Oberdorfer, Ewa M., <u>Relationship Between Sense of Control, Obesity, and Healthy Behaviors in a Primary Care Setting – North Texas Healthy Heart I Study</u>. Master of Public Health (Community Health), August 2009, 58 pp, 8 tables, 2 figures, bibliography 37 titles.

The purpose of the study is to analyze if sense of control (SOC) is associated with body mass index (BMI), having a PCP, exercise behavior and a routine health check-up. Using the NTHHS' (North Texas Healthy Heart I Study) questionnaire, numerous models were run using both linear and logistical regressions to analyze the relationship between SOC, BMI, PCP, exercise behavior, and having a routine check-up as well as if PCP modifies these relationships.   SOC was associated with exercise behavior but not BMI, PCP or having a routine check-up. PCP did not modify the associations. SOC can help PCP's identify individuals who engage in exercise behavior.

RELATIONSHIP BETWEEN SENSE OF CONTROL, OBESITY, AND HEALTHY

BEHAVIORS IN A PRIMARY CARE SETTING –

NORTH TEXAS HEALTHY HEART I STUDY

THESIS

Presented to the School of Public Health

University of North Texas

Health Science Center at Fort Worth

Partial Fulfillment of the Requirements

for the Degree of

Master of Public Health

By

Ewa M. Oberdorfer, DO, B.S.

Fort Worth, Texas

August 2009

TABLE OF CONTENTS

Chapter

        Rationale
        Purpose of the Study
        Research Questions and Hypothesis
        Limitations
        Delimitations
        Assumptions
        Definition of Terms
        Importance of the Study

        Sense of Control
        Medical and the Psychological Cost of Obesity
        Economic Cost of Obesity
        Obesity in Primary Care
        Exercise

        A. Study Questions of Interest
        B. Survey Construct

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

Rationale

The sense of control (SOC) scale is used to analyze the extent to which an individual perceives having personal power and direction over outcomes in life. Past studies using the Mirowsky and Ross 1991 SOC scale found that patients with higher SOC had lower rates of diabetes mellitus (Cardarelli, Vernon, Baumler, Tortolero, & Low, 2007). Another study found that people with higher level of education reported a higher SOC, and this resulted in lower levels of depression, anxiety, and fewer body aches and pains (Ross & Van Willigen, 1997). Although there have been studies conducted using the Mirowsky and Ross' SOC scale, so far no studies have been conducted primarily in the primary care setting. Primary care physicians (PCPs) may identify psychological characteristics such as SOC to assist their patients in weight reduction and prompting healthy behaviors.

The goal of this research project is to address the issue of whether SOC is associated with body mass index, having a primary care physician, presence of exercise behavior, and receiving routine health checkups. Furthermore, the ultimate objective of this project is to potentially identify whether PCPs can utilize the sense of control scale as a tool to alter their approach to managing their patients and promote healthy lifestyles. In other words, understanding the obese patients' sense of control may assist PCPs in guiding the management of their patients.

Purpose of the Study

Because of the large number of individuals with an increased BMI in the US, it is prudent to identify psychological components that may have a relationship to health behaviors. For one, psychological characteristics may assist PCPs in helping their patients manage their weight and live healthier lives. Furthermore, the weight reduction may have a global effect by reducing the monies spent on health care costs due to increased BMI. This study is chiefly concerned with sense of control (SOC) and its association with BMI, presence of a primary care physician (PCP), obtaining preventive health care, and reported exercise behavior.

Research Questions and Hypotheses

In what way is SOC related to a patient's BMI, exercise, health behaviors, and presence of a PCP? The Theory Model is illustrated in Figure 1.

Question 1: To what extent is SOC associated with BMI?

Hypothesis 1: Sense of control (SOC) will be associated with BMI.

Question 2: How does SOC predict having a primary care physician?

Hypothesis 2: SOC will be associated with having a PCP.

Question 3: To what extent is SOC associated with self-reported exercise behavior?

Hypothesis 3: SOC will be associated with self-reported exercise behavior.

Question 4: To what extent is SOC associated with self-reported routine health check-ups?

Hypothesis 4: SOC will be associated with self-reported routine health check ups.
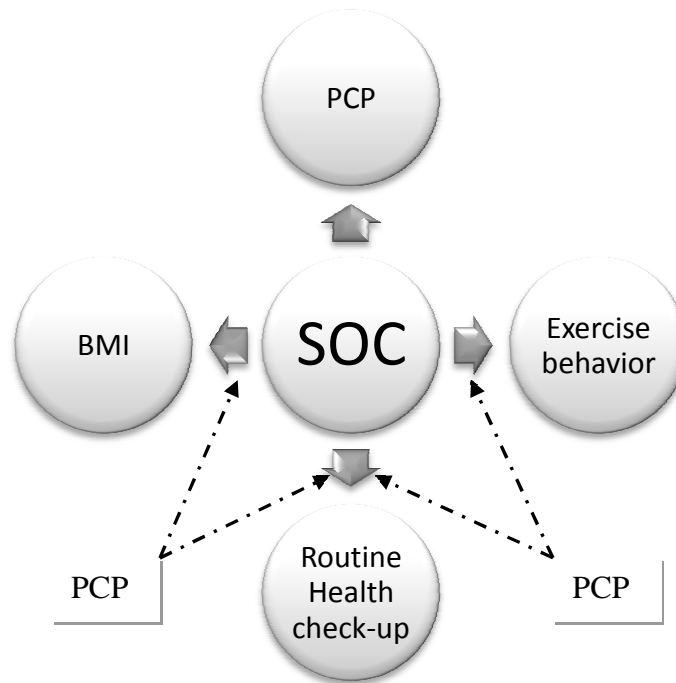
Figure 1: Theory Model. Illustration of SOC and the relationships tested.   Primary care physicians (PCP) were tested as interaction terms as well as a confounder in the model. Body Mass Index (BMI), Exercise Behavior in the past month and Routine health check-up in the past 2 years

Question 5: In what way does the presence of a PCP modify the association between

SOC and BMI.

Hypothesis 5: The association between SOC and BMI will be modified by the self-

reported presence of a PCP.

Question 6: In what way does the presence of a PCP modify the association between

SOC and self-report exercise behavior?

Hypothesis 6: The association between SOC and self-reported exercise behavior will be

modified by the self-reported presence of a PCP.

Question 7: In what way does the presence of a PCP modify the association between SOC and subjects who report having a routine health check-up?

Hypothesis 7: The presence of a PCP will modify the association between SOC and self-reported routine health check-up.

<div align="center">Limitations:</div>

The study was limited by:

- Reliance on self-reported data

- Recall of the participants

- Cross-sectional nature of the survey; therefore, it can only offer limited insight into the cause and effect relationship

- Use of secondary data collected through the North Texas Healthy Heart I Study

- Influenced by the mood and attitude of the subjects during the survey

- Use of one question about exercise behavior. The question only asks the subject if they participated in any exercise in the past month but does not ask how often they exercise or how many times in the past month the subject exercised.

- Convenience sample of subjects from PCP clinics in Tarrant County. The subjects may be different from the general population because they are a clinical sample, and some of the subjects are referred to the study by their primary care physician.

<div align="center">Delimitations:</div>

North Texas Healthy Heart (NTHH) study had the following delimitations:was delimitated by:

- The study recruited males and females 45 years old and older.

- The study recruited Hispanics, African American, Caucasians, and all other ethnicities and races were included.

- The study recruited subjects from 12 family practice clinics in Tarrant County.

- The study included surveys, height, weight and waist measurements, lab analysis of blood, multislice CT scan and visceral fat analysis.

Assumptions

For the purpose of this study, the following assumptions were made:

- The individuals participating in the survey responded truthfully to the questions.

- The individuals participating in the survey understood the questions posed to them.

- Weight and height measurements were collected without error.

Definition of Terms

Sense of Control: "Belief …that outcomes are contingent on one's own choices and actions. The sense of powerlessness, the opposite, is the belief that one's actions do not affect outcomes" (Ross & Van Willigen, 1997 pg. 278).

Exercise: Subjects who reported exercising, other than their regular job, in the past month were classified as reporting exercise behavior (Kriska et al., 2006).

Routine checkup: For the purpose of this study, a routine checkup was a general physical exam, not an exam for a specific injury, illness, or condition

Body Mass Index (BMI): BMI is a screening tool that correlates with the direct measure of body fat. For adults over 20 years old, BMI is interpreted using standard weight status categories that are the same for all ages and for both men and women. (CDC, 2008).

Formula: $BMI = weight\ (kg)\ /\ [height\ (m)]^{2}$

Primary Care Physician: For the purpose of this study, the term "Primary Care Physician" refers to the one person the subjects thought of as their personal doctor or health care provider.

Importance of the Study

The main point of this study is to evaluate whether SOC can be used as a tool in the primary care setting to better help patients achieve healthier lifestyle and ultimately better health. Although Mirowsky and Ross's SOC scale has been studied in specific diseases and populations such as diabetes and the elderly, it has not been studied exclusively in the primary care setting. This study will focus on the primary care setting and strive to analyze whether SOC is associated with BMI and presence of PCPs as well as healthy behaviors like receiving health care check-ups and exercising. Through this study, PCPs can identify a psychological characteristic like SOC that may help to promote healthy behaviors in their patients.

CHAPTER 2

REVIEW OF LITERATURE

Sense of Control

Because of the large number of overweight and obese individuals as well as the high rate of suboptimal physical activity, it is important to identify psychological characteristics that may predispose persons to have healthy and unhealthy behaviors. Sense of control (SOC) is one of the characteristics that may be helpful to predict healthy behavior. SOC is a belief that outcomes are dependent on one's own choices and actions (Ross & Van Willigen, 1997; Rotter, 1966). The opposite of SOC is the sense of powerlessness, where a person believes that one's actions or behaviors do not affect outcome (Ross & Van Willigen, 1997).

To study sense of control it is important to identify a reliable tool for measuring a person's perceived control. In 1991, Mirowky and Ross published a 2 x 2 index on sense of control (SOC). The Mirowsky and Ross' SOC scale which built previous on the work of Rotter's Internal-external locus of control scale and Pearlin and colleagues' mastery scale (Mirowski & Ross, 1991; Pearlin et al., 1981; Ross & Van Willigen, 1997; Rotter, 1966). The Mirowsky and Ross' 1991 scale differed from the previous scales in two ways. First, it balanced the statements claiming control against those denying it. Second, it balanced the statements about good outcomes against those about bad outcomes. The Mirowsky and Ross scale, therefore, eliminated defense and agreement bias (Mirowski & Ross, 1991; Ross & Van Willigen, 1997).

A few studies were conducted using the Mirowsky and Ross' 1991 SOC scale. For example, Ross and Van Willigen found that people with higher level of education reported a higher SOC, and this resulted in lower levels of depression, anxiety, fewer body aches and pains, and less difficulty "getting going" on a day-to-day basis (Ross & Van Willigen, 1997). A study of an elderly population showed that people with a high SOC over the most important aspects of their lives may live longer (Krause & Shaw, 2000). Another study showed that persons with a high SOC had significantly lower risk of Diabetes Mellitus (Cardarelli, Vernon, Baumler, Tortolero, & Low, 2007). Since diabetes mellitus is associated with a higher BMI, this study suggests that patients with high SOC may be less obese and have less chronic illnesses than patients with low SOC. However, there have been other scales that analyzed the concept of SOC.

Locus of control (LOC), powerlessness, mastery, efficacy, self-efficacy, self-directedness, instrumentalism, and fatalism are some of the terms used to describe the concept of SOC (Mirowski & Ross, 1991; Pearlin, Lieberman, Menaghan, & Mullan, 1981; Rotter, 1966; Seeman & Evans, 1962; K. A. Wallston & Wallston, 1981). Health LOC describes the extent to which a person believes they are in control of their own health (K. A. Wallston, Strudler Wallston, & DeVellis, 1978). Persons with a high internal LOC believe that they are able to make decisions about their own health, while persons with external LOC believe that others are in charge of their health (K. A. Wallston et al., 1978). Therefore people with a high external locus of control believe that health is dependent of fate, luck and chance (Cross, March, Lapsley, Byrne, & Brooks, 2006; K. A. Wallston et al., 1978).

There are numerous health studies using various tools to study LOC. For example, Seeman and Evans found that hospitalized tuberculosis patients that had a higher internal LOC knew more about their disease than those that had an external LOC (Seeman & Evans, 1962). One study found a positive correlation between readiness of patients to manage their pain and an internal LOC (Hadjistavropoulos & Shymkiw, 2007). Another study found that people who were hospitalized for an acute myocardial infarction, who also had anxiety about their health status and a low locus of control had poorer outcomes (Moser et al., 2007). Elderly patients with depression were found to have a better compliance with anti-depressant medications when their LOC was higher (Voils, Steffens, Flint, & Bosworth, 2005).

LOC can have an impact on health behavior, as well. Lachman and colleagues conducted a study regarding LOC, and the relationship between control and health (Lachman & Weaver, 1998). Those in lower income groups were less likely to feel a mastery of their lives (Lachman & Weaver, 1998). Furthermore, a high LOC has a positive correlation with engaging in healthy behaviors and avoiding health damaging behaviors (Lachman & Weaver, 1998). Therefore, it would be helpful to identify whether LOC has an impact on a person's exercise behavior.

Studies use different scales to measure a person's LOC. This makes it difficult to analyze and compare the data on LOC and weight loss. In one study, internal LOC was associated with some level of success in reducing weight (Adolfsson, Andersson, Elofsson, Rossner, & Unden, 2005). However the data have not been consistent and there has been a disparity in findings. Some studies found that a high internal or high

external LOC has a better outcome in weight reduction than those with moderate internal and external LOC (Adolfsson et al., 2005; Balch & Ross, 1975; Goldney & Cameron, 1981; Nir & Neuman, 1995). Other studies have found no association between LOC and weight reduction (Adolfsson et al., 2005; Tobias & MacDonald, 1977). One reason for this discrepancy might be that people who have high LOC over their lives but fail to lose weight may feel like their weight is beyond their own control. Individuals whose LOC orientation (internal or external) was taken into account while tailoring their weight reduction program lost more weight compared to programs that were not tailored (Adolfsson et al., 2005). Because of the large number of overweight and obese individuals in the US, it is important to identify not only medical but also psychological aspects of the obesity problem.

Medical and the Psychological Cost of Obesity

The number of obese adults and children has increased dramatically in the past two decades. In a study from 1999 through 2002, 65.1% of adults at least 20 years old were considered overweight, 30.4 % were considered obese, and 4.9% were considered extremely obese (Hedley, Ogden, Johnson, Carroll, Curtin, & Flegal, 2004). In 2003-2004, the prevalence of obesity was 32.9% of the US population, and the prevalence of obesity among men was 32% and women was 34% (Ogden, Yanovski, Carroll, & Flegal, 2007). Therefore, the number of overweight and obese individuals continues to rise. Among children ages six through 19, 31% of children were at risk for becoming overweight and 16% were considered overweight (Hedley et al., 2004). In the US, it is estimated that 300,000 people die of obesity related causes each year, and diabetes is the

sixth leading cause of death (Mokdad et al., 2003). The Framingham Heart study

suggests that 40-year old non-smoker women lost 7.1 years of life and 40-year old non-

smoker males lost 5.8 years of life due to obesity (Ogden et al., 2007).

Obesity is associated with many comorbid diseases such as diabetes mellitus, and

it is estimated that the number of people with diabetes worldwide will increase from 175

million in 2000 to 353 million in 2030 (Runge, 2007). Recent data from the National

Health and Nutrition Examination Survey (NHANES) estimates that the prevalence of

type II diabetes mellitus in the US is 9.3%, with 2.8% being undiagnosed, and an

estimated 26% having impaired fasting glucose (Ogden et al., 2007). Furthermore, there

is a strong association between obesity and cardiovascular disease as well as myocardial

infarctions (Ogden et al., 2007).   Obesity is also correlated with an increase in congestive

heart failure and atrial fibrillation (Ogden et al., 2007). The 1999-2000 NHANES found

that 27% of US adults met the criteria for metabolic syndrome which is a constellation of

symptoms including central adiposity, low high-density lipoprotein-cholesterol levels,

high serum triglyceride levels, increased blood pressure, and impaired fasting glucose

(Ogden et al., 2007). Additionally, obesity has the same effect on chronic health

conditions as 20 years of aging (Runge, 2007). Obesity has many medical and

psychological effects on an individual, but there is also an economic cost of obesity that

is endured by both the individual and society.

Economic Cost of Obesity

Although the morbidity and mortality due to obesity is high, there is also a substantial amount of economic cost due to obesity. Finkerstein (2003) has reported that the US spends 9.1% of its total health care expenditure on overweight and obesity (Finkelstein, Fiebelkorn, & Wang, 2003). The cost of obesity is endured by the public on three levels.

First, on an individual level, the overall health care costs for an obese individual is 37% higher than for people of normal weight (Finkelstein et al., 2003; Runge, 2007). This adds an extra $732 to the health care bill of each and every individual in the US (Runge, 2007). Obesity is associated with a 77% increase in medication cost and a 36% increase in both inpatient and outpatient spending (Runge, 2007). One of the causes of obesity is an inactive lifestyle. Anderson (2005) concluded that inactive individuals had 24% higher health care costs than active individuals (Anderson, Martinson, Crain, Pronk, O''Connor & Whitebird, 2005).

The second level of the economic cost of obesity is endured on the employer level. Obesity and obesity related illnesses such as heart disease, osteoarthritis, gallbladder disease, hypertension, and type II diabetes mellitus result in $62.7 billion in doctors' visits and $39.3 billion in lost workdays each year (Runge, 2007). Type II diabetes mellitus causes an estimated added cost of $98 billion per year (Runge, 2007).

The final level that obesity affects cost is at the local, state and federal government levels. It increases expenditures for state-run insurance programs like Medicaid, Medicare, and Veterans Hospitals. This pushes the cost onto current and

future taxpayers (Runge, 2007). Using the Behavioral Risk Factor Surveillance System (BRFSS), researchers analyzed the direct cost of health care due to obesity to the states' Medicaid and Medicare programs. The cost amounts to $75 billion and on average 5.7% of the states' medical care spending (Runge, 2007). Additionally, Medicare and Medicaid fund 50% of the total medical spending related to obesity (Finkelstein, Fiebelkorn, & Wang, 2004). In one study, the data collected showed that Medicaid had by far the highest prevalence of obesity when compared to other insurance categories including uninsured, privately insured, and Medicare (Finkelstein et al., 2003). Furthermore, self reported prevalence of obesity for Medicaid patients is 50% higher than the general public (Finkelstein et al., 2004). Because of the high cost of obesity on an individual, employer, and government level, primary care physicians (PCPs) are important players in addressing the obesity epidemic.

<div align="center">Obesity in Primary Care</div>

Obesity poses significant health risks and economic expenditures, and the primary care physicians (PCP) are at the frontlines of the obesity battle. In 2004, the number of adults to seek out any type of physician or mid-level practitioner care was 69.6% of the US population. Of these visits, 43.4% saw a family physician or a general practitioner (Ferrer, 2007). The uninsured individual had fewer appointments with a physician than an individual with public or private insurance (Ferrer, 2007). Furthermore, African American and Hispanics had less contact with a health care provider than their Caucasian counterparts (Ferrer, 2007). One study revealed that adults with lower income, public insurance, or rural residence are more likely to visit a family physician than those with

higher incomes, private insurance, or urban location who are more likely to seek out a specialist or sub-specialist physician (Ferrer, 2007).

Because of the growing number of overweight and obese individuals in the US, it is important for PCPs to recognize and counsel their patients regarding the medical and psychological consequences of obesity. One challenge that PCPs face is to help their patients comprehend the dangers of obesity and the connection between obesity and chronic illness. However, some studies show that physicians do not recognize or document the obesity status of their patients during a clinic visit. In a study of internal medicine residents, only 7.3% of their overweight patients were identified as overweight, and 30.9% of their obese patients were identified as obese (Ruser, Sanders, Brescia, Talbot, Hartman, & Vivieros, 2005). Furthermore, only 16.5% of the overweight and obese patients received any sort of counseling about their weight (Ruser et al., 2005). One reason for such a small intervention number is that physicians might feel like a short educational session about weight management would be inadequate to help the problem (Ruser et al., 2005).

Other studies reveal that PCPs are not documenting obesity status in their patients. For example in the National Ambulatory Medical Care Surveys visits from 1995-1996, physicians reported obesity in only 8.6% of their patients (Stafford, Farhat, Misra, & Schoenfeld, 2000). This number is below the national obesity prevalence suggesting that physicians identify obesity only 36% of the time (Stafford et al., 2000). Once patients were identified as obese, physicians provided counseling for weight loss (35.5%), exercise (32.8%), and diet (41.5%) (Stafford et al., 2000). However in this

study, only a fourth of the patients were provided any type of weight management service or counseling (Stafford et al., 2000).

Patient compliance with weight reduction programs poses a challenge for PCPs. Furthermore, comorbid conditions can play a role in weight reduction compliance. For example, patients who are obese and have psychiatric comorbidities have a harder time communicating with their physicians which can augment their treatment outcomes especially for chronic illnesses such as diabetes (De Panfilis et al., 2007). In another study, subjects' compliance with taking anti-psychotic medicines was related to their BMI and distress about gaining weight. The study found that obese individuals (BMI >30%) were 2.5 times more likely to be non-compliant with their anti-psychotic medications than their non-obese counterparts (Weiden, Mackell, & McDonnell, 2004). Most of the subjects expressed distress over gaining weight as a cause of stopping their medications (Weiden et al., 2004). These are just some of the difficulties a PCP encounters when dealing with overweight and obesity. The difficulties with weight reduction compliance can also influence a patient's exercise behavior.

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

One of the strategies PCPs can employ to help their patients lead a healthier lifestyle is to promote physical activity. The current recommendation for physical activity is 30 minutes a day of moderate-intensity activity most days of the week or 20 minutes of high-intensity activity three times a week (CDC, 2008). There are both physical and psychological benefits from engaging in exercise.

Exercise reduces the risk of coronary heart disease and stroke as well as raising high density lipoproteins (CDC, 2008). Being fit has been shown to reduce cardiovascular disease by 50% (Warburton, Nicol & Bredin, 2006). Furthermore, exercise lowers the risk of hypertension and helps reduce blood pressure in people who are already afflicted with hypertension (CDC, 2008). Exercise lowers the risk of developing type II diabetes and helps achieve and maintain a healthy body weight (CDC, 2008). In people who have type II diabetes, physical activity improves glucose homeostasis and researchers have seen a strong correlation between exercise and reduced mortality rate especially due to diabetes (Warburton et al., 2006). Physical activity helps reduce feelings of depression, anxiety and stress (CDC, 2008). Regular physical activity reduced mortality rates in both older and younger adults (HHS, 2002). In addition, exercise is important in maintaining bone strength and muscle mass (HHS, 2002). Among the elderly, physical activity protects against falling and hip fractures (HHS, 2002). Also, exercise has been shown to decrease the risk of colon cancer (CDC, 2008).

Currently, more than 60% of Americans do not achieve the recommended level of activity (CDC, 2008). The 2000 BRFSS indicated that 27.6% of the US population was completely inactive (Anderson et al., 2005). Inactivity is more common among women than men, and is more common among those that have a low income and less education (CDC, 2008). Middle-aged women who were inactive had a 52% increase in all-cause mortality (Warburton et al., 2006). Furthermore, nearly half of adolescents ages twelve to 21 are not active on a regular bases, and female adolescents are much less active then their male counterparts (CDC, 2008).

CHAPTER THREE

METHODOLOGY

North Texas Healthy Heart I Study

The data for this manuscript was obtained by using Phase I of the North Texas Healthy Heart (NTHH) study. The NTHH is part of the North Texas Primary Care Practice-Based Research Network (NorTex). The centralized NorTex research office is located within the University of North Texas Health Science Center, Primary Care Research Institute. As a collaborative network of primary care clinics, NorTex strives to serve the North Texas community including the low-income population. NorTex's goal is to contribute to the scientific knowledge base as well as improve the health of the Texas community.

Study Participants

Recruitment for the NTHH occurred from 12 family medicine/internal medicine clinic sites that are part of the NorTex network as well as self-referrals from the community. The 12 participating sites included four academic community-based clinics, three county community health centers, four solo-practitioner private practices, and one federally-qualified health center. Study participants were recruited by receiving referrals from site clinicians, posting flyers at each of the participating sites, as well as having research assistants recruit from each clinic.

Through the recruiting efforts, 371 participants were included in the study, therefore, allowing for a cross-sectional study. The study included non-Hispanic whites, non-Hispanic blacks, and Hispanics/Latinos.

Inclusion Criteria

To screen for eligibility, all potential participants were screened on site or over-the-phone from a centralized NorTex research office. Inclusion criteria included being over the age of 44 and self-identified themselves as non-Hispanic white, Non-Hispanic black, or Hispanic/Latino. The participants had no history of self-reported cardiovascular disease (coronary artery disease, peripheral arterial disease, history of myocardial infarction or stroke, or congestive heart failure), renal failure or cirrhosis.

Protection of Human Participants

All study procedures were approved by the University of North Texas Health Science Center Institutional Review Board.

Data Collection Procedures

Participants who met the study criteria were given a morning appointment at the NorTex research office. First, consent was obtained from all eligible participants. Spanish-only participants received and signed an informed consent in Spanish. Demographic information, medical histories, and several psychosocial domains were collected via a 1-hour face-to-face interview in a controlled environment. After the completion of the structured interview, participants were then brought into a clinical exam room, changed into a gown, and had weight, height, waist/hip circumferences, blood pressure measures (millimeters of mercury [mmHg]), and body fat measurements (% body fat) completed. Research assistants trained by the investigators recorded all the measurements. Height was measured to the nearest 0.25 inch, and weight was measured to the nearest 0.25 lb using a standard balance scale. Height and weight measurements

were used to calculate a body-mass index for each subject using the Quetelet's equation (kg/m^2) (Fidanza, 1972).

Each participant will be contacted once per year for the next three consecutive years for telephone follow-up interviews which was not available for this manuscript.

Instrumentation and Data Analysis

The NTHH study employed questions from the Behavioral Risk Factor Surveillance System. By utilizing these standard questions, researches collected a numer of demographic and health behavior information. Age in years was recorded as a continuous variable. Gender (male or female) was cataloged as a dichotomized variable. Race/ethnicity was assessed using the Federal Office of Management and Budget standards and then categorized as non-Hispanic white, non-Hispanic Black, and Hispanics/Latino. Marital status was categorized as married, divorced, widowed, separated, never married and in a relationship.

The subjects were asked the question "Last year, what was your total family income from all sources, before taxes?" The participants' responses were divided into the following categories, less than $10,000, more than $10,000 but less than $20,000, more than $20,000 but less than $30,000, more than $30,000 but less than $40,000, more than $40,000 but less than $50,000, more than $50,000 but less than $75,000, more than $75,000 but less than $100,000 and more than $100,000.

Health insurance status was obtained by asking the question "Do you have any kind of health care coverage, including health insurance, prepaid plans such as HMOs or

government plans such as Medicare or Medicaid?" The participants had the following choices: yes, no, don't know/not sure and refused.

Descriptive statistics were included. Normality was checked by plotting a histogram and noting whether the curves followed a normal distribution. Age did not follow a normal distribution because the study only included individual over the age of 44.

Psychosocial measures incorporated in the NTHH study included perceived racial discrimination, reaction to unfair treatment, ethnic identity, sense of control, social support, depression symptomatology, perceived stress, aggression, religiousness/spirituality, and acculturation among Hispanics/Latinos and African Americans.

Variables

Sense of Control (Cronbach α 0.68) (Mirowski & Ross, 1991) is the extent to which an individual perceives having personal power and direction over outcomes in life (Appendix A). The questions are scored based on responses given: strongly disagree (-2), disagree (-1), neutral (0), agree (1), strongly agree (2). The scores to the eight questions were added up and divided by eight yielding a mean score.

Body Mass Index (BMI): BMI was tested for normality using both a histogram and stem-leaf plot. These revealed that BMI did not have a normal distribution. Therefore, BMI outliers had to be excluded from the model. To achieve this, a jack knife residual was examined, and any value of three or greater was excluded. This resulted in 359 subjects (Appendix A).

Primary care physician (PCP): The presence of a PCP was ascertained by asking the question "Do you have one person you think of as your personal doctor or healthcare provider?" The participants were given the following choices: yes, only one; more than one; no; don't know/not sure; and refused. The responses were dichotomized into having one or more than one person they think of as their healthcare provider and none. The answers that were recorded as "Don't know/Not sure" and "Refused" were not used for analysis (Appendix A).

Exercise behavior: The presence of exercise behavior was ascertained by asking the following question: "During the past month, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise?" The participants were given the following choices: yes, no, don't know/not sure, and refused (Appendix A). The answers to the above question were dichotomized into having exercised in the past month and not having exercised in the past month. The answers that were recorded as "Don't know/Not sure" and "Refused" were not included in the model.

Routine health care check up: To ascertain the amount of time since the last routine health care check up, the following question was analyzed "About how long has it been since you last visited a doctor for a routine checkup? A routine checkup is a general physical exam, not an exam for a specific injury, illness, or condition."   The participants were given the following choices: within the past year (1-12 months ago), within past 2 years (1-2 years ago), within past 5 years (2-5 years ago), 5 or more years ago, never, don't know/not sure, and refused (Appendix A). The answers to the above question were

dichotomized into having a routine check up in the past 2 years and having a routine checkup more than 2 years ago or never. Answers that were recorded as "Don't know/Not sure" and "Refused" were not used in the model.

Question 1: To what extent is SOC associated with BMI?

To test the question to what extent is SOC associated with BMI, linear regression was performed with BMI as the dependent variable and SOC as the independent variable.

Question 2: To what extent is SOC associated with having a primary care physician?

To test the question to what extent is SOC associated with having a primary care physician, logistic regression was used with the dichotomized PCP as the dependent variable and SOC as the independent variable.

Question 3: To what extent is SOC associated with self-reported exercise behavior?

To test the question to what extent is SOC associated with self reported exercise behavior; logistic regression was utilized with the dichotomized exercise in the past month as the dependent variable and SOC as the independent variable.

Question 4: To what extent is SOC associated with self-reported routine health check-ups?

To test the question to what extent is SOC associated with self reported routine health check-ups, logistic regression was utilized with the dichotomized routine checkup as the dependent variable and SOC as the independent variable.

Question 5: In what way does the presence of a PCP modify the association between SOC and BMI.

To test the question, in what way does the presence of a PCP modify the association between SOC and BMI, linear regression was performed. BMI was the dependent variable and SOC and PCP were the independent variables. The interaction term SOC*PCP was also included.

Question 6: In what way does the presence of a PCP modify the association between SOC and self-report exercise behavior?

To test the question in what way does the presence of a PCP modify the association between SOC and self-reported exercise behavior, logistic regression was utilized. The dependent variable was the dichotomized exercise behavior in the past month. The independent variables included SOC and PCP. The interaction term SOC* PCP was also included.

Question 7: In what way does the presence of a PCP modify the association between SOC and subjects who report having a routine health check-up?

To test the question in what way does the presence of a PCP modify the association between SOC and subjects who report having a routine checkup, logistic regression was utilized. The dependent variable was the dichotomized routine checkup. The interaction term SOC* PCP was also included.

CHAPTER FOUR

RESULTS

There were 371 subjects that took part in the survey. The study included subjects that were older than 44 years of age. Three of the subject's ages were missing. Of the 368 subjects that did respond, the minimum age in the study was 45 years old and the maximum age was 80 years. The mean age in the study was 55.5 years with a standard deviation of 8.1.

Of the 371 participants, 100 (27%) classified themselves as Non-Hispanic Caucasian, 136 (36.7%) classified themselves as Non-Hispanic Black, and 135 (36.4%) classified themselves as Hispanic or Latino. Gender was missing for two participants. Of the 369 with available information, 233 (63.1%) were female and 136 (36.9%) were male. Marital status was missing for two participants. Of the 369 that did respond, 235 (63.7%) were married, 54 (14.6%) were divorced, 26 (7.0%) were widowed, 16 (4.3%) were separated, 23 (6.2%) were never married, and 15 (4.1%) were in a relationship (Table 1).

Of 371 participants, 23 responses were missing for income (Table 2). Of the 348 that did respond, 35 (10.1%) had a household income of less than $10,000, 52 (14.8%) had a household income of more than $10,000 but less than $20,000, 52 (14.9%) had a household income of more than $20,000 but less than $30,000, 30 (8.6%) had a household income of more than $30,000 but less than $40,000, 33 (9.5%) had a household income of more than $40,000 but less than $50,000, 50 (13.2%) had a household income of more than $50,000 but less than $75,000, 46 (13.2%) had a

household income of more than $75,000 but less than $100,000, and 50 (14.4%) had a household income of more than $100,000 (Table 2).

The participants were asked what type of healthcare coverage they had. Of the 371 that participated in the study, 3 responses were missing. Of the 368 subjects that did respond, 79 (21.5%) did not have health care coverage and 289 (78.5%) did have health care coverage (Table 2).

Of the 371 participants, 369 responded to the SOC questions (Table 3). The minimum SOC score was -0.5, and the maximum score was 2. The mean score was 0.9 with a standard deviation of 0.5 (Table 3). Of the 371 participants, BMI was obtained from 366 subjects. Because of the lack of normality to distribution curve, the jack knife residual was examined and excluded an additional 6 subjects, yielding a total of 359 participants. The minimum BMI was 19.4 and maximum BMI was 50.4. The mean BMI was 30.9 with a standard deviation of 5.6 (Table 3).

Out of the 371 subjects, 7 responses were missing for having a PCP (Table 4). From the 364 participants that responded, 235 (64.6%) had one health care provider, 70 (19.2%) subjects had more than one person they thought of as their primary healthcare provider, and 59 (16.2%) did not have a primary health care provider (Table 4).

Of the 371 participants, 5 answers were missing for having participated in exercise behavior in the past month. Of the 366 who responded, 27.6% (n=101) did not exercise in the past month and 71.4% (n=264) did exercise in the past month (Table 4).

Of the 371 participants, 3 answers were noted as missing for having had a routine healthcare checkup. Missing answers were participants who refused to answer the

question or answered "Don't know/not sure." Of the 368 participants who did answer,

11.3% (n=42) had a routine healthcare checkup over 2 years ago or never, and 87.9%

(n=326) had a routine healthcare checkup within the past 2 years (Table 4).
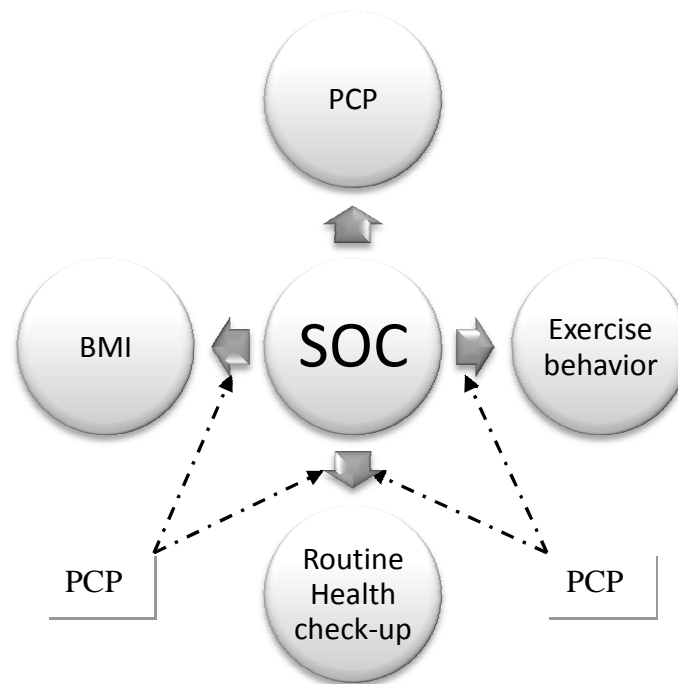
Figure 1: Theory Model. Illustration of SOC and the relationships tested. Primary care physicians (PCP) were tested as interaction terms as well as confounders in the model. Body Mass Index (BMI). Exercise Behavior in the past month and Routine health check-up in the past 2 years.

Question 1: To what extent is SOC associated with BMI?

SOC was not associated with BMI. The relationship between SOC and BMI was

not statistically significant (β= -.95, p = 0.093) (Table 5).

Question 2: To what extent is SOC associated with having a primary care physician?

SOC was not associated with having a primary care physician. The relationship between SOC and PCP was not statistically significant ($p = .50$). The Odds Ratio was 1.21 (95% CI 0.70-2.12). Though not statistically significant, the model revealed that for every unit of increase of SOC, there was a 21% increase in the likelihood having a PCP (Table 6).

Question 3: To what extent is SOC associated with self-reported exercise behavior?

SOC was associated with having exercise behavior in the past month. The relationship between SOC and exercise behavior was statistically significant ($p = 0.001$). The Odds Ratio was 2.32 (95% CI 1.42 to 3.77), which means for every unit of increase of SOC, there was a 2.32 times increase in the likelihood of exercising in the past month (Table 7).

Question 4: To what extent is SOC associated with self-reported routine health check-ups?

SOC was not associated with having a routine check-up. The relationship between SOC and having a routine check-up less than two years ago was not statistically significant ($p = 0.784$). The Odds Ratio was 1.09 (95% CI 0.58 to 2.07) (Table 8).

Question 5: In what way does the presence of a PCP modify the association between SOC and BMI.

To test the question whether the association between SOC and BMI was modified by having a PCP, the interaction term SOC * PCP was added to the model. The *p*-value

for the interaction term SOC * PCP was 0.66 (β= -.63). The association between SOC

and BMI was not modified by having a PCP (Table 5).

To test for confounding, SOC and PCP were run as independent variables with

BMI as the dependent variable. The *p*-value for PCP as a confounder was 0.069 with a β

of -1.05. Because the β did not significantly change in either value or direction when

PCP was added to the model, therefore, PCP is not a confounder in the model (Table 5).

Question 6: In what way does the presence of a PCP modify the association between

SOC and self-report exercise behavior?

To test the question whether the association between SOC and self-reported

exercise behavior was modified by having a PCP, the interaction term SOC * PCP was

added to the model. The *p*-value for the interaction term SOC * PCP was 0.560. The

odds ratio for the interaction term SOC * PCP was 1.43 (95% CI 0.43 to 4.69). The

association between SOC and self-reported exercise behavior was not modified by having

a PCP (Table 7).

To test for confounding, SOC and PCP were run as independent variables with

self reported exercise behavior as the dependent variable. The odds ratio for PCP as the

confounder was 2.27 (95% CI 1.38 to 3.72) (*p* = 0.001). Because the OR did not

significantly change in either value or direction when PCP was added to the model,

therefore, PCP is not a confounder in the model (Table 7).

Question 7: In what way does the presence of a PCP modify the association between SOC and subjects who report having a routine health check-up?

To test the question whether the association between SOC and having a routine check-up in the past two years was modified by having a PCP, the interaction term SOC * PCP was added to the model. The *p*-value for the interaction term SOC * PCP was 0.280. The odds ratio for interaction term SOC * PCP was 2.17 (95% CI 0.53 to 8.80).The association between SOC and having a routine check-up was not modified by having a PCP (Table 8).

To test for confounding, SOC and PCP were both independent variables with having a routine health check-up as the dependent variable. The odds ratio for the PCP as the confounder was 0.92 (95% CI 0.47 to 1.78) (*p* = 0.801). Because the OR did not significantly change in either value or direction when PCP was added to the model, therefore, PCP is not a confounder in the model (Table 8).

CHAPTER FIVE

DISCUSSION

The purpose of this study was to evaluate whether PCP's can potentially use a psychological characteristic like SOC to promote healthier behaviors in their patients. The first step was to analyze whether SOC is associated with BMI, having a PCP, exercise behavior and obtaining a routine healthcare check up. The second step was to analyse whether PCP modified the relationships between SOC, BMI, exercise behavior and obtaining a routine healthcare check-up.

SOC was not associated with BMI, having a PCP, or having a routine health check-up in the past two years. It is possible that the SOC questions were not guided specifically to a person's perception of health. SOC measures a participants overall view of the control they have over their life. Nonetheless, the results of the relationship between SOC and BMI came as a surprise especially since previous studies showed that a higher SOC was related to lower rates of diabetes mellitus (Cardarelli et al, 2007). Previous studies using the Ross and Mirowsky SOC scale found that people with higher SOC were less likely to have depression and anxiety. Also, elderly with higher SOC felt like they had more control over their health. This could lead to higher SOC leading to fewer visits to a PCP and even perhaps not having a PCP and not obtaining a routine health check-up. On the other hand, having a higher SOC could empower the person to seek out the best care possible so that they are healthier. However, the study did not find an association, either positive or negative.

Furthermore, PCP did not augment the relationship between SOC and BMI, exercise or having a routine check-up. Even in patients that were exercising, having a PCP did not modify the relationship between SOC and exercise behavior. Surprisingly, PCP was neither a modifier nor a confounder in the relationship between SOC and having a routine check-up.

The data showed that SOC was associated with engaging in exercise behavior in the prior month. SOC is an important psychological construct and is helpful in predicting many health behaviors. Therefore, it is beneficial to know that a higher SOC can predict exercise behavior as this could lead to a healthier lifestyle. Furthermore, by taking advantage of a person's SOC, PCP's may be able to promote exercise behavior in their patients. The results of this study warrant more studies specifically investigating SOC, exercise behavior and the role of PCPs.

The study had certain limitations. The study relied on a secondary analysis of a cross-sectional survey. Furthermore, because of the use of a survey, the study was limited by reliance on self-reported data and the recall of the participants as well as the mood of the subjects during the survey. When answering the SOC questionnaire, the subjects were rating the control they had over their whole lives not just their healthcare. Also, the survey did not ask the participants if their PCP offered any counseling about healthy lifestyles during their routine health check-up. Moreover, there was only one question in the NTHHS survey that addressed exercise. The question posed did not ask specifically what kind of exercise the subject performed, how often, or how long. The question also did not test the cause and effect of exercise and SOC. Meaning, the

particular question did not investigate whether the person had a higher SOC because they exercised or whether exercise improved a person's SOC. Additionally, the study was bias toward having subjects that already did have a PCP because the recruitment took place at general practitioner's offices around Tarrant County.

In future study designs, exercise should be measured in numerous ways. The survey would need to include specific questions about type of exercise performed, how often a person exercised and time spent exercising. This would give a clearer idea about the participants exercise behavior. Also, a question should be asked if their PCP encouraged exercise behavior and the influence this had on their lifestyle. An SOC construct should be investigated that dealt specifically with a person's perceived control over their health.

Furthermore, future studies should investigate the interaction between SOC and exercise behavior through interventional studies. The intervention would include a counseling session by their PCP and then re-measuring SOC and exercise after the intervention. This would give further insight into both SOC as well as a PCP's role in promoting healthy behavior in their patients.

In conclusion, the hypotheses that PCP would augment the relationships between SOC, BMI, exercise and having a routine health check-up was not supported by the data. However, SOC was associated with increase in exercise behavior. This suggests that SOC as a psychological construct could predict a person's exercise behavior. Through an interventional study design, future research could investigate specifically if a counseling session with a PCP as well as SOC could augment exercise behavior. This may help

PCP's to intervene and assist their patients to lead healthier lifestyles through the use of

the patient's current SOC.

REFERENCES

AAFP. (2008). *Primary care physician.* Retrieved May/01, 2008, from

    http://www.aafp.org/online/en/home/policy/policies/p/primarycare.html#Parsys0004

Adolfsson, B., Andersson, I., Elofsson, S., Rossner, S., & Unden, A. L. (2005). Locus of

    control and weight reduction. *Patient Education & Counseling, 56*(1), 55-61.

Anderson, L. H., Martinson, B. C., Crain, A. L., Pronk, N. P., Whitebird, R. R.,

    O''Connor, P. J., et al. (2005). Health care charges associated with physical

    inactivity, overweight, and obesity. *Preventing Chronic Disease, 2*(4), A09.

Balch, P., & Ross, A. W. (1975). Predicting success in weight reduction as a function of

    locus of control: An unidimensional and multidimensional approach. *Journal of*

    Consulting & Clinical Psychology, 43(119)

Black, P. H. (2006). The inflammatory consequences of psychologic stress: Relationship

    to insulin resistance, obesity, atherosclerosis and diabetes mellitus, type II. *Medical*

    Hypotheses, 67(4), 879-891.

Cardarelli, K. M., Vernon, S. W., Baumler, E. R., Tortolero, S., & Low, M. D. (2007).

    Sense of control and diabetes mellitus among U.S. adults: A

    cross-sectional analysis. *BioPsychoSocial Medicine, 1*(19)

CDC. (2008). *Physical activity for everyone.* Retrieved 4/01, 2008, from

    http://www.cdc.gov.proxy.hsc.unt.edu/nccdphp/dnpa/physical/index.htm

Cross, M. J., March, L. M., Lapsley, H. M., Byrne, E., & Brooks, P. M. (2006). Patient self-efficacy and health locus of control: Relationships with health status and arthritis-related expenditure. *Rheumatology, 45*(1), 92-96.

De Panfilis, C., Cero, S., Dall'Aglio, E., Salvatore, P., Torre, M., & Maggini, C. (2007). Psychopathological predictors of compliance and outcome in weight-loss obesity treatment. *Acta Bio-Medica De l Ateneo Parmense, 78*(1), 22-28.

Ferrer, R. L. (2007). Pursuing equity: Contact with primary care and specialist clinicians by demographics, insurance, and health status. *Annals of Family Medicine, 5*(6), 492-502.

Finkelstein, E. A., Fiebelkorn, I. C., & Wang, G. (2003). National medical spending attributable to overweight and obesity: How much, and who's paying?. *Health Affairs, Suppl Web Exclusives*(Suppl Web Exclusives), W3-219-26.

Finkelstein, E. A., Fiebelkorn, I. C., & Wang, G. (2004). State-level estimates of annual medical expenditures attributable to obesity. *Obesity Research, 12*(1), 18-24.

Goldney, R. D., & Cameron, E. (1981). Locus of control as a predictor of attendance and success in management of obesity. *International Journal Obesity, 5*, 39-43.

Hadjistavropoulos, H., & Shymkiw, J. (2007). Predicting readiness to self-manage pain. *Clinical Journal of Pain, 23*(3), 259-266.

Hedley, A. A., Ogden, C. L., Johnson, C. L., Carroll, M. D., Curtin, L. R., & Flegal, K.
M. (2004). Prevalence of overweight and obesity among US children, adolescents,
and adults, 1999-2002. *JAMA: The Journal of the American Medical Association,
291*(23), 2847-2850.

HHS. (2002). *Physical activity fundamental to preventing disease.* Retrieved 4/02, 2008,
from http://aspe.hhs.gov/health/reports/physicalactivity/

Krause, N., & Shaw, B. A. (2000). Role-specific feelings of control and mortality.
Psychology & Aging, 15(4), 617-626.

Kriska, A. M., Edelstein, S. L., Hamman, R. F., Otto, A., Bray, G. A., Mayer-Davis, E. J.,
et al. (2006). Physical activity in individuals at risk for diabetes: Diabetes prevention
program. *Medicine & Science in Sports & Exercise, 38*(5), 826-832.

Lachman, M. E., & Weaver, S. L. (1998). The sense of control as a moderator of social
class differences in health and well-being. *Journal of Personality & Social
Psychology, 74*(3), 763-773.

Mirowski, J., & Ross, C. E. (1991). Eliminating defense and agreement bias from
measures of the sense of control: A 2 x 2 index. *Social Psychology Quarterly, 54*(2),
127-145.

Mokdad, A. H., Ford, E. S., Bowman, B. A., Dietz, W. H., Vinicor, F., Bales, V. S., et al.
(2003). Prevalence of obesity, diabetes, and obesity-related health risk factors, 2001.
JAMA: The Journal of the American Medical Association, 289(1), 76-79.

Moser, D. K., Riegel, B., McKinley, S., Doering, L. V., An, K., & Sheahan, S. (2007). Impact of anxiety and perceived control on in-hospital complications after acute myocardial infarction. *Psychosomatic Medicine, 69*(1), 10-16.

Nir, Z., & Neuman, L. (1995). Relationship among self-esteem, internal-external locus of control and weight change after participation in a weight reduction program. *J.Clin.Psychol., 51*, 482-490.

Ogden, C. L., Yanovski, S. Z., Carroll, M. D., & Flegal, K. M. (2007). The epidemiology of obesity. *Gastroenterology, 132*(6), 2087-2102.

Pearlin, L. I., Lieberman, M. A., Menaghan, E. G., & Mullan, J. T. (1981). The stress process. *Journal of Health & Social Behavior, 22*(4), 337-356.

Ross, C. E., & Van Willigen, M. (1997). Education and the subjective quality of life. *Journal of Health & Social Behavior, 38*(3), 275-297.

Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs, 80*(1), 1-28.

Runge, C. (2007). Economic consequences of the obese. *Diabetes, 56*(11), 2668-2672.

Ruser, C. B., Sanders, L., Brescia, G. R., Talbot, M., Hartman, K., Vivieros, K., et al. (2005). Identification and management of overweight and obesity by internal medicine residents. *Journal of General Internal Medicine, 20*(12), 1139-1141.

Seeman, M., & Evans, J. W. (1962). Alienation and learning in a hospital setting. *American Sociological Review, 27*(6), 772-782.

Stafford, R. S., Farhat, J. H., Misra, B., & Schoenfeld, D. A. (2000). National patterns of physician activities related to obesity management. *Archives of Family Medicine, 9*(7), 631-638.

Tobias, L. L., & MacDonald, M. L. (1977). Internal locus of control and weight loss: An insufficient condition. *J.Consult.Clin.Psychol., 45*, 647-653.

Voils, C. I., Steffens, D. C., Flint, E. P., & Bosworth, H. B. (2005). Social support and locus of control as predictors of adherence to antidepressant medication in an elderly population. *American Journal of Geriatric Psychiatry, 13*(2), 157-165.

Wallston, K. A., & Wallston, B. S. (1981). Health locus of control. In H. Lefcourt (Ed.), *RESEARCH WITH THE LOCUS OF CONTROL CONSTRUCT* (pp. 189). New York: Academic Press.

Wallston, K. A., Strudler Wallston, B., & DeVellis, R. (1978). Development of the multidimensional health locus of control (MHLC) scales. *Health Education & Behavior, 6*(1), 160-170.

Warburton, D. E. R., Nicol, C. W., & Bredin, S. S. D. (2006). Health benefits of physical activity: The evidence. *Canadian Medical Association Journal, 174*(6), 801-809.

Weiden, P. J., Mackell, J. A., & McDonnell, D. D. (2004). Obesity as a risk factor for

antipsychotic noncompliance. *Schizophrenia Research, 66*(1), 51-57.

APPENDIX A

Study Questions of Interest

Mirowsky and Ross 1991 Sense of Control Scale

Control over good

1. I am responsible for my own successes

2. I can do just about anything I really set my mind to

Control over bad

3. My misfortunes are the result of mistakes I have made

4. I am responsible for my failures

Powerlessness over good

5. The really good things that happen to me are mostly luck

6. There's no sense in planning a lot- if something good is going to happen, it will.

Powerlessness over bad

7. Most of my problems are due to bad breaks

8. I have little control over the bad things that happen to me.

Note: Rating of the questions: Strongly agree (2), agree (1), Neutral (0), disagree (-1), strongly disagree (-2)

BMI

Height was measured to the nearest 0.25 inch.

Weight was measured to the nearest 0.25 lb using a standard balance scale.

Note: Height and weight measurements were used to calculate a body-mass index for each subject using the Quetelet's equation (kg/m^2)

Exercise

During the past month, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise?

Note: Answer choices: Yes, No, Don't know or Not sure, Refused

Primary Care Physician

Do you have one person you think of as your personal doctor or health care provider? (If no ask: Is there more than one, or is there no person who you think of as your personal doctor or health care provider?)

Note: Answer choices: Yes, only one; More than one; No; Don't know/Not sure; Refused

Health care checkup

About how long has it been since you last visited a doctor for a routine checkup? A routine checkup is a general physical exam, not an exam for a specific injury, illness, or condition

Note: Answer choices: Within past year (1-12 months ago), Within past 2 years (1-2 years ago), Within past 5 years (2-5 years ago), 5 or more years ago, Never, Don't know/Not sure, Refused

APPENDIX B

Survey Construct

Construct	Reference	Number of questions
Measurements		5
Discrimination	Krieger N. Racial and gender discrimination: risk factors for high blood pressure? *Soc Sci Med* 1990; 30(12):1273-1281. Krieger N, Sidney S. Racial discrimination and blood pressure: the CARDIA Study of young black and white adults. *Am J Public Health* 1996; 86(10):1370-1378. Krieger N, Smith K, Naishadham D, Hartman C, Barbeau EM. Experiences of discrimination: Validity and reliability of a self-report measure for population health research on racism and health. *Soc Sci Med* 2005; 61(7):1576-1596.	11
Medical history		10
Sense of Control	Ross CE, Van Willigen M. Education and the subjective quality of life. *J Health Soc Behav* 1997; 38(3):275-297. Mirowsky J, Ross CE. Eliminating defense and agreement bias from measures of the sense of control: A 2x2 index. *Soc Psychol Quart* 1991; 54:127-145.	8
Social Support	Ross CE, Van Willigen M. Education and the subjective quality of life. *J Health Soc Behav* 1997; 38(3):275-297. Mirowsky J, Ross CE. Eliminating defense and agreement bias from measures of the sense of control: A 2x2 index. *Soc Psychol Quart* 1991; 54:127-145.	4
Depression	Radloff LS. The CES-D Scale: A Self-Report Depression Scale for Research in the General Population. *Applied Psychological Measurement* 1977; 1(3):385-401	20

Construct	Reference	Number of questions
Behaviors	[1]Centers for Disease Control and Prevention (CDC). *Behavioral Risk Factor Surveillance System Survey Questionnaire*. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2004	38
• Active infection[1]		1
• Smoking[1]		3
• Nutrition[1]		3
• Alcohol[2]		3
• Drugs abuse[2]	[2]Whetten K, Reif S, Swartz M, Stevens R, Ostermann J, Hanisch L, Eron JJ Jr. A brief mental health and substance abuse screener for persons with HIV. *AIDS Patient Care STDS.* 2005;19:89-99	2
• Substance abuse[2]		2
• General health[1]		1
• Exercise[3]		1
• Health coverage[1]	[3]Kriska AM, Edelstein SL, Hamman RF, Otto A, Bray GA, Mayer-Davis EJ, Wing RR, Horton ES, Haffner SM, Regensteiner JG. Physical activity in individuals at risk for diabetes: Diabetes Prevention Program. Med Sci Sport Exerc, 38(5):826-832, 2006	3
• Health provider		3
• Healthcare check-up[1]		
• Demographics[1]		5
• Education[1]		2
• Employment[1]		2
• Income[1]		1
• Shelter/transportation[1]		2
• Family history[1]		1
• Prescription drugs[1]		3
Stress	Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. *J Health Soc Behav* 1983; 24(4):385-9	10
Spirituality	Ironson-Woods Spirituality/Religiousness Index	25
Ethnic Identity		21
Aggression	Buss AH, Perry M. The aggression questionnaire. *J Pers Soc Psychol.* 1992; 63(3):452-9	29
Hispanic/Latino Acculturation Scale		30
Beliefs and Attitudes Survey		47
Total		258

Table 1

Race, Gender, and Marital Status of the Participants

	N	Percent	Valid Percent
Race			
Non-Hispanic Caucasian	100	27.0%	27.0%
African American	136	36.7%	36.7%
Hispanic	135	36.4%	36.4%
Missing	0		
Gender			
Male	136	36.7%	36.7%
Female	233	62.8%	63.1%
Missing	2	.5%	
Marital Status			
Married	235	63.3%	63.7%
Divorced	54	14.6%	14.6%
Widowed	26	7.0%	7.0%
Separated	16	4.3%	4.3%
Never Married	23	6.2%	6.2%
In a relationship	15	4.0%	4.1%
Missing	2	0.5%	

Table 2

Income and Health Care Coverage of the Study Participants

	N	Percent	Valid Percent
Income*			
<10,000	32	9.0%	9.3%
10,000 to <20,000	49	13.8%	14.6%
20,000 to <30,000	51	14.3%	15.2%
30,000 to <40,000	29	8.1%	8.7%
40,000 to <50,000	32	9.0%	9.6%
50,000 to <75,000	49	13.8%	14.6%
75,000 to <100,000	45	12.6%	13.4%
>100,000	48	13.5%	14.3%
Missing	23	5.9%	
Healthcare coverage			
Have healthcare coverage	289	77.9%	78.5%
No healthcare coverage	79	21.3%	21.5%
Missing	3	0.8%	

*Income presented in US dollars

Table 3

Sense of Control and Body Mass Index of the Participants

	N	Minimum	Maximum	Mean	SD	95% CI
SOC	369	-0.5	2.0	0.9	0.5	0.8-0.9
BMI	359	19.4	50.4	30.9	5.6	30.3-31.5

Note: Sense of Control (SOC), Body Mass Index (BMI)

Table 4

Primary Care Physician, Exercise Behavior and Routine Healthcare Check-up of the Participants

	N	Valid Percent
PCP		
One PCP	235	64.6%
More than one PCP	70	19.2%
No PCP	59	16.2%
Missing	7	
Exercise behavior[a]		
Did exercise	264	71.4%
Did not exercise	101	27.6%
Missing	5	
Routine healthcare check-up		
Less than 2 years	326	87.9%
Over 2 years or never	42	11.3%
Missing	3	

Note: Primary Care Physician (PCP)
[a]Exercise behavior in the past month

Table 5

Three Linear Regression Models with BMI as the Dependent Variable

Independent variables	β	Standard error	*p*-value
SOC[a]	-.93	.57	0.093
SOC[b]	-.54	1.30	0.628
PCP[b]	.41	1.43	0.777
SOC * PCP[b]	-.63	1.45	0.660
SOC[c]	-1.05	.58	0.069
PCP[c]	-.12	.77	0.878

Note: Sense of Control (SOC), Primary Care Physician (PCP)
[a]First Model: SOC as the independent variable and BMI as the dependant variable.
[b]Second Model: Interaction term model which included SOC, PCP and SOC*PCP as independent variables with BMI as the dependant variable. [c]Third model: PCP as tested as the confounder with SOC and PCP as the independent variables and BMI as the dependant variable

Table 6

Logistical Regression with PCP as the Dependent Variable

Independent variable	Odds Ratio	95% CI	*p*-value
SOC	1.21	0.70-2.12	0.500

Note: Sense of Control (SOC), Primary Care Physician (PCP)

Table 7

Three Logistical Regression Models with Exercise Behavior as the Dependent Variable

Independent variable	Odds Ratio	95% CI	*p*-value
SOC[a]	2.32	1.42-3.77	0.001
SOC[b]	1.72	0.60-4.90	0.311
PCP[b]	0.89	0.30-2.69	0.839
SOC * PCP[b]	1.43	0.43-4.69	0.560
SOC[c]	2.27	1.38-3.72	0.001
PCP[c]	1.16	0.62-2.20	0.641

Note: Exercise behavior recorded in the past month. Sense of Control (SOC), Primary Care Physician (PCP)
[a]First Model: SOC as the independent variable and exercise behavior as the dependant variable. [b]Second Model: Interaction term model which included SOC, PCP and SOC*PCP as independent variables with exercise behavior as the dependant variable. [c]Third model: PCP as tested as the confounder with SOC and PCP as the independent variables and exercise behavior as the dependant variable

Table 8

Three Logistical Regression Models with Healthcare Check-up as the Dependent Variable

Independent variable	Odds Ratio	95% CI	*p*-value
SOC[a]	1.09	0.58-2.07	0.784
SOC[b]	0.57	0.19-1.73	0.319
PCP[b]	2.24	0.54-9.23	0.264
SOC * PCP[b]	2.17	0.53-8.80	0.280
SOC[c]	0.92	0.47-1.78	0.801
PCP[c]	4.36	2.14-8.87	0.000

Note: Sense of Control (SOC), Primary Care Physician (PCP). Routine healthcare check-up in the past 2 years.
[a]First Model: SOC as the independent variable and routine healthcare check-up as the dependant variable. [b]Second Model: Interaction term model which included SOC, PCP and SOC*PCP as independent variables with routine healthcare check-up as the dependant variable. [c]Third model: PCP as tested as the confounder with SOC and PCP as the independent variables and routine healthcare check-up as the dependant variable