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The Effect of Retirement on Vigorous Physical Activity Controlling for the Socio-Demographic Variables of Age, Gender, Education, Income, Race and Perceived Health Status Affect

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THE EFFECT OF RETIREMENT ON VIGOROUS PHYSICAL ACTIVITY CONTROLLING

FOR THE SOCIO-DEMOGRAPHIC VARIABLES OF AGE, GENDER, EDUCATION,

INCOME, RACE AND PERCEIVED HEALTH STATUS AFFECT.

by

Jayme D. Nekuda

A DISSERTATION

Presented to the Faculty of
The Graduate College at the University of Nebraska
In Partial Fulfillment of Requirements
For the Degree of Doctor of Philosophy

Major: Human Sciences

Under the Supervision of Professor James A. Thorson

Lincoln, Nebraska

May 2009

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Jayme D. Nekuda, Ph.D.

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Advisor: James A. Thorson

Health and Retirement Study data was used to examine the relationship between retirement and vigorous physical activity. The independent variables studied were vigorous physical activity in 1998 (T1) and retirement status in 2000 (T2). The dependent variable was vigorous physical activity in 2000 (T2). The entire sample consisted of 5,351 respondents who were in the workforce in 1998 (T1). In 2000 (T2), 4,449 reported still being in the workforce while 902 reported having retired between T1 and T2. The affect was controlled by the covariates of age, gender, education, income, race and perceived health status. These covariates together predicted approximately 16.5% to 22% of the variability in participation of vigorous physical activity. Participants in the entire sample consisted of 51.7% males, 48.3% females, average age of 59, average income of $80,558, and average years of education was 13.03. White/Caucasian individuals accounted for 82.4%, 13.5% were Black/African American and slightly over four percent reported being "Other". Those who retired between T1 and T2 consisted of 57.4% males, 42.6% females, average income of $56,828, and average years of education was 12.56.

Individuals' perceived health status did not significantly change from T1 to T2 whether or not they retired. Examination found that the most significant indicator of participation in vigorous physical activity after retirement was an individual's participation in vigorous physical activity prior to retirement. There was no relationship however, between retirement status and participation in vigorous physical activity. Gender was significantly related to participation in vigorous physical activity, with men's participation being higher than women's. Perceived health status was also found to be significantly related to participation in vigorous physical activity. Those who perceived their health as excellent, very good or good were significantly more likely to participate in vigorous physical activity than those who reported their health as fair or poor. Education was negatively correlated to vigorous physical activity which contradicted the literature.
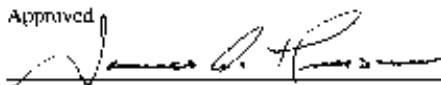
DISSERTATION TITLE

DOES RETIREMENT, WHEN CONTROLLED FOR THE SOCIO-DEMOGRAPHIC
VARIABLES OF AGE, GENDER, EDUCATION, INCOME, RACE AND PERCEIVED HEALTH
STATUS AFFECT AN INDIVIDUAL'S PARTICIPATION IN VIGOROUS PHYSICAL ACTIVITY?
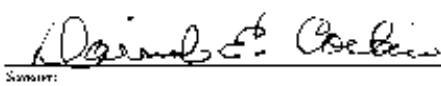
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ACKNOWLEDGEMENTS

Of course, thanks goes to my committee chair, Dr. Jim Thorson, what can I say, there is only ONE Dr. Thorson, cheers!

I want to express my gratitude to my other committee members Dr. David Corbin, Dr. Jennifer Huberty, Dr. Karl Kosloski and former committee member Dr. Chuck Powell. I truly appreciate your encouragement, time commitment and feedback in order to help me through the astronomical dissertation process.

A very special thanks goes out to my dear friend and mentor, Dr. Kay Ryan. Kay actually started me on down this long, winding and sometimes rough road called a Ph.D. Kay, thanks for believing in me, and my abilities, even when I didn't believe in myself!

A huge thanks goes out to Audrey Paulman, M.D. for introducing me to Jenenne Geske. Jenenne was a god-send who helped me trudge through the statistics along with assisting me in understanding and making sense of it all. I would still be working on this dissertation if it hadn't been for her assistance.

I would like to thank Keith Swarts and Amy Lamer for their proof reading and editing, Kim Laursen for working through the page-numbering challenges and Lori Fuller for assisting with scanning and printing issues.

I am very grateful for my very special "study partner" Bob who lended a paw by keeping me company and by comforting me with a friendly purr when I felt overwhelmed and under-confident.

I also want to show my appreciation to my dear friend Tina Anderson who always gave me encouragement and made me laugh.

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INTRODUCTION

"Your first wealth is health."
Ralph Waldo Emerson

Most people believe that their health is one of, if not the single most important asset they have. The following anonymously written quote reinforces the significance of good health, "A person who has health has a thousand wishes, the person who doesn't, has but one." While health is difficult to define, it is much more than Webster's (2004) definition "freedom from physical disease or pain". The meaning of health is very individualistic and, more than likely, as unique as personal fingerprints.

An individual's health and healthcare is of great concern on personal, economical, societal, and political levels and is greatly impacted as our society's life expectancy continues to increase in the United States. From 1990 to 2004 the life expectancy of American men lengthened by more than three years and for American women by more than one year (National Center for Health Statistics, 2007). Even though progress has been made in improving life expectancy, increases in longevity have often times been accompanied with pain and disability.

At present there are 600 million people worldwide who are 60 years of age or more, and this number is expected to increase to 1.2 billion by the year 2025 (World Health Organization, 2007). Due to the fact that major chronic diseases escalate with age, so too does the medical burden. This burden, in turn, raises public spending, due mainly to the result of the healthcare demands of older people. "The aging of the U.S. population is

one of the major public health challenges we face during this century. One of the Centers for Disease Control and Prevention's (CDC) highest priorities as the nation's health protection agency is to increase the number of older adults who live longer high-quality, productive, and independent lives" (CDC, 2008).

Aging is a process that takes place over a lifespan and is impacted by various personal choices as well as circumstances that are dynamic and ever-changing over time. We cannot stop the aging process but we, as individuals, do have the power within ourselves to make healthy lifestyle choices that have been shown to make a positive impact on overall health and quality of life. A wide variety of factors influence health, including genetic makeup, lifestyle habits, as well as the environment. Health affects have an impact on almost all, if not all, areas of life.

The Center for Medicare and Medicaid Services (2004) estimates that over 75% of all healthcare costs are tied to preventable chronic health conditions in spite of the fact that only one percent of the U.S. healthcare budget is spent on preventing injury and illness. Chronic health conditions have a substantial impact on employers' indirect costs such as absenteeism, turnover, and lost productivity (Mokdad, et al., 2004). As a result, new strategies that focus on prevention, early detection, and management of diseases will need to be implemented in order to help curtail the prevalence and expense that preventable diseases are causing on our society as a whole.

A very troubling reality is the number of Americans with unhealthy lifestyle behaviors. These unhealthy lifestyle behaviors increase the chance of experiencing chronic diseases and disabilities (Belloc & Breslow, 1972). In order to try to improve the health of our older, more racially and ethnically diverse nation, we will need to find ways

to encourage healthy lifestyle behaviors while taking into consideration our nation's major demographic changes.

Prevention, or living a healthy lifestyle is one answer to improving our nation's health while simultaneously reducing its healthcare costs. Therefore, a societal priority and goal of the CDC is to strive to enhance the overall health and well-being of older Americans by not only helping them to live longer, but also helping them to live the highest quality of life as possible.

What is a healthy lifestyle? The CDC has established ten Leading Health Indicators that they believe relate to the major health concerns of the U.S. for the 21st century. These indicators were chosen because of their significance as public health issues, their ability to move people toward acting on healthier behaviors, and the capability to measure their progress. Beginning in 2000, these ten indicators are now being measured.

Leading Health Indicators are:
- Physical Activity
- Overweight and Obesity
- Tobacco Use
- Substance Abuse
- Responsible Sexual Behavior
- Mental Health
- Injury and Violence
- Environmental Quality
- Immunization
- Access to Healthcare

Determinants of Physical Activity in Adults

The relationship between the prevalence of physical activity and social class in the U.S. was studied by Crespo, Ainsworth, Keteyian, Heath and Smit (1999). These authors found that inactivity was higher for women than for men, 28% versus 17%. They also

found that people who were less educated, lived below the poverty line, had a household income below $20,000, and who had retired were less likely to be active.

Kelley (2000) reported that gender, education, race, rank in the military, weight and exercise behavior were significant predictors of personal fitness. Women and men who had college degrees were three to four times more likely, respectively, to pass a physical readiness test than those with only a high school diploma.

The CDC reports that women are usually less active than men, and they become even more inactive as they age. Women with lower levels of education, as well as minority women, also tend to have lower activity levels than their peers (Purath, 2006) as well as women who become parents (Sherwood & Jeffry, 2000).

Education level has been shown to influence leisure-time physical activity. Stephens and Caspersen (1994) compared data of the most educated with the least educated groups. The most educated were 1.5 to 3.1 times more likely to be physically active than the least educated group and only 30% versus 60% as likely to be sedentary.

The Problem

This study will focus on vigorous physical activity. Participating in physical activity can have an impact on health in a number of very important aspects such as managing weight and decreasing blood pressure, lipids, and stress (CDC, 2008). If participating in physical activity has such a positive impact on health, then why don't more people practice this health behavior?

Trost, S.G., Owen, N., Bauman, A.E., Sallis, J.F. and Brown, W. (2002) conducted a meta-analysis of the determinants of adult physical activity. Forty-five studies published between 1992 and 1997 were analyzed. What they found was that these studies tended to

contribute significantly to the knowledge of the factors that impacted one's physical activity and that barriers to physical activity had a strong impact on leisure-time activity in elderly men and women. Barriers to physical activity included lack of time, too tiring, too weak, fear of falling, bad weather and no facilities. The lack of exercise partners had the strongest effect on men's and women's leisure time.

In 1993, the Peter D. Hart Research Associates (The President's Council on Physical Fitness and Sports, 2008) conducted a nationally representative survey on behalf of the President's Council on Physical Fitness and Sports that investigated the attitudes of adult Americans 18 years or older who reported themselves to be "less active." Less active was defined as those who exercise vigorously less than two times per week. The survey asked questions related to the subjects' perceived barriers associated to their physical activity. Forty-three percent of participants who were in the less active category reported that their most significant barrier for not being more active was lack of time. An overwhelming 64% of the less actives agreed with the statement "I would like to exercise more, but I just can't find the time". This included 75% of the baby boomers, 76% of those with desk positions, and 76% of working women.

Sallis and Hovell (1990) and Sallis, Hovell (1990 & 1992) and Hofstetter (1992) cited that the ten most prevalent barriers that kept individuals from engaging in a physically active lifestyle were that they:

- Do not have enough time to exercise
- Find it inconvenient to exercise
- Lack self motivation
- Do not find exercise enjoyable
- Find exercise boring
- Lack confidence in their ability to be physically active (low self-efficacy)
- Fear of being injured or they have been injured recently

- Lack self-management skills, such as the ability to set personal goals, monitor progress, or reward progress toward goals
- Lack encouragement, support or companionship from family and friends
- Do not have parks, sidewalks, bicycle trails or safe and pleasant walking paths convenient to their homes or offices

CDC, 2008 (Overcoming Barriers to Physical Activity, para. 2)

The proposed question for this study is: does retirement, when controlled for the socio-demographic variables of age, gender, education, race, income and perceived health status, affect an individual's participation in vigorous physical activity?

Significance of the Problem

The growth of the aging American population is escalating mainly due to two reasons 1) life spans are increasing and 2) the baby boomer generation, those born between the years of 1946 and 1964. It is predicted that in the next 25 years these two factors will cause the American population 65 years of age or older, to double. Twenty percent of the U.S. population will be comprised of older adults, totaling approximately 71 million by the year 2030 (CDC, 2008). It is predicted that the aging of the American population will have a tremendous impact, not only on individuals, but also on families and society as well. Beginning in 2011, the impact on American society could be even more profound due to the impact of the baby boomers starting to turn 65 years of age (Health and Retirement Study, 2008). The baby boomer generation will cause the largest American demographic cohort shift ever. In the year 2000 there were 35 million people over the age of 65. That number is expected to more than double to 72 million by the year 2030 because of the coming of the age of the Baby Boomers. These Boomers are not only living longer, they are also living healthier lives than those in previous generations. For

instance, according to the U.S. Census Bureau, in 1960 the average lifespan was 69.7. Today it is 77 years. When an individual reaches age 50 their expected life span is another 30 years. Health becomes even more valuable as people age, not only from a physical and psychological standpoint, but from a financial standpoint as well.

As a result of these demographic changes, our nation's healthcare spending is estimated to increase by 25%. Currently older peoples' healthcare costs run three to five times that of someone who is younger than 65 years of age. Thus, the increased number of older persons will have a tremendous affect on the American economy.

Thirty-five percent of the deaths in the U.S. in the year 2000 were attributed to four health-related behaviors: smoking, poor diet, physical inactivity and alcohol consumption (Mokdad, Marks, Stroup, & Gerberding, 2004). These four behaviors have a significant impact on the nation's most prevalent causes of premature death and disability due to chronic diseases: diabetes, cancer, stroke, and heart disease. The annual report submitted to the President and members of Congress "Health, United States, 2007" indicated that from 2001 to 2004, approximately 70% of men and 80% of women who were 75 years of age or older either had high blood pressure or were taking medication for high blood pressure as opposed to only 35% of adults between the ages of 45 and 54. Hypertension is a major risk factor related to stroke and heart disease. In the United States, heart disease is the leading cause of mortality, with cancer and cerebrovascular disease being the second and third leading causes respectively.

It is estimated that by the year 2030, 21% of the U.S. population will be 65 years of age or older. This increase in the number of older adults will bring with it an increase in cardiovascular-related costs as well as an increase in mortality rates; therefore, it would

be wise for Americans to pursue cardiovascular disease risk factor modifications. One

solution to reduce the risk of cardiovascular disease is to participate in physical activity.

According to Calfas, Long, Sallis, Wooten, Pratt and Patrick (1996) physical activity is a

very inexpensive, non-pharmacologic approach that would have a tremendous impact on

the challenging issues of cardiac disability and related diseases.

   The U.S. Department of Health and Human Services (HHS) projects that the number

of Americans who will experience functional disability may increase 300% by the year

2049. This increase of people with functional disabilities will be a consequence of larger

population and a variety of diseases and illnesses such as arthritis, diabetes, stroke,

coronary artery disease or cognitive impairment (2002). The HHS estimated that in 2002

approximately 75% of those over the age of 65 experienced at least one chronic illness,

and that 50% experienced two or more chronic illnesses (2002). These chronic

conditions can progress and develop into instant and serious disabilities such as strokes or

hip fractures, and can progress and escalate and ultimately affect their capacity to care for

themselves. Disabilities have very far-reaching consequences that can, and do, have a

huge economic impact on Federal and State governments and families and the elderly.

The Agency for Healthcare Research and Quality (AHRQ) (2002) reports that the largest

out-of-pocket healthcare costs are attributed to those people with chronic conditions or

functional impairment. The report also pointed out that these costs are largely due to the

cost of home healthcare. In 1996 alone, the expenses for home healthcare totaled $27.2

billion, of which Medicare paid approximately 60%. In 1996 the AHRQ conducted a

survey that estimated 14.3% of those 65 years of age or older, which equates to

approximately 4.5 million Americans, needed help with shopping, preparing meals, dressing and bathing (AHRQ, 2002).

Much discussion has taken place debating the impact that physical activity can have on increasing longevity, and whether or not those added years are merely replaced with additional years of increased morbidity as one ages. The compression of morbidity hypothesis suggests that being physically active can reduce and compress the period of time at which chronic diseases and/or disabilities are encountered toward the end life.

How much does physical activity increase longevity and will additional years of life be offset by higher morbidity? This question was studied by Hubert, Bloch, Oehlert, and Fries (2002) in a study designed to test the hypothesis of compression of morbidity. They assessed the lifestyle-related risk factors of physical inactivity, smoking and under- or over-weight in an aging cohort. Four-hundred eighteen participants were observed from 1986 to 1998. Participants were divided into three risk groups based on the number of the three risk factors they exhibited when they were enrolled in the study. Disability scores were determined for each of the three risk groups. The group that had no risk factors had a disability score close to zero, 10 to 12 years prior to their death. Subjects who had two or more risk factors sustained a higher level of disability throughout their follow-up and had a higher rate of decline one and a half years before their death. The group that had moderate health risks experienced a significant increase in disability just three months prior to their death. These results suggest that by leading a healthy lifestyle, substantial reduction and/or postponement of disabilities can be experienced.

Health should be a basic right and is also essential for social and economic development. Therefore it is important to make strides in improving life issues, not only

from a public health perspective but also from an economic perspective as well.
Compression of morbidity looks at the impact of healthy lifestyles on an individual's
longevity and whether or not, or to what degree, the additional years of life are impacted
by increased morbidity. The compression of morbidity concept proposes that by
participating in healthy lifestyle behaviors an individual can either decrease or compress
the length of time between when they become disabled and when life ends. From a
health promotion perspective, compression of morbidity predisposes people to enjoy a
healthier quality of life for a longer period of time. From an economic perspective,
preventative behaviors can contribute to more cost-effective strategies aimed at
alleviating some of the economic burdens on society imposed by an aging population.

   Mokdad, Marks, Stroup, and Gerberding (2004) conducted a meta-analysis of English-
language articles that reviewed epidemiological, clinical, and laboratory studies that
revealed associated risk behaviors impacting mortality. They included articles from 1980
to 2002. The number of U.S. deaths and associated causes were collected from the
Centers for Disease Control and Prevention 2000 mortality data. The four principal
influences on causes of death were found to be tobacco (18.1% of U.S. deaths); poor diet
and physical inactivity (16.6% of deaths); and alcohol consumption (3.5% of deaths).
Even though smoking is the most prevalent health risk associated with mortality in this
analysis, poor diet and inactivity could soon surpass the health risks associated with
tobacco. This meta-analysis indicated that as many as 38.2% of deaths were attributed to
the four aforementioned behavioral risk factors. The overwhelming reality is that the
leading causes of death in the United States can be influenced by modifiable behavioral
risk factors.

Retiree's Lifestyle

According to Higgs & Quirk (2007), lifestyle factors have been determined to be a crucial factor in influencing health later in an individual's life. Exercise, nutrition and social environment are lifestyle factors that either promote, or limit, an individual's chance for a healthy post-retirement life. By living a healthy lifestyle, individuals can reduce the rates of chronic disease and disability, as well as increasing their quality of life based on compression of morbidity. For example, retirees often travel south during the winter months to get away from the colder northern latitudes. These groups of people are often called "snow birds". A common link that many of these individuals have is an active lifestyle and making a concerted effort to age successfully.

In 2006, Goldberg and Beitz studied retirees and their process of aging. They believed that healthy retirement is comprised of two defined stages: Early Wellness and Later Illness. They also believed that six fundamental variables are evident in this transition: having high activity, losing activity, losing personal health, losing the spouse's health, losing the spouse and losing financial stability.

They reported that most retirees experienced a highly active lifestyle immediately after retirement. Several of the widows described traveling around the United States and Europe while their spouses were alive and healthy. Many retirees described themselves as still being active as volunteers. They served on committees, worked at thrift shops, were drivers for others, were active on boards, were active in church groups, volunteered at religious organizations, participated in hobbies as well as visiting friends and family.

Nearly all participants indicated they had slowed down to some extent due to the result of aging and losing personal health. Many also reported experiencing some pain.

A major reason for individuals limiting their activity level was reports of falling and the fear associated with falling. Individuals also reported decreased mobility and loss of health.

Individuals compared losing activity to a change in their health status and/or shifting in the direction of a more frail and chronic state. Many of the individuals referred to their prior activity level in the past tense. Alternatively, many participants also still considered themselves as active. Even if participants had experienced very little change in their activity, they were still fearful of its loss. Loss of activity was also affected by the rise in chronic health problems of the individual's spouse and well as losing a spouse.

The relationship of physical activity and health is as simple and basic as it gets; participation reduces the risk of premature morbidity and mortality (Mokdad et al., 2004). The bottom line is that physical activity has a substantial protective effect that continues to have an impact even as old age is entered. The benefits derived from physical activity can even offset some of the negative impact that risk factors such as smoking, high blood sugar and high blood pressure may have on an individual. Once the benefits of moderate physical activity are added up, it is difficult to envision why all or most individuals would not be participating in some sort of physical activity on a regular basis. According to Rowe and Kahn (1998) physical fitness enables older people to retain their independence, function better in their everyday life, live longer, and have a higher quality of life even if they are challenged by additional health issues or participate in other negative health habits.

So, what is the relationship between physical activity and retirement? Does retirement predict participation in vigorous physical activity when the variables of age, gender, education, race, income and perceived health status have been controlled?

According to Oliveira, Andrade, Figueira, Araujo, Matsudo, Matsudo and Andrade (1998) the most cited reason for not participating in physical activity by both men and women was "lack of time". Stutts (2002) found the primary reason for one's inactivity was "lack of time". "Time" was the most common barrier to participation in physical activity reported by Fletcher, Behrens and Domina (2008) when studying physical activity barriers of white- and blue-collar workers. Wolin, Bennett, McNeill, Sorensen and Emmons (2008) also found a significant relationship between low participation in physical activity and low levels of discretionary time.

According to the some of the research, "not enough time" consistently is a reason given for why people are not physically active. A wide variety of barriers have been reported by the American College of Sports Medicine (ACSM), Centers for Disease Control and Prevention (CDC), the American Dietetics Association (ADA), Mayo Clinic, Johns Hopkins, as well as *The Physician and Sportsmedicine Journal* why people are not physically active, or why they do not participate in the recommended guidelines set by the CDC and the ACSM. One of the most prevalent barriers reported by people for not participating in physical activity is lack of time. If lack of time is really a significant barrier that Americans give for not being physically active, then logically it follows that only once people retire they would have more discretionary time and the number of retirees who report participating in vigorous physical activity should increase.

Purpose of the Study

The purpose of this study is to determine if retirement affects vigorous physical activity. The research question is: Does retirement, when controlled for the socio-demographic variables of age, gender, education, race, income and perceived health status, affect an individual's participation in vigorous physical activity?

This hypothesis is derived from the argument that one of the most common reasons people give for not being physically active is lack of time. If this is a valid reason, then the act of retiring should enhance a person's physical activity level. This study will compare the self-reported activity of participants' pre- and post-retirement to determine if the actual event of retirement predicts increased participation in physical activity based on the supposition that upon retirement participants should have more available and unscheduled time. The relationship between the pre- and post-test should be positive. People who report having high levels of physical activity prior to retirement should remain high after retiring, and people who report having low levels of physical activity prior to retirement should increase after retiring. This study will analyze the 1998 and 2000 Health and Retirement Study (HRS) data for these relationships. The HRS survey is conducted every two years. Frequencies were run to determine which two-year timeframe experienced the greatest number of retirees. From the onset of the HRS in 1992, the greatest number of respondents reported retiring between the years of 1998 and 2000 (n = 902). Therefore it was determined that if there was a relationship between retirement and participation in vigorous physical activity, this two-year time span would have the greatest power of determining if there was a relationship between retirement and participation in vigorous physical fitness.

Significance of the Study

Only twelve studies in nursing, medical, and allied health databases in the past thirty-seven years have been identified that are on the topic of physical activity and retirement. The present study is unique from a social science standpoint because it examines the health behavior of physical activity which has a direct effect on social, economic and political challenges that an aging society will most likely experience in the 21st century. The event of retirement gives individuals the freedom to be able to make choices about what it is that they want to do once they retire. At some point in time prior to retiring most individuals begin to contemplate their options of what they want to do during this next important phase in their lives. As employees near their retirement, this would seem to be a logically opportune time for health promotion practitioners to have an impact on the current and future health and well-being of retirees and future retirees. This impact would be a result of emphasizing what is involved in "successful aging" and assisting both the retirees and future retirees in the important health behavior changes that would significantly impact their personal successful aging. Retirement is an important juncture in life. It is a time when individuals are making key decisions that can directly impact their futures. Targeting soon-to-be retirees and encouraging them to make healthier lifestyle choices could have a significant impact on individuals' future overall health and quality of life.

Hypothesis

This study will test the 1998 and 2000 HRS data to determine the relationship of retirement to participation in vigorous physical activity controlling for the socio-

demographic variables of age, gender, education, income, race and perceived health status. It is hypothesized that individuals who retire will exercise more than those individuals who continue to work, net the other covariates. Individuals who have retired are expected that to have more unscheduled time after retirement and that this will have a significant predictive relationship upon participation in vigorous physical activity. Socio-demographics (age, gender, education, income, race and perceived health status) are included to control for previous effects (e.g., health affects both retirement and physical activity).

Limitations

The results analyzed in this study are based upon self-reported data which fundamentally is subjectively biased and based on recall. Second, these data do not include information on nonleisure-time physical activities or participation in moderate physical activity; therefore an individual's total activity may be underestimated. Another limitation may be an over-estimation of one's vigorous physical activity levels based on the definition given in the HRS that included heavy housework and a job involving physical labor. A fourth limitation is that only one question was asked regarding participation in physical activity. The question was: On average over the last 12 months have you participated in vigorous physical activity or exercise three times a week or more? By vigorous physical activity we mean things like sports, heavy housework, or a job that involved physical labor. Yes, No, Don't Know, Refused (HRS, 1998 & 2000).

Additional limitations that may also have an impact on results are the various socio-demographic variables that were not analyzed in this study such as environmental

climate, whether a rural or city-dweller, whether or not living in a suburb or downtown along with how walk-able and/or safe is their community.

Assumptions

The logistic regression model to be used in this analysis accommodates for a binary dependent variable and can be used to predict a binary dependent variable from a set of independent variables violating no statistical assumptions. Inherent in this data set is the dependent value which has categorical data points. It is assumed that responses to the self-reported interview data are accurate. And finally, it is assumed that this is a representative sample of American retirees.

Research Question

The following research question will be investigated utilizing the 1998 and 2000 Health and Retirement Study data: Does retirement, when controlled for the socio-demographic variables of age, gender, education, income, race and perceived health status, affect an individual's participation in vigorous physical activity?

Subjects

The HRS subject population consists of a national sample of over 20,000 Americans age 50 or older who were randomly chosen and were born in 1947 or earlier. Spouses, and significant others were included in the study regardless of their age. The sample is representative of America's diversity in health, occupational and employment histories, racial and ethnic backgrounds, economic conditions, marital histories and family compositions, living arrangements, and well as other characteristics of life. Subjects were given a $40 payment to participate in the study.

To obtain the largest sample size of subjects who retired during a two-year period, a frequency was run to determine when the largest number of participants reported being retired. After examining the data it was determined that the largest number of people retired (n = 902) between the years of 1998 and 2000. Therefore, the data that will be analyzed for this study will be from the 5,351 participants, all of which reported being in the workforce in 1998, and who completed the surveys in the years of 1998 and 2000.

Instrument

In 1990 F. Thomas Juster of the University of Michigan Institute for Social Research was awarded a five-year cooperative agreement by The National Institute on Aging to create the Health and Retirement Study (HRS). The HRS's overarching goal was to gather and supply data on retirement to researchers, policy analysts, as well as program planners making major policy decisions affecting retirement. Reasons for gathering these data were tied to concerns about the affect of the aging American population on the health and economic well-being later on in life as well as the well-being of those who help older family members through public programs. HRS is a longitudinal study of health, retirement and aging that provides data to researchers that can help to illustrate the course of health, economic, and family status of Americans over age 50. These data can then be used to test theories and behavioral models. The HRS provides data for a variety of science disciplines, some of which were analyzed for the present study: health conditions, cognitive conditions, employment status, job history, and demographic background. Since 1992 this survey tool has been administered to a sample of Americans over the age of 50.

Data for this study was taken from compiled survey data administered by the University of Michigan using the Health and Retirement Study (HRS). The HRS is a biennial survey that represents over 20,000 Americans over the age of 50. The current HRS is composed of two separate collections that were combined in 1998: The Study of Asset and Health Dynamics among the Oldest Old (AHEAD) and the Health and Retirement Study (HRS). The original HRS cohort was comprised of people who were born between 1931 and 1941, were 51 to 61 years of age, and first interviewed in 1992. The AHEAD cohort consisted of subjects who were born before 1923; 70 years of age or older and first interviewed in 1993. The combination of these two studies formed a complete panel of over 20,000 participants over the age of 50. Two additional subsamples: the Children of the Depression (CODA), born between 1924 and 1930 and the War Babies (WB) born between 1942 and 1947 were added in order to give full panel data for all persons over 50 years of age in the United States. A steady-state design was implemented; therefore new respondents between the ages of 50 and 56 are added every six years. The HRS is now a panel study that consists of interviews, generally by telephone, conducted every two years. In 2004 a new cohort, the Early Baby Boomers (EBB) was added. Those considered as EBB were born between 1948 and 1953. All cohorts were obtained from a representative sample taken nation-wide. Biennial interviews that were comprised of a broad range of topics were administered via telephone, except for a few personal interviews. Topics included work, retirement, and work history; income and wealth; self-reports of major health conditions; health care utilization, insurance coverage, and out-of-pocket spending; and relations with family members.

The core study design consisted of:

- o A national panel study
- o Initial sample of 12,000+ persons from 7, 600 households, current sample is 26,000 persons from 15,000+ households
- o Oversamples of Hispanics, Blacks and Floridians were taken so that there would be an accurate overview of the cohort born between 1931 and 1941.
- o Baseline data consisted of in-home, face-to-face interviews in 1992 for those born from 1931-1941 (if they were married, spouses were also interviewed regardless of their age).
- o In 1998 the HRS and AHEAD (those born prior to 1923 and interviewed for the first time in 1993, they were age 70 and above) were merged so they comprised a comprehensive panel of the population who were over the age of 50.
- o In 1998 the Children of the Depression Age (CODA) born from 1924-1930 and the War Babies born from 1942-1947 were added.
- o In 2004 the Early Boomers were added to the study, they were born from 1948-1953.
- o HRS and AHEAD survey instruments and field data sets were combined in 1998
- o Follow-up interviews via telephone every second year

Questionnaire topics included:

- Cognitive and health conditions and status
- Retirement plans and perspectives
- Attitudes, preferences, expectations, and subjective probabilities
- Family structure and transfers
- Employment status and job history
- Job demands and background
- Disability
- Demographic background
- Housing
- Income and net worth
- Health insurance and pension plans
- Experimental modules

Nominal Definitions

ACSM = American College of Sports Medicine

ADA = American Dietetics Association

AHEAD = Asset and Health Dynamics among the Oldest Old

CDC = Centers for Disease Control and Prevention

HRS = Health and Retirement Study

Operational Definitions

The following definitions are meant to assist in the practical identification of relevant terms related to this study.

Activities of daily living (ADLs). Activities related to personal care include bathing or showering, dressing, getting in or out of bed or a chair, using the toilet, and eating (CDC, 2004, para.2).

Health behaviors. Those personal attributes such as beliefs, expectations, motives, values, perceptions, and other cognitive elements; personality characteristics, including affective and emotional states and traits; and overt behavior patterns, actions, and habits that relate to health maintenance, to health restoration, and to health improvement. (Gochman, 1997).

Baby Boomers. Americans who were born during the years of 1946 to 1964 (HRS, 2008).

Barrier. An individual's opinion of the tangible and psychological costs of an advised action (CDC, 2005, p. 14, table 2).

Disability. A contextual variable, dynamic over time and in relation to circumstances. One is more or less disabled based on the interaction between the person and the individual, institutional and social environments (World Health Organization, 2007, para. 5).

Early Baby Boomer. Americans who were born during the years of 1948 to 1953 (HRS, 2008).

Functional disability. Inability to perform activities of daily living. (University of Nebraska Medical Center, 2008, para.1)

Health. A human condition with physical, social and psychological dimensions, each characterized on a continuum with positive and negative poles. Positive health is associated with a capacity to enjoy life and to withstand challenges; it is not merely the absence of disease. Negative health is associated with illness, and in the extreme, with premature death (CDC, 2008, para. 8).

Instrumental activities of daily living (IADL). Activities related to independent living that include preparing meals, managing money, shopping for groceries or personal items, performing light or heavy housework, and using a telephone (CDC, 2004 para. 2).

Perceived health status. Self-rated or subjective view of overall health (HRS, 2008).

Retirement. When a person is no longer in the paid labor force (HRS, 2008).

Vigorous physical activity. Participating in activities such as sports, heavy housework, or a job that involves physical labor (HRS, 2008).

CHAPTER II

REVIEW OF LITERATURE

Although the current research will explore the relationship of retirement on physical activity levels, it is important to first understand what is known about the variables that are related to why people do or do not participate in physical activity. This literature review will provide the foundation for not only understanding the variables but the subsequent selection of those to be controlled as well.

Successful Aging

Valliant and Mukamal (2001) reported that just in the last century the number of years an individual is expected to spend in active retirement has increased ten-fold. They tracked the changes in two cohorts of adolescent. Every five years the individuals were given complete physical exams, and every two years psychosocial data was collected from them. Six predictor variables representing uncontrollable factors (physical health at age 50, parental social class, ancestral longevity, family cohesion, major depression, and childhood temperament) were assessed, and seven variables representing personal control (exercise, body mass index, education, coping mechanisms, marital stability, smoking, and alcohol abuse) were assessed before or at age 50. Six outcome variables were analyzed, four of which were objectively evaluated variables: physical health, social support, mental health, and death and disability prior to age 80, and two were self-

reported variables: life enjoyment and instrumental activities of daily living. All six outcomes variables were assessed at age 70-80.

Study results indicated that there was a correlation between how well one aged from age 70-80, and that it was dependent upon the assessment of variables prior to age 50. The findings are viewed as very positive because seven of the variables are individual and personally controlled. The only uncontrollable predictor variable that had an impact on the quality of subjective and objective aging was that of depression. The other uncontrollable factors of unhappy childhood, ancestral longevity and parental social class were not significant. In summary, these findings indicate that an individual has more individual control over his biopsychosocial health after retirement than once thought.

Retirement

Retirement, according to *Merriam-Webster's Collegiate Dictionary*, *Eleventh Edition*, (2003), is defined as "withdrawing from one's position or occupation or from active working life". In real life, the definition of retirement is not so simple. It is a very complex process. Retirement has an impact on the individual as well as their socio-cultural environment. Retirement is one of the most important events for older workers. Retirement will impact how they spend their time, their income, their social interaction and, most likely, will impact their physical and mental health, self-esteem and life satisfaction.

Retirement is one of the major transitions in an individual's life course, often the last phase in an individual's life cycle. Most individuals look forward to retirement with great anticipation. It serves as an opportunity for them to make changes in their lives. Being retired may mean that an individual now has more time to do the things they have

always wanted to. Or they might want to look for new ideas, or to do things they thought they would enjoy. In any case, there are a range of opportunities one can enjoy in retirement.

Lifestyle / Successful Aging

In 1998, Rowe and Kahn linked lifestyles and successful aging together based on the 10-year MacArthur study. They contend that the research establishes, "lifestyle and personality factors that boost the chance of aging successfully". They regard successful aging as a result of individual lifestyle choices along with the avoidance of risky behaviors, while unsuccessful aging is thought to be the result of maladaptive lifestyles. They believe that later on in life these maladaptive lifestyles result in disease and disability.

Determinants of Behavioral Patterns in Adults

Gender, Age, Education, Income, and Race

Disease prevention and health promotion efforts are closely tied to the relationships between health-related behaviors. Health-related behaviors might also have synergistic effects on an individual's risk of disease. In large part due to these two reasons, Berrigan, Dodd, Troiano, Krebs-Smith and Barbash (2003) chose to look at the five demographics of gender, age, education, income, and race along with the five health behaviors of physical activity, tobacco use, fruit and vegetable consumption, dietary fat intake, and alcohol consumption. They studied the 32 possible combination patterns from the five demographic variables and the five health behavior variables. Data from the Third National Health and Nutrition Examination Study (NHANES III) was used in

their analysis. These data consisted of a nationally representative sample of the U.S. population (N = 15,425). They found that gender, age, education, income, and race were linked with several behavior patterns. Gender impacted several health behavior patterns, with men having 2.6 times the probability of non-adherence than women in relation to all five recommendations. Women were 1.6 times more likely to adhere to all five behaviors. All five behaviors showed an increased adherence with age, education, and income, but were different for the three race/ethnic groups (non-Hispanic blacks, non-Hispanic whites and Mexican Americans). Results from this study revealed that age and gender appear to be the two main correlates in relation to the extremes of adhering to all or none of the five behavioral recommendations.

Determinants of Physical Activity in Adults

In 2007, the CDC summarized the National Health Interview Survey that asked questions related to leisure-time physical activity from 1998 through 2006. (CDC, 2007 p. 286, table 73). Leisure-time physical activity data from U.S. adults 18 years of age and over indicated that several variables affected an individual's participation in physical activity. The variables they analyzed were age; sex; sex and age; race; Hispanic origin and race; education; percent of poverty levels; Hispanic origin, race and poverty level; geographic region; and local residence. Data from the CDC's Health, United States (2006) sampled the civilian non-institutionalized population using household interviews from 1998-2004 (N = more than 350,000 annually). The data for 2006 indicated that 18-24 year olds had the highest rate of regular leisure-time activity at 38.1% while the lowest 17.3%, was experienced by those 75 years and over. Males participated in regular

activity more than females, 33.1% and 29.0% respectively. Activity participation was

highest for whites (31.9%) followed by Asian only (30.5%), those of two or more races

(30.0%), American Indian or Alaska Native only (29.5%), and finally Black or African

American (24.9%). Almost 38% of those who attended some college participated in

regular leisure-time activity, while those who received a high school diploma or GED

were at 23.5%, and those with no high school diploma or GED were at 16.5%. Those

households below the government defined poverty level reported 20.6% participation in

regular leisure-time activity. When broken down by race, Hispanic or Latinos below

poverty level were at 15.5% and African Americans below poverty level were at 19.4%.

Geographic regions were also analyzed with the Northeast and Midwest almost being

equal at 32.8% and 32.6% respectively. The lowest activity participation level was

reported in the South at 28.0%. The last characteristic that was analyzed was location of

residence, either within a metropolitan statistical area (MSA) or outside a MSA with

results indicating activity participation at 31.8% and 26.9% respectively.

Individual and Environmental Characteristics

   Sherwood and Jeffery (2000) examined two broad categories of behavioral

determinants associated with physical activity: 1) individual characteristics and 2)

environmental characteristics. Individual characteristics consisted of exercise history,

skills, self-efficacy, motivations, as well as other health behaviors. Environmental

characteristics included time barriers, cost, and access, along with cultural and social

support. Demographic characteristics influence whether or not one participates in regular

physical activity. Women were less active than men, with only 40% of American women

taking part in any physical activity. African American and Hispanic adults had lower activity levels than Caucasians. Physical activity levels were also lower for those who were less educated and had lower incomes. Marital status also impacted physical activity, with unmarried people being the most active and married women being the least active. Exercise history influenced future physical activity if it was recent history, as opposed to childhood history of activity. Body weight was a strong correlate of physical activity, with heavier people being less active than those who were lighter in weight.

A strong environmental characteristic that correlated with physical activity was that of social support. Those who participated in regular exercise stated that they received more support from individuals at work and at home than those who were less active. A constraint in time was the most common reason given by individuals whether they were active or not. Particular population subgroups may experience this "lack of time" barrier to a greater degree than others. For example, those who have just become parents, particularly new mothers, experienced a reduction in physical activity, reporting that it was due to lack of time. Depending on activity preference, access to exercise facilities was a barrier for some, while environment in terms of paths, sidewalks, and safety was a barrier for those who preferred to participate in outdoor activities. Also, important predictors of exercise behavior were the attributes related to exercise: intensity, duration, type and variety of exercise. Those who participate in higher doses and intensities of activity generally have personal profiles that are predictive of exercise behaviors. Another important aspect related to promoting physical activity is that of variety. Participation in a wide range of activities could help support adherence by decreasing injuries, as well as boredom, along with increasing the flexibility of being able to

participate in several activities. Public health recommendations have recently focused on the fact that health benefits can be derived from short periods of activity that may be more manageable for people to integrate into their lifestyles. Regular exercise also increased the chance of injury, particularly injuries to the musculoskeletal system.

Women, Age, Education, Income, and Race

Physical activity levels among a large and diverse group of urban women ($N = 521$) were examined by Ransdell and Wells (1998). Age, education, income, and ethnicity/race were analyzed along with demographic and behavioral predictors. They also analyzed behavioral and demographic predictors related to high levels of participation in physical activity. The lowest levels of leisure-time physical activity were experienced by women over 40, women of color, and women who did not have a college education. Most women were inactive, with only 8% of African-American women, 11% of Mexican-American women, and 13% of Caucasian women participating in the amount of physical activity recommended by the U.S. Surgeon General. Results from this study did not show any significant relationship between age, income, self-rated health, body mass index (BMI), smoking or alcohol consumption and that of leisure-time physical activity.

Education, Income, Employment, Labor Force Participation, and Occupation

In 1999 Crespo, Ainsworth, Keteyian, Heath and Smit studied how physically inactive people were during their leisure time. Eighteen thousand, eight hundred, twenty-five adults age 20 or older were interviewed about their physical activity, education, income, employment, and labor force participation. The results showed that more women reported being inactive during their leisure time than men, 28% versus 17% respectively.

Activity was less prevalent in those who were less educated, those whose household income was less than $20,000, those who were living below the poverty level, and those who were retired. Regardless of the category of social class that subjects were in, women were less active than men. The study concluded that social class and gender were predictive of physical inactivity.

Gender, Education, Race, Military Rank, Weight, and Exercise Behavior

Kelley (2000) studied the health perceptions, physical self-efficacy, barriers to exercise, and exercise behaviors as predictors of personal physical fitness and physical readiness of 355 active duty Navy service members. It was found that gender, education, race, military rank, weight and exercise behavior were significant predictors of personal fitness. Women and men who had college degrees were three to four times more likely to pass a physical readiness test (PRT) than those with only a high school diploma. If one was overweight, then their odds of being physically unfit and failing the PRT rose by 92%.

Gender, Age, Race, Community Surroundings, and Personality Characteristics

Seefeldt, Malina and Clark (2002) reviewed literature that examined the determinants of an active lifestyle as well as the barriers that prevented people from integrating activity into their lives. What they found was that several factors influenced participation in physical activity. They divided those factors into two categories: 1) those that were invariable such as gender, age, ethnicity/race and 2) those that were alleged to be modifiable such as personal traits, community surroundings, environmental circumstances, support systems, economic status, occupation, education, physical disability, and opportunity for healthcare. What emerged as barriers for ethnic minorities

was the lack of affordable facilities, nonavailability of childcare, concern for safety, high

crime rates, and activities that were culturally unfitting. Social support from various

groups such as family members, healthcare providers, peers and community caused slight

improvements across various ages, cultures, and genders in certain situations. Beginning

and continuing a regular physical fitness activity program is contingent on a variety of

socio-cultural and biological variables that can change as people move through the

various stages of their lives.

Gender and Occupation

   In 2007, Caban-Martinez, Lee, Fleming, LeBlanc, Arheart, Chung-Bridges, Christ,

McCollister and Pitman assessed physical activity levels associated with work groups

that participated in The National Health Interview Survey (NHIS). Participants consisted

of U.S. civilian non-institutionalized participants who were classified into 41

standardized occupational categories. Subjects ranged in age from 18 to 88 years old.

Leisure-time physical activity questions were about frequency and duration of light and

moderate activity levels as well as vigorous activity. Moderate activity was defined as

activity that lasted a minimum of 10 minutes and resulted in light sweating or a slight

increase in heart rate or breathing. Vigorous activity was defined as activity that lasted at

least 10 minutes and resulted in heavy sweating or a considerable increase in breathing or

heart rate. Study participants were said to have met the Healthy People 2010 regular

leisure-time physical activity guidelines if they stated they participated in light-moderate

activity, which consisted of activity for 30 minutes or more five times per week or more

(N = 11,205) or vigorous activity that consisted of activity of 20 minutes or more, three

or more times per week (N = 28,756), or some who fell into both categories (N = 10,766).

Participants who reported that they were unable to or never participated in leisure-time activity were combined into one group (N = 101,146).

Results indicated that the average participant was 40.3 years old with 31% of males and 36% of females meeting the recommendations set by the Healthy People 2010 leisure-time physical activity guidelines. From 1997-2004 there was no significant change in the level of leisure-time physical activity among these respondents when stratified by gender, race or ethnicity. During this time, higher levels of leisure-time physical activity were experienced by male workers when compared to female workers. In 1997, male workers' leisure-time physical activity was 32% compared to only 29% of female workers. In 2004, male workers' leisure-time physical activity was reported as 38% versus 34% for female workers. White workers reported higher levels of leisure-time physical activity in contrast to black workers or workers from other races (33%-36% versus 26%-34% respectively). Twenty-four percent of Hispanic workers reported that they met the recommended levels of leisure-time physical activity levels as compared to 33%-37% to non-Hispanic workers.

From 1997-2004 the leisure-time physical activity levels of male workers who were in management positions, inspectors, samplers, assemblers, fabricators and motor vehicle operators declined significantly. On the other hand, there were significant increases in the amount of leisure time reported by females employed in management, sales, commodities and finance, secretaries, stenographers, and typists. The percentage of female workers who met the Healthy People 2010 definition of recommended leisure-time physical activity levels varied from 46%-16% as compared to male workers who ranged from 55%-25%. The occupational groups held by females that had the lowest

leisure-time physical activity levels, in regard to the Healthy People 2010 guidelines, were the machine operators/tenders, assemblers, samplers, inspectors, material moving equipment operators, cleaning and building service and freight, stock and material handlers. As for the male workers, the lowest occupational groups were farm managers and operators, farm and other agricultural workers, construction laborers, cleaning and building service and forestry and fishing occupations.

These researchers found that only 36% of male US workers and 31% of female US workers were meeting the Healthy People 2010 Guidelines for recommended levels of leisure activity. There was also a considerable difference in gender-specific rates of leisure-time physical activity levels with regard to occupation, with blue collar workers having the lowest participation rates.

Males Working in White versus Blue Collar Positions

Desmond, Conrad, Montgomery and Simon (1993) examined a convenience sample of 325 male workers' engagement in physical activity by analyzing the variations associated between white collar versus blue collar workers. The sample consisted of employees from three different sites working in physical, clerical, or management positions. The majority of the sample was made up of 236 employees who were blue collar or physical workers. The three types of physical activity analyzed were: work physical activity, sports activity, and leisure-time activity. Age, education, income, perceived health status, perceived barriers, self-efficacy, and job categories were studied. The mean age of the sample was 37.5 years, fewer than 1% had less than 12 years of education, and 83% had an annual income of $40,000 or more. Participants were asked to complete a survey during a mandatory safety meeting that took approximately 15 minutes. This survey

measured perceived health status, physical self efficacy, perceived barriers, and physical activity. Results showed a positive correlation between self efficacy and physical activity. There was no association between perceived barriers and physical activity in this study. Perceived health status was found to be positively associated with physical activity. Two of the independent variables that accounted for 30% of the variance were perceived self efficacy and job category. As for the work physical activity, 56% of the variance was associated with job category and income. Six percent of the variance in sports activity could be explained by perceived health status. Job category and perceived self efficacy accounted for 13.5% of the variance in leisure time activity. Participants who reported higher perceived self efficacy were more likely to engage in physical activity along with those who experienced higher perceived health status. When combining the three types of physical activity (work, sports, and leisure), job category and self efficacy were the predictors of participation that were statistically significant. Regardless of job category, workers with higher incomes were the ones who were more inclined to participate in work activity. The only significant predictor of participation in sports activity was perceived health status. Perceived self efficacy and job category explained 13% of engagement in leisure time activity. Overall, results indicated that job category, or white versus blue collar work, were found to be a strong predictor of participation in physical activity.

The review of the literature shows there are a variety of variables impacting an adult's participation in physical activity. None of the studies examined in this literature review analyzed participation of physical activity pre- and post-retirement. This study will

control for the variables of age, gender, education, income, race and perceived health status, to determine if retirement affects participation in physical activity.

Physical Health and Retirement

Ekerdt, Baden, Bosse and Dibbs (1983) studied self-reported physical health changes over a three to four year period among male retirees and those who continued to work. Study participants consisted of 229 retirees and 409 men who were still working and all ranged in age from 55-73. All were participants in the Veterans Administration Normative Aging Study. This took place in Boston during 1963 and studied over 2,000 men who were born between the years of 1884 and 1945. Every five years, participants received a medical examination until they were 52 years old, then every three years thereafter. This study included those retirees who ranged in age between 55-70 when they retired, and those who retired between 1972 and March of 1981. All had a medical examination just prior to their retirement (T1). The length of time between when they had their pre- and post-retirement (T2) exams was more than three years but less than five and-a-half years. The medical examinations included a physical exam by a physician, a medical history, a chest x-ray, an ECG, and usual blood and urine tests. A scale developed by Vaillant was administered by an internist. A nurse then rated each individual's physical health using a Likert scale. A one on the scale equated to irreversible illness with serious disability, a two denoted serious chronic illness without disability, a three denoted minor chronic problems, and a four signified excellent health. It was noted that the study conducted pre-screenings and excluded participants who had chronic medical conditions.

Recurrent questionnaires gathered data related to the circumstances of one's retirement such as age when retired, if disability or illness was a major reason for retiring, if retirement was a result of mandatory age rules, if one's retirement was unpredicted, and where, on a scale, did one's standard of living after retirement fall compared to their pre-retirement standard of living. Marital status, education level, and status of their former occupation were also measured.

Multiple regression methods were used to compare the differences in the physical health of workers versus retirees. While physical health typically declines over time, investigators in this study did not demonstrate any significant changes in health between those who retired and those who kept working when controlling for age and excluding those who retired due to illness or disability. Pre- and post-retirement health changes for retirees were not significant even when events were taken into account that can negatively impact retirement such as a potentially lower standard of living or mandatory retirement. There was still no change in health, even after including the covariant of social class which consisted of education level and the Duncan SEI. There was also no significant difference in physical health between workers and retirees when regressions were run for different age ranges. The study also found that retirement was not significantly affected by retiring early, retiring because of mandatory age requirements, retiring suddenly, nor if an individual had a lower standard of living after retirement, or if they did not have a spouse in retirement. Results determined that retirement at a later age was significantly associated with declining health. However, this was a manifestation of chronological age at T2. Not any of the other conditions of retirement were linked to any changes impacting health. It was interesting to note that the variable of "compulsory

retirement" did not negatively impact health. This situation was thought to be a stressful event that could have a negative impact on health. Another variable thought to potentially impact health outcome was "length of time retired". This relates to the idea that people may experience an emotional letdown shortly after retirement which could, in turn, impact their health. Results indicated that this was not the case. There was no significant effect based on the length of time of retirement and any health changes. In conclusion, this study did not show any physical health changes among men who were employed and then retired over three to four years compared to those men who were still employed. Nor did they show a decline due to any of the circumstances that can make the transition challenging such as compulsory retirement, unexpected retirement, or retirement from a prestigious occupation. The study concluded that the event of retirement did not represent a risk of declining health.

The present study will review the same cohort only in a later setting, 1992-1994. It will analyze the self-reported physical activity variable. The data is this study will provide the opportunity to establish if the same trend noted in Ekerdt et al.'s (1983) study also exists in the present study along with determining whether or not physical activity level changed based on an individual's retirement. Also, this study will include both genders.

Physical Activity and Retirement

A prospective study determining if retirement at age 60 was associated with an improvement or deterioration in mental and physical health when controlled by gender and occupation grade was conducted by Mein, Martikainen, Hemingway, Stansfeld, and Marmot (2003). This longitudinal study consisted of male and female civil service

employees recruited in 1985 who ranged in age from 35-55. Participants were employed in 20 different civil service departments in London, England. Phase One of the study recruited 10,308 employees who were given a health questionnaire and participated in a health screening from 1985-1988. Phase Two occurred in 1989 and consisted of a questionnaire administered by mail. Phase Three was considered the baseline measurement for this study while Phase Four was the follow-up. The average length of time between Phase Three and Four was 36 months, with response rates of 81% and 77% respectively. Both men and women in the civil service are required to retire at age 60 with exceptions made for outstanding employees who are allowed to work past the age of 60. Analysis for this study was limited to working civil servants who were between the ages of 54 and 59 at baseline. During the follow-up phase, subjects were grouped as 1) still working (n = 618) 239 of the 618 were over the age of 60, or 2) retired at the mandatory age of 60 (n = 392). One-hundred ninety-one subjects were excluded from the study because of early retirement due to either bad health, taking another position elsewhere, or terminations. Questionnaires were completed by 392 retired individuals and 618 working individuals at follow-up comparing scores of health functioning using The Short Form 36 General Health Survey (SF-36) which encompasses eight dimensions. These include: physical functioning, role limitations due to physical issues, social functioning, physical pain, mental health, role limitations due to mental health, vitality, and broad health perceptions. Scores were divided into mental and physical groupings using factor analysis. The average score for this survey is typically 50, with lower scores reflecting low functioning. There was very little difference between the functioning scores of men and women at baseline. Those who kept working had a lower mental

functioning score than those who retired.   Physical functioning dropped for both men and women at follow-up whether the subjects had retired or not. The data was also analyzed to determine if there were differences in mental or physical functioning based on employment grade, marital status, job satisfaction, or job control. Men and women were then combined, and adjustments were made for sex and age and marital status. Participants did not exhibit any significant changes in their physical functioning based on employment grade, marital status, job satisfaction, job control or whether they were retired or not. There were, however, changes by employment grade in mental functioning between those working and those retired. Mental functioning improved for retirees in the two highest employment grades even when adjusted for marital status, job satisfaction, and job control.

Patrick, Bassey, Irving, Blecher, and Fentem (1986) studied the physical activity levels of three groups of individuals before and after retirement. The 39 subjects worked in either steel or light manufacturing industries and were all over 60 years of age. These 39 male and female factory-workers (17 men and 22 women) had their activity levels measured prior to retirement, and 33 of those 39 (17 men and 16 women) had their activity levels measured again after their first year of retirement. All workers were either skilled or semi-skilled and were required to be on their feet the majority of the day and only rarely were required to perform physically strenuous tasks. All worked full-time and therefore were assumed to be in satisfactory health. Activity levels were objectively measured using heart rates and footfall signals that were recorded on miniature magnetic tape systems worn by the subjects. The system recorded bio-signals that showed the intensity and duration of physical activities within an entire day. Tape-recorded diaries

were also kept by an observer who interviewed the participants the morning after their magnetic tape-recorded sessions.

Sixteen of the male steel-workers were studied prior to their retirement, and 25 males were studied after the first or second year of their retirement. Eleven men were in both the pre- and post-retirement steel-worker groups. In addition, 16 of these 25 men were studied at two different times after their retirement, with at least two years between the study evaluation periods, in order to distinguish any changes in activity levels during retirement. There was also a sub-group consisting of seven men who were studied over a 10-14 day time-period to determine if there happened to be any day-to-day changes in activity levels that might be attributed to the day of week, i.e. work day versus weekend days. Neither group of men demonstrated any consistent or significant changes in either the intensity or duration of their activity levels after their first year of retirement. The 16 retired male steel-workers who were tracked a minimum of three years after their retirement did show a significant decrease in the intensity of their walking, indicating that their walking had slowed down. When analyzing body composition and weight, the results indicated that steel-workers experienced no changes at retirement while the male factory-workers experienced a 5% decrease in thigh muscle.

Female factory-workers experienced a significant decrease in activity levels one year after their retirement, while male retirees did not experience the same activity level decrease until several years after their retirement. Female factory-workers had no change in thigh muscle; however, they did have a 5% increase in thigh adipose tissue along with a 2% increase in weight. At the time of retirement, women who worked in the light industry experienced a significant decrease in the intensity of their walking.

All three groups of both men and women recorded low amounts of activity with no significant changes in heart rate either before, or one year after retirement.

Slingerland, et al. (2007) examined the effect of retirement on three major types of physical activity: work-related transportation, sports, and non-sports leisure time. They studied employees who were between 40 and 65 years of age and who had participated in the GLOBE Study (Health and Living Conditions of the Population of Eindhoven and surrounding area), which was conducted from 1991-2004 in and around the Dutch city of Eindhoven. A mailed questionnaire collected 1991 baseline data from 18,973 participants. In 2004 a follow-up questionnaire was sent to three groups who were randomly sampled from the original group of participants. The three groups consisted of one group of 2,800 respondents who were randomly sampled, another group consisted of 2,867 individuals who were sampled with chronic diseases, and a third group consisted of 1,246 individuals who lived in and around Eindhoven from 1991-2004. An analysis was conducted on retired and employed participants adjusting for age, sex, marital status, chronic disease, and education. Physical activity was measured using three different categories: work-related transportation such as walking or cycling to work, participating in sports activities, or participating in non-sports leisure-time physical activity such as walking, cycling or gardening. Researchers assessed the changes in physical activity during the 13 years of follow up using a multinomial logistic regression. Results showed that 70% of the participants at baseline had retired some time during the 13-year follow-up period. As expected, retirees were older at baseline than those who were still working at follow-up. Retirees who conveyed that they experienced chronic diseases were more often less educated. There were also some variations between those retired and those still

employed after the 13-year follow-up. The percentage of individuals who seldom participated in sports was lower at baseline for those who had retired than for those still employed 13 years later. After the follow-up, as might be expected, retirees experienced a significantly greater decrease in work-related physical-activity transportation. Results after follow-up also revealed that the number of participants who seldom participated in work-related physical activity increased from 55% to 90%. For those not yet retired, the decrease was much less, from 27% to 24%. Those still employed actually increased their participation in sports, while the retirees did not. Retirees did not show increases in any of the three categories of sports participation, while those still employed actually showed an increase in sports participation. When comparing the distribution of the respondents to the three categories of sports, the participation in each of the categories was comparable among those still working and those who had retired. In addition, retirement was associated with a significant decrease in non-sports leisure-time physical activity in contrast to those who were still employed.

A 2005 study conducted by Mein, Shipley, Hillsdon, Ellison, and Marmot in the United Kingdom investigated the association between work, retirement, and physical activity. Data was taken from the original Whitehall Study which began in 1985 and consisted of self-administered questionnaires given to 10,308 British Civil Service employees. The original intention of the Whitehall Study was to look at the social gradient in morbidity and mortality within the British Civil Service. This study analyzed data that was gathered between 1997 and 1999 from phase five of the original Whitehall Study. Phase five had 6,224 questionnaires returned with complete data. Respondents' ages ranged from 45 to 69, consisting of 50% between the ages of 45 and 54, 42%

between 55 and 64, and 8% between 65 and 69. Eighty percent of the participants were

married or co-habiting. Service occupations consisted of jobs from 13 grades. For

analysis of this study, jobs were divided into three groupings: high grades (administrative

with salaries from £25,393 - £150,000), middle grades (professional/executive with

salaries from £8602 - £17,182) and low grades (clerical/support staff with salaries

between £4995 - £13,025) with all of the salaries at 1995 rates. Fifty-four percent of the

men and 21% of the women were considered as having high-grade civil service positions.

Respondents were asked whether or not they were retired from the Civil Service and if

they were in paid employment elsewhere. If respondents reported not being in paid

employment elsewhere they were to categorize themselves as unemployed,

housewife/househusband, student, sick or retired. Respondents who classified

themselves as still being in paid employment, whether in the Civil Service or working

somewhere else, were asked how many hours per week they worked. This information

allowed for calculation to determine who had retired from the Civil Service as opposed to

those working prior to and after retirement. Sixty-eight percent of all respondents were

still employed for pay, and 64% of all respondents had not yet retired. More men were

still employed than women, 70% versus 62% and more men than women worked full

time, 87% versus 81%, respectively. There was no reported difference between men and

women with regard to retirement status.

The men had a stronger association between employment grade than did women. Men

who had been employed in the highest job grades participated in the most activities,

mainly sports, games and gardening activities, while women reported participating

mostly in household activities. Over 62% of the men stated that they met the

recommended amount of physical activity set in 1996 by the Department of Health (DOH), while 55% of the women stated they met the recommendations. This corresponds with more men holding the higher grade positions (administrative with salaries from £25,393 - £150,000). Older respondents, as well as those who were married or co-habiting, regardless of their gender, were significantly more likely to participate in the recommended levels of activity than were younger respondents or respondents who were single, separated or divorced. Questionnaires completed by the men in the summer months showed significantly more participation in activity than did the men who completed their questionnaires in the winter months. Activity levels for the women were similar during both seasons. Regardless of gender, there were consistent relationships linking physical activity with employment grade, working status, and retirement status. A significantly higher number of respondents who had worked in either medium- or high- grade positions, as well as those who worked part-time or did not work at all, along with those who retired, reported meeting the recommended physical activity levels. When comparing full-time workers who had not yet retired to those working ($\geq$ 30 hours/week) part-time ($\leq$ 30 hours/week) or not at all, the likelihood of their participation in recommended physical activity levels was 1.27 to 1.59 times and 2.13 to 2.28 times respectively when controlling for age. Retired respondents who had been employed full-time prior to their retirement reported slightly higher, but not significant, levels of recommended activity than did respondents who were working the same amount of time and had not yet retired even after controlling for age, marital status, season and employment grade. Respondents who had either worked part-time or not at all had a

higher response rate than the respondents who had worked full-time prior to their retirement.

Those respondents who had lower-grade jobs tended to report lower levels of physical activity regardless of their gender, whether they were retired or not or whether they were working full- or part-time. Those in lower grade positions were only 0.24 to 0.76 times as likely to have reported participating in the recommended physical activity level compared to those in higher grades, regardless of whether they were still working or not, with one exception: a few retired women who continued to work full-time reported higher levels of physical activity levels.

Wong, Rechnitzer, Cunningham and Howard (1990) designed a study to determine the association between the perception of exertion during exercise and actual exertion when exercising. These researchers studied 138 males who averaged 62.7 years of age and who were approaching retirement. Subjects were randomly assigned to an activity group, and all participated in a number of physiological tests when the study began (T1) and again at 12 months after they retired (T2). The preliminary assessment consisted of a physical exam and medical history. In addition, height, weight and body mass index (BMI) measurements, maximal oxygen uptake and ratings of perceived exertion (RPE), on a 15-poing scale were, also measured. Exercise leaders conducted training sessions three times per week. Participants were encouraged to add at least one extra day of exercise into their week. The intensity of their workouts was established according to a baseline that was determined during their first exercise test. They were asked to palpate their pulse during each training session.

Regression equations were used to calculate RPE for each individual. Multiple regression analyses were used to determine the associations between the items at the end of 12 months and at the study's baseline. This study showed that the control group experienced a decline in their overall fitness level 12 months post retirement. This decline included weight gain along with a significant increase in body fatness. Related to this change also came a shift in perception of perceived effort so that a specific workload after retirement was now perceived as higher. The activity group was successful at maintaining their pre-retirement body mass and body fatness levels. This group also showed a 12% increase in their level of cardiovascular fitness during this 52-week period. RPE along with oxygen uptake were both lower by approximately one to two units after the training period when compared to the start of the activity group. Findings, however, showed that when expressing oxygen uptake as a percentage of the maximum oxygen uptake, the results were unrelated to training.

Even though the RPE in the activity group did not change because of training, these subjects significantly improved their cardiovascular fitness as compared to the control group who showed no change in cardiovascular fitness and yet thought they had increased their perceived effort.

A 2002 study conducted by Evenson, Rosamond, Cai, Diez-Roux, Brancati, as well as additional investigators from the Atherosclerosis Risk in Communities Study analyzed data to determine what influence retirement had on leisure activity. At baseline, the study cohort ranged in age from 45-64. Four communities were sampled between the years of 1986 and 1989: Washington County, Maryland; Jackson, Mississippi; Forsyth County, North Carolina; and the suburbs in northwest Minneapolis, Minnesota. Three of the

locations consisted of samples that reflected the community demographics while the

Jackson location enrolled only African-Americans. An interviewer administered the

Baecke questionnaire to 1,825 African-Americans and 5,957 White participants who

reported they were still working during the initial visit. This questionnaire assessed

physical activity using three semi-continuous indices that ranged from low (1) to high (5)

for physical activity during work, participating in sports and during leisure time. The

leisure score was made up of four questions ranging from television viewing, to walking

and bicycling, as well as the period of time spent walking or bicycling either to shop or

go to work. The sports score consisted of three questions pertaining to how often they

participated in exercise or sport, how often they sweated, and how they compared their

own activity level to those they knew who were close to their same age. A fourth

component asked about the participants' frequency, duration and intensity of the four

activities. The work score was derived from questions that asked about the frequency of

standing, walking, sitting, sweating, lifting heavy loads, and if the participant was

physically tired when they left work for the day. If the participant did not experience any

activity at their job they were given a score of "1", all other components that made up the

work, leisure and sports scores were weighted uniformly. Physical activity scores were

also broken down and classified in one of the following four areas: 1) "maintainers"

those who, at baseline and year six, took part in a minimum of one exercise or sport; 2)

"sedentary" if a participant did not participate in a sport or exercise at baseline or year

six; 3) "adopters" who did not participate in exercise or sport at baseline but did at year

six; and 4) "stoppers" if a person participated in exercise or sport at baseline and then

ceased participating at year six. Study participants defined themselves as "employed" at

baseline and at the end of the six-year time-frame as either "employed", "retired and working" or "retired and not working". Race, gender, education, occupation and perceived health status were also examined. Multivariable linear regression models were used to study the scores related to sport only, leisure only, and sport in addition to leisure, along with the change in individual scores when looking at workers versus retirees. When comparing exercise maintenance with exercise adoption or stopping and with staying inactive, an unconditional multivariable logistic regression model was used. Age, education, gender, and perceived health status were all adjusted in the models used. Perceived health status was reported as follows: 35.4% reported excellent; 51.2% as good; 11.8% as fair; and 1.5 % as poor. Six-year physical activity monitoring utilizing Spearman's rank correlation coefficients along with confidence intervals mathematically based on the bootstrap method were employed.

Of those who retired during this six-year period, 26.1% were White females, 34.8% were White males, 26.0% were African-American females and 23.8% were African-American males. All participants who retired during this six-year time-frame, regardless of their race or gender, showed a significant increase in exercise and sport scores. Retirees' regular activity significantly increased regardless of their race or gender. In addition, during the six-year time period, participation in walking, as well as in watching television, increased in all groups, with the largest increase reported in the retiree group. The frequency of cycling for leisure was minimal and did not significantly change during the six-year period.

This study showed a significant increase in sport and exercise participation, as well as television viewing by those who retired versus those who did not during a six-year

time-frame. A lesser increase was reported by working African-Americans and Whites, with working Whites experiencing a significant decrease in their participation in exercise and sports. No group experienced a change of more than 3% in vigorous activity except for White males who reported they were both working and retired. Those who did not exercise or participate in sports at baseline were more likely to begin an activity program once they retired versus those who kept working, except for the subset of African-American women. Walking, yard work, gardening, and mowing were the activities that most participants cited as their activity. Finally, this study demonstrated that retirement was associated with an increase in television viewing as well as participation in exercise and sports.

In 2006 (Bryant, Trew & Bruce) examined a quantitative case study of Mrs. A who retired at the age of 56 after being employed as a health professional for 30 years. One week prior to her retirement she was tested for a baseline of her activity levels, lower limb strength, balance as well as range of motion. This testing was repeated at six months, and again at 12 months after her retirement. Mrs. A's initial assessment revealed that she had no visual impairments and was not taking any medications and yet she had fallen twice in the last 12 months. She reported only participating in the minimum level of physical activity. Prior to her retiring she communicated that she wanted to increase her fitness level by joining a local health club upon retirement. Mrs. A informed the researchers that she had experienced several unexplained falls prior to the beginning of the study. She showed lower limb muscle weakness and her peak torque values were much lower than those of a group of volunteers with the same body size and from the same age group. In fact, her highest torque values were consistent with a group of elderly

nursing home residents whose mean age was 82. Mrs. A's balance was also significantly more unstable than those of her same age group, and she experienced a smaller range of movement in her ankle joint.

After Mrs. A retired she became significantly more active. She joined a fitness club which she visited five times per week and where she used a cross-trainer, cycled and walked on a treadmill. She began bowling and joined a line dancing class. Her increased activity level had a significant impact on her level of physical fitness. Six months after Mrs. A's retirement she had a substantially higher physical fitness level and improved lower limb strength and range of motion, as well as improving her balance which led to her not experiencing any falls after her retirement. These results indicated that Mrs. A attained considerable increases in her physical fitness levels that resulted in physiological benefits in a limited amount of time. These important lifestyle changes which began once she retired assisted her in improving her functional independence.

In a 1988 study, Kolanowski and Gunter found that exercise did not affect the health status or morale of the retired career women they studied. The sample studied 43 retired women who were members of a Women's Club in northeastern Pennsylvania and who had completed a survey focusing on exercise. They were asked to write three letters: a type of written life-review that included their major roles, life events, challenges and accomplishments, as well as their health practices. In addition, they were also asked to complete questions inquiring about their demographic information. The Philadelphia Geriatric Center (PGC) Morale Scale was administered to the participants before and after they wrote their life reviews and completed their health and exercise questionnaire. The PGC consisted of 17 items that evaluate the psychological condition of older people.

Morale issues such as attitude towards aging, agitation and loneliness were also measured. Twelve items were asked about exercise and health with the main focus on respondents' views of the aging process, views on exercise and how it ties to health, as well as their exercise patterns.

Demographic information consisted of age, marital status, number of children, living arrangements, occupation and health status. These data were analyzed using descriptive statistics.

The participants ranged in age from 51-85 years of age with a mean age of 69.4, and 53.4% were married and living with their spouses. Of the 37 ever-married women, the mean number of children was 1.5, with nine of the married couples without any children. Most frequently cited occupation was teaching at 34.8% followed by secretarial work at 25.5%. Thirty-nine indicated that they worked an average of 26.3 years in their careers. Just over 76% rated their health as excellent or good while in contrast, only 2.3% rated their health as poor. Subjects thought of aging in terms such as "relaxation," "opportunity," and "satisfaction." They seldom selected the negative categories that included "decline," "deterioration" and "increased illness." Morale, as measured by the PGC scale, was also high scoring 28 (scores of 13-17 are usually viewed as high). The majority of participants considered exercise as beneficial in relation to maintaining health, remaining active, and assisting them in feeling better. They didn't feel as strongly about exercise playing a role in maintaining their independence or improving their fitness level. For the most part, their enjoyment of exercise after retirement didn't change. Subjects considered a 15-minute walk, gardening, and housework to be exercise. Most of them participated in moderate exercise two to three times per week. Slightly less than

half reported participating in "little if any exercise," and just a few reported participating in "vigorous exercise." The most common reasons given for hindering exercise participation were pain or discomfort and physical limitations. Most were not interested in participating in any type of planned programs; only 12 said they would consider this option. Walking and dancing were the two exercises that they stated they were interested in.

A chi-square method of analysis indicated that the quantity of exercise a subject participated in did not have any significant effect on their health ratings. Those who reported their health as good to excellent did, however, exercise more frequently than those who reported their health as only fair to poor. The quantity of exercise did not show a significant impact on morale. Those who participated in moderate to heavy exercise had a higher morale when compared to subjects who reported low or moderate exercise.

Nutritional and physical activity levels for pre- and post-retirees were studied by Lauque, Nourashemi, Soleilhavoup, Guyonnet, Bertiere, Sachet, Vellas & Albarede (1998). They looked at nutritional and physical changes six months before and 18 months after retirement. Fifty-two individuals, 37 women and 15 men, completed the study. They were selected from the Toulouse Pension Fund office, and of those enrolled, 60% were associated with the National Education Insurance Company. The majority were retired teachers with a mean age of 57.3 ± 3.2 years. They were seen six months prior to retirement, and then again at six and 18 months after retirement. Each one's dietary intake as well as their physical and functional status was examined. In conjunction with these examinations, they also completed a questionnaire to gauge their

sense of well-being. Participants reported their medical history by means of a questionnaire and interview and had a physical examination that consisted of height, weight, tricep skin-fold, calf circumference, and waist and hip measurements.

A 56-question inventory, the Iowa Self-Assessment Inventory (ISAI), was used to assess well-being. This consisted of seven scales that assessed: physical health, mobility, emotional balance, cognitive status, social support, trusting others, and economic resources. The inventory measured perception of status in these areas. Physical activity was measured using a self-administered questionnaire that asked if they participated in sports and how much time they spent walking. This questionnaire also gathered data on socio-cultural activities, time spent eating meals, and whether or not one took nutritional supplements. Dietary intake was measured by having them keep three-day food diaries.

Physical and social activities both showed an increase after retirement. The ISAI assessment displayed very little change in health after retirement, but it did show a significant improvement in emotional well-being. Changes in individual's subjective health six months prior to retirement was compared to 18 months after retirement. Results showed that participants increased their physical activity from 32.7% to 42.3%, were more engaged in social activities up from 9% to 30%, and visited friends more often increasing from 22% to 44% when comparing pre- and post-retirement.

Anthropometric changes were minimal. The change in men's weight at 18 months post retirement (83.7 ± 9.4 Kg vs. 85.8 ± 10.4 Kg, $p < 0.05$) was small but significant. In addition, body mass index (BMI), calf circumference, brachial circumference and tricep skin-fold also showed no significant changes after retirement. Women did not show a

change in BMI or any other of the anthropometric measures during the two-year time span of the study.

Minimal changes were detected in their diets pre- and post-retirement. The two exceptions were an increase in the consumption of bread and alcohol after retirement.

This study has determined that psychosocial factors impact length of life in the very old. These factors consist of personal and psychological characteristics, environmental circumstances, as well as lifestyle preferences, all of which have been linked to well-being.

Anstey, Luszcz, and Andrews (2002) evaluated the effect that psychosocial factors, self-rated health (SRH), and self-rated life expectancy had on the risk of mortality during a nine-year period of time. Two-thousand eighty-seven males and females, 65 years of age or older, participated in this Australian Longitudinal Study of Aging (ALSA). The South Australian Electoral Roll was used to determine which homes had residents who were 70 years old or older. Cohorts were stratified by sex and age into three groups: 70-74, 75-79, 80-84. A fourth group was made up of those 85 years of age or older. If households had other members who were 65 years of age or older, they too were integrated into the study.

Six waves of data were collected: the first from September, 1992, through March, 1993, and served as the baseline and then again five additional times, approximately one year apart. During the baseline, each person completed a two-hour home interview as well as a voluntary individual clinical assessment. Interview questions covered demographics, health, physical status, and medical psychosocial issues. Measures of psychological well-being included questions related to satisfaction, perceived control,

and self-esteem. Measures of socio-demographics and functional self-ratings included self-rated health and social memberships. Mortality status was determined by official death certificates. All predictors were assessed after adjusting for three series of analyses: for age alone, for age and SRH, and for age, SRH, instrumental activities of daily living (IADL), and climbing stairs.

Results showed that 1,109 of the 2,087 participants were still alive through March 31, 2001, with those who were surviving being almost four years younger than those not surviving at the end of the study. A higher percentage of those non-survivors were men. One-fourth of those still living thought they were "very likely" to live another ten years and another half of those still living thought they were "likely" to live another ten years for a combined total of 72%. These data suggest that older adults have a perception about their probable longevity and that it is associated with their real survival outcomes

They were evaluated on their SRH, morale, perceived control, life satisfaction, social participation, self-rated life expectancy, and self-reported physical function. The study showed that psychosocial variables were associated with self-rated health, and that self-rated health was shown to be predictive of mortality. There was also a strong link between self esteem and control. After adjusting for age, all of the lower psychosocial scores were associated with mortality. Psychosocial scores were shown to be associated with physical function as well as health status and determined to be inseparable from one another when relating them to the adults who are very old.

Women's longevity was shown to be related to morale and perceived control, along with social participation when controlling for SRH, physical function, and age. The results also revealed that men's longevity was related to perceived control when SRH,

physical function and age were controlled. Results also indicated that there seems to be a solid difference in the relationships of psychosocial variables and mortality based on gender. Men's results suggest that their psychosocial factors may have an effect on self-rated health, which in turn impacts mortality. Women's results were impacted more by the positive characteristics associated with high morale and perceived control. If men experienced poor physical function, it negated any advantage that may have been associated with a positive psychological function.

Participants were followed up three years later, and it was shown that self-rated life expectancy predicted mortality over nine years. A second significant predictor of mortality was the ability of individuals to climb two flights of stairs. This held true for men and women even when self-rated health was controlled. This indicates that how one rates their physical performance is separate from their actual health. Additional analyses confirmed that a number of psychosocial measures were independent of one's physical functioning.

This study includes the variable of perceived health status which will be measured to determine if there is a direct correlation between perceived health status with or without participation in physical activity.

A study of older adults living in a retirement community (Stuart, Marret, Kelley, & Nelson, 2002) indicated that younger age and higher levels of education achievement have a positive affect on physical activity. In addition, receiving advice from a physician about the importance of being physically active were all predictors that correlated positively with increased participation in physical activity.

One hundred and nine participants living in an independent retirement community in De Kalb, Iowa, completed an 18-item survey. Survey items consisted of questions related to age, gender, level of education, amount of physical fitness, and whether their health care professional encouraged them to be physically active. Multivariate regression analysis was applied to establish predictors of the dependent variables, which included frequency, intensity, and duration of physical fitness involvement. The independent variables that were determined to be significant in the multivariate regression analysis were then used to calculate each of the dependent variables using a univariate regression analysis and descriptive statistics. Results showed the majority of the respondents were female (75.2%) and the ages ranged from 62-100. Thirty-five percent of the respondents graduated from high school, and 65% had attended one to six years of college. Participants reported participating in some type of physical activity a minimum of four times per week. Fifty-seven percent reported participating in physical activity for more than 21 minutes at a time and 53% perceived their workout as "somewhat hard". Results showed that the significant predictors of physical fitness participation were: younger age, higher level of education, having a positive attitude regarding physical activity, and having a physician advise participation in physical activity. These four variables accounted for a statistically significant amount of the variance for all four aspects of physical fitness: frequency, intensity, duration, and mode.

According to Dubbert (Caban-Martinez, 2007), while cigarette smoking, high blood pressure, and high cholesterol levels have a major impact on heart disease, by far the most widespread risk factor impacting heart disease is inactivity. Physical inactivity poses a huge burden on the U.S. economy. A study by Garrett (Caban-Martinez, 2007)

projected that inactivity alone explains approximately 9% of the U.S.'s annual health care costs.

Summary

The data from these studies indicates that physical activity does have an impact both mentally and physically on individuals as they age. There was, however, no conclusive data verifying that retirees did increase their physical activity upon retirement.

The studies in this literature review indicated that men were more likely to be involved in physical activity prior to retirement and were more likely to keep up their physical activity routine after retirement. Females, on the other hand, tended to show less participation in physical activity both pre- and post-retirement.

Even though the studies showed results that were somewhat conflicting in their conclusions about whether or not retirees increase their physical activity post-retirement, the studies did point out significant findings surrounding physical activity. That is, occupation, education level and optimistic attitudes regarding physical activity had direct impacts on outcomes. In addition, usually those in a physical activity program prior to retirement seemed to maintain it after retiring. It is a complex issue because there are so many variables that are related to an individual's physical activity.

This study will provide move definitive answers to the relationship of retirement and physical activity. The data which will be utilized is comprised of a much broader base of participants (n = 1,180). One of the most prevalent barriers given for not participating in physical activity is lack of time. In addition, this study will allow for insight as to whether or not the act of retiring impacts an individual's participation in physical activity when controlling for age, gender, race and perceived health status.

CHAPTER III

METHODS

Procedures

Data for this study were obtained from a longitudinal study of health, retirement and aging titled the Health and Retirement Study (HRS). The HRS is primarily sponsored by the National Institute of Aging (NIA) and is administered by the Institute for Social Research (ISR) at the University of Michigan.

The HRS began in 1990 when F. Thomas Juster of the University of Michigan ISR was awarded a five-year cooperative agreement by the NIA. The goal of the HRS was to gather and provide a source of data on retirement to researchers, policy analysts, and program planners who make major policy decisions affecting retirement. The purpose of the HRS was to gather data on the aging American population as it relates to their health and economic well-being as well as the well-being of those helping older family members through public programs.

This longitudinal study of health, retirement and aging provides data to researchers that illustrates the course of health, economic and family status of Americans over the age of 50. These data have been previously used to test theories and behavioral models. In addition, the HRS also provides data for a variety of science disciplines including: health and cognitive conditions and status; employment status and job history; as well as the demographic background of participants.

The initial HRS cohort was interviewed in 1992, and was comprised of participants who were born between the years of 1931 and 1941 hence were 51 to 61 years of age.

All cohorts were obtained from a nation-wide representative sample. Participants were asked to complete a survey that included a consent and release statement; a confidentiality statement; as well as a health history questionnaire.

Interviews comprised a broad range of topics administered mostly via telephone. Topics included work; retirement and work history; income and wealth; self-reports of major health conditions; health care utilization; insurance coverage; out-of-pocket spending; and relationships with family members. All participants were paid $40.00 for participation in the survey.

The present HRS is comprised of five cohorts:

1) Initial HRS cohort, born 1931 to 1941, who were first interviewed in 1992 and subsequently every two years after.

2) Study of Asset and Health Dynamics among the Oldest Old (AHEAD), born before 1924 who were first interviewed in 1993, 1995, 1998, and subsequently every two years,

3) Children of Depression Age (CODA) cohort, born 1924 to 1930, first interviewed in 1998 and subsequently every two years.

4) War Baby (WB) cohort, born 1942 to 1947 and first interviewed in 1998 and subsequently every two years.

5) Early Baby Boomer (EBB) cohort, born 1948 to 1953, first interviewed in 2004.

In addition to respondents, spouses or the partners of respondents were also interviewed regardless of their age.

A steady-state design was implemented assuring that new respondents between the ages of 50 and 56 are added every six years. The HRS is now a panel study that consists of interviews conducted biennially, generally by telephone.

The core study design consisted of:
- A national panel study
- Initial sample of 12,000+ persons from 7, 600 households, current sample is 26,000 persons from 15,000+ households
- Oversamples (100%) of Hispanics, Blacks and Floridians
- Baseline data consists of in-home, face-to-face in 1992 for the Children of the Depression Age (CODA), War Babies (WB) and the Early Baby Boomer (EBB) cohorts
- In 1998 the HRS and AHEAD studies combined the survey instrument and field data sets
- Follow-up interviews via phone every second year

Questionnaire topics included:
- Cognitive and health conditions and status
- Retirement plans and perspectives
- Attitudes, preferences, expectations, and subjective probabilities
- Family structure and transfers
- Employment status and job history
- Job demands and background
- Disability
- Demographic background
- Housing
- Income and net worth
- Health insurance and pension plans
- Experimental modules

The purpose of this study is to determine if retirement affects participation in vigorous physical activity. The hypothesis is: Does retirement affect participation in vigorous physical activity? This hypothesis is derived from the argument that one of the most prevalent reasons people provide for not being physically active is lack of time. If this is a valid reason, then the act of retiring should enhance a person's participation in vigorous physical activity. This study will compare the self-reported activity of participants with

those who retired and those who did not retire to determine if the actual event of retirement predicts increased participation in vigorous physical activity. This is based on the supposition that upon retirement participants might have more available and unscheduled time. If this supposition holds true, there should be no relationship between the pre- and post-test; regardless of how much they exercised prior to retirement, they should have increased levels of exercise after retirement compared to those who did not retire.

Sample

Subjects for the present study consisted of voluntary participants who took part in the 1998 and 2000 HRS cohorts. The 1998 and 2000 HRS cohorts' data were utilized because it was the two-year time period that consisted of the largest number of individuals who had retired. Of the 17,679 respondents in the HRS, 5,351 individuals reported that they were still in the workforce in 1998. Of the 5,351 still working in 1998, 902 reported retiring between 1998 and 2000.

Permission to utilize the 1998 and 2000 HRS data set for the purpose of this research was granted by registering for access to the HRS Public Release Data and by agreeing to the Conditions of Use for Public Data Files in January, 2008. Additionally, authorization for this study was obtained from the University of Nebraska Institutional Review Board (IRB) under the Exemption Category Four status of pre-existing data (Appendix F).

Respondents are uniquely identified in the HRS database by two numbers that when combined identify individual respondents. The first unique number is the household identifier (HHID) and the second unique number is the three-digit person number (PN). The PN is assigned to a specific respondent. The assignment of a PN number to each

respondent helps to ensure that confidentiality of the individuals participating in the HRS is not compromised. In addition, a statement of confidentiality was read to respondents (Appendix C).

Analysis of Data

The HRS data were downloaded from the RAND Center for the Study of Aging web site. The RAND Center for the Study of Aging has taken the HRS data, processed and streamlined it to make it more practical and easier to use than the HRS data. Variables were entered into the Statistical Package for the Social Sciences (SPSS) 17.0 for Windows (2006 SPSS, Inc.).

The statistical approach utilized in the present study was a non-equivalent control group design that used a residualized change score analysis. Specifically, in a regression analysis, the post-test was regressed on the pre-test, yielding a set of residual scores. These scores reflected the portion of the variance in post-test scores that were not predicted from the pre-test. The value being predicted using logistical regression is essentially the probability which ranges from 0 to 1. The presumption was that these residuals contain both random error and change in the dependent variable that occurs from pre- to post-test. The portion of the variance containing change was explained by the indicator variable, in this case, retired versus not retired, net of the other covariates (age, gender, education, income, race and perceived health status).

The independent variables in this study were vigorous physical activity on the first survey administration in 1998 (T1) and retirement status on the second survey administration in 2000 (T2) all adjusted for age, gender, education, income, race and perceived health status. The dependent variable in this study is vigorous physical activity

on the second survey administration in 2000 (T2) also adjusted for age, gender, education, income, race and perceived health status. Because the dependent variable is a categorical variable and is classified into groups, it was analyzed using logistic regression.

   In this study the independent variable, participation in vigorous physical activity was determined by asking subjects the survey question: On average over the last 12 months have you participated in vigorous physical activity or exercise three times a week or more? Vigorous physical activity was defined as participating in activities such as sports, heavy housework, or a job that involves physical labor. The response choices were: yes, no, don't know, or refused. The second independent variable, retirement status was determined by asking subjects if they were still in the workforce (T2). The response choices were: yes, no, don't know, or refused. The dependent variable was vigorous physical activity on the second survey administration (T2). Covariates are predominately used to control for spurious effects which can potentially influence both the independent and dependent variables. This HRS data consisted of a variety of levels of covariates. Covariates controlled in this study include age, gender, education, income, race and perceived health status (see Table 3.1). Covariate study questions are listed (Appendix B).

Table 3.1

Selected Variables from the Health and Retirement Study Data

Variable	Level of Measurement
Control Variables:	
Age	Interval
Gender	Nominal
Education	Ordinal
Income	Absolute
Race	Nominal
Perceived Health Status	Ordinal
Independent Variables:	
Vigorous Physical Activity on the First Survey Administration T1 (1998)	Nominal
Retirement Status on the Second Survey Administration T2 (2000)	Nominal
Dependent Variable:	
Vigorous Physical Activity on the Second Survey Administration T2 (2000)	Nominal

CHAPTER IV

RESULTS

The present study was designed to investigate the relationship of retirement on vigorous physical activity. The following research question was examined: Does retirement affect an individual's participation in vigorous physical activity?

Demographic Variables

Covariates controlled for were age, gender, education, income, race and perceived health status. The primary independent variables in the present study were vigorous physical activity on the first survey administration (1998) and retirement status on the second survey administration (2000). The dependent variable was vigorous physical activity on the second survey administration (2000).

The Health and Retirement Study (HRS), using the RAND Center for the Study of Aging data had a total of 4,449 respondents who were still in the workforce in 2000 and 902 participants who were either totally, or partially retired, between the administration of the 1998 survey (T1) and the administration of the 2000 survey (T2).

Table 4.1 shows the demographic information of the sample. Those making up the entire sample consisted of 51.7% males and 48.3% females; 82.4% White/Caucasian, 13.5% Black/African American and 4.1% reported themselves in the "Other" category of race. Those who retired between T1 and T2 consisted of 57.4% males and 42.6% females; 82.2% were White/Caucasian, 15.0% Black/African American and 2.9% in the category of "Other".

Between T1 and T2, 16.9% of participants reported having retired. The ages of participants ranged between 27 and 92 years of age at the beginning of the 2000 data collection. The average age was 58.95 years (SD = 6.7) for the entire sample and 63.39 (SD = 6.9) for those who retired between T1 and T2.

Participant education levels ranged from no formal education to 17 years or more, with 82.2% of the participants in the entire sample reporting having completed high school or having higher levels of education. The average years of education was 13.03 (SD = 2.9) for the entire sample and 12.56 (SD = 2.9) for those who retired between T1 and T2.

The total annual income for the entire sample ranged between $0.00 and $5,539,024 with the average income being $80,558 (SD = $137,356) while the average income for those who retired was $56,828 (SD = $73,521).

Table 4.1

Sample Demographic Information

	Entire Sample	Retired Between T1 and T2
Gender		
% Male	51.7	57.4
% Female	48.3	42.6
Race		
% White	82.4	82.2
% Black / African American	13.5	15
% Other Race	4.1	2.9
% Retired between Pre and Post	16.9	-
Average Age (SD)	58.95 (6.7)	63.39 (6.0)
Average Education in Years (SD)	13.03 (2.9)	12.56 (2.9)
Average Income (SD)	$80,558 ($137,356)	$56,828 ($73,521)

Table 4.2 shows that participation in vigorous physical activity for the entire sample did not significantly change from pre- to post-test (53.3% versus 50.9%) nor did their inactivity levels (46.6% versus 49.1%). Participation in vigorous physical activity for those who had retired between T1 and T2 was 54.0% during the pre-test and 51.2% post-test while inactivity levels were 46.0% and 48.8% from pre- to post-test. Past physical fitness behavior supported future physical fitness behavior (Jackson, Smith, & Conner, 2003; Armitage, 2005; Boudreau & Godin, 2007).

Table 4.2

Participation in Vigorous Physical Activity for the Entire Sample and Those Who Retired Between T1and T2

		Entire Sample				**Retired Between T1 and T2**			
		Pre		Post		Pre		Post	
		#	%	#	%	#	%	#	%
Do you participate in vigorous physical activity 3 or more times per week?									
	No	2496	46.6	2625	49.1	415	46.0	440	48.8
	Yes	2852	53.3	2725	50.9	487	54.0	462	51.2
	Total	5348	99.9	5350	100.0	902	100.0	902	100.0

Those in the entire sample in T1 reported their perceived health status as good, very good or excellent totaling 85.5% compared to 86.1% in T2. Individuals reporting their health as fair or poor in T1 and T2 totaled 14.5% and 13.9% respectively as shown in Table 4.3. Those who retired between T1 and T2 who reported their perceived health status as good, very good or excellent accounted for 80.0% and 76.9% in T1 versus T2. Interestingly, those in the entire sample who reported their health in the good, very good or excellent categories in T1 actually showed a slight but insignificant increase in T2.

Table 4.3

Perceived Health Status for the Entire Sample and Those Who Retired Between
T1 and T2

	Entire Sample				**Retired Between T1 and T2**			
	Pre		Post		Pre		Post	
	#	%	#	%	#	%	#	%
Perceived Health Status								
Excellent	1030	19.2	1044	19.5	118	13.1	137	15.2
Very Good	1834	34.3	1972	36.9	285	31.6	287	31.8
Good	1715	32.0	1587	29.7	318	35.3	270	29.9
Fair	672	12.6	593	11.0	158	17.5	152	16.9
Poor	100	1.9	153	2.9	23	2.5	55	6.1
Total	5351	100.0	5349	100.0	902	100	901	99.9

Disability and change in perceived health status variables were eliminated from the model because of the high collinearity between these variables and that of participation in vigorous physical activity.

Analysis of the Research Question

The research question examined if there was a correlation between the independent variables of participation in vigorous physical activity (T1) and retirement status (T2) to the dependent variable participation in vigorous physical activity (T2) while controlling for age, gender, education, income, race and perceived health status.

Logistic regression analysis was utilized to analyze the 1998 and 2000 RAND HRS data to predict the values on the categorical variable, participation in vigorous physical activity. This regression analysis method indentifies the probabilities of the specific outcomes for each participant involved. In the present study, this analysis attempts to

predict membership into one of four categories for those in the entire sample as well as those who retired between 1998 and 2000: 1) those participating in vigorous physical activity in 1998/T1, 2) those not participating in vigorous physical activity in 1998/T1, 3) those participating in vigorous physical activity in 2000/T2, or 4) those not participating in vigorous physical activity in 2000/T2 (Table 4.4). Physical activity categories for the entire sample who reported not participating in vigorous physical activity in T1 or in T2 consisted of 32.8% who were labeled "sedentary". "Maintainers" were the participants who continued being physically active from T1 to T2, this group consisted of 37.0% for the entire sample. Those who were physically active in T1 but discontinued being physically active in T2 were the "stoppers" making up 16.3%. The "adopters" were the group of individuals who were previously inactive in T1 and began being physically active between T1 and T2 consisting of 13.9%. Those who retired between T1 and T2 fell into the following physical activity categories: "sedentary" 29.7%, "maintainers" 34.9%, "stoppers" 19.1% and "adopters" 16.3%.

Table 4.4

Physical Activity Categories for the Entire Sample and Those Who Retired Between T1 and T2

| | | **Post: Do you participate in vigorous physical activity 3 or more times per week?** | | | |
| | | No | | Yes | |
		Entire Sample	Retired Between T1 and T2	Entire Sample	Retired Between T1 and T2
Pre: Do you participate in vigorous activity 3 or more times per week?		**Sedentary**		**Adopters**	
	No	n=1752	n=268	n=744	n=147
		32.8%	29.7%	13.9%	16.3%
		Stoppers		**Maintainers**	
	Yes	n=872	n=172	n=1979	n=315
		16.3%	19.1%	37.0%	34.9%

Physical activity in T1 had a significant effect on physical activity in T2 controlling for the covariates of age, gender, education, income, race, and perceived health status (Table 4.5). Conversely, there was no relationship between retirement status and physical activity. Of the covariates, age, income and race were not predictive of participation in physical activity after controlling for all the variables in the model. Gender was significantly related to participation in physical activity, with men being more physically active than women. Perceived health status was significantly related to participation in vigorous physical activity. Those with better health were significantly more likely to participate in vigorous physical activity. Education was significantly, but negatively, related to participation in physical activity.

Table 4.5

Vigorous Physical Activity and the Major Selected Explanatory Variables

	B	S.E.	Odds Ratio	95% C.I. for Odds Ratio Lower	Upper	p-value
Pre-Retirement Vigorous Physical Activity	1.601	0.061	4.96	4.387	5.584	0.000
Retired	0.054	0.085	1.06	0.89	1.246	0.525
Age	0.005	0.005	0.995	0.986	1.005	0.337
Women	-0.377	0.062	0.686	0.608	0.776	0.000
Years of Education	-0.026	0.011	0.974	0.95	0.996	0.022
Income	-0.024	.039	0.976	0.904	1.094	0.536
Race:						
(Other / Reference Group)	-	-	-	-	-	-
White/Caucasian	-0.039	0.156	0.962	0.708	1.307	0.804
Black/African American	-0.114	0.173	0.983	0.636	1.253	0.511
Perceived Health Status	0.265	0.032	1.306	1.226	1.3961	0.000
Constant	-0.293	0.551	0.746	-	-	-

* $p < .05$

Table 4.6 illustrates that all of the variables together, predict approximately 16.6% (Cox & Snell Pseudo-R^2) to 22.1% (Nagelkerke Pseudo-R^2) of the variability in participation in vigorous physical activity after retirement.

Table 4.6

Variability in Participation of Vigorous Physical Activity after Retirement

Cox & Snell R Square	Nagelkerke R Square
.166	.221

These variables also predict whether participants engaged in vigorous physical activity after retirement for approximately 69.8% of the population.

Results from this study support the hypothesis that the relationship between pre- and post-test should be positive. Thus, most of those who reported having high levels of physical activity prior to 1998 tended to remain high in 2000 and those who reported having low levels of physical activity in 1998 tended to remain low in 2000 whether or not they had retired.

CHAPTER V

DISCUSSION

The purpose of the present study was to determine if retirement impacts participation in vigorous physical activity. The variables examined were vigorous physical activity in 1998 (T1) and retirement status and vigorous physical activity in 2000 (T2). Individuals participating in the HRS were asked: On average over the past 12 months have you participated in vigorous physical activity or exercised three times a week or more?

The results showed that in the 1998 and 2000 HRS sample, the most significant indicator of participation in vigorous physical activity was an individual's participation in vigorous physical activity prior to retirement.

An inherent phenomenon in the 1998 and 2000 data should be noted in order to qualify the present findings. There were very few 1998 and 2000 HRS respondents from the entire sample who reported their health as fair or poor, 14.5% and 13.9%. The majority, 85.5%, reported their perceived health status as good, very good or excellent in T1 compared to 86.1% in T2. Eighty percent of those who retired between 1998 and 2000 reported their perceived health status and good, very good or excellent in the pre-test as compared to 76.9% in the post-test. Those who retired between the pre- and post-test reported their health as fair or poor were 20.0% and 23.0% respectively.

Age, Gender, Education, Race, Income and Perceived Health Status

When controlling for age, gender, education, income, race, and perceived health status, the covariates that were significantly related to vigorous physical activity after the administration of the 2000 survey were previous participation in vigorous physical

activity, gender and perceived health status. Education was inversely related to T2 which is the opposite of what would be expected from the review of literature. One explanation for this may be due to the definition of vigorous physical activity provided in the HRS survey that specifies vigorous physical activity to include such things as sports, heavy housework or a job that involved physical labor. In addition, those less educated being more likely to be working in blue collar positions and may consider their work activity to be perceived as "vigorous".

If participants perceived themselves as being in excellent, very good or good health, then they were much more likely to report participating in vigorous physical activity. It is difficult to determine if their perception of being healthy is due to participating in physical activity or if it is a result of participating in physical activity. Participation in vigorous physical activity in 1998 was highly correlated to participation in vigorous physical activity in 2000. The reasons for this correlation could be that long-time physical activity habits have been established, good physical health is highly valued, social benefits have been experienced, and the desire for an appealing physical appearance.

Limitations

The results analyzed in this study are based upon self-reported data that fundamentally are subjectively biased and based on recall. Second, these data do not include information on non-leisure-time physical activities or participation in moderate physical activity; therefore one's total activity may be underestimated. A third limitation is that only one question was asked regarding participation in physical activity: "On average over the last 12 months have you participated in vigorous physical activity or exercise

three times a week or more? By vigorous physical activity we mean things like sports, heavy housework, or a job that involved physical labor." Yes, No, Don't Know, Refused (HRS, 1998 & 2000). A fourth limitation that may be problematic is the definition of "vigorous physical activity" in the HRS and/or the term "vigorous" itself. There are a wide range of activities that promote health that may not be considered "vigorous" by some and not by others. In addition, there are a variety of types of physical activities that promote health but may not be considered by some to be vigorous. For example, tai chi or yoga. Additional limitations that may also have an impact on the results are the various socio-demographic variables that were not analyzed in this study. Participants' environmental climate, whether they reside in a rural setting or are city-dwellers, whether or not they live in a suburb or downtown, how walk-able their community is, how safe their community is, whether they were in white or blue collar professions and the differences in activity levels based on seasonal swings could all have an impact on vigorous physical activity.

Additionally, a time-series analysis at one-year intervals after retirement may have helped to establish more clearly the stages in retirement adjustment.

Another major limitation in this study is that we do not know the actual reason, or reasons, why participants retired. The retiree may have been laid off, taken an early buy-out, may not have enjoyed their job or had a sick spouse or relative. These are only a few of the potential reasons for retiring which also may have contributed to their physical activity level.

Influences on Physical Activity

Currently, the majority of adults do not engage in a level of physical activity that is recommended for a healthy lifestyle. There are a mired of activities that retirees may look forward to after retirement that does not include participation in vigorous physical activity. For instance, volunteering, traveling, caretaking of one's spouse, babysitting grandchildren, gardening, reading, taking classes, participating in hobbies as well as other things.

Research has indicated that an individuals' physician has a significant influence on their health behaviors, one of which includes their physical activity levels. Weidinger, Lovegreen, Elliott, Hagood, Haire-Joshu, McGill, and Borwnson, (2008) conducted a longitudinal study that found exercise counseling was most effective when a physician communicated a prescription or plan for the patient, inspired action and devised a plan for follow up. Healthy People 2010 challenges physicians to counsel at-risk patients about their health behaviors such as physical inactivity. Physicians are thought to be in a position to give effective advice due to their knowledge of patients' families, environments and communities. Physician counseling is recognized as having a positive impact on their patients' health-related behaviors.

In addition to the influence an individual's physician has on incorporating regular physical activity into their life, worksite health promotion efforts prior to retirement could play an important role in incorporating regular physical activity into an individual's life prior to their retirement (Berger, Der, Mutrie & Hannah, 2005).

Individuals and society, as well as the future of health promotion would all benefit if health promotion evolved to not only include the working employee population but also

to include the retiree population. If retirees were brought into the fold of health

promotion it could have a huge impact on the maintenance and rehabilitation of their

functional capacity (Beobil, 1989).

CHAPTER VI

ASSUMPTIONS, CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

The purpose of the present study was to determine if retirement impacts participation in vigorous physical activity. In fact, the results showed that the most significant predictor of participation in vigorous physical activity was an individual's participation in vigorous physical activity prior to retirement. Individuals participating in the HRS were asked: "On average over the past 12 months have you participated in vigorous physical activity or exercised three times a week or more?" The independent variables were vigorous physical activity on the survey administered in 1998 (T1) and retirement status on the survey administered in 2000 (T2). The dependent variable was vigorous physical activity on the second survey administration which was in 2000 (T2). The HRS data were analyzed utilizing frequency statistics and logistic regression.

Assumptions

The following assumptions are integral to any conclusions which are derived from the findings of the current study.

1.   It is assumed that the individuals answered the questions administered to them on the HRS truthfully to the best of their ability.

2.   It is assumed that survey participants were randomly selected from a nation-wide representative sample and that there was no attempt to alter or preselect the sample.

3.   It is assumed that analyzing the data for those who retired between 1998 and 2000 provided the best representation of possible participants for this study.

Conclusions

The purpose of the present study was to expand the body of existing knowledge associated with the relationship of retirement and physical activity. A very common response given as to why people do not participate in physical activity is because they have little or no time for it. Retirement is when leisure-time is most abundant, or, at the very least, individuals have more unscheduled time. Lack of time appears to be a convenient, and often given reason for not participating in physical activity. It is my belief that the "lack of time" response is frequently given because it seems to be a socially acceptable response for most of those who are asked the question. In our society, long hours at work, having children participating in a number of extracurricular activities, being active in your community, being active in your church, in other words, being very busy is generally looked upon as a favorable thing. Therefore, if you say you are "too busy" or "don't have enough time", that is generally acceptable and looked upon favorably or as acceptable. Some people may be inactive because they simply do not like to be physically active or do not value its' importance. Older individuals are also frequently concerned about the risk of falling and its' repercussions.

Also, from this study we do not know the reason why participants chose to retire. Retirement may have been associated with their own ill health or the ill health of a loved one, in which case they may be responsible for caretaking, and consequently physical activity may not be a priority for them. Retirement can offer a free and relaxing lifestyle. It is the pot of gold at the end of the rainbow. Therefore, it is my belief that it would be a wise investment if every one of us scheduled time, each and every day of our lives, for participation in vigorous physical activity because, it may just be one of the closest things to a fountain of youth that we will ever find.

Implications

The United States has witnessed longer life spans and the coming of the baby boomer generation. With these two factors it is predicted that in the next 25 years the American population of individuals 65 years and older will double. With the doubling of this age group comes the burden on both government and families for healthcare and healthy living. It has been shown time and again the role and benefits that physical activity and practicing healthy lifestyle behaviors can have on an individual.

This study was significant because the findings indicated that retirees do not engage in more physical activity after they retire. Most likely they continue to live the lifestyle they have been accustomed to prior to retirement. A significant finding did point out that generally, those who were engaged in physical activity prior to retirement continued their involvement after retirement. This has important implications. Providing the opportunity for pre-retirement physical activity health promotion programs could have a very important affect and carry over into their post retirement period.

Recommendations for Future Research

A study of how much impact health promotion programs have on retirees would provide a better understanding of the motivations and reasons why people participate in physical activity. It would also provide the opportunity to examine the pre-conceived barriers of really wanting to participate in physical activity but perceiving to not have the time. Again, this is where work-place programs could help to build on the future on healthy lifestyles for individuals.

More research is also needed to determine if physical activity does, in fact, decrease morbidity. A study examining groups of elderly individuals and studying their decreased morbidity versus physical activity would be valuable. Another factor is that the younger age cohort have lived more in a time period with more leisure time and more physical activity opportunities. A comparative study examining these groups would differentiate the relationships of their physical activity after retirement. Additional studies examining the type of activities retirees participate in, as well as if they participate alone, in groups, with their spouse or with a friend would be valuable.

Further research is needed to reinforce or dispel the results found in this study.

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APPENDIX A

EXPLANATION OF INSTRUMENT

The Health and Retirement Study was initiated in 1990 by F. Thomas Juster of the University of Michigan. The HRS is primarily sponsored by the National Institute of Aging and is administered by the Institute for Social Research at the University of Michigan. The HRS is compiled survey data of a longitudinal study of health, retirement and aging that illustrates the course of health, economic and family-status of Americans over the age of 50. The initial cohort was interviewed in 1992 and was comprised of participants who were born between the years of 1931 and 1941 and came from a nation-wide representative sample. Participants were asked to complete a survey that included a consent and release statement; a confidentiality statement; as well as a health history questionnaire.

Interviews were comprised of a broad range of topics administered mostly via telephone. Topics included work; retirement and work history; income and wealth; self-reports of major health conditions; health care utilization; insurance coverage; out-of-pocket spending; and relationships with family members. All survey participants were paid $40.00 for participation in the survey.

The present HRS is comprised of five cohorts:

1) Initial HRS cohort, born 1931 to 1941, who were first interviewed in 1992 and subsequently every two years after.

2) Study of Asset and Health Dynamics among the Oldest Old (AHEAD), born before 1924 who were first interviewed in 1993, 1995, 1998, and subsequently every two years, 3) Children of Depression Age (CODA) cohort, born 1924 to 1930, first interviewed in 1998 and subsequently every two years.

4) War Baby (WB) cohort, born 1942 to 1947 and first interviewed in 1998 and subsequently every two years.

5) Early Baby Boomer (EBB) cohort, born 1948 to 1953, first interviewed in 2004.

In addition to respondents, spouses or the partners of respondents were also interviewed despite their age.

A steady-state design was implemented assuring that new respondents between the ages of 50 and 56 are added every six years. The HRS is now a panel study that consists of interviews conducted biennially, generally by telephone.

The core study design consisted of:
- A national panel study
- Initial sample of 12,000+ persons from 7, 600 households, current sample is 26,000 persons from 15,000+ households
- Oversamples (100%) of Hispanics, Blacks and Floridians
- Baseline data consists of in-home, face-to-face in 1992 for the Children of the Depression Age (CODA), War Babies (WB) and the Early Boomers (EBB) cohorts
- In 1998 the HRS and AHEAD studies combined the survey instrument and field data sets
- Follow-up interviews via phone every second year

Questionnaire topics included:
- Cognitive and health conditions and status
- Retirement plans and perspectives
- Attitudes, preferences, expectations, and subjective probabilities
- Family structure and transfers
- Employment status and job history
- Job demands and background
- Disability
- Demographic background
- Housing
- Income and net worth
- Health insurance and pension plans
- Experimental modules

APPENDIX B

STATEMENT OF CONSENT

<u>Appendix I</u>

<u>Consent Statements:</u>

<u>HRS</u>: Most of the interviews will be conducted by telephone. Consistent with on-going HRS practice (telephone and some personal interviews) all respondents are read a confidentiality statement when first contacted, and give oral or implied consent by agreeing to do the interview. The confidentiality statement is as follows:

"This interview is completely voluntary. If we should come to any question that you don't want to answer, just let me know and I will go on to the next question. The answers you give will be kept confidential.

A Department of Health and Human Services Certificate of Confidentiality covers this research in order to help ensure your privacy. This certificate can help protect the investigators from being forced to release any research information that identifies you.

We must report credible evidence of serious harm or abuse to any person to the authorities, but we will not ask you any questions about such topics."

Some technically exempt research projects ethically require either informed consent (written or oral) or notification via a cover letter. If, in the investigator's opinion, the study requires informed consent, the method used to obtain informed consent should be described and any written consent forms or cover letter submitted. If the study does not require consent or notification, it should be stated and justified.

APPENDIX C

QUESTIONS USED FROM RAND

Questions Used from RAND:

1. Age at Interview (in months and years)
2. Gender
3. Education: Years of Education
4. Race, Ethnicity: Race
5. Total Household Income (respondents and spouses)
6. Self-Report of Health
7. Labor Force Status
8. Health Behaviors: Physical Activity or Exercise

APPENDIX D

PERMISSION FROM HEALTH AND RETIREMENT STUDY

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The Health and Retirement Study
A Longitudinal Study of Health, Retirement, and Aging
Sponsored by the National Institute on Aging

Conditions of Use for Public Data Files

Thank you for your interest in Health and Retirement Study (HRS) Public Release data files. Once you have registered as a user of this site, Public Release files may be downloaded to your computer from our private server at the University of Michigan Survey Research Center.

The data and documentation files at this site are provided for your convenience by the staff of the Health and Retirement Study. While HRS staff make every effort to ensure the accuracy of the data and documentation at this site, users are reminded that errors may be present, even in files that have been thoroughly cleaned. The Health and Retirement Study will make reasonable efforts via electronic mail and/or announcements on our public Web site to notify registered users of data file changes.

By registering for access to HRS Public Release data, the User agrees to all of the following:

- Make no attempts to identify study participants.

- Not to transfer HRS Public Release data to any third party other than staff or students for whom you are directly responsible except as indicated below.

- Not to allow others to use your username and password to access this site.

- To certify the destruction of any downloaded Public Release data file as well as any data files derived from the downloaded file when requested to do so by the Health and Retirement Study.

- To include the following citation in any research reports, papers, or publications based on Public Release data:
  In text:
  > "The HRS (Health and Retirement Study) is sponsored by the National Institute of Aging (grant number NIA U01AG009740) and is conducted by the University of Michigan."

  In references:
  > "Health and Retirement Study, ([insert Product Name]) public use dataset. Produced and distributed by the University of Michigan with funding from the National Institute on Aging (grant number NIA U01AG009740). Ann Arbor, MI, (year)."

- To include the following citation in any research reports, papers, or publications based on any Public Release data file tagged as "Early" or "Preliminary":

  > "This analysis uses Early Release data from the Health and Retirement Study, ([insert Product Name]), sponsored by the National Institute of Aging (grant number NIA U01AG009740) and conducted by the University of Michigan. These data have not been cleaned and may contain errors that will be corrected in the Final Public Release version of the dataset."

- Provide information regarding publications based on data obtained from the Health and Retirement Study by sending a copy of any papers or publications using HRS public files or datasets to:

  Health and Retirement Study
  Room 3050 ISR
  P.O. Box 1248

Ann Arbor, MI 48106-1248.

- Report immediately to the Health and Retirement Study at hrsquest@isr.umich.edu any disclosure of study participant identity as well as any discovery of flaws or errors in the data or documentation files.

- Notify the Health and Retirement Study through use of the update function provided at this site or by electronic mail directed to hrsquest@isr.umich.edu of changes in your electronic mail address, postal address, telephone number, organizational affiliation or organizational status.

Additional Information

- *Redistribution to Third Parties*. A number of requests have been received concerning redistribution of HRS Public Release files to third parties. Data libraries and archiving institutions are permitted to redistribute HRS and AHEAD public release files under the following restrictions:
    - Third parties to whom the data files are distributed must be affiliated with the distributor's institution or organization.
    - An authorized representative of the data library or archive must fill out and return the User Registration form. It may be completed and returned by one of three methods:
        - Via the web at the address given.
        - Via electronic mail to hrsquest@isr.umich.edu.
        - Via postal service to HRS Public Data Release Registrations, Room 3050 ISR, P.O. Box 1248, Ann Arbor, MI, 48106-1248.
    - All third party recipients of HRS Public Release files must personally fill out and return the User Registration form by one of the three methods listed above.
    - Procedures must be in place to ensure that these restrictions are fulfilled.

- Co-investigators and persons not under the direct supervision of another researcher are required to submit separate applications in order to obtain access to HRS public files and datasets.

- Once you have completed the registration process, your username and password will be sent to you, via electronic mail, for your use only.

⬅ [Back]

Last change: February 22, 2006

Health and Retirement Study   **Institute for Social Research**   **University of Michigan**

APPENDIX E

IRB REVIEW INFORMATION

Nebraska
UNIVERSITY OF
Medical Center

IRB APPLICATION FOR EXEMPT EDUCATIONAL, BEHAVIORAL, AND SOCIAL SCIENCE RESEARCH

SECTION I

Status:

_x_ New Submission

___ Three Year Resubmission (Current IRB #   )

Title of Protocol:

Exercise Prior To and After Retirement: A study of self reported activity level in a defined population using Health and Retirement Study (HRS) Data

Principal Investigator: Jayme D. Nekuda, M.S.
Secondary Investigator(s): James A. Thorson, Ed.D.
                            University of Nebraska at Omaha
                            Department of Gerontology
                            6001 Dodge Street
                            Omaha, NE 68182-0202
                            Phone: (402) 554-2273
                            Fax: (402) 554-2317

Participating Physicians: NA

PI Department: Division Director, Benefits and Work-Life Programs at the University of Nebraska Medical Center
PI Phone: (402) 559-8448
PI e-mail: jnekuda@unmc.edu
PI Address for correspondence:
                            Jayme D. Nekuda
                            Student Life Center
                            985530 Nebraska Medical Center
                            Omaha, NE 68198-5530

Funding Source: Check all that apply and supply names
___ NIH
___ Commercial – Provide company name:
___ State
___ Other – Provide source:
_x_ None

Funding agency deadline for IRB approval:

Performance sites (see II.9 below for definition of performance site):

SECTION II

Instructions: In order to review your proposal, the IRB must have the following information. Each subpart must be titled using **boldface subheadings** as described below and addressed independently in the listed sequence without reliance on information covered under other subparts. Attachment of applicable sections of the grant application is not acceptable as a substitute for completion of each subpart.

The IRB Application must provide sufficient information to facilitate an effective review by all members of the IRB including non-specialists. Applications not meeting this requirement may be returned to the investigator unreviewed for resubmission.

Unless justification is provided, section II of the IRB application has an absolute limit of six pages excluding references. These pages should be numbered.

1. Purpose of the Study.

What are the specific scientific objectives (aims) of the research?

Health in Retirement Survey data will be evaluated to determine if people continue to participant in vigorous physical activity once retired, begin to participate in physical activity after retirement, were active prior to retirement and then become inactive after retirement or were inactive prior to retirement and after retirement.

2. Background and Rationale.

Describe the background of the study. Include a critical evaluation of existing knowledge, and specifically identify the information gaps that the project is intended to fill.

Note: This section should clearly support the purpose of the study and must contain appropriate literature citation.

"The aging of the U.S. population is one of the major public health challenges we face in the

21st century. One of the Centers for Disease Control and Prevention's (CDC) highest priorities

as the nation's health protection agency is to increase the number of older adults who live longer

high-quality, productive, and independent lives". Therefore, a goal of the CDC is to strive to

enhance the overall health and well-being of older Americans by not only helping them to live

longer, but to also help them live as high of quality of life as possible; this is a societal priority.

The increase of aging in the American population is due mainly to two reasons, one of which

is the fact that our life spans are increasing and secondly, because the baby boomer generation, those born between the years of 1946 and 1964, is aging. It is predicted that in the next 25 years these two factors will cause the American population that is 65 years of age, or older, to double. Twenty percent of the U.S. population will be comprised of older adults totaling approximately 71 million by the year 2030 (CDC, 2006). It is predicted that the aging of the American population will have a tremendous impact not only individuals, but families and society as well. Beginning in 2011 the impact on American society could be even more profound due to the impact of the baby boomers starting to turn 65 years of age. (Health and Retirement Study, 2006). The baby boomer generation, will cause the largest American demographic cohort shift ever. In the year 2000 there were 35 million baby boomers over the age of 65, that number is expected to more than double to 72 million by the year 2030. These boomers are not only living longer, they are also living healthier than those in previous generations. For instance, in 1960 the average lifespan was 69.7, today it is 77 years. (U.S. Census Bureau, 2006).

As a result of these demographic changes, our nation's health care spending is estimated to increase by 25 percent. Currently older Americans' health care costs run three to five times that of someone who is younger than 65. The increased number of older persons is will have a tremendous affect on the American economy. Thirty-five percent of the deaths in the U.S. in the year 2000 were attributed to three health-related behaviors: smoking, poor diet, and physical inactivity. These three behaviors have a significant impact on the nation's most prevalent causes of premature death and disability from chronic diseases: diabetes, cancer, stroke, and heart disease.

One solution to reduce the risk of cardiovascular disease would be participation in physical activity. According to Calfas, Long, Sallis, Wooten, Pratt and Patrick (1996) physical activity would be a very inexpensive, non-pharmacologic approach that would have a

tremendous impact on the challenging issues of cardiac disability and related diseases.

Much discussion has taken place debating the impact that healthy lifestyles can have on increasing longevity and whether or not those added years are merely replaced with additional years of increased morbidity as one ages. The compression of morbidity hypothesis suggests that by leading a healthy lifestyle one can reduce, and compress the period of time that one will encounter chronic disease and/or disability toward the end of one's life. This helps make for a strong case to participate in preventive health measures to offset disabling morbidity and also ease some of the burdens resulting from the increased longevity of today's aging populations. Hubert, Bloch, Oehlert, and Fries (2002) studied the lifestyle-related risk factors of physical inactivity, smoking and under- or over-weight in an aging cohort. The group that had no risk factors had a disability score close to zero, 10-12 years prior to death, this score rose only slightly over the same time period. Subjects who had two or more risk factors sustained a higher level of disability throughout their follow-up and maintained a higher rate of decline 1.5 years before their death. The group that had moderate health risks experienced a significant increase in disability just three months prior to their death. These results reinforce that by leading a healthy lifestyle, one can experience a substantial reduction and postponement of disability.

The relationship of physical activity and health is as simple and basic as it gets; fitness reduces the risk of premature morbidity and mortality. The bottom line is that physical activity has a substantial protective effect that continues to have an impact even as one enters old age. The benefits derived from physical activity can even offset some of the negative impact that risk factors such as smoking, high blood sugar and high blood pressure may have on an individual. Once the benefits of moderate physical activity are added up, it is difficult to envision why everyone would not be participating in some sort of physical activity on a regular basis. According to Rowe and Kahn (1998) physical fitness enables older people to retain their

independence, function better in their everyday life, to live longer, and to have a higher quality of life even if they are challenged by additional health issues or participate in other negative health habits.

The relationship between the prevalence of physical activity and social class in the U.S. was studied by Crespo, Ainsworth, Keteyian, Heath and Smit (1999). These authors found that inactivity was higher for women than for men, 28 percent versus 17 percent. They also found that people who were less educated, lived below the poverty line, had a household income below $20,000, and who had retired were less likely to be active.

Kelley (2000) reported that gender, education, race, rank in the military, weight and exercise behavior were significant predictors of personal fitness. Women and men who had college degrees were three to four times more likely, respectively, to pass a physical readiness test than those with only a high school diploma.

The CDC reports that women are usually less active than men and they become even more inactive as they age. Women with lower levels of education, as well as minority women, also tend to have lower activity levels than their peers (Purath, 2006) as well as women who become parents (Sherwood & Jeffry, 2000).

Education level has been shown to influence leisure-time physical activity. Stephens and Caspersen (1994) compared data of the most educated with the least educated groups. The most educated were 1.5 to 3.1 times more likely to be physically active than the least educated group and only 30 percent versus 60 percent as likely to be sedentary.

This study will use Health in Retirement Survey information to determine if retirement affects physical activities, in the context of gender, education level, and other socio-economic factors.

3. Number of Subjects.

    a. What is the maximum number of subjects at UNMC, the Nebraska Medical Center, UNO and other sites approved by the UNMC IRB (that is, sites listed in section I of the application)? The University of Michigan Health and Retirement Study (HRS) has surveyed than 22,000 Americans over the age of 50 every two years. The HRS is supported by the National Institute on Aging (NIA U01AG009740), and the data is accessed through permission of the HRS.

Note: This section refers only to sites approved by the UNMC IRB, for which the UNMC IRB has responsibility. This does not include other sites participating in a multicenter study which have their own IRB.

Note: The IRB approves a maximum number of subjects to be enrolled, NOT the number of subjects who are actually evaluable for the aims of the research. Enrollment may not exceed the maximum accrual approved by the IRB without a change in protocol.

b. For multicenter protocols, what is the total number of subjects to be enrolled at all sites? NA

4. Gender of the Subjects.

Are there any enrollment restrictions based on gender? No.

5. Age Range of the Subjects.

a. What is the age range of the adult subjects? Age 50 years of age and over.

b. What is the rationale for selecting this age range? This is the data in the HRS data set.

c. Will children and/or adolescents (18 years of age or younger) be included in this research? No.
If yes, respond to the following:
    1. What is the justification for including children and adolescents? NA
    2. What is the age range of child and adolescent subjects? NA
    3. What is the rationale for the age range chosen? NA

6. Racial and Ethnic Origin.

Are there any subject enrollment restrictions based upon race or ethnic origin? No.

7. Inclusion Criteria.

What are the specific inclusion criteria? All participants in the HRS survey will be included in the study.

8. Method of Subject Identification and Recruitment.

a. How will prospective subjects be identified (eg, previous research participants, databases)? All subjects will have been enrolled through the HRS using HRS surveys. No new subjects will be enrolled outside of the HRS.

b. Does the principal or secondary investigator have ethical or professional access to the names of potential subjects? No. The personally identifiable information is already removed from the subjects by the HRS.

c. How will prospective subjects be contacted for recruitment into the study? Individual subjects will not be recruited. Only existing HRS data will be used.

Note: The identification and recruitment of subjects must be ethically and legally acceptable and free of coercion. In addition, the recruitment procedure should be designed to facilitate equitable selection of subjects with particular attention paid to the recruitment of study participants of both genders and from different racial or ethnic groups

MEMORANDUM
TO: Institutional Review Boards/Human Subjects Review Committees
FROM: David R. Weir, Principal Investigator, Health and Retirement Study
RE: Health and Retirement Study Public Use Datasets

The Health and Retirement Study (HRS) is an ongoing longitudinal survey of Americans over the age of 50, sponsored by the National Institute on Aging (U01 AG009740) with support from the Social Security Administration. HRS makes available to researchers both unrestricted datasets, available to all researchers, and restricted datasets, available only under agreement to researchers who meet rigorous conditions.

No individual identifiers or links to individual identifiers are provided to researchers under any conditions. Moreover, unrestricted datasets from the HRS have been sufficiently purged of secondary identifying information that they pose no significant threat to respondent anonymity. These files are public-use and are distributed via download from our website. We assert that in most cases the HRS public use files qualify as anonymized datasets and that secondary data analysis using these files may qualify for exempt IRB status, under **45 CFR 46.101(b)**.

The entire Health and Retirement Study is under current IRB approval by the relevant committees at the University of Michigan and the National Institute on Aging, the primary sponsor of HRS.

If you have further questions, please feel free to contact:

Cathy Liebowitz
Survey Research Center
426 Thompson, Room 3050
Ann Arbor, Michigan 48104-2321

Academic Research & Services Building 3000 / 987830 Nebraska Medical Center / Omaha NE 68198-7830
402-559-6463 / FAX 402-559-3300 / Email: irbora@unmc.edu / http://www.unmc.edu/irb

phone: 734-763-4180
fax: 734-647-1186
email: catlieb@umich.edu

9. Performance Sites.

Where will the study be conducted? Submit a letter from an authorized official at all external performance sites other than UNMC, the Nebraska Medical Center, and UNO, granting permission to conduct the research at that site. *Note: Performance sites are defined as (1) sites where UNMC/UNO/Nebraska Medical center investigators or staff interact with subjects, collect data or solicit consent, or (2) sites over which the UNMC IRB has responsibility. This does not include other sites participating in a multicenter study which have their own IRB.*

The study will be conducted by analyzing the data in HRS by the principal investigator. There will be no interaction with the subjects.

10. Description of Procedures.

a. Does the research involve interaction with or observation of subjects? No.
b. Does the research involve review of identifiable private information, including information from public or other registries or databases? No.
> 1. What information will be accessed from the records? Information related to demographics, physical activity, and health.
> 2. Will there be identifiers associated with research data at any time following retrieval from the registry or database? No, only household identification number (HHID) and respondent person identification number (PN).
> 3. Will existing data be used (that is, data existing in a registry or database at the time of this application)? Yes.
> 4. Will prospective data be used (that is, data which will be collected in the future)? No.
> 5. Will data be retained with or without identifiers for use in future research projects (that is, will a database be constructed for future analysis or recruitment)? No.

11. Confidentiality.

Where will the research data be stored during the study and how will it be secured?
Note: The investigator must take all necessary steps to maintain confidentiality of data. This includes coding data and choosing an appropriate and secure data storage mechanism which will prevent unauthorized access to the data.
Research data will be stored in a password protected hard drive and paper copies will be secured in a locked cabinet.

12. Informed Consent. No individual consent will be obtained. See appendix I.

13. Exemption Category. 4.

Specify the exemption category [1-6] this protocol qualifies. The categories are outlined in the submission instructions located on pages 1-3. A study may qualify for more than one category, and all categories should be stated. Refer to the instructions attached to the beginning of this form.

14. References.

List the references cited in Section II.2.

<div align="center">References</div>

Calfas, K.J., Long, B.J., Sallis, J.F., Wooten, W.J., Pratt, M. & Patrick, K. (1996). A controlled trial of physician counseling to promote the adoption of physical activity. *Preventive Medicine*, 25 (3), 225-233.

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APPENDIX F

SIGNED PERMISSION FORM FROM IRB

Nebraska
UNIVERSITY OF
Medical Center

NEBRASKA'S HEALTH SCIENCE CENTER

October 8, 2008

Jayme Nekuda, MS
Student Life Center
UNMC - 5530

IRB #: 368-08-EX

TITLE OF APPLICATION/PROTOCOL: Exercise Prior to and After Retirement: A Study of Self Reported Activity Level in a Defined Population Using Health and Retirement Study (HRS) Data

Dear Ms. Nekuda:

The Institutional Review Board for the Protection of Human Subjects has completed its review of your Request for Change dated September 23, 2008 regarding the addition of two investigators (Paulman and Geske) and the removal of an investigator (Thorson).

This letter constitutes official notification of the approval of the protocol form change. You are, therefore, authorized to implement this change accordingly.

Sincerely,

Ernest Prentice, PhD/

Ernest D. Prentice, Ph.D.
Co-Chair, IRB

EDP/gdk

APPENDIX G

EXEMPTION FORM FROM IRB

Nebraska
UNIVERSITY OF
Medical Center

NEBRASKA'S HEALTH SCIENCE CENTER

Institutional Review Board (IRB)
Office of Regulatory Affairs (ORA)

August 6, 2008

Jayme Nekuda, MS
Student Life Center
UNMC - 5530

IRB#: 368-08-EX

TITLE OF PROTOCOL: Exercise Prior to and After Retirement: A Study of Self Reported Activity Level in a Defined Population Using Health and Retirement Study (HRS) Data

Dear Ms. Nekuda:

The IRB has reviewed your Exemption Form for *Exempt Educational, Behavioral, and Social Science Research* on the above-titled research project. According to the information provided, this project is exempt under 45 CFR 46:101b, category 4. You are therefore authorized to begin the research.

It is understood this project will be conducted in full accordance with all applicable sections of the IRB Guidelines. It is also understood that the IRB will be immediately notified of any proposed changes that may affect the exempt status of your research project.

Please be advised that the IRB has a maximum protocol **approval period of 5 years** from the original date of approval and release. If this study continues beyond the five year approval period, the project must be resubmitted in order to maintain an active approval status.

Sincerely,

Ernest Prentice, PhD / SDK

Ernest D. Prentice, Ph.D.
Co-Chair, IRB

EDP/gdk