arizona and the Human Research Subjects Protection Office at the University of Puerto Rico, Medical Sciences Campus, in compliance with institutional ethical standards and

federal regulations to protect human subjects' rights (Appendix A and B). The informative sheet given to each subject was approved by both programs before the initiation of the study (Appendix C through E). Approval letters from the settings were obtained to recruit participants for this study (Appendix F through I).

Subjects' respect, privacy and information confidentiality was protected using a numbered code on all the questionnaires. The principal investigator (PI) assigned a study identification number to each subject in the order in which the research subjects enrolled in the study. No names or identifying information was gathered on the questionnaires. The PI maintained all questionnaires in a locked and secure file cabinet in her home. Disclosure (information) forms were given to the participants; no consent forms were signed. The data were entered into Statistical Package for Social Sciences statistical software, version 17, using only the numeric identification code to identify participants. The data entry was performed only by the PI. After finishing data analysis, all of the administered questionnaires were destroyed using a paper shredder.

Sample Recruitment

A flyer, which contained information about the purpose of the study, criteria for participation as well as the PI's contact information, was used for participant recruitment (Appendix J and K). A receptionist at each site gave a flyer to potential participants with type 2 DM during their check-in for services at the front desk. After potential participants had the opportunity to read the flyer, they were asked by the site receptionist if they were interested in participating and if they would like to speak with the PI. If the persons were not interested, the receptionist thanked them for their time; if they were not sure, a copy of the informative sheet, which contained contact information for the PI, was provided. If the persons expressed interest in

participating, the site employee informed the PI who then met with each potential participant in a private office where the PI would introduce herself, explain the study, confirm the person's willingness to participate and evaluate the inclusion criteria. If the persons declined participation, the PI thanked them for their time. The PI also posted a flyer at the clinics, including the PI's contact phone number, so that any other patient who was interested in participating could contact the PI to make an appointment.

Once enrolled, subjects were given a disclosure form to read. Any questions and concerns the subjects may have had about the study were answered by the PI. Arrangements were made so that the subjects could complete the questionnaires before, during or after their medical appointment or at a later time coordinated with the PI.

Once data collection had begun, an amendment to recruitment procedures was requested to the Human Subjects Protection Program at the University of Arizona as well as the Human Research Subjects Protection Office at the UPR, Medical Sciences Campus. The approved amendment made it possible to send the previously approved flyer through the UPR Medical Science Campus webmail service which is received by students and Campus employees (faculty and administrative). Potential participants then contacted the PI through phone calls. Together, the PI and potential subjects coordinated a meeting in a private office at the School of Nursing at the UPR Medical Sciences Campus, and consenting and data collection were done as previously described.

Data Collection Procedure

After obtaining consent by subjects to participate in the study, the PI privately administered the International Physical Activity Questionnaire, after which subjects completed self-administered questionnaires: Demographic Data Questionnaire, Exercise Self-efficacy Scale,

and Exercise Benefits/Barriers Scale. The PI was available to answer questions during the completion of the questionnaires. The duration of the subject's participation in the study was approximately 45 minutes: 10 minutes for the consent process, 15 minutes for the questionnaire administered by the PI and 20 minutes for the self-administered questionnaires. Once all study questionnaires were completed, the PI checked for any missing data, before the subjects left and placed the data into a closed envelope.

Instruments

Demographic Data Questionnaire

The Demographic Data Questionnaire consisted of two parts. Part one consisted of 12 questions about age, birth year, gender, educational level, marital status, the number of people living in the house, the presence of children, employment, occupation, annual household income, and medical insurance. Eight questions (3-6, 8, 10-12) were answered by making a check mark (✓) and four questions (1, 2, 7, 9) were answered by writing the information in the provided space. Part two was about subjects' health history. It consisted of six questions answered by making a check mark or writing the information in the provided space. This questionnaire addressed the subject's weight and height, and the presence of four medical diagnoses (retinopathy, neuropathy, nephropathy and high blood pressure). This information was provided by self-report. PI calculated BMI using the mathematical formula: [weight (pounds) / height (in) ^{2}] x 703. This formula was used because pounds and inches are the typical units used to report weight and height in PR. The English and Spanish versions of the demographic questionnaire are included in Appendix L and M.

Exercise Benefits/Barriers Scale (EBBS)

The EBBS was designed by Sechrist, Walker and Pender in 1985. The Benefits subscale measures a variety of positive perceived consequences of exercise while the Barriers subscale measures perceived barriers to exercise. Its underlying theory is the Health Promotion Model of Nola Pender, which is based on social learning theory. The original scale had 65 items but after psychometric evaluation, the original authors reduced them to 43. The Benefits subscale has 29 items and the Barriers subscale has 14 items. Both subscales are in a 4-point Likert format that goes from strongly agree (4) to strongly disagree (1), which helps in obtaining an ordinal measure of the strength of the agreement with each item. The possible range of scores for the complete scale is 43-172: for the Benefits subscale is 29-116, and for the Barriers subscale is 14-56. Higher score indicated more perceived benefits and barriers respectively (Sechrist et al., 1987).

The reliability (internal consistency and stability), factor analysis and item analysis of the scale were evaluated by the authors. Their sample consisted of 650 healthy male and female adults from the general community, between 18-88 year of age, with a mean age of 38.7 years. Internal consistency of the final 43-item scale was measured using Cronbach's alpha, and the standardized alpha for the total scale was 0.952. The standardized alpha for the Benefits subscale was 0.953 and 0.866 for the Barriers subscale. Test-retest reliability over two weeks was 0.889 for the total scale, 0.893 for the Benefits subscale and, 0.772 for the Barriers subscale. Factor analysis of the final scale showed that nine factors explained 64.9% of the variance. The Benefits subscale items loaded on five factors: life enhancement, physical performance, psychological outlook, social interaction and preventive health. Barriers subscale items loaded on four factors: exercise milieu, time expenditure, physical exertion and family encouragement. Principal

components extraction with oblique rotation (Varimax) was completed as a second factor analysis. Two factors (benefits and barriers) were extracted explaining 47.4% of the variance; thus, supporting the theoretical conceptualization of the measured phenomena (Sechrist et al., 1987).

EBBS psychometric properties have been widely used and supported by previous research studies and it has demonstrated good reliability and validity in older, middle and young adult populations. For example, Stutts (2002) applied the scale to adults from 19 to 86 years of age with a mean age of 39 years, of which more than 60% were non-Hispanic white. The majority of the sample (60.7%) reported no chronic illness. But of those reporting chronic illnesses, the most frequent health problems were high blood pressure, arthritis, depression, arrhythmias and diabetes. In this study, the Cronbach's standardized alpha for the Benefits subscale was 0.948 and 0.836 for the Barriers subscale.

EBBS was translated to Spanish in 2002; this version was provided by Sechrist, one of the original authors. The Spanish version was used by Cromwell in an unpublished study (Cromwell, personal communication, 2007). In Cromwell's study Cronbach's alpha for both subscales (Benefits and Barriers) was calculated with a sample of 58 Mexican American women using five different times of application. The Benefits subscale ranged from 0.957-0.985 and Barriers subscale ranged from 0.783-0.857.

EBBS was selected for this study because it has been used successfully throughout different adults' stages. Also, the scale measures physical, physiological and social benefits and also measures several types of barriers to performing physical activity behavior, such as environmental, physical and socio-cultural. Some important socio-cultural barriers measured by the EBBS that apply to Puerto Rican culture are time and responsibilities related to family, and

partner and family members support. Two open-ended questions about perceived benefits and barriers were included at the end of the instrument to identify additional benefits and barriers that could be not included in the questionnaire. These questions were: what other benefits, not mentioned before, do you obtain when you exercise and what other barriers, not mentioned before, prevent you from exercising?

At the beginning of the research study, the internal consistency of the Spanish version was established with 20 Puerto Rican adults with type 2 DM. Possible language problems and the level of comprehension of the items were also evaluated. The English and Spanish versions of EBBS are included in Appendix N and O.

Exercise Self-efficacy Scale (ESS)

The ESS was developed by Bandura (2006), has 18 items and was originally in English. The instrument measures how confident people are that they can perform exercise routines regularly (three or more times a week) under various circumstances or barriers such as bad weather, without support from family or friends, among others. It is a unipolar scale ranging from 0% (cannot do) to a maximum strength of 100% (certain can do) in 10-unit intervals.

ESS was the only questionnaire not previously translated into Spanish. Therefore, it was translated from the original English language (source language) into Spanish (target language) using back-translation strategy (Brislin, 1970; Jones, Lee, Phillips, Zhang & Jaceldo, 2001). The first translator was a doctorally prepared nurse who translated the original English version to the Spanish language. She lived in Louisiana where she completed a DNS academic degree and is currently the Director of the Nursing Research Center on HIV/AIDS Health Disparities at the School of Nursing of the University of Puerto Rico, Medical Sciences Campus. The back-translation was performed by another doctorally prepared nurse, who has proficiency in English

language due to the fact that she lived most of her childhood life in the state of New York. The translators selected are nurses with higher academic preparation, who are fully bilingual and familiar with the content of the instrument. Furthermore, they have cultural knowledge because they are Puerto Ricans who have lived in PR most of their lives. The translation process was done separately using a blind technique. The second translator did not see the original instrument to assure validity and reliability in the translation. After the translation process, both versions were compared by the PI to identify any discrepancies in translations. Finally, a discussion with both translators was conducted to make necessary adjustments to the instrument.

The questionnaire's translation was evaluated using the following technique. Both versions, English and Spanish, were administered to bilingual people (Brislin, 1970; Jones et al., 2001). The small project was titled "Evaluating the Spanish Version of the Exercise Self-efficacy Scale in Puerto Rico." It was conducted from August to December 2007 after obtaining approval from the Human Subjects Protection Program at the University of Arizona. Both versions of ESS were administered to 20 bilingual Puerto Rican adults in order to identify discrepant responses, compare participants total scores as well as scores by items to assess any discrepancy in meaning between two versions.

Reliability analysis for the original instrument and translated version was performed with 20 subjects, 60% (n=12) female, 40% (n=8) male, and the mean age was 51 years. The Cronbach's alpha for the original English version was 0.96 (n=15) and 0.93 (n=18) for the new Spanish version. The item correlation among original instrument and translated version were strong correlations: between 0.71 and 0.98; and the total correlation between both instruments was 0.98. These results demonstrated similar responses and similar item comprehension among participants. The Spanish translated ESS was useful for this study since it showed good internal

consistency in the small project describe above. It was also congruent with the investigator's research interest because it measures perceived self-efficacy in confronting barriers like personal problems and physical discomfort among others. The English and Spanish versions of ESS are included in Appendix P and Q.

International Physical Activity Questionnaire (IPAQ)

The International Physical Activity Questionnaire (IPAQ) was developed with the purpose of estimating health related physical activity within and between nations. The IPAQ can be used in adolescents and adults from 15-69 years of age. There are four versions available: long and short, and telephone or self-administered versions. The IPAQ estimates frequency (day/week) and duration (minutes or hours/week) of different intensity physical activities (moderate and vigorous), including walking activity during the previous seven days. It also includes the time spend sitting. The long version consist of 27 questions in four physical activity domains and one sedentary domain: occupational, transportation, housework/house maintenance, leisure-time physical activity, and the time spend sitting (sedentary activity domain). The short version summarizes these domains in seven questions.

IPAQ short version was used because the purpose of this study was to describe the level of physical activity. The English and Spanish versions of IPAQ are included in Appendix R and S. In a previous report, Craig et al. (2003) demonstrated that the short and long versions of the IPAQ provide similar results identifying physical activity levels. Both categorical and continuous measures of physical activity can be reported with the IPAQ. The categorical variable is the level of physical activity: low, moderate or high level. Because of the typical non-normal distribution of categorical variables, the use of continuous variables is recommended. Continuous variables are the minutes/week or MET-minutes/week of moderate to vigorous physical activity. MET

represents the energy expenditure required for a particular intensity of physical activity relative to the energy expenditure required at rest. For example, a value of 1-3 METs is used to identify physical activities of low intensity, 4-6 METs for activities of moderate intensity, and more than six METs for activities of vigorous intensity (Ainsworth et al., 2000; Pate et al., 1995).

The IPAQ measurement properties were determined from studies conducted in 12 different countries (Craig et al., 2003). Guatemala was the Hispanic/Latino country included in the study. The test-retest reliability, concurrent and criterion validity were assessed. The correlation coefficient was approximately 0.80 (Spearman's correlation coefficient) based on total MET minute per week across all PA domains; with comparable data for the short and long versions. Total reliability coefficient correlations in a Guatemala urban population were 0.85 and 0.88 for the long and short version, respectively. However, the total reliability coefficients correlations in a rural population were 0.52 and 0.25 for the long and short version respectively. The samples were similar across the recruitment site but the education level of the urban sample was higher than the rural sample. Criterion validity using an accelerometer showed a Spearman's correlation coefficient of 0.33 and 0.30 for the long and short version, respectively. According to the authors, these results are comparable to other physical activity self-report validation studies (Craig et al., 2003).

The IPAQ short version was also administered to Hispanic/Latino adults living with HIV in PR. Test-retest reliability coefficients at an eight-days interval in this population was significant (Spearman's correlation coefficients: 0.32 to 0.75 for the different physical activity domains and total minutes/week). The comparison between the accelerometer and IPAQ showed that in all physical activity domains, except sedentary behavior, these participants self-reported more time engaged in moderate to vigorous physical activities with the IPAQ than objectively

measured with the accelerometer (Ramirez-Marrero et al., 2008). However, IPAQ has acceptable psychometric properties to estimate physical activity by self-report in many countries and in diverse settings, and also, it is suitable for national population-based prevalence studies of physical activity behavior (Craig et al., 2003).

It is important to emphasize the problem of distinguishing vigorous from moderate physical activity. To minimize this problem and to facilitate understanding of the instrument, several strategies were implemented. Firstly, before starting data collection, the PI met with an experienced investigator in Puerto Rico to observe an actual administration of the IPAQ in a research setting, and practice administering the instrument. Secondly, the IPAQ was administered only by the PI to ensure consistency in all data collection processes.

Pilot Test

The first 20 participants of this study comprised the subsample that evaluated possible language barriers, the level of comprehension and the internal consistency of the Spanish versions of the Exercise Self-efficacy Scale and Exercise Benefits/Barriers Scale. The inclusion criteria, settings and recruitment process of this subsample were identical to those of the principal study. The analysis of the data gathered during the pilot testing was focused on internal consistency results: Cronbach's alpha, inter-item correlations and item to total correlation. Difficulties in comprehension were also assessed at the end of the process through the use of an open-ended question (Are any words or sentences difficult to understand?).

Data Analysis

The Kolmogorov-Smirnov and Shapiro-Wilk tests were used to determine the normal distribution of the principal variables. Both tests were statistically significant at p-value less than .05 for physical activity level and outcome expectancies (perceived physical activity benefits)

variables, indicating non- normal distribution. After transformation on the variables, the Kolmogorov-Smirnov and Shapiro- Wilk tests were still statistically significant. As a result, non-parametric statistics were used with physical activity level and outcome expectancies (perceived physical activity benefits). Physical activity self-efficacy beliefs and outcome expectancies (perceived physical activity barriers) were normally distributed.

The data analysis was performed according to the research questions (descriptive and relational). Descriptive statistics were used to answer descriptive questions. Median and quartiles were used to describe the level of physical activity in Puerto Rican adults with type 2 DM, since there was a non-normal distribution of the total physical activity minutes per week in the sample. Mean and standard deviation were calculated to describe the level of physical activity self-efficacy beliefs, outcome expectancies (perceived physical activity benefits and barriers).

The associations between physical activity levels and physical activity self-efficacy beliefs, outcome expectancies (perceived physical activity benefits and barriers) were evaluated using the Spearman rho coefficient to determine the direction and magnitude of the relationships. The Spearman rho coefficient was also employed to determine the association between physical activity self-efficacy beliefs and outcome expectancies (perceived physical activity benefits). The association between physical activity self-efficacy beliefs and outcome expectancies (perceived physical activity barriers) were evaluated through the Pearson correlation coefficient.

Statistical analyses were conducted using the Statistical Package for Social Sciences (SPSS), version 17.0. Alpha and power level was set at the traditional values for social science research (0.05; 0.8) with the goal of maintaining good statistical power and statistical significance.

Exploratory Data Analysis

Exploratory data analysis was conducted to describe differences between groups. The mean levels of the principal variables (physical activity self-efficacy beliefs, outcome expectancies [perceived physical activity benefits and barriers] and physical activity level) were compared for socio-demographic subgroups. The differences between age, gender, the presence of children at home and status of employment were observed using independent sample t-tests or Mann Whitney tests. For the variables of educational level, marital status and household income one-way analysis of variance or Kruskal-Wallis test were implemented. In addition, the differences between BMI, health history (medical diagnoses) and the principal variables were explored using one-way analysis of variance or the Kruskal-Wallis test and independent sample t-tests or the Mann Whitney test, respectively. The BMI variable was divided into four categories (underweight, normal, overweight and obese), but the data analysis was conducted using normal, overweight and obese categories, because no subject was reported to have an underweight. High blood pressure was the only medical diagnose selected for data analysis because it had a sample of 74 participants while the other three diagnoses, neuropathy, retinopathy and nephropathy, had only a few numbers of cases.

The contribution of socio-demographic factors, BMI and health history to the prediction of physical activity self-efficacy beliefs, outcome expectancies (perceived physical activity benefits and barriers) and physical activity level in Puerto Rican adults with type 2 DM were explored. Multiple linear regression analyses of the physical activity level was performed to assess the effects of physical activity self-efficacy beliefs and outcome expectancies (perceived physical activity benefits and barriers) while controlling for the socio-demographic, BMI and health history characteristics.

Qualitative Data Analysis

Two open-ended questions were included at the end of the questionnaire to identify additional benefits and barriers that could be not included in the EBBS. Content analysis was performed by the PI to identify common themes among the participants' responses within the a priori categories of benefits and barriers. The peer debriefing method (comparing themes and categories identified by a peer colleague) was used to establish credibility of the qualitative findings. Credibility is one of the requisites to establish trustworthiness as proposed by Lincoln and Guba (1985). The PI conducted content analysis individually and then sent the participants' answers to a doctoral prepared nurse who is a professor at the School of Nursing of the University of Puerto Rico, Medical Sciences Campus with experience in conducting qualitative nursing research. The qualified peer consultant identified themes and categories, and discussed them with the PI. The PI and consultant compared their separate findings until consensus was reached to ensure that the analysis represented accurately participants' responses.

Summary

This chapter presented the descriptive correlational design that was used to explore the relationships between physical activity self-efficacy beliefs, outcome expectancies (perceived physical activity benefits and barriers) and physical activity level in Puerto Rican adults diagnosed with type 2 DM. Sample characteristics, settings, sample recruitment, data collection procedures, including human rights protection were discussed. The four study questionnaires, data analysis procedure and the pilot test to evaluate the instruments' language equivalence, level of comprehension and internal consistency were also described.

CHAPTER IV: RESULTS

Chapter IV presents the study results of statistical data analysis. The results are organized in two sections: pilot study and descriptive correlational study. The pilot study was conducted to evaluate the research questionnaires. The purpose of the descriptive correlational study was to explore self-efficacy beliefs and outcome expectancies (perceived benefits and barriers) as possible factors that affect physical activity level in Puerto Rican adults diagnosed with type 2 DM. The results of the descriptive correlational study are presented according to the research questions (descriptive and relational). Finally, this chapter presents the secondary study analysis (exploratory data and exploratory regressions). Qualitative data about benefits and barriers are included at the end of the chapter.

Pilot Study

As described in chapter 3, a pilot study was conducted to evaluate possible language barriers, the level of comprehension and the internal consistency of the Spanish versions of the Exercise Self-efficacy Scale and Exercise Benefits/Barriers Scale. It was conducted with a subsample of the first 20 participants. The analysis of internal consistency was focused on Cronbach's alpha and item to total correlation.

Sample Characteristics of Pilot

Descriptive characteristics of the pilot test subsample are presented in Table 2. Age ranged from 40 to 60 years, with a mean of 51.3 (SD=6.6) years. The majority of the participants (75%, n=15) were female. Most participants (65%) had completed some education beyond high school level while 35% had a high school or lower level of education. Six participants (30%) were currently working; fifteen participants (75%) had an annual household income of less than $27,820, of which 55% (n=11) received less than $15,260. Thirteen participants (65%) reported

being diagnosed with high blood pressure, six cases (30%) reported neuropathy, 10% reported retinopathy and 5% reported nephropathy. The majority of the sample was overweight (25%) or obese (75%). Some 60% of the participants were recruited from a diabetes educational program.

TABLE 2. Pilot Sample Characteristics

	Frequency = N	Percent %
Gender		
Female	15	75
Male	5	25
Age, mean SD (range)	51.3 yrs ± 6.6 yrs (40-60)	
Education		
Elementary school	3	15
High school	4	20
Technical/associate	8	40
Undergraduate degree	4	20
Master degree	1	5
Doctorate degree	0	0
Work		
Yes	6	30
No	14	70
Annual household income		
less than $8,980	4	20
$8,980 – $15,260	7	35
$15,261 - $21,540	3	15
$21,541 – 27,820	1	5
above $27,820	4	20
missing	1	5
Medical diagnosis		
Retinopathy	2	10
Neuropathy	6	30
Nephropathy	1	5
High blood pressure	13	65
Body mass index (kg/m2)		
Underweight (below 18.5)	0	0
Normal (18.5 – 24.9)	0	0
Overweight (25.0 – 29.9)	5	25
Obese (30.0 and more)	15	75
Data collection sites		
Endocrinology clinic UDH	7	35
Private medical office	1	5
Educational program	12	60

Note: UDH = University District Hospital

The language and comprehension aspects of the questionnaires were evaluated during and after questionnaire administration of each instrument. None of the participants had problems answering the items on both questionnaires and they did not verbalize any comprehension difficulties during or after the administration of the questionnaires. The results of the internal consistency analysis for each scale are presented below.

Exercise Self-efficacy Scale (ESS)

The internal consistency analysis using the unstandardized Cronbach's alpha for the ESS was 0.95 (n=19). The item to total scale correlation did not reveal items with low correlations but 10 items (#5-11, 13, 14, 18) obtained item to total correlations above 0.70. Conversely, the alpha coefficient value remained equal even if any of these would have been removed.

The range of item to total scale correlation should be 0.30 to 0.70. Redundancy could be a problem if the inter-item correlations were above 0.70 and there could have been a lack of substantive relation among items if the interitem correlations were below 0.30 (Ferketich, 1990).

Exercise Benefits/Barriers Scale (EBBS)

The internal consistency analysis using unstandardized Cronbach's alpha for the EBBS was 0.87 (n=18). Cronbach's alpha for the Benefits subscale was 0.95 (n=18) and 0.86 (n=20) for the Barriers subscale. The item to total correlation in the Benefits subscale revealed one item (#39) with low correlations in the overall scale and 4 items (#10, 20, 31, and 34) with a high correlation between 0.70 and 0.75. Conversely, the alpha coefficient value remained equal even when any of these items were removed. The Barriers subscale revealed 12 items within the normal range of correlations with the overall scale and two items (#6 and 28) with low correlations in the overall scale. Items number 6 and 28 were: "exercise tires me" and "I think

people in exercise clothes look funny." The alpha coefficient value would increase minimally from 0.86 to 0.87 if item #28 were removed; therefore, all the items in both scales were kept.

Descriptive Correlational Study

Sample Characteristics

The descriptive characteristics of the entire sample (n=110) are presented in Table 3. Age ranged from 40 to 60 years, with a mean of 52.2 (SD=5.6) years. The majority of the participants (65.5%, n=72) were female. Thirty-seven participants (33.6%) were recruited from a private medical office and thirty-two (29.1%) from a diabetes educational program. Most participants (67.3%) had completed some education beyond high school level and 23.6% completed education ending at the high school level. More than half of the participants (60.9%) were married and 33.7% were single or divorced. Most participants (66.4%) did not have children living with them and 76.3% reported a family composition of three or less members.

Half of the participants (50%) were currently working and 19.1% were retired. Seventy-six participants (69.1%) had an annual household income of less than $27,820, of which 25.5% (n=28) received less than $8,980. All participants (100%) had medical insurance: 68.2% private and 27.3% governmental insurance. Seventy-four participants (67.3%) reported being diagnosed with high blood pressure, twenty-three cases (20.9%) reported neuropathy, 8.2% reported retinopathy and 2.7% reported nephropathy. The majority of the sample was overweight or obese (27.3% and 64.5%, respectively).

TABLE 3. Descriptive Correlational Study Sample Characteristics

	Frequency = N	Percent %
Gender		
Female	72	65.5
Male	38	34.5
Age, mean SD (range)	52.2 yrs ± 5.6 yrs (40-60)	
Education		

	Frequency = N	Percent %
Elementary school	10	9.1
High school	26	23.6
Technical/associate	35	31.8
Undergraduate Degree	28	25.5
Master's Degree	8	7.3
Doctorate Degree	3	2.7
Marital status		
Married	67	60.9
Single	19	17.3
Divorced	18	16.4
Widow	2	1.8
Living together	4	3.6
Children at home		
Yes	37	33.6
No	73	66.4
Number of people at home		
1	15	13.6
2	37	33.6
3	32	29.1
4	15	13.6
5 or more	10	9.1
Work		
Yes	55	50
No	55	50
Retired		
Yes	21	19.1
No	89	80.9
Stay at home		
Yes	29	26.4
No	81	73.6
Annual household income		
less than $8,980	28	25.5
$8,980 – $15,260	24	21.8
$15,261 - $21,540	12	10.9
$21,541 – 27,820	12	10.9
above $27,820	29	26.4
Medical insurance		
Yes	110	100
Type of medical insurance		
Medicaid	1	0.9
Medicare	4	3.6
Private insurance	75	68.2
Governmental	30	27.3
Medical diagnosis		

	Frequency = N	Percent %
Retinopathy	9	8.2
Neuropathy	23	20.9
Nephropathy	3	2.7
High blood pressure	74	67.3
Body mass index (kg/m2)		
Underweight (below 18.5)	0	0
Normal (18.5 – 24.9)	9	8.2
Overweight (25.0 – 29.9)	30	27.3
Obese (30.0 and more)	71	64.5
Data collection sites		
Endocrinology clinic UDH	15	13.6
Private medical office	37	33.6
Community center	6	5.5
Educational program	32	29.1

Note: UDH = University District Hospital

The internal consistency for the ESS and EBBS were also analyzed for the entire sample, showing a Cronbach's alpha of 0.94 and 0.84 respectively. The Cronbach's alpha for benefits and barriers subscales was also analyzed showing 0.93 and 0.81, respectively.

Descriptive Correlational Study (Descriptive Questions)

This section includes the descriptive results of the principal study variables: level of physical activity, physical activity self-efficacy beliefs and outcome expectancies (perceived physical activity benefits and barriers) of the sample of Puerto Rican adults with type 2 DM.

Physical Activity Level

The median and the 25th, 75th percentile for the self-reported physical activity level by gender and age is presented in Table 4. The time engaged in moderate to vigorous physical activity reported by the entire sample was 82.5 minutes/week. A total of 27 participants (25%) achieved the minimum of physical activity recommendation (≥ 150 minutes/week) and 75% did not.

Men reported a median of 120 minutes/week of moderate to vigorous physical activity and females 60 minutes/week. Participants between 40-50 years of age reported a median of 90.0

minutes/week of moderate to vigorous physical activity and participants from 51-60 years of age reported a median of 60.0 minutes/week.

TABLE 4. Physical Activity in Minutes per Week

IPAQ (n)		Gender				Age			
Total Activity (110)		Women (72)		Men (38)		40-50 (43)		51-60 (67)	
Mean (SD) 105.1 (114.1)		85.6 (103.1)		142.1 (125.6)		112.4 (106.6)		100.4 (119.1)	
Median	25^{th} 75^{th}	Median	25^{th} 75^{th}	Median	25^{th} 75^{th}	Median	25^{th} 75^{th}	Median	25^{th} 75^{th}
82.5	18.8, 150.0	60.0	3.8, 116.3	120.0	20.0, 262.5	90.0	20.0, 150.0	60.0	0, 150.0

Self-efficacy and Outcome Expectancies

The mean score of physical activity self-efficacy beliefs was 923.9 (SD = 417.3) points with range of 60-1750 points. The outcome expectancies (perceived physical activity benefits) score showed a median of 102.5 and a range from 68 - 116 points. The five benefits with highest means were: exercising increases my level of physical fitness (3.80); exercising improves functioning of my cardiovascular system (3.79); exercise improves the way my body looks (3.67); exercise improves my mental health (3.64) and exercising makes me feel relaxed (3.61). These data indicates that the highest benefits in the sample were part of physical performance and psychological outlook factors.

The mean score for outcome expectancies (perceived physical activity barriers) was 27.8 (SD = 7.1) points, with a range from 15 – 47 points. A high proportion of the sample reported that they agreed or strongly agreed that physical activity causes tiredness (56.4%) and fatigue (54.6%). The five barriers with highest means were: exercise tires me (2.65); I am fatigued by exercise (2.60); exercising takes too much of my time (2.35); exercise is hard work for me (2.14) and places for me to exercise are too far away (2.03). These items are part of the physical exertion, time expenditure and exercise milieu factors.

Associations Between Principal Study Variables (Relational Questions)

The relationship between physical activity self-efficacy beliefs and physical activity level in the sample of Puerto Rican adults with type 2 DM was significant but moderate (r_s=.32, p = .001). This finding means that the higher the physical activity self-efficacy beliefs, the higher the physical activity level. No significant association was observed between outcome expectancies (perceived physical activity benefits) and physical activity level (r_s =.09, p = .38). Also, no significant association was observed between outcome expectancies (perceived physical activity barriers) and physical activity level (r_s = ˉ.17, p = .07).

The correlation between physical activity self-efficacy beliefs and outcome expectancies, (perceived physical activity benefits) was significant but moderate (r_s = .46, p < .001). This finding means that the higher the physical activity self-efficacy beliefs, the higher perceived physical activity benefits. The correlation between physical activity self-efficacy beliefs and outcome expectancies, (perceived physical activity barriers) was significant, moderate and negative (r = -.40, p <.001). This finding means that the higher the physical activity self-efficacy beliefs, the lower perceived physical activity barriers.

Exploratory Data

An exploratory data analysis was conducted to determine the effects of socio-demographic variables on physical activity level, perceived physical activity self efficacy beliefs, perceived physical activity benefits and perceived physical activity barriers. Differences in means of the principal variables (physical activity level, physical activity self-efficacy beliefs, and outcome expectancies [perceived physical activity benefits and perceived physical activity barriers]) organized by age, gender and BMI are presented in Table 5 and 6. Exploratory results

using parametric tests are included in Table 5 and Table 6 included exploratory results using non-parametric statistics.

Physical Activity

Men reported a higher physical activity level (Mdn= 120) compared to women (Mdn=60) (U=987.5, p=.016). There were no statistical significant differences between physical activity and age groups (U=1279.5, p=.321). Physical activity level was also not significantly different between BMI categories (normal weight, overweight, and obese) (H(2)=.081, p=.960).

Self-efficacy

Men presented a significantly higher self-efficacy belief score (M= 105.9, SD= 40.6) than women (M= 85.3, SD= 40.8) (*t statistic*= - 2.52, *p*= .013 (two tailed). The physical activity self-efficacy was not statistically significant between age groups (*t statistic*= -1.899, *p* = .06 (two tailed)).

Self-efficacy belief score was significantly different between BMI categories (*F* (2, 107) = 10.517, $p < .001$). Post-hoc comparisons using the Turkey HSD test indicated that the mean self-efficacy beliefs score for the normal weight group (M= 117.7, SD= 15.9) was significantly higher than the obese group (M= 79.9, SD= 41.6), and that the mean score for the overweight group (M= 114.3, SD= 34.9) was significantly higher than for the obese group. The self-efficacy beliefs score for the normal weight group did not differ significantly from the overweight group.

Outcome Expectancies

There were not significant differences in outcome expectancies (perceived physical activity benefits) by gender and age groups (U= 1145.5, p=.16) and (U=1149, p=.07).

The differences in perceived physical activity benefits between BMI groups were significant (H(2)= 7.88, p=.019). People with normal weight had significantly higher perceived

benefits (Mdn=106) than people with obesity (Mdn=99) (U=193, p=.05). People with overweight had significantly higher perceived benefits (Mdn=104) than people with obesity (Mdn=99) (U=745, p=.017). There was no significant difference between people with normal weight and those overweight (U=134, p=.97).

Female participants had significantly higher perceived physical activity barriers (M= 29.1, SD= 7.3) than males (M= 25.3, SD= 5.9) (*t statistic* = 2.75, *p*= .007 (two tailed)). The differences in perceived physical activity barriers scores between age groups were not statistically significant (*t statistic* = 1.780, *p*= .078 (two tailed)).

A one way analysis of variance between groups was conducted to explore the impact in the perceived physical activity barriers by BMI categories. There was a significant differences in perceived physical activity barriers for the three BMI groups (F (2, 107) = 4.315, p = .016). Post-hoc comparisons using the Turkey HSD test indicated that the mean score for the overweight group (M= 25.3, SD= 6.2) was significantly lower than for the obese group (M= 29.2, SD= 7.2). The normal weight group (M= 24.7, SD= 6.1) did not differ significantly from either the overweight or obese group.

TABLE 5. Exploratory Results – Parametric Tests

Measures	Variables	Groups (df=108)	Mean	S.D.	*t*	*p*
T test						
	Self-efficacy	Gender				
		Women	85.3	40.8	-2.52	.013
		Male	105.9	40.6		
	Self-efficacy	Age				
		40 – 50 (n=43)	83.1	40.0	-1.899	.06
		51 – 60 (n=67)	98.4	41.9		
	Outcome Expectancies Barriers	Gender				
		Women	29.1	7.3	2.75	.007
		Male	25.3	2.8		
	Outcome Expectancies Barriers	Age				
		40 – 50 (n=43)	29.2	7.2	1.780	.078
		51 – 60 (n=67)	26.8	6.9		

Anova		Groups df (2, 107)	Mean	S.D.	*f*	*p*
	Self-efficacy	BMI				
		Normal	117.7	15.9	10.517	<.001
		Overweight	114.3	34.9		
		Obese	79.9	41.6		
	Outcome Expectancies	BMI				
	Barriers	Normal	24.7	6.1	4.315	.016
		Overweight	25.3	6.2		
		Obese	29.2	7.2		

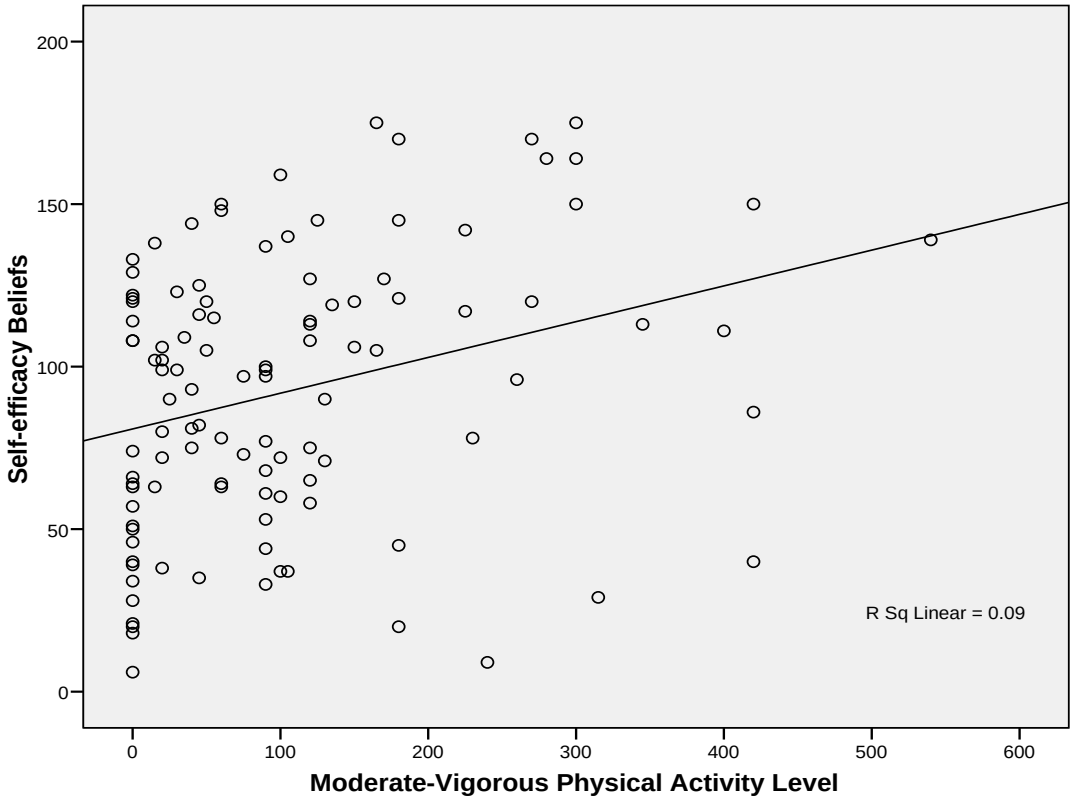
TABLE 6. Exploratory Results – Non-Parametric Tests

Measures	Variables	Groups	Median	U	*p*
Mann Whitney					
	Physical Activity	Gender		987.5	.016
		Women	60.0		
		Male	120.0		
	Physical Activity	Age		1279.5	.32
		40 – 50 (n=43)	90.0		
		51 – 60 (n=67)	60.0		
	Outcome	Gender		1145.5	.16
	Expectancies	Women	101.5		
	Benefits	Male	103.0		
	Outcome	Age		1149	.07
	Expectancies	40 – 50 (n=43)	99.0		
	Benefits	51 – 60 (n=67)	103.0		
Kruskal Wallis	Variables	Groups	Median	Chi-Square	*p*
	Physical Activity	BMI		.081	.96
		Normal	50.0		
		Overweight	75.0		
		Obese	90.0		
	Outcome	BMI		7.88	.019
	Expectancies	Normal	106		
	Benefits	Overweight	104		
		Obese	99		

Exploratory Regressions

The contribution of socio-demographic factors, BMI and the medical diagnosis of high blood pressure to the prediction of physical activity self-efficacy beliefs, outcome expectancies (perceived physical activity benefits and barriers) and physical activity level in the sample of

Puerto Rican adults with type 2 DM were explored. There were no significant results. Different multiple regression models were conducted to assess the effect of physical activity self-efficacy beliefs and outcome expectancies (perceived physical activity benefits and barriers) in predicting physical activity level of participants. There were no significant values, although self efficacy beliefs appeared to contribute in the prediction of physical activity level. Therefore, a Pearson correlation coefficient and a simple linear regression model were conducted to determine if in fact self efficacy beliefs could be associated and predict physical activity levels (see Figure 3). Self efficacy beliefs and physical activity were significantly but moderately correlated ($r = 0.30$, $p = 0.001$); however, a small percentage ($R^2 = 0.09$) of the variance in physical activity level could be explained by self-efficacy beliefs.



Simple regression linear model (Y = .822(X) + 29.118)

FIGURE 3. Simple Linear Regression Between Self-efficacy Beliefs and Physical Activity Level

Qualitative Data

Additional physical activity benefits and barriers expressed by participants in the open-ended questions are included in Table 5 and 6. The main themes for perceived physical activity benefits were: 1) positive benefits to health status, 2) optimal physical status, 3) optimal psychological status and social benefits and 4) benefits in daily life activities. The main themes for perceived physical activity barriers were: 1) physical impairments by medical history, 2) overwhelmed by multiple responsibilities from work and home, 3) concerns regarding their own safety and 4) motivation and self-esteem.

TABLE 7. Main Themes from Qualitative Data on Perceived Physical Activity Benefits

Positive Benefits to Health Status
Improves my diabetes condition and blood circulation.
For people who have had heart surgery like me it increases or improves my condition.
My cardiovascular condition.
I feel it helped my condition regarding high levels of sugar in my body.
It helps me lower lipids and sugars.
It helps me with depression and diabetes condition.
It helps me lower sugar levels and blood pressure.
Optimal physical status
Physically my body hurts less, I feel lighter and stronger.
My muscles hurt less.
It helps my metabolic system.
It maintains my flexibility and physical agility.
Maintain a healthy weight.
Optimal psychological status and social benefits
I feel good and it cheers me up. My self-esteem increases.
It makes me feel alive.
It makes me happy.
The best benefit is feeling good with myself.
It makes me forget my problems at the time because it I have fun.
I establish goals and it gives me satisfaction when I achieve them.
Clothing fits me better
I love my new appearance.
I spend time with my children.
When I exercised outside my house I met new friends and I joined a jogging club.

Benefits in daily life activities
I sleep much better.
I am less tired in my other activities.
It helps me sleep at least 8 hours.
Sex is better.

TABLE 8. Main Themes from Qualitative Data on Perceived Physical Activity Barriers

Physical impairments by medical history
Knee surgery.
When my back condition or knee does not allow me to do it. And when I am tired from chemo.
I cannot do heavy exercise by the cardiologist's orders.
Chronic arthritis pain.
My back condition.
In my case my thrombophlebitis condition.
I have a spur on one foot.
Medical conditions, knees, and arthritis.
Leg fractures.
I would like to run, but I cannot because I have trouble with my discs.
Overwhelmed by multiple responsibilities from work and home
Long work hours.
My work demands many times do not allow me to get home early.
Setting out time between work and the house.
Rotating shifts at work.
I do not have a lot of time.
Too much work.
My job requires from 10-12 hours a day.
Concerns regarding their own safety
I was afraid of another person who had a weapon.
Safety in the area. My husband works and cannot go with me.
Many dogs around my neighborhood.
Motivation and self-esteem
Besides the fact that I get fatigued quite easily, the mockery of people prevents me from exercising.
I am too self-conscious about my weight to leave the house to go to the gym or park.
Lack of motivation and interest.
I do not exercise much because I am lazy.
I am not in the mood.

Summary

The results from the analysis of the data collected in a sample of Puerto Rican adults with type 2 DM were presented in this chapter. A total of 75% of the sample did not achieve the minimal physical activity recommendation for health. The relationship between self-efficacy beliefs and physical activity level was moderate but significant. Self-efficacy beliefs explained 9% of the variance in self-reported physical activity. The correlation between self-efficacy beliefs and perceived benefits and barriers was moderate and significant. The exploratory data analysis demonstrated that men were more physically active, had higher self-efficacy beliefs, and perceived lower barriers than women. Also, obese people had a significantly lower self-efficacy beliefs and perceived benefits, and higher perceived barriers than overweight people.

CHAPTER V: DISCUSSION

This chapter presents the discussion of the research results within the perspective of previous research literature and Bandura's Social Cognitive Theory. The chapter is organized by the principal study concepts of the descriptive correlational study although the pilot study discussion is presented first. Exploratory and qualitative data analyses are also integrated throughout the discussion. The study limitations, implications for nursing practice and recommendations for future research are also presented.

Pilot Study

A methodological issue in conducting research regarding self-efficacy with a Hispanic population was the lack of available instruments in Spanish. This was discussed by Bernal et al. in 2000 and it is an issue that still needs to be considered when conducting research with other concepts. The research instruments are a critical aspect to guaranteeing internal and external validity of the results in quantitative designs (Hilton & Skrutkowski, 2002). Therefore it is important to conduct pilot tests of research instruments before using them in a study.

Cronbach's alphas for the Spanish versions of the Exercise Self-efficacy Scale (ESS) and Exercise Benefits and Barriers Scale (EBBS) including both subscales (Benefits and Barriers) in the pilot test and with the entire sample were between 0.81-0.95. The majority of items in both questionnaires indicated item to total correlations within the recommended range (0.30-0.70), with few items out of that range. Redundancy could be a problem if the inter-item correlations are above 0.70 and there could be a lack of substantive relationship among items if the interitem correlations are below 0.30 (Ferketich, 1990). Nonetheless, if any of the few items out of range were removed, the alpha coefficient values would remain equal or the increase would not be dramatic.

According to Nunnally and Bernstein (1994) a Cronbach's alpha of 0.70 is adequate for a new instrument and, and a Cronbach's of at least 0.80 is adequate for previously developed instruments. The Cronbach's values reported in the pilot and the descriptive correlational study supported that the instruments had a good internal consistency and that the study results are valid. The EBBS had demonstrated a good reliability and validity to measure perceived physical activity benefits and barriers in different samples (Brown, 2005; Conn, 1998; Conn, Burks, Pomeroy & Cochran, 2003; Sechrist et al., 1987; Stutts, 2002), as ESS (Shin, Jang & Pender, 2001). This means that both questionnaires are appropriate and can be used in other research studies that need a measure of perceived physical activity self-efficacy and physical activity benefits and barriers in Puerto Rican adults with type 2 DM.

Descriptive Correlational Study

Physical Activity Level

The self-reported physical activity in this sample did not reach the recommendations of the U.S. Department of Health and Human Services (2008) and supported by ADA (2010) of 150 minutes per week of moderate to vigorous intensity physical activity. The median for total physical activity levels (moderate and vigorous) in the sample of Puerto Rican adults with type 2 DM was 82.5 minutes per week. The low level of moderate to vigorous intensity physical activity reported by the participants of this study is congruent with the low physical activity level observed in the general Puerto Rican population described in statistical reports throughout past years (BRFSS, 2002 & CDC, 2007b). Also, the low physical activity level reported by the studied sample is congruent with the low physical activity level of Puerto Rican adults living with HIV chronic disease in Puerto Rico (143.5 min/week), measured by an ActiGraph accelerometer (Ramirez-Marrero et al., 2008).

Physical inactivity is a health problem in the Puerto Rican population and also at the U.S. national level. The Summary of Health Statistics for U.S. civilian population of adults in 2008 reported that 36% of adults were considered inactive in the leisure-time physical activity category, 31% had some physical activity in the same category, and only 33% engaged in physical activity on a regular frequency. Twenty eight percent (28%) of non Hispanic white adults carry out physical activities in their free time three or more times a week compared to only 20% of non-Hispanic black adults and 19% of Hispanic adults. Consequently, Hispanic adults were more inactive than non-Hispanic white adults in all leisure-time physical activity. Regarding gender, men were more active than women. Twenty nine percent (29%) of men engaged in leisure-time physical activities on a regular basis while only 23% of women did (Pleis, Lucas & Ward, 2009).

Although the self-reported time engaged in physical activity in the studied sample was lower in women than men and for people between 51-60 years than those 40-50 years of age, after conducting statistical analysis to compare the physical activity by gender and age, gender was the only variable showing statistically significant differences. This finding is consistent with the statistics reported by the CDC (2007b), and Pleis et al. (2009). Low levels of physical activity in women have been reported throughout the research literature. In a sample of Latinas primarily from Mexico, among 20-50 years of age, 52.3% were insufficiently active and 11.7% were inactive, especially the older women (Wilbur, Chandler, Dancy & Lee, 2003). Physical activity differences by gender should always be a consideration for future research studies as well as the development and planning of interventional programs. Although no significant differences in physical activity level by age group was observed within the sample of Puerto

Rican adults with type 2 DM, the influence of age on physical activity should be considered in future research with this population particularly if a broader age range is included.

Self-efficacy

The ESS had 18 items, ranging from 0% (cannot do) to a maximum strength of 100% (certain can do) in 10-unit intervals. The possible range of score is 0 to 1800. The mean of physical activity self-efficacy beliefs was 923.90 with range from 60-1750. The relationship between physical activity self-efficacy beliefs and physical activity level in Puerto Rican adults with type 2 DM was moderate and positive. This means that the higher the perceived physical activity self- efficacy beliefs are, the higher the physical activity level will be. This finding is congruent with several cross-sectional studies investigating the association between self-efficacy and physical activity. Self-efficacy has been highly correlated with physical activity in older adults (Hays & Clark, 1999; Resnick et al., 2000; Conn, 1998) and middle-age adult populations (Marquez & McAuley, 2006b; Stutts, 2002, Anderson et al., 2006).

In accordance with the relationship between concepts contained in Bandura's theory, there is a reciprocal relationship between strong self-efficacy beliefs and the accomplishment of determined behaviors or tasks whereby an increase in one enhances the other as well. People with high conviction in their capabilities sustain their efforts and are sure that they can exercise control (Bandura, 1982; 1997; 2000). Not only are self-efficacy beliefs and physical activity moderately positively correlated, but self-efficacy was the only variable that contributed to predicting physical activity. Nine percent of the variance in physical activity in the sample of Puerto Rican adults with type 2 DM can be explained by their self-efficacy beliefs. Some other longitudinal and interventional studies have demonstrated a lower predictive role of self-efficacy over time (Gleeson-Kreig, 2006; McAuley et al., 1994; Steptoe et al., 2000). Self-efficacy beliefs

were related to and explained a percentage of the physical activity level in the studied sample. However, there are other physical and psychosocial factors that should be considered in future nursing research to explore their influence on physical activity level in Puerto Rican adults with type 2 DM. Depression, coping and motivation are some emotional factors related to physical activity (Gleeson-Kreig, 2006).

The exploratory data analysis demonstrated a significant difference in physical activity self-efficacy beliefs by to gender. Men presented a higher physical activity self-efficacy belief level than women. According to Resnick et al. (2000) gender differences may be sample specific. For example, gender was not strongly correlated with any of the diabetes self-efficacy scales in a sample of 95% Puerto Rican older adults (Bernal et al., 2000), nor between any demographic variable and self-efficacy (Gleeson-Kreig, 2006). In contrast, Resnick et al. (2000) found that older women had lower self-efficacy to exercise than older men.

Men were more physically active and had higher physical activity self-efficacy beliefs than women. These findings support Bandura's theoretical relationship of the importance of self-efficacy beliefs to execute a course of action. Self-efficacy reflects how confident a person is to perform a specific task. The higher self-efficacy beliefs are, more perseverance and more success are achieved in a determined behavior (Bandura, 1982; 1997; 2000). In conclusion, self-efficacy is a variable that plays a significant role in adults' physical activity behavior including Puerto Rican adult men and women with type 2 DM.

Outcome Expectancies

Benefits.

The outcome expectancies (perceived physical activity benefits) variable showed a mean of 100.1 of the possible range of scores of 29-116. The highest perceived benefits in the sample

were part of physical performance and psychological outlook factors of those included in the questionnaire. Physical performance perceived benefits were improvements in physical fitness, cardiovascular system and body look. Qualitative data of perceived benefits in the area of physical performance benefits were categorized in: 1) positive benefits to health status, and 2) optimal physical status. The category of positive benefits to health status is reflected in the following expression of study participants: "for people who have had heart surgery like me it increases or improves my condition" and "improves my diabetes condition and blood circulation". The category of optimal physical status was supported by comments such as: "physically my body hurts less, I fell lighter and stronger" and "my muscles hurt less."

The psychological benefits were in the area of mental health improvement and feeling relaxed. These benefits were also supported by qualitative data where participants expressed: "it makes me feel alive"; "it makes me happy" and "the best benefit is feeling good with myself." Other benefits already gathered by the instrument are in the area of life enrichment and social interaction factors were participants expressed qualitatively that they feel an improvement in their sleep and social interaction with family members and new friends. Better sexual activity was also categorized as a part of the daily life activity benefits. Sexuality, which was not included as part of the benefits in EBBS but is considered to be a basic human need, is an integral part of a holistic human being and it is an additional physical activity benefit. The importance of physical activity in sexual function is supported through previous research. For example, a study reported that obese men who increased their physical activity level and decreased their body mass index achieved improvements in their erectile function (Esposito et al., 2004).

Brown (2005) established that participants who reported pleasure from physical activity, physical benefits and improvement in daily activities, engaged in higher levels of physical activity behavior. Although the mean of perceived physical activity benefits were relatively high in the entire studied sample, participants had low physical activity levels. The difference between the thinking process and the actions taken indicate that although having knowledge about the physical, psychological and social benefits is important because they function as motivators, there are other physical, psychosocial and environmental variables that influence behavioral decisions.

Perceived physical activity benefits and physical activity level were not significantly associated. Perceived physical activity benefits also did not contribute to predicting physical activity in the studied sample. The lack of association between perceived physical activity benefits and physical activity level is dissimilar to some but similar to other results reported in different populations. For example, outcome expectancies have been significantly correlated with physical activity in several studies (Marquez & McAuley, 2006b; Williams & Bond, 2002; Resnick et al., 2000; De Bourdeaudhuij & Sallis, 2002; Anderson et al., 2006). However, in a sample of African American and non-Hispanic white adults, outcome expectancies were not significantly associated with physical activity (Hays & Clark, 1999). The ability of perceived physical activity benefits in predicting physical activity level has been inconsistent in studies with different populations (Anderson et al., 2006; Williams & Bond, 2002; Brown, 2005) but none including Puerto Rican adults. Although perceived physical activity benefits was not significantly associated with and did not contribute to predict physical activity level in this research study, outcome expectancies is one of the principal concepts of SCT, which operate as important determinants of human self-regulation and exercise influence over the pattern of

behavior. Also, a continuous and successful behavioral performance increases self-efficacy beliefs and better outcomes will then be expected (Bandura, 1997; 1998; Bandura, et al., 1977). Therefore, it is possible that some underlying socio-cultural and behavioral factors not addressed in the instruments utilized in this study, might be influencing the lack of association between physical activity level and perceived physical activity benefits.

Barriers.

The mean for outcome expectancies (perceived physical activity barriers) was 27.8 of a possible range of scores of 14-56. The highest reported barriers in the study sample were related to physical exertion factors. More than 50% of the sample reported either strongly agreeing or agreeing that physical activity causes tiredness (56.4%) and fatigue (54.6%). These symptoms could be influenced by different medical diagnoses and health status. In qualitative data results, many participants expressed physical activity barriers associated to physical impairments related to medical history: “knee surgery”; “I cannot do heavy exercise by the cardiologist’s orders”; “leg fractures”; “chronic arthritis pain”; “in my case, my thrombophlebitis condition.” Barriers to physical activity reported in previous studies also include medical conditions, physical injury and poor health (Booth et al., 1997; Dutton et al., 2005; De Bourdeaudhuij & Sallis, 2002). Congruently, a sample of Puerto Rican adults with type 2 DM living in the U.S. reported injuries as a limitation for exercise (von Goeler et al., 2003). The health history information gathered in the study includes the presence of retinopathy, neuropathy, nephropathy and high blood pressure. Even though there were no significant differences when comparing the physical activity barriers between medical diagnosis groups, other medical diagnoses not included in this study that are related to the cardiovascular, respiratory and musculoskeletal systems need to be considered in future studies because they could influence the capacity to perform physical activity.

Also, the symptoms of tiredness and fatigue could be influenced by cognitive interpretation. Bandura's Self-efficacy-Social Cognitive Theory states that self-efficacy and outcome expectancies are related to people's physical status. Physical fatigue and muscular pain can be interpreted as signs of physical weakness and lack of capabilities affecting their self-efficacy beliefs, perception of barriers and behavioral attainment. Enhancing self-efficacy and outcome expectancies is important because it reduces people's stress and physical reactions and corrects their perceptions and interpretations (Bandura, 1977; 1997; 1998; Bandura, et al., 1977).

Some important socio-cultural barriers that apply to Hispanic/Latino cultures are familism and *machismo* (Galanti, 2003; Purnell & Paulanka, 2003). Many Hispanic/Latinos, especially women, strongly believe in placing family care at a higher priority than self-care. Hispanic/Latino women including Puerto Rican women are also socialized to sacrifice themselves for family and child care and to respect and obey their husband. Some socio-cultural barriers to physical activity reported in different age groups from diverse ethnicities were lack of time, gender role, family importance and child care (Booth et al., 1997; Dutton et al., 2005; Eyler et al., 1998; Thompson et al., 2002; Voorhees & Rohm, 2003), especially in young and middle aged Hispanic/Latinas (Evenson et al., 2002). This information is extremely relevant because the barriers perception in the studied sample was significantly higher in women than men. It is important to mention that the majority of the participants had a small family composition without children, but some women in the sample verbalized their role as caregivers to grandchildren and parents. This information was not systematically collected in the study but the grandparents and caregivers' role in family dynamic should be an important consideration in future research.

Even though the barriers associated with time for family relationships and responsibilities in both genders were reported at a smaller level than physical exertion, these were reported by

both gender groups. Congruently, perception of lack of time by multiple responsibilities from work and home as a barrier for physical activity was supported by qualitative data. Some of the participants' comments were: "too much work"; "my job requires from 10-12 hours a day"; "setting out time between work and the house." Lack of time is a socio-cultural barrier to physical activity previously reported in different age groups from diverse ethnicities including Hispanics (Booth et al., 1997; Dutton et al., 2005; Evenson et al., 2002; Eyler et al., 1998; Thompson et al., 2002; Voorhees & Rohm, 2003).

The distance or location of physical activity facilities was one of the five barriers most reported in EBBS by the sample studied. Other environmental physical activity barrier that was not reflected in the Exercise Benefits/Barriers Scale but was of significant importance in the qualitative data analysis was the importance of feeling safe at the place where physical activities are carried out. Participants stated that "I was afraid of another person who had a weapon"; "many dogs around my neighborhood." Safety, lack of available programs, and facilities, higher costs, transportation and weather conditions were some environmental barriers to physical activity frequently described in research literature (Lawton et al., 2006). Also, the lack to access to exercise facilities was identified as a barrier to physical activity behavior (Dutton et al., 2005). Socio-cultural barriers such as those mentioned must be considered in research studies about physical activity and for the development of culturally sensitive physical activity programs.

Because BMI is known to influence physical activity and physical activity barriers, participants were classified as normal weight, overweight or obese according to their BMI. Stutts (2002) observed that people with high BMI perceive more barriers to engage in physical activity. Perceived physical activity barriers were significantly higher in participants classified as obese as opposed to those classified as overweight in this study. This could be explained by the

associations between weight gain or weight loss failure and body image, self esteem and mood disorders (Talen & Mann, 2009). Perceiving oneself as "ugly" and feeling embarrassed because of body size are perceptions that people have when they are overweight or obese (Chang, Chang & Cheah, 2009), and these perceptions can affect physical activity behavior. Self-esteem was one of the main themes from the qualitative portion of physical activity barriers in the sample, reflected by expressions such as: "besides the fact that I get fatigued quite easily, the mockery of people prevents me from exercising"; "I am too self-conscious about my weight to leave the house to go to the gym or park." According to Chan et al. (2009), these results may indicate a self-discrimination in the obese and overweight person rather than a social discrimination. Additional research is needed to explain the effects of self-esteem, body image and body size perception as barriers to physical activity and behavioral change in overweight and obese Puerto Rican adults with type 2 DM.

Motivation was another main physical activity barrier derived from the qualitative data analysis and illustrated by comments like: "lack of motivation or interest"; "I do not exercise much because I am lazy" and "I am not in the mood." Lack of motivation was a psychological barrier that has already been identified in the sample of Puerto Rican adults by von Goeler et al. (2003). Physical activity motivation and its relationship with SCT's concepts should be also explored in further research with this population. According to SCT, the level of self-efficacy belief determines people's feelings, thoughts, motivations and behaviors. Outcomes expectancies also are expected to motivate and guide people's actions. If perceived self-efficacy influences people's reactions and motivations when encountering obstacles and failures (Bandura, 1989; 1997; 1998), it is important to address motivation to physical activity in any interventional program designed to improve physical activity in adults with type 2 DM in Puerto Rico.

Although men were more physically active and also perceived lower barriers than women in the current study, the association between perceived physical activity barriers and physical activity level did not reach statistical significance in the current study sample and also, physical activity barriers did not contribute to explain physical activity. These findings were contrary to other correlational studies which have found that perceived barriers partially explains physical activity behavior (Conn, 1998; De Bourdeaudhuij & Sallis, 2002; Dutton et al., 2005; Hays & Clark, 1999). It should be restated that these results are based on a sample of Puerto Rican adults with type 2 DM. Similar to perceived physical activity benefits, the physical activity barriers section of the instrument used in this study might not completely capture other particular social, cultural or behavioral factors that adults in Puerto Rico could interpreted as barriers to physical activity, therefore, future studies need to address this potential bias. However, perceived barriers have been determinant factors for physical activity behavior because they are perceived as preventing behavioral factors (Williams et al., 2005). Adults placed less importance on exercise behavior when reporting more barriers according to Dutton et al. (2005). As a result, minimizing the perceptions of physical activity barriers is significant for achieving the recommended physical activity behavior (Hays & Clark, 1999; Stutts, 2002).

Self-efficacy and Outcome Expectancies

The correlation between physical activity self-efficacy beliefs and outcome expectancies (perceived physical activity benefits and barriers) was moderate and statistically significant and also in the right direction: negative between self-efficacy beliefs and barriers and positive for self-efficacy and benefits. Congruently, self-efficacy has been significantly correlated with outcome expectancies in DM disease control and physical activity in previous studies (Stutts, 2002; Resnick et al., 2000; Conn, 1998; Brown, 2005).

According to the SCT, these relationships mean that people who perceive themselves as highly efficacious expect high benefits and perceive fewer barriers for performing the behavior (Bandura, 1997; 1998; Bandura, et al., 1977). This is supported by the following results: participants with obesity perceived more barriers, fewer benefits and had lower self-efficacy beliefs than those who were overweight. Outcome expectations are based largely on the individual's self-efficacy expectations but, Bandura affirms that outcome expectancies can be dissociated from self-efficacy expectations. A person can believe that a certain behavior will result in beneficial outcomes but they may not believe to have the capabilities necessary for performing the behavior. However, people take action and change behavioral patterns when they have high self-efficacy beliefs and positive outcome expectancies (Bandura, 1997; 2004).

In summary, self-efficacy beliefs were significantly associated with physical activity level, and it was the only variable that predicted physical activity. Perceived physical activity barriers and benefits were not associated nor predicted physical activity, but the participants reported high benefits of physical activity to their physical, psychological and health status. Additionally, they reported several social benefits and positive outcomes related to daily life physical activities. Knowing and understanding the benefits of physical activity for health maintenance and management of complications associated with DM is an incentive for change and maintenance of behavior. However it is important not only to emphasize the benefits of physical activity; it is also essential to address the perception of barriers and their effect on the level of confidence and behavior. According to the SCT, the relationship between increased self-efficacy, increased benefits perception and reduce barriers perception is necessary for obtaining behavioral change (Bandura, 1997). Therefore, interventions designed to increase Puerto Rican

adults' perceptions of physical activity self-efficacy level will serve to change perceived physical activity benefits and barriers (Stutts, 2002).

Limitations of the Study

Limitations for this research study were identified pertaining to the sample characteristics, instruments and data collection procedures. The research study used a convenience sample of Puerto Rican adult men and women between 40-60 years of age, diagnosed with type 2 DM for 6 or more months. People with orthopedic or neuromuscular conditions that impede engaging in normal daily physical activity were excluded, and the majority of the participants were recruited from settings related to receiving health care services. As a consequence, the findings' generalizations are limited to groups that share the same characteristics represented in this sample.

Data was collected using four questionnaires: Demographic Data Questionnaire, ESS, EBBS and IPAQ. It was possible the EBBS was not culturally equivalent, because it had not been tested in Puerto Rico before (Jones et al., 2001). The IPAQ was administered by the PI and the other questionnaires were self-administered. The longest questionnaire was EBBS with 43 questions; the participants had to answer a total of 86 questions between all research questionnaires which meant that subjects took approximately 45 minutes to complete the questionnaires. In some situations, participants appeared to be anxious about time even though the PI provided the opportunity to complete the questionnaires before, during or after their appointment or at a later time of their convenience. Respondent burden (issues of tiredness, feeling rushed and anxiety) could be limitations to the data accurateness. All study data were gathered by self-report method including information about weight, height and medical diagnosis. This represents a limitation because participants could be influenced by social

desirability and human memory during self-report, which can consequently influence data accurateness (Polit & Beck, 2004; Trochim, 2001).

Physical activity level was measured using the IPAQ. Physical activity questionnaires have a practical value for assessing patterns of physical activity (Shephard, 2003). However, the use of questionnaires to measure physical activity level could provide erroneous estimations. Ramirez-Marrero et al. (2008) concluded that a sample of Hispanic adults living with HIV overestimated their physical activity using the IPAQ. To facilitate items' understanding and minimize problems in distinguishing moderate from vigorous physical activity, the PI administered the instrument to each participant. This was a positive strategy to ensure consistency in the data collection process but it also represents a validity threat. Throughout the research process, the PI may become more adept at administering the instrument, which could have an effect on data collection and the conclusions (Shadish, Cook & Campbell, 2002; Trochim, 2001).

Data collection was performed only by the PI. At the beginning of the study, the schedule was programmed to visit one setting each day. This represented a limitation regarding the amount of participants that could be recruited from the different settings at the same time. Additionally, several participants who arrived to the scheduled settings did not meet the inclusion criteria, principally because they were over 60 years of age. As a result, several amendments were requested to the IRB for increasing the number of available settings. The purpose of the amendments was to increase the possibility of reaching more potential participants and achieving the sample size within the expected time.

Implications for Nursing Practice

This study's intent was to address explore the possible associations between physical activity and the concepts of SCT: self-efficacy and outcome expectancies (perceived physical activity benefits and barriers). Findings from this dissertation research highlight the importance of SCT in physical activity for nursing research as well as promote the development of innovative interventional programs for Puerto Rican adults with type 2 DM. Multi-factorial barriers such as physical, social and environmental should be considered by nursing professionals when designing culturally sensitive strategies in order to decrease barriers perceptions . Physical activity benefits must be included as part of physical activity educational sessions and counseling to emphasize short, medium and long term benefits. Benefits and barriers were predictors of physical activity change from baseline to 12 months of behavioral counseling (Steptoe et al., 2000). Strategies to increase self-efficacy beliefs are also imperative; increasing in self-efficacy beliefs will decrease perceived barriers and increase perceived benefits. Guiding patients to develop realistic goals, the use of incremental steps in physical activity plan, clinicians and peer role modeling and continuous feedback are some examples of strategies to increase self-efficacy (Allen, 2004; Hays & Clark, 1999).

Based on these study results, physical activity and other lifestyles modification programs are still necessary. Culturally sensitive physical activity programs for Puerto Rican adults with type 2 DM need to be family focused, because the importance of family support, especially couple support, are important norms of Latino and Puerto Rican culture. It is congruent with the significant contribution of social support from family, friends and partner to physical activity changes over 12 months (Steptoe et al., 2000). Physical activities such as walking, would allow children's participation, and also could be beneficial for women caring their grandchildren.

Physical activity programs should be designed to encourage social contact among family, friends and neighbors, again addressing Puerto Rican cultural needs.

Recommendations for Future Nursing Research

Self-efficacy, perceived benefits and barriers play an important role in the ability to engage in physical activity. The influence of age, history of medical diagnoses, gender role and time of diabetes diagnosis in Puerto Rican adults with type 2 DM should be considered in future research to explore their role as potential physical activity barriers. When focusing on older adults, the grandparents' and caregivers' role within the family dynamic could be also explored in future nursing research with this population. Furthermore, crucial concepts like motivation, self-esteem, body image and body size perception as physical activity barriers and the associations with SCT's concepts in this population should be explored.

One potential area of research related to physical activity could be distinguishing between leisure and non-leisure physical activities in this population. Moreover, the use of motion sensors such as pedometers and accelerometers could be incorporated to measure physical activity level. Motion sensors could provide an objective approach and establish concurrent validity among several methods. The inclusion of metabolic values and anthropometric measures could be useful in future nursing research to determine the participants' risk status and to explore possible associations with the study's principal variables in Puerto Rican adults with type 2 DM.

Nursing research about physical activity must continue and move towards experimental study designs in which interventional programs can be implemented to enhance this behavior. However, prior research of influencing factors is necessary to build the supporting knowledge base that best applies to Puerto Rican adults with type 2 DM. An existing issue that needs to be addressed in nursing research with this population is the identification and selection process of

instruments. On that note, language translation and cultural factors are some of important areas that need to be considered and appropriately addressed before instrument selection and utilization.

Summary

In summary, the low physical activity and the high rate of overweight and obesity are significant risk factors for the development of chronic complications and low quality of life that threaten Puerto Rican adults with type 2 DM. Physical activity is an essential component of a healthful life-style and important to achieve a better self-management of diabetes disease. Self-efficacy had relevance to the enhancement of physical activity in this population.

APPENDIX A:

UNIVERSITY OF ARIZONA – HUMAN SUBJECTS PROTECTION PROGRAM

APPROVAL LETTER

THE UNIVERSITY OF ARIZONA.

Human Subjects
Protection Program

1618 E Helen St.
P.O. Box 245137
Tucson, AZ 85724-5137
Tel: (520) 626-6721
http://irb.arizona.edu

27 January 2009

Nancy Davila, Doctoral Student
Advisor: Janice Crist, PhD
Nursing
PO Box 210203

Project NO. 08-1079-00 Physical Activity in Puerto Rican Adults with Type 2 Diabetes Mellitus

Dear Ms. Davila:

We received documents concerning your above cited project. Regulations published by the U.S. Department of Health and Human Services [45 CFR Part 46.101(b) (2)] exempt this type of research from review by our Institutional Review Board.

Exempt status is granted with the understanding that no further changes or additions will be made to the procedures followed (copies of which we have on file) without the review and approval of the Human Subjects Committee and your College or Departmental Review Committee. Any research related physical or psychological harm to any subject must also be reported to each committee.

Thank you for informing us of your work. If you have any questions concerning the above, please contact this office.

Sincerely,

Elizabeth Boyd

Elizabeth Boyd, Ph.D.
Assistant Vice-President, Research Compliance & Policy
Office of Responsible Conduct for Research

cc: Departmental/College Review Committee
EB:mm

APPENDIX B:

UNIVERSITY OF PUERTO RICO – MEDICAL SCIENCES CAMPUS – HUMAN SUBJECTS PROTECTION PROGRAM APPROVAL LETTER

UNIVERSIDAD DE PUERTO RICO, RECINTO DE CIENCIAS MÉDICAS
UNIVERSITY OF PUERTO RICO, MEDICAL SCIENCES CAMPUS

OFICINA DEL RECTOR
OFFICE OF THE CHANCELLOR

COMITÉ DE DERECHOS HUMANOS (IRB)
INSTITUTIONAL REVIEW BOARD

Date: November 24, 2008

Protocol Number: A7200109

Principal Investigator: Nancy Dávila Ortiz

Department / Division:

Sponsor:

Title: ***Physical Activity in Puerto Rican Adults with Type 2 Diabetes Mellitus***

This is to certify that the above referenced research proposal/protocol was evaluated on **November 24, 2008** and meets **expedite** IRB review category. The research proposal was **approved.**

This action involves:

- ☒ New proposal/project
- ☐ Waiver of Consents
- ☐ Continuing Review of Previously Approved Protocol
- ☐ Protocol Amendment
- ☐ Amendment
- ☐ Adverse Events
- ☐ Serious Adverse Events

The following documents were reviewed under this submission:

- ☒ Protocol
- ☐ Assent Document
- ☐ Informed Consent Document
- ☐ Letter of Amendment
- ☒ Survey Instrument
- ☐ Package Insert
- ☒ Advertisement
- ☐ Human Subject Certified
- ☐ Investigator Brochure
- ☐ Authorization Letter
- ☒ Informative Sheet
- ☐ Curriculum Vitae
- ☐ HIPAA Certified
- ☐ FDA #1572
- ☒ Others: Abstract, HIPAA Identifiers

In compliance with federal regulations, the approval for this study is valid through: **November 23, 2009**.
For additional information please contact Human Research Subjects Protection Office at 787-282-0010 or 787-282-0018; e-mail opphi@rcm.upr.edu

Cordially,

Alan Preston, PhD
Chairperson IRB 1

rnco

1. Research must be conducted according to the proposal that was approved by the IRB.
2. Changes to the protocol or its related consent document must be approved by the IRB prior to implementation.
3. All serious or unexpected adverse events/drug reactions should be reported.
4. Each subject should receive a copy of the consent document, if appropriate.
5. Records must be retained for at least three years.
6. Any future correspondence should include the IRB identification number provided and the study title.

APPENDIX C:

UNIVERSITY OF ARIZONA – HUMAN SUBJECTS PROTECTION PROGRAM

SUBJECT'S DISCLOSURE FORM (ENGLISH VERSION)

APPROVED BY UNIVERSITY OF AZ IRB.
THIS STAMP MUST APPEAR ON ALL
DOCUMENTS USED TO CONSENT SUBJECTS.
DATE: 01-27-09

Subject's Disclosure Form

Title of Project:
Physical Activity in Puerto Rican Adults with Type 2 Diabetes Mellitus

You are being invited to voluntarily participate in the above-titled research study. The purpose of the study is to describe your level of physical activity, and perceived benefits and barriers, as well as how confident you believe you are to overcome these barriers. You are eligible to participate because you: 1) are Puerto Rican (born in Puerto Rico or one parent born in Puerto Rico), 2) live in Puerto Rico for the last 5 years, 3) are between 40-60 years old, 4) have Type 2 Diabetes Mellitus for 6 or more months and 5) are able to read and write Spanish and answer questionnaires individually or through personal interviews.

If you agree to participate, your participation will involve answering four questionnaires: 1) Demographic Data Questionnaire 2) Exercise Self-efficacy Scale, 3) Exercise Benefits/ Barriers Scale, and 4) International Physical Activity Questionnaire. Your name will not appear on the questionnaires.

Any questions you have will be answered. You may withdraw from the study at any time without penalties; your decision will not affect your medical care at this clinic. There are no known risks from your participation and no direct benefit from your participation is expected. There is no cost to you except for about 45 minutes of your time. You will not be paid for your participation.

Only the principal investigator (Ms. Nancy Davila) will have access to the information collected. In order to maintain your confidentiality, your name will not be included in any questionnaire or in reports about the results from this project. The questionnaires will be kept in a locked box in principal investigator's home until data will be entered into the computer program.

You can obtain further information from the principal investigator. The Principal Investigator is Nancy Davila, MSN, RN, who is PhD nursing student of The University of Arizona at (787) 501-0271. If you have questions concerning your rights as a research subject, have general questions, concerns or complaints you may call the University of Arizona Human Subjects Protection Program office at (520) 626-6721. If out of state use the toll-free number 1-866-278-1455. If you would like to contact the Human Subjects Protection Program via the web, please visit the following website: http://www.irb.arizona.edu/contact/.

By completing the questionnaires, you are giving permission for the investigator to use your information for research purposes.

Thank you.

Nancy Davila, MSN, RN
Principal Investigator

APPENDIX D:

UNIVERSITY OF ARIZONA – HUMAN SUBJECTS PROTECTION PROGRAM

SUBJECT'S DISCLOSURE FORM (SPANISH VERSION)

Subject's Disclosure Form

Título del Proyecto: **Actividad Física en Adultos Puertorriqueños con Diabetes Mellitus Tipo 2**

Se le ha invitado a que participe voluntariamente en el estudio de investigación cuyo título encabeza este documento. El propósito de este estudio es describir su nivel de actividad física, y su percepción sobre los beneficios y barreras. También se describirá cuan confiado usted se siente para superar las barreras al ejercitarse. Usted cumple con los requisitos para participar porque: 1) es Puertorriqueño (nació en Puerto Rico o uno de sus padres es Puertorriqueño/a), 2) reside en Puerto Rico en los últimos 5 años, 3) se encuentra entre las edades de 40-60 años, 4) fue diagnosticado con Diabetes Mellitus tipo 2 hace 6 meses o más, y 5) tiene la habilidad de leer y escribir Español, y de contestar cuestionarios individualmente o a través de entrevista.

Si está de acuerdo en participar, su participación consistirá en contestar cuatro cuestionarios: 1) Cuestionario sobre sus Datos Demográficos, 2) Escala de Auto-eficacia para Hacer Ejercicio, 3) Instrumento para Medir la Percepción de los Beneficios y las Barreras para Hacer Ejercicio y 4) Cuestionario Internacional de Actividad Física. Su nombre no aparecerá en ninguno de los cuestionarios.

Se le contestarán todas las preguntas que tenga. Usted podrá retirarse del estudio en el momento que desee sin ninguna penalidad; su decisión no afectará los servicios de salud que usted recibe en esta clínica. No existen riesgos conocidos para usted a causa de su participación y no se espera que usted obtenga beneficios directos por participar. No tiene que pagar y el único costo para usted es aproximadamente 45 minutos de su tiempo. No habrá compensación monetaria por su participación.

Únicamente la investigadora principal (Sra. Dávila) tendrá acceso a la información que usted proporcione en los cuestionarios. Para mantener su confidencialidad, su nombre no será incluido en los cuestionarios y por ende en ningún reporte que resulte de este estudio. Los cuestionarios que usted conteste se guardarán en un armario bajo llave en la residencia de la investigadora principal hasta que los datos se hayan ingresado en la computadora. Los cuestionarios serán destruidos al finalizar el análisis.

Usted puede obtener más información del investigador principal. La investigadora principal es la Sra. Nancy Dávila, MSN, RN quien es estudiante del programa doctoral en enfermería en la Universidad de Arizona llamando al (787) 501-0271. Si usted tiene alguna pregunta sobre sus derechos como sujeto de investigación científica, puede llamar a la oficina del Programa de Protección de Sujetos Humanos en la Universidad de Arizona al (520) 626-6721. Si está fuera del estado utilice el siguiente número, libre de costo: 1-866-278-1455. Si desea comunicarse a la oficina del Programa de Protección de Sujetos Humanos por vía electrónica, puede hacerlo visitando la siguiente dirección: http://www.irb.arizona.edu/contact/.

Al contestar los cuestionarios usted otorga su permiso para que el investigador utilice la información que usted le proporcione para los propósitos de este estudio de investigación.

Muchas gracias.

Nancy Dávila, MSN, RN
Investigadora Principal

APPENDIX E:

UNIVERSITY OF PUERTO RICO – MEDICAL SCIENCES CAMPUS – HUMAN SUBJECTS PROTECTION PROGRAM SUBJECT'S DISCLOSURE FORM

(SPANISH VERSION – HOJA INFORMATIVA)

HOJA INFORMATIVA

Título del Proyecto: **Actividad Física en Adultos Puertorriqueños con Diabetes Mellitus Tipo 2**

Se le ha invitado a que participe voluntariamente en el estudio de investigación cuyo título encabeza este documento. El propósito de este estudio es describir su nivel de actividad física, y su percepción sobre los beneficios y barreras. También se describirá cuan confiado usted se siente para superar las barreras al ejercitarse. Usted cumple con los requisitos para participar porque: 1) es Puertorriqueño (nació en Puerto Rico o uno de sus padres es Puertorriqueño/a), 2) reside en Puerto Rico en los últimos 5 años, 3) se encuentra entre las edades de 40-60 años, 4) fue diagnosticado con Diabetes Mellitus tipo 2 hace 6 meses o más, y 5) tiene la habilidad de leer y escribir Español, y de contestar cuestionarios individualmente o a través de entrevista.

Si está de acuerdo en participar, su participación consistirá en contestar cuatro cuestionarios: 1) Cuestionario sobre sus Datos Demográficos, 2) Escala de Auto-eficacia para Hacer Ejercicio, 3) Instrumento para Medir la Percepción de los Beneficios y las Barreras para Hacer Ejercicio y 4) Cuestionario Internacional de Actividad Física. Su nombre no aparecerá en ninguno de los cuestionarios.

Se le contestarán todas las preguntas que tenga. Usted podrá retirarse del estudio en el momento que desee sin ninguna penalidad; su decisión no afectará los servicios de salud que usted recibe en esta clínica. No existen riesgos conocidos para usted a causa de su participación y no se espera que usted obtenga beneficios directos por participar. No tiene que pagar y el único costo para usted es aproximadamente 45 minutos de su tiempo. No habrá compensación monetaria por su participación.

Únicamente la investigadora principal (Sra. Dávila) tendrá acceso a la información que usted proporcione en los cuestionarios. Para mantener su confidencialidad, su nombre no será incluido en los cuestionarios y por ende en ningún reporte que resulte de este estudio. Los cuestionarios que usted conteste se guardarán en un armario bajo llave en la residencia de la investigadora principal hasta que los datos se hayan ingresado en la computadora. Los cuestionarios serán destruidos al finalizar el análisis.

Usted puede obtener más información del investigador principal. La investigadora principal es la Sra. Nancy Dávila, MSN, RN quien es estudiante del programa doctoral en enfermería en la Universidad de Arizona llamando al (787) 501-0271. Si usted tiene alguna pregunta sobre sus derechos como sujeto de investigación científica, puede llamar a la Oficina de Protección de Participantes Humanos en Investigación del Recinto de Ciencias Médicas de la Universidad de Puerto Rico al (787) 282-0018 ó (787) 282-0010.

Al contestar los cuestionarios usted otorga su permiso para que el investigador utilice la información que usted le proporcione para los propósitos de este estudio de investigación.

Muchas gracias.

Nancy Dávila, MSN, RN
Investigadora Principal

APPENDIX F:

APPROVAL LETTER FROM THE UNIVERSITY OF PUERTO RICO DISTRICT HOSPITAL

University of Puerto Rico
Medical Sciences Campus
School of Nursing

COLLABORATION AGREEMENT

This document represents a collaborative agreement between Nancy Davila Ortiz RN, MSN, Principal Investigator and Assistant Professor of the School of Nursing, University of Puerto Rico - Medical Sciences Campus and the Endocrinology Section of the School of Medicine, University of Puerto Rico - Medical Sciences Campus for the period of **November 2008 to November 2009**. The research study will be conducted as part of PhD academic degree requisite of the College of Nursing, University of Arizona in Tucson.

Purpose: This serves to assure the effectiveness of activities directed to the development of the study: **Physical Activity in Puerto Rican Adults with Type 2 Diabetes**.

In specific reference to the study, **Physical Activity in Puerto Rican Adults with Type 2 Diabetes**, **Endocrinology Section** agrees to provide the following:

- Allow the receptionist to hand out a flyer to each patient with type 2 Diabetes Mellitus, during their check-in at the front desk.
- Provide access to physical space that permits privacy for the consent process and completion of surveys.
- Provide a space in the lobby to post a flyer in an area visible to patients.

Address:
PO BOX 365067
SAN JUAN PR
00936-5067
Phone:
(787) 754-5655
Fax:
(787) 281-0721

In specific reference to the Study **Physical Activity in Puerto Rican Adults with Type 2 Diabetes,** Principal Investigator, **Nancy Davila,** agrees to provide the following:

- Oral presentation for setting staff in order to explain sample criteria and the procedure for addressing potential participants.
- A written copy of the study so that this information may be used by the organization.
- Oral presentation to setting staff and participants about the study results if requested.

Indemnity:
This agreement does not represent a legal obligation between the parties, but it is a good faith agreement that formalizes an alliance to increase research, effectiveness and availability of specific diabetes mellitus services to people diagnosed with that disease.

Responsibility:
The following persons are authorized representatives and agree to comply with the mentioned statements. Both parties also agree to comply with the confidentiality and privacy statures stated by law.

Myriam Z. Allende-Vigo, MD
Professor & Director
Endocrinology Section
University Hospital
School of Medicine
Medical Sciences Campus
University of Puerto Rico

10/20/2008
Date

Nancy Davila Ortiz, MSN
Principal Investigator - PhD Nursing Student
College of Nursing – University of Arizona
Assistant Professor
School of Nursing
Medical Sciences Campus
University of Puerto Rico

10/20/2008
Date

APPENDIX G:

APPROVAL LETTER FROM DR. MARIA DE LOURDES MIRANDA PRIVATE MEDICAL OFFICE

May 13, 2009

Nancy Davila, MSN, RN
Parque del Monte MB-92
Trujillo Alto, PR.00976

Dear Ms. Davila

I have reviewed your request regarding your study and am pleased to support your research project entitled: Physical Activity in Puerto Rican Adults with Type 2 Diabetes Mellitus. Your request to use my private clinical office as a research or recruitment site is granted.

The study will include the administration of several instruments by you, the principal investigator. The participants will be patients with type 2 diabetes mellitus who arrive at my medical practice. The office receptionist will be able to give a recruitment flyer and inform to you if the person agrees to receive more information about the study. We will provide you with a space so that you can collect the data privately.

This authorization covers the time period of May, 2009 to December, 2009. We look forward to working with you.

Sincerely,

Maria de Lourdes Miranda, M.D.

APPENDIX H:

APPROVAL LETTER FROM THE CENTER FOR PROMOTION AND MAINTENANCE OF COMPREHENSIVE HEALTH OF MANUEL A. PEREZ COMMUNITY

University of Puerto Rico
Medical Sciences Campus
School of Nursing
Center for the Promotion and Maintenance of
Comprehensive Health of Manuel A. Perez Community

April 28, 2009

Nancy Davila, MSN, RN

Parque del Monte MB- 92

Trujillo Alto, PR. 00976

Dear Ms. Davila

I have reviewed your request regarding your study and am pleased to support your research project entitled: Physical Activity in Puerto Rican Adults with Type 2 Diabetes Mellitus. Your request to use the Center for Promotion and Maintenance of Comprehensive Health of Manuel A. Perez as a recruitment site is granted.

The study will include the administration of several instruments by you, the principal investigator. The participants will be patients with type 2 diabetes mellitus who arrive at the Center. The first contact person (nurse practitioner student or the nursing staff) will be able to give a recruitment flyer and inform to you if the person agrees to receive more information about the study. We will provide and office so that you can collect the data privately.

This community nursing center is well established since 2003 and serves to one of the largest public housing projects in PR, with an estimated population of 6,000 residents, and surroundings communities with many chronic diseases as type 2 diabetes. For this reason, we request to you the findings dissemination when you finish with your study, in an activity that we will plan in the future.

This authorization covers the time period of May, 2009 to December, 2009. We look forward to working with you.

Sincerely,

Dharma Freytes, RN, MSN

Community nursing center director

PO BOX, 365067, SAN JUAN PUERTO RICO 00936-5067
TEL. (787) 754-5655/787-620-8432* Fax: (787) 281-0721
"Preparando un Profesional de Excelencia"
Equal Employment Opportunities Employer M/M/V/I

APPENDIX I:

APPROVAL LETTER FROM THE EDUCATIONAL PROGRAM

“SALUD A TU ALCANCE”

SALUD A TU ALCANCE
Dr. Luis R. Padilla
Director

January 28, 2009

Nancy Davila, MSN, RN
Parque del Monte M-B 92
Trujillo Alto, PR. 00976

Dear Ms. Davila

I have reviewed your request regarding your study and am pleased to support your research project entitled: Physical Activity in Puerto Rican Adults with Type 2 Diabetes Mellitus. Your request to use the *"Salud a Tu Alcance Program" Municipality of Bayamón*, as a research or recruitment site is granted.

The study will include the administration several instruments by you, the principal investigator. The participants will be patients with type 2 diabetes mellitus who arrive at my medical practice. The office receptionist will be able to give a recruitment flyer and inform to you if the person agrees to receive more information about the study. We will provide and office so that you can collect the data privately.

This authorization covers the time period of January, 2009 to December, 2009. We look forward to working with you.

Sincerely,

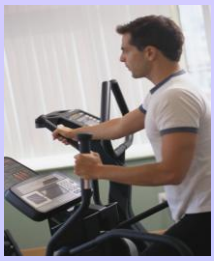
Dr. Luis Raúl Padilla, Endocrinologist
Director
Salud a tu Alcance Program
Municipality of Bayamón

ESTADO LIBRE ASOCIADO DE PUERTO RICO
CIUDAD DE BAYAMON
PO Box 1588 · Bayamón, Puerto Rico 00960-1588
Tel. 787-995-1900 • Ext. 4044 • Fax 787-995-1929
Ciudad de Bayamón

APPENDIX J:

ENGLISH RECRUITMENT FLYER

Would you like to Participate in a Research Study about Physical Activity in People with Type 2 Diabetes?



What does it entail?

Your participation would consist of answering several questionnaires about physical activity.

What is the purpose?

The purpose is to explore your self-efficacy beliefs, and perceived benefits and barriers about physical activity.

You may participate if you are:

- ☒ Puerto Rican **(born in Puerto Rico or one parent born in PR)**
- ☒ Living in Puerto Rico for the last 5 years
- ☒ Between 40-60 years old
- ☒ Type 2 diabetic for 6 or more months
- ☒ Able to read and write Spanish

How much time will you spend?

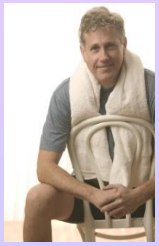
It will take you only 45 minutes or less.

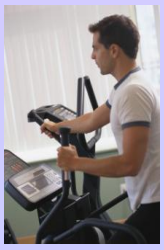
Principal Investigator: Nancy Dávila, MSN, RN
Nursing PhD student
The University of Arizona, Tucson
Contact Telephone: (787)501-0271

APPENDIX K:

SPANISH RECRUITMENT FLYER

¿Deseas Participar en un Estudio de Investigación sobre Actividad Física en Personas con Diabetes Tipo 2?





¿En que consiste?

Tu participación consiste en contestar varios cuestionarios relacionados con actividad física.

¿Cuál es el propósito?

El propósito es explorar tu percepción sobre los beneficios y las barreras de la actividad física y cuan confiado se siente para superar estas barreras.

Puedes participar si:

- ☒ Eres Puertorriqueño/a (nació en Puerto Rico o uno de sus padres es puertorriqueño)
- ☒ Vives en Puerto Rico en los últimos 5 años
- ☒ Tienes entre 40 y 60 años
- ☒ Fue diagnosticado con diabetes tipo 2 desde hace 6 meses o más
- ☒ Puedes leer y escribir español

¿Cuánto tiempo debes dedicar?

Te tomará aproximadamente 45 minutos.

Investigadora Principal: Nancy Dávila, MSN, RN
Estudiante del Programa Doctoral en Enfermería
The University of Arizona, Tucson
Teléfono de contacto: (787) 501-0271

APPENDIX L:

DEMOGRAPHIC DATA QUESTIONNAIRE (ENGLISH VERSION)

Participant Code: _____

DEMOGRAPHIC DATA QUESTIONNAIRE

Part I. Instructions

Read each question and answer it, making a check mark (✓) or providing the information requested in the blank spaces.

1. How old are you _____ years
2. Birth year: _____

3. What is your gender? (Check one)
   _____ Female
   _____ Male

4. What is the highest level of education you have completed? (Check one)
   _____ Grade school
   _____ High school graduate or GED
   _____ 2 years of college / Associate Degree / Technical-Vocational-Trade School
   _____ College graduate (BA or BS)
   _____ Master's degree
   _____ Doctorate degree

5. What is your marital status?
   _____ Marriage
   _____ Single
   _____ Divorced
   _____ Widow
   _____ Living together

6. Are there are children living in your house?
   ___ Yes ___ No

7. How many people live in your household (count all adults and all children)? _____

8. Do you work?
   ___ Yes ___ No

9. Occupation _____
   Retired _____
   Stay at home _____

10. What is your annual household income? (check one)
    _____ less than $8,980
    _____ $8,980 – $15,260
    _____ $15,261 - $21,540
    _____ $21,541 – 27,820
    _____ above $27,820

11. Do you have medical insurance?
    ___ No ___ Yes (go to question #12).

12. What type of medical insurance or health coverage do you have? (Check all that apply)
    _____ Medicaid
    _____ Medicare
    _____ Private Insurance
    _____ Governmental
    _____ Other Specify _____

Part II. Instructions

The following questions are about your health history. Read each question and answer it, making a check mark (✓) or providing the information requested in the blank spaces.

1. What is your weight? _____ pounds

2. What is your height? _____ feet _____ inches

3. Have you received the following medical diagnosis?

_____ Retinopathy (disease of the retina)

_____ Neuropathy (nerve damage)

_____ Nephropathy (kidney complication)

_____ High blood pressure

To be used by Principal Investigator only

Body Mass Index (BMI) _____

$$\frac{\text{Weight in pounds}}{(\text{Height in inches})^2} \times 703 = \textbf{BMI}$$

APPENDIX M:

DEMOGRAPHIC DATA QUESTIONNAIRE (SPANISH VERSION)

Código del Participante: _____

CUESTIONARIO DEMOGRÁFICO

Parte I. Instrucciones

Lea cada pregunta y conteste haciendo una marca de cotejo (✓) o proveyendo la información requerida en los espacios en blanco.

1. Edad: _____

2. Año de Nacimiento: _____

3. Género
   _____ Femenino
   _____ Masculino

4. ¿Cual es el nivel más alto de educación que haya completado? (marque sólo una)
   _____ Escuela elemental
   _____ Escuela intermedia
   _____ Escuela superior
   _____ Grado asociado, técnico o vocacional
   _____ Grado de bachillerato
   _____ Grado de maestría
   _____ Grado doctoral

5. Estado civil
   _____ Casado/a
   _____ Soltero/a
   _____ Divorciado/a
   _____ Viudo/a
   _____ Conviviendo

6. ¿Viven niños en su casa?
   ___ Si ___ No

7. ¿Cuántas personas viven en su casa? (Incluya todos los adultos y niños) _____

8. ¿Usted trabaja?
   ___ Si ___ No

9. Ocupación _____
   Retirado/a _____
   Amo/a de casa _____

10. ¿Cuánto es su ingreso anual? (marque sólo una)
    _____ menos de $8,980
    _____ $8,980 – $15,260
    _____ $15,261 - $21,540
    _____ $21,541 – 27,820
    _____ sobre $27,820

11. ¿Posee usted un plan de salud?
    ___ No ___ Si (si esta es su respuesta pase a la pregunta #12).

12. ¿Qué tipo de seguro médico o plan de salud usted tiene? (Marque todas las que apliquen)

    _____ Medicaid
    _____ Medicare
    _____ Seguro Privado
    _____ Reforma
    _____ Otro Especifique _____

Parte II. Instrucciones
Las siguientes preguntas son relacionadas a su historial de salud. Lea cada pregunta y conteste haciendo una marca de cotejo (✓) o proveyendo la información requerida en los espacios en blanco

1. ¿Cuál es su peso? _____ libras

2. ¿Cuál es su estatura? _____ pies _____ pulgadas

3. ¿Ha recibido alguno de los siguientes diagnósticos médicos? (Marque todas las que aplique).

_____ Retinopatía (enfermedad de la retina)

_____ Neuropatía (daño a nervios)

_____ Nefropatía (complicación renal)

_____ Alta presión sanguínea

Para ser utilizado por el Investigador Principal solamente

Índice de Masa Corporal (BMI) _____

$$\frac{\text{Peso en libras}}{(\text{Estatura en pulgadas})^2} \times 703 = \textbf{BMI}$$

APPENDIX N:

EXERCISE BENEFITS AND BARRIERS SCALE (ENGLISH VERSION)

Participant Code: _____

EXERCISE BENEFITS/BARRIERS SCALE

DIRECTIONS
Below are statements that relate to ideas about exercise. Please indicate the degree to which you agree or disagree with the statements by circling SA for strongly agree, A for agree, D for disagree, or SD for strongly disagree.

	Strongly Agree	Agree	Disagree	Strongly Disagree
1. I enjoy exercise.	SA	A	D	SD
2. Exercise decreases feelings of stress and tension for me.	SA	A	D	SD
3. Exercise improves my mental health.	SA	A	D	SD
4. Exercising takes too much of my time.	SA	A	D	SD
5. I will prevent heart attacks by exercising.	SA	A	D	SD
6. Exercise tires me.	SA	A	D	SD
7. Exercise increases my muscle strength.	SA	A	D	SD
8. Exercise gives me a sense of personal accomplishment.	SA	A	D	SD
9. Places for me to exercise are too far away.	SA	A	D	SD
10. Exercising makes me feel relaxed.	SA	A	D	SD
11. Exercising lets me have contact with friends and persons I enjoy.	SA	A	D	SD
12. I am too embarrassed to exercise.	SA	A	D	SD
13. Exercising will keep me from having high blood pressure.	SA	A	D	SD
14. It costs too much to exercise.	SA	A	D	SD
15. Exercising increases my level of physical fitness.	SA	A	D	SD
16. Exercise facilities do not have convenient schedules for me.	SA	A	D	SD
17. My muscle tone is improved with exercise.	SA	A	D	SD
18. Exercising improves functioning of my cardiovascular system.	SA	A	D	SD
19. I am fatigued by exercise.	SA	A	D	SD
20. I have improved feelings of well being from exercise.	SA	A	D	SD

	Strongly Agree	Agree	Disagree	Strongly Disagree
21. My spouse (or significant other) does not encourage exercising.	SA	A	D	SD
22. Exercise increases my stamina.	SA	A	D	SD
23. Exercise improves my flexibility.	SA	A	D	SD
24. Exercise takes too much time from family relationships.	SA	A	D	SD
25. My disposition is improved with exercise.	SA	A	D	SD
26. Exercising helps me sleep better at night.	SA	A	D	SD
27. I will live longer if I exercise.	SA	A	D	SD
28. I think people in exercise clothes look funny.	SA	A	D	SD
29. Exercise helps me decrease fatigue.	SA	A	D	SD
30. Exercising is a good way for me to meet new people.	SA	A	D	SD
31. My physical endurance is improved by exercising.	SA	A	D	SD
32. Exercising improves my self-concept.	SA	A	D	SD
33. My family members do not encourage me to exercise.	SA	A	D	SD
34. Exercising increases my mental alertness.	SA	A	D	SD
35. Exercise allows me to carry out normal activities without becoming tired.	SA	A	D	SD
36. Exercise improves the quality of my work.	SA	A	D	SD
37. Exercise takes too much time from my family responsibilities.	SA	A	D	SD
38. Exercise is good entertainment for me.	SA	A	D	SD
39. Exercising increases my acceptance by others.	SA	A	D	SD
40. Exercise is hard work for me.	SA	A	D	SD
41. Exercise improves overall body functioning for me.	SA	A	D	SD
42. There are too few places for me to exercise.	SA	A	D	SD
43. Exercise improves the way my body looks.	SA	A	D	SD

BERLIN SECHRIST ASSOCIATES

October 17, 2008

Nancy Davila Ortiz
MB-92 Parque del Monte
Trujillo Alto PR, 00976

Dear Nancy Davila Ortiz:

Thank you for your interest in the Exercise Benefits/Barriers Scale (EBBS). We received the copy of your abstract and your agreement regarding use of the instrument. You have our permission to use the Spanish version of the EBBS in your research to to explore self-efficacy beliefs and outcome expectancies (perceived benefits and barriers) as possible factors that affect physical activity level in Puerto Rican adults diagnosed with type 2 DM..

Best wishes with your research.

Sincerely,

Karen R. Sechrist

Karen R. Sechrist, PhD, RN
for Sechrist/Walker/Pender

18 Morning Star · Irvine, CA 92603-3745 · (949) 854-7167 · (949) 854-8532 (FAX) · krsech@pacbell.net

APPENDIX O:

EXERCISE BENEFITS AND BARRIERS SCALE (SPANISH VERSION)

Código del Participante: _____

Instrumento para Medir la Percepción de los Beneficios y las Barreras Para Hacer Ejercicio

I. Instrucciones

A continuación hay una lista de declaraciones acerca de algunas ideas sobre el hacer ejercicio. Por favor indique con una marca cuan de acuerdo o en desacuerdo esta usted con las siguientes declaraciones.

	COMPLETAMENTE DE ACUERDO	DE ACUERDO	EN DESACUERDO	COMPLETAMENTE EN DESACUERDO
1. Yo disfruto el hacer ejercicio.	CA	DE	ED	CD
2. Hacer ejercicio disminuye mi estrés y tensión.	CA	DE	ED	CD
3. Hacer ejercicio mejora mi salud mental.	CA	DE	ED	CD
4. Hacer ejercicio toma mucho de mi tiempo.	CA	DE	ED	CD
5. Haciendo ejercicio, prevengo ataques al corazón.	CA	DE	ED	CD
6. Hacer ejercicio me cansa.	CA	DE	ED	CD
7. Hacer ejercicio aumenta la fuerza de mis músculos (fortaleza muscular).	CA	DE	ED	CD
8. Hacer ejercicio me da un sentido de logro personal.	CA	DE	ED	CD
9. Los lugares en que yo puedo hacer ejercicio están muy lejos.	CA	DE	ED	CD
10. Hacer ejercicio me hace sentir relajado(a).	CA	DE	ED	CD
11. Hacer ejercicio me permite tener contacto con mis amistades y con personas que me agradan.	CA	DE	ED	CD
12. Me da mucha vergüenza hacer ejercicio.	CA	DE	ED	CD
13. Hacer ejercicio evitará que me dé alta presión (hipertensión).	CA	DE	ED	CD
14. Hacer ejercicio cuesta mucho dinero.	CA	DE	ED	CD
15. Hacer ejercicio mejora mi condición física (acondicionamiento Físico).	CA	DE	ED	CD
16. Los lugares para hacer ejercicio no tienen horarios convenientes para mí.	CA	DE	ED	CD
17. Mi tono muscular mejora haciendo ejercicio.	CA	DE	ED	CD
18. Hacer ejercicio mejora el funcionamiento de mi corazón (sistema cardiovascular).	CA	DE	ED	CD
19. Yo me fatigo cuando hago ejercicio.	CA	DE	ED	CD
20. Cuando hago ejercicio, mi sentido de bienestar mejora.	CA	DE	ED	CD

	COMPLETAMENTE DE ACUERDO	DE ACUERDO	EN DESACUERDO	COMPLETAMENTE EN DESACUERDO
21. Mi esposo(a)/compañero(a) o ser mas querido no apoya el hacer ejercicio.	CA	DE	ED	CD
22. Hacer ejercicio aumenta mis energías (estamina).	CA	DE	ED	CD
23. Hacer ejercicio mejora mi flexibilidad.	CA	DE	ED	CD
24. Hacer ejercicio toma mucho tiempo de las relaciones familiares.	CA	DE	ED	CD
25. Mi disposición (animo) mejora cuando hago ejercicio.	CA	DE	ED	CD
26. Hacer ejercicio me ayuda a dormir mejor por la noche.	CA	DE	ED	CD
27. Voy a vivir más tiempo si hago ejercicio.	CA	DE	ED	CD
28. Yo pienso que las personas en ropa de hacer ejercicio se ven graciosas.	CA	DE	ED	CD
29. Hacer ejercicio me ayuda a disminuir la fatiga.	CA	DE	ED	CD
30. Hacer ejercicio es una buena forma para yo conocer nuevas personas.	CA	DE	ED	CD
31. Mi vigor físico (fortaleza física) mejora por medio del ejercicio.	CA	DE	ED	CD
32. Hacer ejercicio mejora el concepto que tengo de mí mismo(a).	CA	DE	ED	CD
33. Los miembros de mi familia no me animan a hacer ejercicio.	CA	DE	ED	CD
34. Hacer ejercicio aumenta mi agilidad mental.	CA	DE	ED	CD
35. Hacer ejercicio me permite llevar a cabo actividades normales sin que me canse.	CA	DE	ED	CD
36. Hacer ejercicio mejora la calidad de mi trabajo.	CA	DE	ED	CD
37. Hacer ejercicio toma mucho tiempo de mis responsabilidades familiares.	CA	DE	ED	CD
38. Hacer ejercicio es un buen entretenimiento para mí.	CA	DE	ED	CD
39. Hacer ejercicio aumenta la aceptación que otros tienen de mí.	CA	DE	ED	CD
40. Hacer ejercicio es un trabajo duro para mí.	CA	DE	ED	CD
41. Hacer ejercicio mejora el funcionamiento general de mi cuerpo.	CA	DE	ED	CD
42. Hay muy pocos lugares para yo hacer ejercicio.	CA	DE	ED	CD
43. Hacer ejercicio mejora mi apariencia física.	CA	DE	ED	CD

II. **Instrucciones**
Favor contestar las siguientes preguntas de acuerdo a su situación personal:

1. ¿Qué otros beneficios, no mencionados anteriormente, usted obtiene cuando hace ejercicio?

_____

_____

_____

_____

2. ¿Qué otras barreras, no mencionadas anteriormente, impiden que usted haga ejercicio?

_____

_____

_____

_____

APPENDIX P:

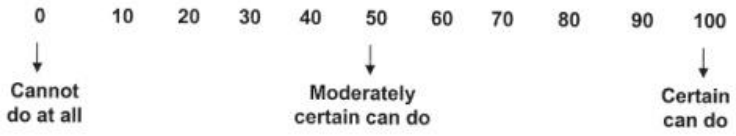
EXERCISE SELF-EFFICACY SCALE (ENGLISH VERSION)

Participant Code: _____

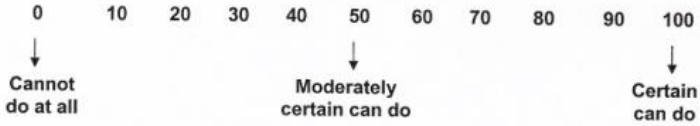
EXERCISE SELF-EFFICACY SCALE

DIRECTIONS

A number of situations are described below that can make it hard to stick to exercise regularly (3 or more times a week). On the items below, please rate your confidence that you can perform exercise on a regular basis. Please rate your degree of confidence by recording in each of the blank spaces a number from 0 to 100 using the scale below.



	(0-100)
1. When I am feeling tired.	____
2. When I am feeling under pressure from work.	____
3. During bad weather.	____
4. After recovering from an injury that caused me to stop exercising.	____
5. During or after experiencing personal problems.	____
6. When I am feeling depressed.	____
7. When I feeling anxious.	____
8. After recovering from an illness that caused me to stop exercising.	____
9. When I feel physical discomfort when I exercise.	____
10. After a vacation.	____
11. When I have too much work to do at home.	____
12. When visitors are present.	____
13. When there are other interesting things to do.	____
14. If I don't reach my exercise goals.	____



(0-100)

15. Without support from my family or friends. ____

16. During a vacation. ____

17. When I have other time commitments. ____

18. After experiencing family problems. ____

Reference:
Bandura, A. (2006). Guide to the construction of self-efficacy scales. In F. Pajares & T. C. Urdan (Eds.), *Self-efficacy beliefs of adolescents* (pp. 307-337). Greenwich, CT: Information Age Publishing.

Re:

You forwarded this message on 10/21/2008 7:54 AM.

Albert Bandura [bandura@psych.stanford.edu]

Sent: Wednesday, July 30, 2008 3:22 PM

To: Davila, Nancy

Permission granted.
Here is the citation for it.
Bandura, A. (2006). Guide to the construction of self-efficacy scales.
In F. Pajares & T. Urdan (Eds.).
Self-efficacy beliefs of adolescents, (Vol. 5., pp. 307-337).
Greenwich, CT: IAP - Information Age
Publishing.

On Tue, July 8, 2008 8:16 pm, Davila, Nancy wrote:
> Hello Dr. Bandura,
>
> I am nursing student in the PhD online program in The University of
> Arizona and I am working with my dissertation proposal.
>
> My research interest is about physical activity, self-efficacy and
> outcome expectancies. I want to use the Exercise Self-efficacy Scale.
> I found it in the following website:
> http://www.des.emory.edu/mfp/self-efficacy.html
>
> I need to know the correct process to request your permit as the
> author, including to translating it to Spanish. I am from Puerto Rico
> and I will make my research here in the Island with Spanish speaking
> people.
>
> Also I have several questions:
>
>

APPENDIX Q:

EXERCISE SELF-EFFICACY SCALE (SPANISH VERSION)

Código del Participante: _____

ESCALA DE AUTO-EFICACIA PARA HACER EJERCICIO

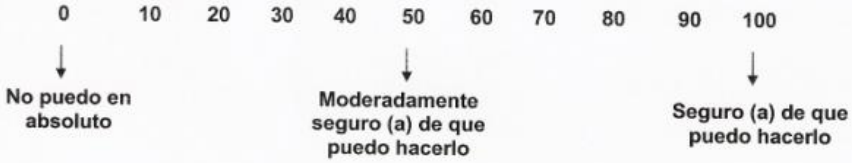
Instrucciones

A continuación se describen varias situaciones que pueden hacer difícil que uno siga ejercitándose con regularidad (3 o más veces a la semana). Para cada situación, indique **su nivel de confianza** de que puede hacer ejercicio regularmente. Clasifique su grado de confianza escribiendo un número del 0 al 100 en cada espacio en blanco utilizando la siguiente escala:

0 10 20 30 40 50 60 70 80 90 100

No puedo en absoluto — **Moderadamente seguro (a) de que puedo hacerlo** — **Seguro (a) de que puedo hacerlo**

	(0-100)
1. Cuando me siento cansado (a).	____
2. Cuando me siento bajo presión del trabajo.	____
3. Durante inclemencias del tiempo.	____
4. Después de recuperarme de alguna lesión que me impidió hacer ejercicio.	____
5. Durante o después de experimentar problemas personales	____
6. Cuando me siento deprimido(a).	____
7. Cuando me siento ansioso(a).	____
8. Después de recuperarme de una enfermedad por la cual tuve que parar de hacer ejercicios.	____
9. Cuando siento incomodidad física durante el ejercicio	____
10. Después de unas vacaciones.	____
11. Cuando tengo demasiado trabajo en mi casa.	____
12. Cuando hay visitantes presentes.	____
13. Cuando hay otras cosas interesantes para hacer.	____
14. Si no he logrado mis metas de hacer ejercicio.	____



(0-100)

15. Sin el apoyo de mi familia o amigos. ____

16. Durante las vacaciones. ____

17. Cuando tengo otros compromisos. ____

18. Después de experimentar problemas familiares. ____

Referencia:
Bandura, A. (2006). Guide to the construction of self-efficacy scales. In F. Pajares & T. C. Urdan (Eds.), *Self-efficacy beliefs of adolescents* (pp. 307-337). Greenwich, CT: Information Age Publishing.

APPENDIX R:

INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE (ENGLISH VERSION)

Short Last 7 Days Telephone IPAQ

READ: I am going to ask you about the time you spent being physically active in the last 7 days. Please answer each question even if you do not consider yourself to be an active person. Think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

READ: Now, think about all the *vigorous* activities which take *hard physical effort* that you did in the last 7 days. Vigorous activities make you breathe much harder than normal and may include heavy lifting, digging, aerobics, or fast bicycling. Think only about those physical activities that you did for at least 10 minutes at a time.

1. During the **last 7 days**, on how many days did you do **vigorous** physical activities?

   _____ Days per week [VDAY; Range 0-7, 8,9]

   8. Don't Know/Not Sure

   9. Refused

   [**Interviewer clarification**: Think only about those physical activities that you do for at least 10 minutes at a time.]

   [**Interviewer note**: If respondent answers zero, refuses or does not know, skip to Question 3]

2. How much time did you usually spend doing **vigorous** physical activities on one of those days?

   __ __ Hours per day [VDHRS; Range: 0-16]

   __ __ __ Minutes per day [VDMIN; Range: 0-960, 998, 999]

   998. Don't Know/Not Sure

   999. Refused

   [**Interviewer clarification**: Think only about those physical activities you do for at least 10 minutes at a time.]

   [**Interviewer probe**: An average time for one of the days on which you do vigorous activity is being sought. If the respondent can't answer because the pattern of time spent varies widely from day to day, ask: "How much time in total would you spend **over the last 7 days** doing vigorous physical activities?"

   __ __ Hours per week [VWHRS; Range: 0-112]

   __ __ __ __Minutes per week [VWMIN; Range: 0-6720, 9998, 9999]

SHORT LAST 7 DAYS TELEPHONE version of the IPAQ. Revised August 2002.

9998. Don't Know/Not Sure
9999. Refused

READ: Now think about activities which take *moderate physical effort* that you did in the last 7 days. Moderate physical activities make you breathe somewhat harder than normal and may include carrying light loads, bicycling at a regular pace, or doubles tennis. Do not include walking. Again, think about only those physical activities that you did for at least 10 minutes at a time.

3. During the **last 7 days**, on how many days did you do **moderate** physical activities?

____ Days per week [MDAY; Range: 0-7, 8, 9]
8. Don't Know/Not Sure
9. Refused

[**Interviewer clarification**: Think only about those physical activities that you do for at least 10 minutes at a time]

[**Interviewer Note**: *If respondent answers zero,* refuses or does not know, skip to Question 5]

4. How much time did you usually spend doing **moderate** physical activities on one of those days?

__ __ Hours per day [MDHRS; Range: 0-16]
__ __ __ Minutes per day [MDMIN; Range: 0-960, 998, 999]
998. Don't Know/Not Sure
999. Refused

[**Interviewer clarification**: Think only about those physical activities that you do for at least 10 minutes at a time.]

[**Interviewer probe**: An average time for one of the days on which you do moderate activity is being sought. If the respondent can't answer because the pattern of time spent varies widely from day to day, or includes time spent in multiple jobs, ask: "What is the total amount of time you spent over the **last 7 days** doing moderate physical activities?"

__ __ __ Hours per week [MWHRS; Range: 0-112]
__ __ __ __Minutes per week [MWMIN; Range: 0-6720, 9998, 9999]
9998. Don't Know/Not Sure
9999. Refused

READ: Now think about the time you spent walking in the last 7 days. This includes at work and at home, walking to travel from place to place, and any other walking that you might do solely for recreation, sport, exercise, or leisure.

5. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time?

   ____ Days per week [WDAY; Range: 0-7, 8, 9]

   8. Don't Know/Not Sure

   9. Refused

   [**Interviewer clarification**: Think only about the walking that you do for at least 10 minutes at a time.]

   [**Interviewer Note**: *If respondent answers zero,* refuses or does not know, skip to Question 7]

6. How much time did you usually spend **walking** on one of those days?

   __ __ Hours per day [WDHRS; Range: 0-16]

   __ __ __ Minutes per day [WDMIN; Range: 0-960, 998, 999]

   998. Don't Know/Not Sure

   999. Refused

   [**Interviewer probe**: An average time for one of the days on which you walk is being sought. If the respondent can't answer because the pattern of time spent varies widely from day to day, ask: "What is the total amount of time you spent walking over **the last 7 days**?"

   __ __ __ Hours per week [WWHRS; Range: 0-112]

   __ __ __ __Minutes per week [WWMIN; Range: 0-6720, 9998, 9999]

   9998. Don't Know/Not Sure

   9999. Refused

READ: Now think about the time you spent sitting on week days during the last 7 days. Include time spent at work, at home, while doing course work, and during leisure time. This may include time spent sitting at a desk, visiting friends, reading or sitting or lying down to watch television.

7. During the last 7 days, how much time did you usually spend ***sitting*** on a **week day**?

   __ __ Hours per weekday [SDHRS; 0-16]

   __ __ __ Minutes per weekday [SDMIN; Range: 0-960, 998, 999]

998. Don't Know/Not Sure
999. Refused

[**Interviewer clarification**: Include time spent lying down (awake) as well as sitting]

[**Interviewer probe**: An average time per day spent sitting is being sought. If the respondent can't answer because the pattern of time spent varies widely from day to day, ask: "What is the total amount of time you spent *sitting* last **Wednesday**?"

__ __ Hours on Wednesday [SWHRS; Range 0-16]
__ __ __ Minutes on Wednesday [SWMIN; Range: 0-960, 998, 999]
998. Don't Know/Not Sure
999. Refused

APPENDIX S:

INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE (SPANISH VERSION)

IPAQ TELEFÓNICO CORTO ÚLTIMOS 7 DÍAS

LEA: Ahora le voy a preguntar acerca del tiempo que Usted fue físicamente activo(a) en los últimos 7 días. Por favor responda cada pregunta aún si Usted no se considera una persona activa. Piense acerca de las actividades que Usted hace en su trabajo, como parte del trabajo en el jardín y en la casa, para ir de un sitio a otro, y en su tiempo libre de descanso, ejercicio o deporte.

LEA: Ahora, piense acerca de todas las actividades vigorosas que requieren un esfuerzo físico fuerte que Usted hizo en los últimos 7 días. Actividades vigorosas son las que hacen respirar mucho más fuerte que lo normal y pueden incluir el levantamiento de objetos pesados, excavar, aeróbicos, o pedalear rápido en bicicleta. Piense solamente en esas actividades que Usted hizo por lo menos 10 minutos continuos.

1. Durante los últimos 7 días ¿Cuantos días hizo Usted actividades físicas vigorosas?

   _____ Días por semana [VDAY; Rango: 0-7, 8,9]

   8. No sabe /no está seguro(a)

   9. Rehusa contestar

   [**Clarificación por parte del entrevistador**: Piense solamente en esas actividades físicas que usted hace por lo menos 10 minutos continuos]

   [**Nota para el entrevistador**: *Si la persona entrevistada responde cero*, rehusa o no sabe, pase a la pregunta 3]

2. ¿Cuánto tiempo en total usualmente le toma realizar actividades físicas vigorosas en los días que las realiza?

   __ __ Horas por día [VDHRS; Rango: 0-16]

   __ __ __ Minutos por día [VDMIN; Rango: 0-960, 998, 999]

   998. No sabe /no está seguro(a)

   999. Rehusa contestar

   [**Clarificación por parte del entrevistador**: Piense solamente en esas actividades físicas que usted hace por lo menos 10 minutos continuos]

   [**Nota para el entrevistador**: Se está buscando un tiempo promedio por día. Si la persona entrevistada no puede contestar porque la cantidad de tiempo varia día a día, pregunte: "¿Cuanto tiempo en total le dedicó usted en los últimos 7 días a actividades físicas vigorosas?"

__ __ Horas por semana [VWHRS; Rango: 0-112]

__ __ __ __ Minutes per week [VWMIN; Rango: 0-6720, 9998, 9999]

9998. No sabe /no está seguro(a)

9999. Rehusa contestar

LEA: Ahora piense en actividades que requieren esfuerzo físico moderado y que Usted hizo en los últimos 7 días. Actividades físicas moderadas son las que hacen respirar algo más fuerte que lo normal e incluyen cargar cosas ligeras, montar en bicicleta a paso regular, o juego de dobles en tenis. No incluya caminar. Otra vez piense únicamente en aquellas actividades físicas que Usted hizo por lo menos 10 minutos continuos.

3. Durante **los últimos 7 días**, cuántos días hizo Usted actividades físicas **moderadas**?

____ Días por semana [MDAY; Rango: 0-7, 8, 9]

8. No sabe /no está seguro(a)

9. Rehusa contestar

[**Clarificación por parte del entrevistador**: Piense solamente en esas actividades físicas que usted hace por lo menos 10 minutos continuos]

[**Nota para el entrevistador**: *Si la persona entrevistada responde cero,* rehusa o no sabe, pase a la pregunta 5]

4. ¿Cuánto tiempo en total usualmente le dedicó en uno de esos días que hizo actividades físicas **moderadas**?

__ __ Horas por día [MDHRS; Rango: 0-16]

__ __ __ Minutos por día [MDMIN; Rango: 0-960, 998, 999]

998. No sabe /no está seguro(a)

999. Rehusa contestar

[**Clarificación por parte del entrevistador**: Piense solamente en esas actividades físicas que usted hace por lo menos 10 minutos continuos]

[**Nota para el entrevistador**: Se necesita un promedio de tiempo al día de uno de los días en los cuales Usted hizo actividad física moderada. Si la persona entrevistada no puede contestar porque la cantidad de tiempo varia día a día, o incluye tiempo dedicado en diferentes trabajos, pregunte: ¿Cuánto tiempo en total le dedicó Usted en **los últimos 7 días** a hacer actividades físicas moderadas?"

__ __ __ Horas por semana [MWHRS; Rango: 0-112]

__ __ __ __ Minutos por semana [MWMIN; Rango: 0-6720, 9998, 9999]

9998. No sabe /no está seguro(a)
9999. Rehusa contestar`

LEA: Ahora piense en el tiempo que Usted le dedicó a caminar en los últimos 7 días. Esto incluye caminar en el trabajo y en la casa, caminar para para ir de un sitio a otro, y cualquier otra caminata que Usted haya hecho meramente por recreación, deporte, ejercicio o placer.

5. ¿Durante los **últimos 7 días**, cuántos días **caminó** Usted por lo menos 10 minutos seguidos?

____ Días por semana [WDAY; Rango: 0-7, 8, 9]
8. No sabe /no está seguro(a)
9. Rehusa contestar

[**Clarificación por parte del entrevistador**: Piense solamente acerca de la caminata que Usted da por lo menos por 10 minutos seguidos.]

[**Nota para el entrevistador**: *Si la persona entrevistada responde cero,* rehusa o no sabe, pase a la pregunta 7]

6. ¿Cuánto tiempo en total pasó generalmente **caminado** en uno de esos días?

__ __ Horas por día [WDHRS; Rango: 0-16]
__ __ __ Minutos por día [WDMIN; Rango: 0-960, 998, 999]
998. No sabe /no está seguro(a)
999. Rehusa contestar

[**Nota para el entrevistador**: Se necesita un promedio de tiempo de los días en los cuales Usted camina. Si la persona entrevistada no puede contestar porque la cantidad de tiempo varía mucho día a día, pregunte: ¿Cuál es la cantidad total de tiempo que Usted pasó caminando en los **últimos 7 días**?"

__ __ __ Horas por semana [WWHRS; Rango: 0-112]
__ __ __ __ Minutos por semana [WWMIN; Rango: 0-6720, 9998, 9999]
9998. No sabe /no está seguro(a)
9999. Rehusa contestar

LEA: Ahora piense acerca del tiempo que Usted pasó sentado(a) en la semana durante los últimos 7 días. Incluya el tiempo en el trabajo, en la casa, estudiando y durante el tiempo de descanso. Esto puede incluir tiempo que pasó sentado(a) en un escritorio, visitando amistades, leyendo, sentado(a) o acostado(a) viendo televisión.

7. Durante los últimos 7 días, ¿Cuánto tiempo en total usted usualmente pasó ***sentado*** durante un **día en la semana**?

__ __ Horas por semana [SDHRS; 0-16]

__ __ __ Minutos por semana [SDMIN; Rango: 0-960, 998, 999]

998. No sabe /no está seguro(a)

999. Rehusa contestar

[**Clarificación por parte del entrevistador**: Incluya el tiempo que pasó acostado (despierto) así como sentado]

[**Nota para el entrevistador**: Se necesita un promedio de tiempo al día. Si la persona entrevistada no puede contestar porque la cantidad de tiempo varia día a día, pregunte: "Cuál fue la cantidad total de tiempo que Usted pasó *sentado(a)* el **Miércoles** pasado?"

__ __ Horas el miércoles [SWHRS; Rango 0-16]

__ __ __ Minutos el miércoles [SWMIN; Rango: 0-960, 998, 999]

998. No sabe /no está seguro(a)

999. Rehusa contestar

REFERENCES

Aday, L. A. (2001). *At risk in America* (2nd ed.). San Francisco: John Wiley & Sons.

Ainsworth, B. E., Haskell, W. L., Whitt, M. C., Irwin, M. L., Swartz, A. M., Strath, S. J., O'Brien, W. L., Bassett, D. R., Schmitz, K. H., Emplaincourt, P. O., Jacobs, D. R. & Leon, A. S. (2000). Compendium of physical activities: an update of activity codes and MET intensities. *Medicine and Science in Sports and Exercise, 32*(9 suppl), S498-504.

Allen, N. A. (2004). Social cognitive theory in diabetes exercise research: an integrative literature review. *The Diabetes Educator, 30*(5), 805-819.

American Diabetes Association (2010). Standards of medical care in diabetes-2010. *Diabetes Care, 33,* S11-S61.

American Diabetes Association (2008). Standards of medical care in diabetes-2008. *Diabetes Care, 31,* S12-S54.

American Diabetes Association (2006). Standards of medical care in diabetes-2006. *Diabetes Care, 29,* S1-S37.

American Heart Association (2010). Metabolic Syndrome. Retrieved on March 15, 2010, from http://www.americanheart.org/presenter.jhtml?identifier=4756

Anderson, E. S., Wojcik, J. R., Winett, R. A. & Williams, D. M. (2006). Social-cognitive determinants of physical activity: the influence of social support, self-efficacy, outcome expectations, and self-regulation among participants in a church based health promotion study. *Health Psychology, 25*(4), 510-520.

Andrus, M., Leggett-Frazier, N. & Pfeifer, M. A. (2003). Chronic complications of diabetes: an overview. In M. J. Frank (Ed.), *A core curriculum for diabetes education, diabetes and complications* (pp. 45-64). Chicago: American Association of Diabetes Educator.

Bandura, A. (2006). Guide to the construction of self-efficacy scales. In F. Pajares & T. C. Urdan (Eds.), *Self-efficacy beliefs of adolescents* (pp. 307-337). Greenwich, CT: Information Age Publishing.

Bandura, A. (2004). Health promotion by social cognitive means. *Health Education & Behaviors, 31*(2), 143-163.

Bandura, A. (2000). Health promotion from the perspective of social cognitive theory. In P. Norman, C. Abraham & M. Conner (Eds.), *Understanding and changing health behaviour from health beliefs to self-regulation* (pp. 299-339). Australia: Harwood Academic Publishers.

Bandura, A. (1998). Self-efficacy. In H. Friedman (Ed.), *Encyclopedia of mental health* (Vol. 3, pp. 421-432). San Diego, CA: Academic Press.

Bandura, A. (1997). *Self-efficacy the exercise of control*. New York: W.H. Freeman and Company.

Bandura, A. (1989). Human agency in social cognitive theory. *American Psychologist, 44*(9), 1175-1184.

Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist, 37*(2), 122-147.

Bandura, A, (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*(2), 191-215.

Bandura, A., Adams, N. E. & Beyer, J. (1977). Cognitive process mediating behavioral change. *Journal of Personality and Social Psychology, 35*(3), 125-139.

Behavioral Risk Factor Surveillance System (2008). Prevalence and Trends Data, Overweight and Obesity. Retrieved on February 8, 2009, from http://apps.nccd.cdc.gov/BRFSS

Behavioral Risk Factor Surveillance System (2002). Puerto Rico Behavioral Risk Factor Surveillance System. Commonwealth of Puerto Rico Department of Health: Office of the Secretary of Health.

Bernal, H., Woolley, S., Schensul, J. J. & Dickinson, J. K. (2000). Correlates of self-efficacy in diabetes self-care among Hispanic adults with diabetes. *The Diabetes Educator, 26* (4), 673-680.

Booth, M. L., Bauman, A., Owen, N. & Gore, C. J. (1997). Physical activity preferences, preferred sources of assistance, and perceived barriers to increased activity among physically inactive Australians. *Preventive Medicine, 26*, 131-137.

Boulé, N. G., Kenny, G. P, Haddad, E., Wells, G. A. & Sigal, R. J. (2003). Meta-analysis of the effect of structured exercise training on cardiorespiratory fitness in Type 2 diabetes mellitus. *Diabetologia, 46*(8), 1071-81.

Boulé, N. G., Haddad, E., Kenny, G. P., Wells, G. A. & Sigal, R. J. (2001). Effects of exercise on glycemic control and body mass in type 2 diabetes mellitus: a meta-analysis of controlled clinical trials. *The Journal of the American Medical Association, 286*(10), 1218-27.

Brislin, R. W. (1970). Back-translation for cross-cultural research. *Journal of Cross-Cultural Psychology, 1*(3), 185-216.

Bray, G. A. (2003). Risks of obesity. *Primary Care, 30*(2), 281-299.

Brown, S. A. (2005). Measuring perceived benefits and perceived barriers for physical activity. *American Journal of Health Behavior, 29*(2), 107-116.

Burns, N., & Grove, S. K. (2005). *The practice of nursing research conduct, critique, and utilization* (5th ed.). St. Louis, MO: Elsevier Saunders.

Canadian Diabetes Association Clinical Practice Guidelines Expert Committee (2008). Canadian Diabetes Association 2008 clinical practice guidelines for the prevention and management of diabetes in Canada. *Canadian Journal of Diabetes, 32*, S1-S201.

Castaneda, C., Layne, J. E., Munoz-Orians, L. Gordon, P. L., Walsmith, J., Foldvari, M., Roubenoff, R., Tucker, K. L. & Nelson, M. E. (2002). A randomized controlled trial of resistance exercise training to improve glycemic control in older adults with type 2 diabetes. *Diabetes Care, 25*, 2335-2341.

Centers for Disease Control and Prevention (2008). Body Mass Index. Retrieved on September 4, 2007, from http://www.cdc.gov/nccdphp/dnpa/healthyweight/assessing/bmi/index.htm

Centers for Disease Control and Prevention (2007b). Behavioral Risk Factor Surveillance System, Prevalence Data Puerto Rico-2005 Physical Activity. Retrieved on April 16, 2007, from http://apps.nccd.cdc.gov/brfss/display.asp?cat=PA&yr=2005&qkey=4418&state=PR

Centers for Disease Control and Prevention (2007a). Behavioral Risk Factor Surveillance System, Prevalence Data Puerto Rico 1996-2006. Retrieved on April 16, 2007, from http://www.cdc.gov/brfss/

Chang, C. T., Chang, K. H. & Cheah, W. L. (2009). Adults' perceptions of being overweight or obese: a focus group study. *Asia Pacific Journal of Clinical Nutrition, 18*(2), 257-264.

Conn, V. S. (1998). Older adults and exercise: path analysis of self-efficacy related constructs. *Nursing Research, 47*(3), 180-189.

Conn, V. S., Burks, K. J., Pomeroy, S. L. & Cochran, J. E. (2003). Are there different predictors of distinct exercise components? *Rehabilitation Nursing,* 28(3), 87-97.

Coureya, K. S. & McAuley, E. (1994). Are there different determinants of the frequency, intensity, and duration of physical activity? *Behavioral Medicine, 20*(2), 84-90.

Craig, C. L., Marshall, A. L., Sjöström, M., Bauman, A. E., Booth, M. L., Ainsworth, B. E. et al. (2003). International physical activity questionnaire: 12-country reliability and validity. *Medicine and Science in Sports and Exercise, 35*(8), 1381-95.

Cuéllar, I., Arnold, B., & Maldonado, R. (1995). Acculturation rating scale for Mexican Americans-II: A revision of the original ARSMA Scale. *Hispanic Journal of Behavioral Sciences, 17*(3), 275-304.

De Bourdeaudhuij, I. & Sallis, J. (2002). Relative contribution of psychosocial variables to the explanation of physical activity in three population-based adult samples. *Preventive Medicine, 34,* 279-288.

Diabetes Prevention Program Research Group (2002). Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *New England Journal of Medicine, 346*(6), 393-403.

Disdier, O., Rodriguez, L., Perez, R. & Perez, C. (2001). The public health burden of diabetes: A comprehensive review. *Puerto Rico Health Sciences Journal, 20,* 123-130.

Dunstan, D. W., Daly, R. M., Owen, N., Jolley, D., De Courten, M., Shaw, J & Zimmet, P. (2002). High-intensity resistance training improves glycemic control in older patients with type 2 diabetes. *Diabetes Care, 25*(10), 1729-1736

Dutton, G. R., Johnson, J., Whitehead, D., Bodenlos, J. S. & Brantley, P. J. (2005). Barriers to physical activity among predominantly low-income African-American patients with type 2 diabetes. *Diabetes Care, 28*(5), 1209-1210.

Esposito, K., Giugliano, F., Di Palo, C., Giugliano, G., Marfella, R., D'Andrea, F., D'Armiento, M. & Giugliano, D. (2004). Effect of lifestyle changes on erectile dysfunction in obese men: a randomized controlled trial. *The Journal of the American Medical Association, 291*(24), 2978-2984.

Evenson, K. R., Sarmiento, O. L., Macon, M. L., Tawney, K. W. & Ammerman, A. S. (2002). Environmental, policy and cultural factors related to physical activity among Latina immigrants. *Women Health, 36*(2), 43-57.

Eyler, A. E., Wilcox, S., Matson-Koffman, D., Evenson, K. R., Sanderson, B., Thompson, J., Wilbur, J. & Rohm-Young, D. (2002). Correlates of physical activity among women from diverse racial/ethnic groups. Journal of Women's Health & Gender-Based Medicine, *11*(3), 239-253.

Eyler, A. A., Baker, E., Cromer, L., King, A. C., Brownson, R. C., Donatelle, R. J. (1998). Physical activity and minority women: A qualitative study. *Health Education & Behavior, 25*(5), 640-652.

Ferketich, S. (1990). Focus on psychometric. Internal consistency estimates of reliability. *Research in Nursing & Health, 13*(6), 437-440.

Field, A. (2005). *Discovering statistics using SPSS* (2nd ed.). London: SAGE Publications.

Flegal, K. M., Carroll, M. D., Ogden, C. L. & Curtin, L. R. (2010). Prevalence and trends in obesity among U.S. adults, 1999-2008. *The Journal of the American Medical Association, 303*(3), 235-241.

Fowler, M. J. (2008). Microvascular and macrovascular complication of diabetes. *Clinical Diabetes, 26*(2), 77-82.

Galanti, G. (2003). The Hispanic family and male-female relationships: An overview. *Journal of Transcultural Nursing, 14*(3), 180-185.

Gallager, D. & Song, M. Y. (2003). Evaluation of body composition: practical guidelines. *Primary Care, 30*(2), 249-265.

Gleeson-Kreig, J. M. (2006). Self-monitoring of physical activity, effects on self-efficacy and behavior in people with type 2 diabetes. *The Diabetes Educator, 32*(1), 69-77.

Government Development Bank for Puerto Rico (2007). Puerto Rico Fact Sheet. Retrieved on February 10, 2008, from http://www.gdbpr.com

Haslam, D. W. & James, W. P. (2005). Obesity. *Lancet, 366*(9492), 1197-1209.

Hays, L. M. & Clark, D. O. (1999). Correlates of physical activity in a sample of older adults with type 2 diabetes. *Diabetes Care, 22*(5), 706-712.

Hilton, A., & Skrutkowski, M. (2002). Translating instruments into other languages: development and testing processes. *Cancer Nursing, 25*(1), 1-7.

Hurley, C. C. & Shea, C. A. (1992). Self-efficacy: strategy for enhancing diabetes self-care. *The Diabetes Educator, 18*(2), 146-150.

International Physical Activity Questionnaire. Retrieved on September 8, 2008, from http://www.ipaq.ki.se/

Johnston-Brooks, C. H., Lewis, M. A. & Garg, S. (2002). Self-efficacy impacts self-care and HbA1c in young adults with type I diabetes. *American Psychosomatic Society, 64*(1), 43-51.

Jones, P. S., Lee, J. W., Phillips, L. R., Zhang, X. E., & Jaceldo, K. B. (2001). An adaptation of Brislin's translation model for cross-cultural research. *Nursing Research, 50*(5), 300-304.

Kavanagh, D. J., Gooley, S. & Wilson, P. H. (1993). Prediction of adherence and control in diabetes. *Journal of Behavioral Medicine, 16*(5), 509-522.

Keller, U. (2006). From obesity to diabetes. *International Journal for Vitamin and Nutrition Research, 76*(4), 172-177.

Krauss, R. M. (2004). Lipids and lipoproteins in patients with type 2 diabetes. *Diabetes Care, 27*(6), 1496-1504.

Lawton, J., Ahmad, N., Hanna, L., Douglas, M. & Hallowell, N. (2006). "I can't do any serious exercise": barriers to physical activity amongst people of Pakistani and Indian origin with Type 2 diabetes. *Health Education Research Theory and Practice, 21*(1), 43-54.

Lincoln, Y. S., & Guba, E. G. (1985). Establishing trustworthiness. In Y. S. Lincoln & E. G. Guba, *Naturalistic inquiry* (pp. 289-331). Newbury Park: Sage Publications.

Marquez, D. & McAuley, E. (2006b). Social cognitive of leisure time physical activity among Latinos. *Journal of Behavioral Medicine, 29*(3), 281-289.

Marquez, D. & McAuley, E. (2006a). Gender and acculturation influences on physical activity in Latino adults. *Annual Behavioral Medicine, 31*(2), 138-144.

McAuley, E., Bane, S. M. & Mihalko, S. L. (1995). Exercise in middle-aged adults: self-efficacy and self-presentational outcomes. *Preventive Medicine, 24*, 319-328.

McAuley, E., Courneya, K. S., Rudolph, D. L. & Lox, C. L. (1994). Enhancing exercise adherence in middle-aged males and females. *Preventive Medicine, 23*(4), 498-506.

Melillo, K. D., Williamson, E., Houde, S. C., Futrell, M., Read, C. Y. & Campasano, M. (2001). Perceptions of older Latino adults, regarding physical fitness, physical activity and exercise. Journal of Gerontological Nursing, *27*(9), 38-46.

Millan-Pabon, C. (2007, Octubre, 30). Mucho mas que alarmante el avance de la diabetes. El Nuevo Día, pp. 34.

Mullooly, C. A. & Hanson, K. (2003). Physical activity/exercise. In M. J. Frank (Ed.), *A core curriculum for diabetes education, diabetes management therapies* (pp. 59-92). Chicago: American Association of Diabetes Educator.

National Diabetes Information Clearinghouse (NDIC) (2005). National Diabetes Statistics. Retrieved April 3, 2007, from http://diabetes.niddk.nih.gov/dm/pubs/statistics/index.htm

National Heart Lung and Blood Institute (2008 b). Overweight and Obesity. Department of Health and Human Services, National Institutes of Health. Retrieved on March 15, 2010 from http://www.nhlbi.nih.gov/health/dci/Disease/obe/obe_whatare.html

National Heart Lung and Blood Institute (2008 a). Calculate your Body Mass Index. Department of Health and Human Services, National Institutes of Health. Retrieved on October 9, 2008 from http://nhlbisupport.com/bmi/bmicalc.htm

Nunnally, J. C. & Bernstein, I. H. (1994). *Psychometric theory* (3rd ed.). New York: McGraw-Hill.

O'Leary, A. (1985). Self-efficacy and health. *Behaviour Research and Therapy, 23*(4), 437-451.

Pan American Health Organization (2007). Perfil de los Sistemas de Salud Puerto Rico. Washington, D.C: OPS.

Pate, R. R., Pratt, M., Blair S.N., Haskell, W. L., Macera, C. A., Bouchard, C., Buchner, D., Ettinger, W., Heath, G. W. & King, A. C. (1995). Physical activity and public health. A recommendation from the Centers for Disease Control and Prevention and the American College of Sports Medicine. *The Journal of the American Medical Association, 273*(5), 402-407.

Perez-Perdomo, R., Perez, C. M., Disdier, O. M., & Rodriguez, L. A. (2004). *Estado de salud de la población adulta de Puerto Rico basado en características seleccionadas del sistema de vigilancia de los factores de riesgo asociados a la conducta: 1996-2000.* San Juan, PR: Escuela Graduada de Salud Pública, Universidad de Puerto Rico.

Petosa, R. L., Suminski, R., & Hortz, B. (2003). Predicting vigorous physical activity using social cognitive theory. *American Journal of Health Behavior, 27*(4), 301-310.

Pleis, J. R., Lucas, J. W., & Ward, B. W. (2009). Summary health statistics for U.S. adults: National Health Interview Survey, 2008. National Center for Health Statistics. *Vital Health Stat 10*(242).

Polit, D. F., & Beck, C. T. (2004). *Nursing research principles and methods* (7th ed.). Philadelphia: Lippincott Williams & Wilkins.

Puerto Rico Department of Health (2003). *Vital Statistical 2001*. San Juan, PR: Department of Health.

Puerto Rico Department of Health (2002). *Puerto Rico Healthy People 2010*. San Juan, PR: Department of Health.

Puerto Rico Diabetes Center for Data Management (2003). *Prevalence of Diabetes, Complications and Services Related to Diabetes in Puerto Rico*. San Juan: PR.

Puerto Rico Planning Board, Office of the Census (2009). Census data. Retrieved on February 8, 2010, from http://www.jp.gobierno.pr/

Purnell, L. D. & Paulanka, B. J. (2003). *Transcultural health care: A culturally competent approach* (2nd ed.). Philadelphia: F.A. Davis Company.

Ramirez-Marrero, F. A., Rivera-Brown, A. M., Nazario, C. M., Rodríguez-Orengo, J. F., Smit, E. & Smith, B. A. (2008). Self-reported physical activity in Hispanic adults living with HIV: Comparison with accelerometer and pedometer. *Journal of the Association of Nurses in Aids Care, 19*(4), 283-294.

Resnick, B. (2003). The theory of self-efficacy. In M. J. Smith & P. R. Liehr (Eds.), *Middle range theory for nursing* (pp. 49-69). New York: Springer Publishing Company.

Resnick, B., Luisi, D., Vogel, A. & Junaleepa, P. (2004). Reliability and validity of the self-efficacy for exercise and outcome expectations for exercise scales with minority older adults. *Journal of Nursing Measurement, 12*(3), 235-247.

Resnick, B., Palmer, M. H., Jenkins, L. S. & Spellbring, A. M. (2000). Path analysis of efficacy expectations and exercise behaviour in older adults. *Journal of Advanced Nursing, 31*(6), 1309-1315.

Rivera, M. (2008). Welcome to Puerto Rico. Retrieved on February 8, 2008, from http://welcome.topuertorico.org/index.shtml

Sarkar, U., Fisher, L. & Schillinger, D. (2006). Is self-efficacy associated with diabetes self-management across race/ethnicity and health literacy? *Diabetes Care, 29*(4), 823-829.

Scarano, F. A. (2000). *Puerto Rico cinco siglos de historia* (2nd ed.). Mexico: McGraw-Hill.

Sechrist, K. R., Walker, S. N. & Pender, N. J. (1987). Development and Psychometric Evaluation of the Exercise Benefits/Barriers Scale. *Research in Nursing & Health, 10*(6), 357-365.

Shadish, W. R., Cook, T. D., & Campbell, D. T. (2002). *Experimental and quasi-experimental designs for generalized causal inference*. Boston: Houghton Mifflin Company.

Shephard, R. J. (2003). Limits to the measurement of habitual physical activity by questionnaires. *Br J Sports Medicine, 37*, 197-206.

Shin, Y., Jang, H. & Pender, N. (2001). Psychometric evaluation of the exercise self-efficacy scale among Korean adults with chronic diseases. *Research in Nursing & Health, 24*, 68-76.

Sigal, R. J., Kenny, G. P., Boulé, N. G., Wells, G. A., Prud'homme, D., Fortier, M., Reid, R. D., Tulloch, H., Coyle, D., Phillips, P., Jennings, A. & Jaffey, J. (2007). Effects of aerobic training, resistance training, or both on glycemic control in type 2 diabetes. *Annals of Internal Medicine, 147,* 357-369.

Sigal, R. J., Kenny, G. P., Wasserman, D. H. & Castaneda-Sceppa, C. (2004). Physical activity/exercise and type 2 diabetes. *Diabetes Care, 27*(10), 2518-2539.

Skelly, A. H., Marshall, J. R., Haughey, B. P., Davis, P. J. & Dunford, R. G. (1995). Self-efficacy and confidence in outcomes as determinants of self-care practices in inner-city, African American women with non-insulin-dependent diabetes. *The Diabetes Educator, 21*(1), 38-46.

Spiers, J. (2000). New perspective on vulnerability using emic and etic approaches. *Journal of Advanced Nursing, 31*(3), 715-721.

Steptoe, A., Rink, E. & Kerry, S. (2000).Psychosocial predictors of changes in physical activity in overweight sedentary adults following counseling in primary care. *Preventive Medicine, 31*(2), 183-194.

Stutts, W. C. (2002). Physical activity determinants in adults, perceived benefits, barriers and self-efficacy. *American Association of Occupational Health Nurses Journal, 50*(11), 499-507.

Talen, M. R. & Mann, M. M. (2009). Obesity and mental health. *Primary Care, 36*(2), 287-305.

Thompson, J. L., Allen, P., Cunningham-Sabo, L., Yazzie, D. A., Curtis, M. & Davis, S. M. (2002). Environmental policy, and cultural factors related to physical activity in sedentary American Indian Women. *Women Health, 36*(2), 69-74.

Trochim, W. M. K. (2001). *The research methods knowledge base* (2nd ed.). Cincinnati, OH: Atomic Dog Publishing.

Tudor-Locke, C. & Myers, A. M. (2001). Challenges and opportunities for measuring physical activity in sedentary adults. *Sports Medicine, 31*(2), 91-100.

United State Census Bureau (2006). Puerto Rico. American Community Survey Retrieved on February 10, 2008, from http://www.census.gov

United State Census Bureau (2000). Census 2000 Data for Puerto Rico. Retrieved on February 10, 2008, from http://www.census.gov/census2000/states/pr.html

U.S. Department of Health and Human Services (2008). 2008-Physical Activity Guidelines for Americans.

U.S. Department of Health and Human Services (1996). *Physical Activity and Health: A Report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion.

Varughese, G. I., Tomson, J., & Lip, G. Y. (2005). Type 2 diabetes mellitus: A cardiovascular perspective. *International Journal of Clinical Practice, 59*(7), 798-816.

Vinicor, F. (2003). Macrovascular disease. In M. J. Frank (Ed.), *A core curriculum for diabetes education, diabetes and complications* (pp. 98-122). Chicago: American Association of Diabetes Educator.

von Goeler, D. S., Rosal, M. C., Ockene, J. K. Scavron, J. & De Torrijos, F. (2003). Self-management of type 2 diabetes: a survey of low-income urban Puerto Ricans. *The Diabetes Educator, 29*(4), 663-72.

Voorhees, C. C. & Rohm, D. (2003). Personal, social and physical environmental correlates of physical activity levels in urban Latinas. *American Journal of Preventive Medicine, 25*(3), 61-68.

Walker, L. O., & Avant, K. C. (2005). *Strategies for theory construction in nursing* (4th ed.). Upper Saddle River, NJ: Person Prentice Hall.

Wilbur, J., Chandler, P. J., Dancy, B. & Lee, H. (2003). Correlates of physical activity in urban Midwestern Latinas. *American Journal of Preventive Medicine, 25*, 69-76

William, K. E. & Bond, M. J. (2002).The roles of self-efficacy, outcome expectancies and social support in the self-care behaviours of diabetic. *Psychology, Health & Medicine, 7*(2), 127-141.

Williams, D. M., Anderson, E. S. & Winett, R. A. (2005). A review of the outcome expectancy construct in physical activity research. *Annals of Behavioral Medicine, 29*(1), 70-79.