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Interaction Between Income, Health Insurance, and Self-rated Health: A Path Analysis.

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INTERACTION BETWEEN INCOME, HEALTH INSURANCE, AND SELF-RATED HEALTH: A PATH ANALYSIS

by

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ABSTRACT

The political focus of equitable health outcomes in the United States have long centered on access to medical care. However, there is compelling evidence that access to medical care is only the bare minimum necessary to achieve health, and the true influence of health insurance on health is still unclear. Widely accepted models of health estimate that less than 20% of health outcomes can be attributed to clinical care, while greater than 50% is related to social and economic determinants of health, with income being the most consistent predictor.

As a result, this study investigated whether earned income is related to insurance status on the one hand and self-rated health on the other; whether the association between income and self-rated health is indirectly influenced by the presence of health insurance –namely private health insurance; whether there are differences in self-rated health between the privately insured, the publicly insured, and the uninsured; and if duration of uninsurance was inversely associated with self-rated health.

As hypothesized, higher income was associated with having health insurance, and in particular private insurance. Among all included predictor variables, higher income and private insurance are the strongest predictors of higher self-rated health, and lower income and Medicaid were the strongest predictors of lower self-rated health. This study affirms that the health of persons with Medicaid is more similar to persons who are uninsured, and the health of persons with private insurance is more similar to those with Medicare. The association between income and self-rated health is indirectly influenced by health insurance. Age and education exerted the strongest overall influence on self-rated health: older respondents had lower self-rated health, and more educated respondents had higher self-rated health. And as uninsurance duration increased, self-rated health decreased. Additional studies are recommended to improve health insurance policy.

This dissertation is dedicated to my late grandfather, Noel James Ashley, the women of color who walked this path before me, and the many who will walk this path after. You are my inspiration.

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LIST OF ACRONYMS

AHCA	American Health Care Act
ASEC	Annual Social and Economic Supplement
CDC	Centers for Disease Control and Prevention
NHIS	National Health Interview Survey
PPACA	Patient Protection and Affordable Care Act
SES	Socioeconomic Status
WHO	World Health Organization

CHAPTER ONE: INTRODUCTION

Background

There are very few arguments against the notion that access to health insurance has the potential to reduce medical costs to the individual, thereby increasing access to medical services and improving health (Black et al., 2013). Health insurance is specifically designed to subsidize or completely defray the cost of accessing medical services thus reducing the financial burden of healthcare to the consumer; this is especially important for the poor and the sick (Health Insurance, 2016). A study of Medicaid expansion in three states demonstrated that, among the poor and sick, access to Medicaid has the potential to reduce mortality for the elderly, decrease delays in accessing medical services due to cost, and increase self-rated health (Sommers, Baicker, & Epstein, 2012). Children and adults under the age of 65 who have health insurance are more likely to have a usual source of care than their uninsured counterparts (National Center for Health Statistics, 2017); having a usual source of care is associated with accessing increased preventive health care services in childhood and reinforcing healthy behaviors long-term (DeVoe, Tillotson, Wallace, Lesko, & Pandhi, 2012).

"Safety net" services (public hospitals, community health clinics, etc.) do provide people without insurance with some healthcare services to protect the sick and poor and encourage a usual source of care; however, uninsured adults do not consume health resources at the same rate as insured adults even when there is an abundance of safety net providers in their region (Castaneda & Saygili, 2016; Hall, 2011; Holahan & Spillman, 2002; Starfield & Shi, 2004; Zimmer, 2018). Additionally, there is little to no evidence that having an abundance of free clinics and public hospitals in an area has "the ability to eliminate, or even narrow, barriers to access to the extent that insurance can" as not all safety net programs and providers are created

equal (Hall, 2011; Holahan & Spillman, 2002, p. 7). While the uninsured have decreased access overall, the uninsured living in the most vulnerable cities in the United States experience even lower access to healthcare services and poorer quality care than their uninsured counterparts who live closer to more affluent areas (Holahan & Spillman, 2002). Thus, although there are services available to help those without health insurance access medical services, safety net services are often inadequate to mimic the benefits of having health insurance. Safety net providers themselves emphasize that health insurance is a way to give poor and underserved patients increased options for primary and specialty care services (Kamimura et al., 2015).

Nonetheless, despite the access and financial benefits of health insurance, being insured does not consistently predict increased quality of life or lower rates of mortality–two common measures of health (Black, Espín-Sánchez, French, & Litvak, 2013; Marmot, 2002). One potential reason health insurance is not consistently related to mortality or quality of life is that health insurance, mortality, and quality of life are influenced by a larger construct: socioeconomic position. Socioeconomic position is known to influence perception of care, health behaviors, health outcomes, and health insurance coverage, type, and duration (Subramanian and Kawachi, 2004; Dunn, Schaub, & Ross, 2007; Smith, 1996).

Socioeconomic position (i.e. income, education, employment status, etc.) is one of the most important social determinants of health, and has been increasingly associated with premature mortality, lower quality of life, and inappropriate emergency department utilization (Meyers et al., 2014; Kirby & Kaneda, 2010). Concentrated poverty, associated with inequities in wealth, is highly correlated with economic instability, lack of social solidarity, decreased social capital, and other aggregate measures of health (Drier, Mollenkopf, & Swanstrom, 2013).

There also exists direct and indirect effects of income on health; infant mortality, a universal benchmark of intercontinental health, is incredibly sensitive to income and consistently has a positively correlated relationship. Social policies that reinforce the material conditions (low access to care, malnutrition, poor quality housing, etc.) of concentrated poverty is a partial explanation of the health-wealth phenomenon (Drier, Mollenkopf, & Swanstrom, 2013). Racial and ethnic disparities also contribute a great deal to health outcomes like infant mortality, but even these disparities are also mediated by income (Marmot, 2002).

Furthermore, these associations between the social conditions of life and mortality do not disappear once health insurance status is accounted for (Smith, 1996). This means that, irrespective of insurance status, socioeconomic position is still associated with health outcomes. A summary of the research on socioeconomic position and health suggests that a lack of health insurance is not the only contributor to poor health, rather; poverty appears to strongly influence both insurance and health (Drier, Mollenkopf, & Swanstrom, 2013). For those living in areas of concentrated poverty, quality of care is reduced for the insured and the uninsured alike (Dreier, Mollenkopf, & Swanstrom, 2013). Furthermore, the latest research on social determinants of health indicate that socioeconomic status represented by zip code of primary residence is an accurate predictor of health outcomes -sometimes stronger than genetic predisposition (Agarwal, Menon, & Jaber, 2015; Graham, 2016; Wang, Ponce, Wang, Opsomer, & Yu, 2015).

In summary, while some studies show that having health insurance is associated with better health outcomes and other studies show that socioeconomic status is also associated with health outcomes, few studies have explored these relationships as interrelated. The causal mechanisms between socioeconomic status, health insurance, and health are still unclear, and few studies specifically examine whether health insurance has a direct effect on health or affects

health indirectly between income and health (Dreier, Mollenkopf, & Swanstrom, 2013; Subramanian & Kawachi, 2004). More research is necessary to substantiate the relationships between socioeconomic position, health insurance, and health, and to assess the role that income has on both health insurance and health, (Pincus, Esther, DeWalt, & Callahan, 1998; Ashing-Giwa & Lim, 2009; Mielck, Vogelmann, & Leidl, 2014; Lee et al., 2014); In order to better understand the socioeconomic and health system factors that contribute to health outcomes, it is essential to identify the variables that indirectly influence health insurance to determine appropriate health policies that could increase quality of life and possibly reduce mortality.

Purpose and Significance of Study

The purpose of this study is to explore the relationships between income, health insurance (status and type), and health. Specifically, this research intends to investigate whether income is related to insurance status on the one hand and self-rated health on the other; whether the association between income and self-rated health is indirectly influenced by health insurance status; and whether there are differences in self-rated health between the privately insured, the publicly insured, and the uninsured.

At this juncture, there is no clear consensus in the literature as to the relationship between health insurance and self-rated health; many scientists study poverty and health insurance as if they are unrelated concepts rather than inextricably intertwined. While there are many articles examining the relationship between income and illness and the relationship between health insurance and illness, many studies barely acknowledge the relative influence of income and health insurance status on illness or health. Whether health is not only affected directly by both socioeconomic status and insurance but also indirectly by the effect of socioeconomic status on insurance is a concept that has yet to be well established in the scientific literature.

While this may appear to be a semantic distinction, failure to recognize the possibility that socioeconomic conditions influence both health insurance and health has significant social and political consequences. The distribution of resources in the United Stated often limits the effectiveness of health insurance and other social programs that do not address the larger social conditions (Starfield & Birn, 2007; Zaidenweber, 2011). Increasing health insurance coverage without addressing the larger context of the patient greatly underestimates the limitations of health insurance and ignores potential solutions to the looming healthcare crisis in the United States. By the same token, restraining access to health insurance without addressing the material conditions of life may have even more severe consequences for the American people.

The answers as to whether both income and health insurance affect health, and health insurance status and type indirectly influence the relationship between income and health could result in substantial policy implications, especially given the polarized political attitudes toward health and health insurance in the United States. As a matter of fact, while this study was being written, the American Health Care Act (AHCA) passed in the U.S. House of Representatives and was set to repeal and replace the Patient Protection and Affordable Care Act (PPACA) if passed by the Senate. The nonpartisan Congressional Budget Office estimated that if PPACA was repealed and replaced by the AHCA, results could have been catastrophic to many Americans who depended on PPACA provisions for accessing medical care (Congressional Budget Office, 2015). As a result, the bill ultimately died in the Senate in the summer of 2017, but health reform remains an ongoing legislative battle with no foreseeable end in sight.

Another significant aspect of this study is the research design and statistical method utilized. Due to the complexity of structural equation modeling (SEM), it is scarcely applied to this area of research even though it is an entirely relevant and appropriate technique. Studies on

income, health, and health insurance -including the present study- tend to fall short of demonstrating causal relationships, and indirect effects of income on health via insurance is infrequently demonstrated; thus, improving statistical power is an important aspect of any study that seeks to study multifactorial social problems. Complex social and behavioral studies are often represented by a preponderance of categorical (such as Likert scales) and binary variables (yes or no questions), and the nature of these variables often discourages scientists to employ structural equation modeling as the primary technique of choice. Nonetheless, at least a few psychometric and econometric data scientists propose SEM and multi-stage regression as appropriate, parsimonious, and more powerful approaches to these kinds of data (Iacobucci, 2012; Iacobucci, Saldanha, & Dang, 2007)

Furthermore, retrospective observational methods are common in the literature on health insurance and health, but multilevel modeling to improve practical significance is not (Black, Espín-Sánchez, French, & Litvak 2013; Wilper, Wollhandler, Lasser, McCormick, Bor, & Himmelstein 2009; Kirby & Kaneda 2010; Allen, Wright, Harding, & Broffman, 2014; Arroyave, Cardona, Burdorf, & Avendano, 2013). Few researchers, including this author, have the time, resources, and access to the conditions necessary to perform prospective experimental analyses, thus it is important to continuously employ statistical methods that are sufficient to analyze large, retrospective data that yields meaningful results (Kronick, 2009; Sommers, Long, and Baicker, 2014).

These challenges are not unusual as it is difficult for studies of health insurance to go beyond quasi-experimental and for studies of socio-economic status to be more than observational. Also, experimental studies are not necessarily able to mimic the quality of life that accompanies certain insurance statuses. Thus, experimental studies have the burden of

appropriately identifying insurance categories and mimicking the real-world conditions that accompany each category. Meta-analyses of observational studies and other forms of aggregate evidence strengthen internal validity, but only a few of these studies have been conducted (Subramanian and Kawachi, 2004; Marmot, 2002; Yearby, 2011). Additionally, statistical methods, such as structural equation modeling, that could extricate such multivariate relationships have yet to be applied to studies on income, health, and health insurance.

In the literature, health insurance status is also over-simplified: sometimes it is treated as a dichotomous variable (insured or uninsured), and other times levels of health insurance are individually categorized (privately insured, publicly insured, uninsured) (Hoffman & Paradise, 2008; Kariisa & Seiber, 2015; Kronick, 2009; Levy & Meltzer, 2004; Reschovsky, Kemper, & Tu, 2000; Sommers, Gawande, & Baicker, 2017; Sommers, Long, & Baicker, 2014; Wilper et al., 2009; Zaidenweber, 2011). This study includes hypotheses and variables on health insurance status (do you have insurance?), insurance type (what kind?), and insurance duration (how long have you had it?).

In summary, this study will provide additional insight into how health insurance influences health, and new insights into the relationships between one specific social determinant of health (socioeconomic status), health insurance, and self-rated health. This study seeks to explore the idea that: (1) both socioeconomic status and health insurance directly influence self-rated health and; (2) socioeconomic status also indirectly influences self-rated health through health-insurance. Specific research questions and hypotheses explored in this study and the definition of terms used follow in the next sections.

Research Questions and Hypotheses

Research Question 1: What is the association between health insurance status and self-rated health?

Hypothesis 1a: People who have insurance have higher self-rated health than those who do not.

Research Question 2: What is the independent effect of insurance type on health?

Hypothesis 2a: People who are privately insured have higher self-rated health than those who have other types of insurance or are uninsured.

Hypothesis 2b: People who have Medicare have higher self-rated health than those who have other types of insurance or are uninsured.

Hypothesis 2c: People who have Medicaid have lower self-rated health than those who have other types of insurance or are uninsured.

Research Question 3: What is the independent effect of income on health insurance?

Hypothesis 3a: Higher income is associated with the presence of health insurance.

Hypothesis 3b: Higher income is associated with private health insurance.

Hypothesis 3e: Higher income is associated with shorter periods of uninsurance.

Research Question 4: What is the independent effect of income on self-rated health?

Hypothesis 4a: Higher income is associated with higher self-rated health.

Research Question 5: Does insurance indirectly effect the relationship between income and self-rated health?

Hypothesis 5a: Higher income predicts the presence of insurance, which in turn is related higher to self-related health.

Hypothesis 5b: Higher income predicts private insurance, which in turn is related to higher to self-related health.

Hypothesis 5c: Higher income predicts Medicare insurance, which in turn is related to higher self-related health.

Hypothesis 5d: Lower income predicts Medicaid insurance, which in turn is related to lower self-related health.

Hypothesis 5e: Lower income predicts uninsurance duration, which in turn is related to lower self-related health.

Research Question 6: What is the association between history of health insurance and self-rated health?

Hypothesis 6a: Longer periods of uninsurance are related to lower self-rated health

Definition of Terms

Table 1 lists a definition of key terms used throughout this study.

Table 1. Definition of Terms

Term/Acronym	Definition
Socioeconomic Status (SES)	Socioeconomic status is "a composite measure that typically incorporates economic status, measured by income; social status, measured by education; and work status, measured by occupation" (Dutton & Levine, 1989, p. 30).
Socioeconomic position (SEP)	Socioeconomic position refers to the “social and economic factors that influence what positions individuals or groups hold within the structure of a society, and encompasses concepts with different historical and disciplinary origins” (Galobardes, Shaw, Lawlor, Lynch, & Smith, 2006). Thus, SEP

Term/Acronym	Definition
	includes SES and other relative metrics of societal justice.
Sociodemographic factors	Demographic characteristics that are inextricably intertwined with social status and economic mobility. Included in this study are race; Hispanic ethnicity; age; geography; and U.S. birth.
Social Determinants of Health	Social determinants of health are "the structural determinants and conditions in which people are born, grow, live, work and age. They include factors like socioeconomic status, education, the physical environment, employment, and social support networks, as well as access to health care" (Heiman & Artiga, 2015; Marmot, Friel, Bell, Houweling, & Taylor on behalf of the Commission on Social Determinants of Health, 2008).
Private Insurance	Commercial health insurance, typically sponsored by an employer, but may be purchased independently for a higher fee
Public Insurance	Government sponsored health insurance for the poor, elderly, sick, or children. Generally, Medicaid or Medicare, but may include Veterans Health Administration insurance where specified.
Self-Rated Health	Subjective ranking of health based on Likert-scaled survey questionnaire.
Income Inequality	Income inequality references the extent to which income unevenly distributed among a population. Income inequality is commonly measured by two methods: the spread of aggregate income received by households, and the Gini Index of income concentration (U.S. Census Bureau, 1995).

Term/Acronym	Definition
Health Disparity	A health disparity is “a particular type of health difference that is closely linked with economic, social, or environmental disadvantage. Health disparities adversely affect groups of people who have systematically experienced greater social or economic obstacles to health based on their racial or ethnic group, religion, socioeconomic -status, gender, age, or mental health; cognitive, sensory, or physical disability; sexual orientation or gender identity; geographic location; or other characteristics historically linked to discrimination or exclusion” (HealthyPeople.gov, nd).
Health Equity	“Health equity is the principle underlying a commitment to reduce—and, ultimately, eliminate—disparities in health and in its determinants, including social determinants. Pursuing health equity means striving for the highest possible standard of health for all people and giving special attention to the needs of those at greatest risk of poor health, based on social conditions” (Braveman, 2014).

CHAPTER TWO: THEORETICAL FRAMEWORK AND LITERATURE REVIEW

Introduction

This chapter introduces the theoretical underpinning, published literature, and conceptual framework that informed the research question, hypotheses and methodology of this study. The literature review includes empirical and theoretical studies on socioeconomic and sociodemographic position; health insurance type; health outcomes including self-rated health; and the relationship between socioeconomic position, health insurance type, and health outcomes.

As, at present, there does not exist a unified theory explaining the relationship between health insurance, income, and health even though such a theory is necessary to effectively define and investigate the complex relationship between insurance, income, and health. Accordingly, this chapter will review multiple mechanisms along the causal pathway between these variables in order to demonstrate the theoretical justification for their inclusion and analysis. The theoretical explanations reviewed include material mechanisms, psychosocial pathways, behavioral pathways, and biological factors; however, as these factors are not isolated in the dataset examined in this study, while aspects are reviewed to account for multiple theoretical possibilities, they are not later statistically examined. Lastly, this chapter will also outline the conceptual framework used to guide the methodology of this study.

Theoretical Framework

With support from the Joseph Rountree Foundation, Benzeval and colleagues (2014) combine several theoretical mechanisms to describe how multiple factors contribute to the causal pathways between income and health. They identify four pathways that potentially explain the observed relationship between income and health: material mechanisms; psychosocial pathways;

behavioral pathways; and poor health as the cause of low income. Stated another way, the material conditions of life, psychosocial influences, and individual behaviors are all influenced by income and all influence health outcomes. Thus, this research is informed by multiple theoretical perspectives and hypotheses that Benzeval and colleagues have combined into one conceptual model described in Figure 1, Theoretical Pathways between Income and Health (2014). The theoretical concepts and mechanisms explored by Benzeval and colleagues (2014) are summarized below and in Table 2. The Benzeval model (Figure 1) represents the most comprehensive assimilation of theory on the topic at hand and is thus the guiding theoretical framework of this study that informs how the variables in the structural model may interact.

The theories and mechanisms from the income and health literature that Benzeval and colleagues (2014) explore can be grouped into three categories: material theories; psychosocial theories; and behavioral theories. Among the material theories are: materialist theory; political economy theory; neo-material theory; financial capital model; and human capital accumulation theory. Central to material theories is the idea that tangible living conditions and the quality and quantity of physical resources influence health through a variety of physical means. Living conditions include food security, air quality, adequate shelter, and occupational hazards; the provision of physical resources include the quality of education available and materials and experiences locally accessible (Gregg, Proper, & Washbrook, 2007; Guo & Harris, 2000; Macintyre, 1997; Marmot, 2002). Material theories posit that economic structures and public policy influence the availability and distribution of resources (e.g. through the tax codes) and create the living conditions in which the poor suffer and the rich flourish (Lynch, Smith, Kaplan, & House, 2000; Szreter & Woolcock, 2004). Material theories emphasize that poverty is neither simple nor short-term as it is usually not feasible to change the conditions in which one lives

without a rapid influx of wealth, or a political redistribution of physical and financial resources.

From a materialist perspective, health is the result of where we live and in what conditions.

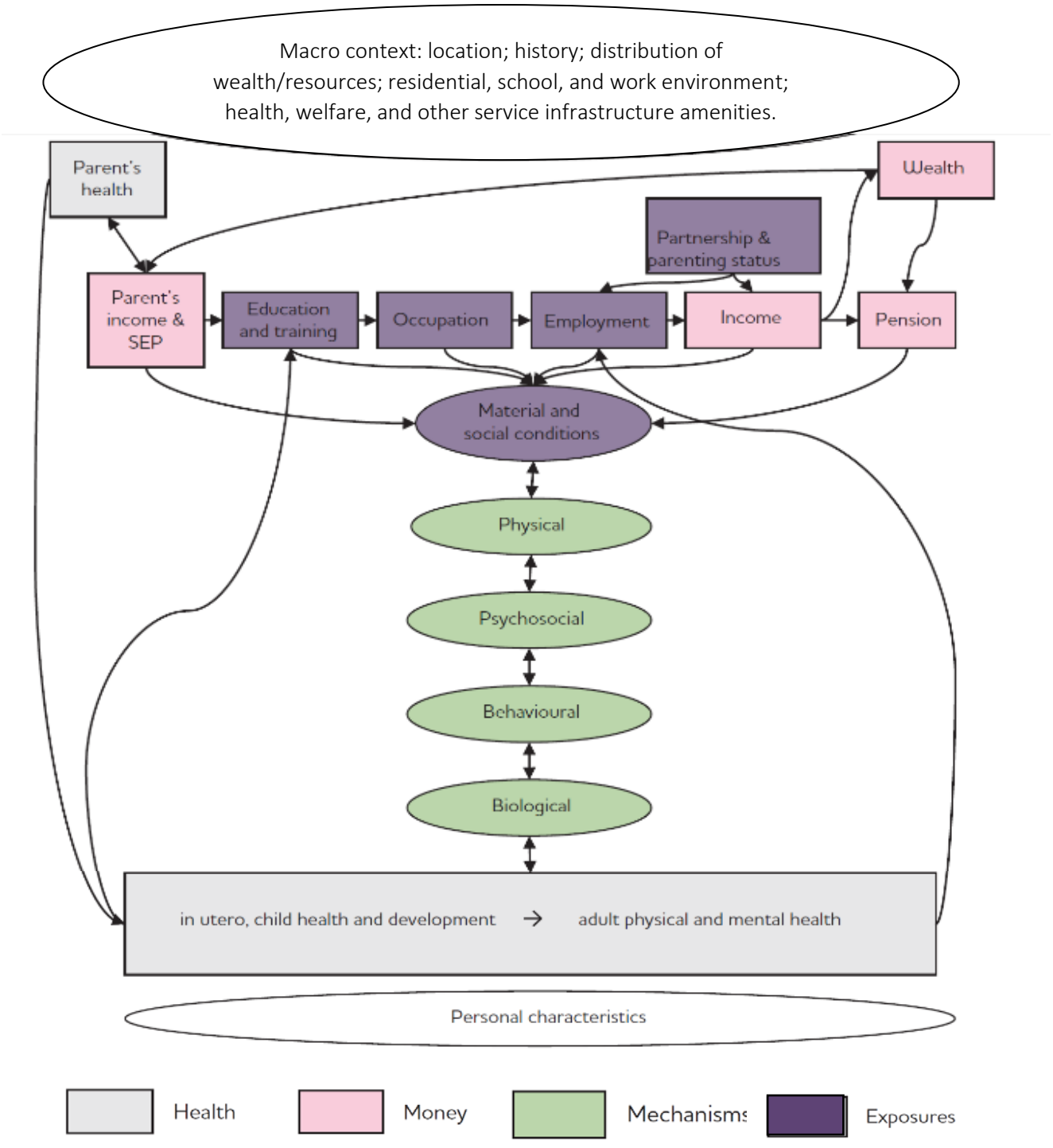


Figure 1. Joseph Rountree Foundation, Benzeval et al., Theoretical Pathways between Income and Health

Psychosocial theories and mechanisms include: psychosocial theory and the constructs of limited control and autonomy; lack of material opportunity; low social support; chronic stress; the theory of relative deprivation; and perceived disadvantage. Psychosocial theories center on the idea that low-income intensifies the experience of psychological stressors that lead to known physiological changes that are ultimately deleterious to health (Adler & Steward, 2010; Aittomaki et al., 2010; Blaxter, 1990; Blaxter, 2003; Marmot, 2004; Kalbbers et al., 2009; Kroenke, 2008; Ploubidis et al., 2011; Runciman, 1966; Shilling, 2012; Stouffer, 1949). Not only does low-income create additional stress, appropriate coping mechanisms to reduce stress are often unavailable to the poor as persons with limited financial resources have reduced access to exercise facilities, affordable counseling, and an abundance of social support (Blaxter, 1990; Blaxter, 2003; Shilling, 2012). Additionally, persons in lower paying jobs often have less autonomy, less control, and poor work-life balance (Adler & Stewart, 2010; Ploubidis et al., 2011). The combination of these factors leads to increased pessimism, depression, anxiety, and in many cases, hopelessness (Adler & Steward, 2010; Aittomaki et al., 2010; Blaxter, 1990; Blaxter, 2003; Marmot, 2004; Kalbbers et al., 2009; Kroenke, 2008; Ploubidis et al., 2011; Runciman, 1966; Shilling, 2012; Stouffer, 1949). The perception of relative disadvantage also heightens the experience of limited resources thus reinforcing the consequences of poverty (Marmot, 2004; Runciman, 1966; Stouffer, 1949). From a psychosocial perspective, health is the result of how we psychologically internalize and biologically express our living conditions and our relative position to others in the social hierarchy.

Behavioral theories and mechanisms include: the stress vulnerability model; direct behavioral explanation pathway mechanisms; lifecycle utility maximization; cultural capital

theory; and diffusions of innovations theory. Central to the behavioral perspective is the idea that persons with limited access to assets and income have constrained opportunities and make poorer choices that reinforce their disadvantage (Bourdieu, 1984, cited by Mackenbach, 2012; Galama & van Kippersluis, 2010; Fuchs, 1982; Pearlin, 1989; Prus, 2007; Raphael et al., 2005; Turner, Wheaton, & Lloyd, 1995; Turner and Lloyd, 1995; Scambler, 2012; Victora, Vaughan, Barros, Silva, & Tomasi, 2000). Persons with lower income consume fewer health care resources, have reduced health literacy, are less likely to use contraception, have lower rates of prenatal care, and exhibit poorer coping mechanisms when stressed (i.e. are more likely to drink, smoke, and overeat and are less likely to seek counseling) (Berkman, Sheridan, Donahue, Halpern, & Crotty, 2011; Bourdieu, 1984, cited by Mackenbach, 2012; Galama & van Kippersluis, 2010; Fuchs, 1982; Pearlin, 1989; Prus, 2007; Raphael et al., 2005; Turner et al., 1995; Turner and Lloyd, 1995; Scambler, 2012; Victora et al., 2000). These behavioral competencies and coping mechanisms are most frequently passed from parents to children, thus persons raised in low-income households tend to learn health-improvement behaviors later in life -if they adapt them at all (Victora et al., 2000). From a behavioral perspective, health is the result of the choices we make, and the choices others make on our behalf.

Cumulatively, where we live and in what condition, how we perceive our living conditions and our relative position to others in the social hierarchy, and the choices that we make and those that are made for us have eternal consequences for our health and well-being. These theories center on individuals nested within families and theoretically explain a large amount of the variance in health outcomes. Table 2 contains a detailed definition of each theory, mechanism, and model mentioned in this section.

Table 2. Theoretical Mechanisms in the Benzeval, et al, Theory of Income and Health

Mechanism/ Theoretical Concept	Description	Citation
Material		
Materialist theory	The impact of tangible living conditions derived from socioeconomic position. Living conditions may include occupation, concentrated poverty, housing conditions, and food security.	Macintyre, 1997 Marmot, 2002
Political economy theory	How economic structures contribute to inequitable patterns of income and living conditions thus creating health inequalities.	Szreter and Woolcock, 2004
Neo-material theory	Emphasizes the influence policy may have on individual resources (i.e. tax benefit redistribution) and living conditions via regulatory agencies and the funding of public services.	Lynch, Smith, Kaplan, & House, 2000
Financial capital model	Among impoverished families, as material resources decrease, parental investment also decreases leading to poor pediatric outcomes.	Guo and Harris, 2000
Human capital accumulation theory	Provision and quality of material resources (i.e. classroom materials, experiences, and services) provided by parents determine children's level of academic achievement.	Gregg, Propper, & Washbrook, 2007
Psychosocial		
Psychosocial theory	Low-income produces severe stress and intensifies the experience of psychological stressors to the point of poor health.	Kalbbers et al., 2009
Limited control and autonomy	Low-income increases exposure to external stressors such as limited power and autonomy, and poor work-life balance.	Adler and Stewart, 2010 Ploubidis, DeStavola, & Grundy, 2011
Lack of material opportunity	Lack of material opportunity may lead to pessimism, depression, hostility,	Kroenke, 2008, p. 32

Mechanism/ Theoretical Concept	Description	Citation
	hopelessness, and ultimately poor health.	
Low social support	Persons with limited financial resources are less likely to have social support. Low social support may influence health outcomes.	Blaxter, 1990
Chronic stress	Chronic stress negatively impacts health in the absence of sufficient social and psychological resources to mediate the emotional impacts of stress. Chronic stress is also known to have biological and physiological consequences for health.	Adler and Stewart, 2010
Theory of relative deprivation	The inability to live "the good life" relative to societal norms and the resulting (relatively) low socioeconomic position causes chronic mental stress.	Aittomaki et al., 2010 p. 1018
Perceived disadvantage	Low socioeconomic position and the perception of relative disadvantage causes stressors that over time lead to poor health, disease, and eventually death.	Stouffer, 1949; Runciman, 1966; Marmot, 2004
Behavioral		
Stress vulnerability model	Stressors (i.e. low income) produce psychological distress and this distress inspires adverse behavioral coping mechanisms such as smoking, overeating, and alcoholism.	Pearlin, 1989 Turner and Lloyd, 1995 Turner, Wheaton, & Lloyd, 1995 Raphael et al., 2005
Direct behavioral explanation pathway mechanisms	Persons with low income consume fewer healthcare resources (including preventative health services) have reduced health literacy, are less likely to use effective contraception methods and have lower utilization of immunizations and prenatal care.	Galama and van Kippersluis, 2010 Prus, 2007 Scambler, 2012
Lifecycle utility maximization	Access to wealth and high income across the lifespan	Galama and van Kippersluis, 2010

Mechanism/ Theoretical Concept	Description	Citation
	coupled with high educational attainment encourages self-investment; this includes participating in healthy behaviors and preventative care services. On the contrary, a person with an economically "high discount rate" focuses their energy on the present (rather than long-term self-investment) without regard for future consequences such as poor health and low income.	Fuchs, 1982
Cultural capital theory	Cultural capital describes competencies and attitudes (frequently passed from parents to children) gleaned from the external environment.	Bourdieu, 1984, Mackenbach, 2012
Diffusion of innovations theory	Persons with higher income are more likely to engage in health-improvement behaviors. Conversely, persons with lower incomes tend to adopt these same health-improvement behaviors later in life, producing a health gap between the economic groups. This is also known as the "inverse equity hypothesis."	Victora, Vaughn, Barros, Silva, & Tomasi, 2000

In addition to the material, psychosocial, and behavioral theories that explore the influence that income exerts on health, Benzeval and colleagues (2014) also acknowledge the possibility that poor health (the fourth mechanism identified by Benzeval and colleagues) could precede low income and not the other way around. However, as the potentially reflexive relationship between income and health is not the focus of this study, lifecourse theories exploring the causal pathway from health to income (rather than from income to health) were not

further explored in this section; however, this relationship is important and could be explored in future research.

While a great amount of the variance in health is theoretically explained via the mechanisms outlined by Benzeval and colleagues, there are also still a host of theories outside of the aforementioned that can and do influence health. While this study centers on micro-level individual factors, additional studies on the interaction between macro level variables -namely public policy, structural racism, concentrated poverty, sexism, ageism, homophobia, and biases against immigrants- are certainly necessary and important. While not all theoretical frameworks described by Benzeval or mentioned in this chapter are included in the structural equation models tested, all theories will be considered when interpreting the data and describing limitations of the outcomes.

Notable in the Benzeval (2014) model is that income is only one of many socioeconomic characteristics that influence health. Benzeval and colleagues (2014) also include parental income and other intergenerational measures of income that shape the social conditions of life. Based on many theories, Benzeval and colleagues (2014) hypothesize that different sociodemographic mechanisms and exposures, over time, are influenced by income and in turn influence health (Figure 1). These other influences are not included in the hypotheses of this study due to the unavailability of data; thus, income is the focus.

Material mechanisms; psychosocial pathways; behavioral pathways, and biological factors are all on the causal pathway between income and health in the Benzeval model. In this study, health insurance status is part of the material and social conditions that shape health outcomes and is thus considered an “exposure.” Nonetheless, while the material and social conditions and physical pathways in the Benzeval (2014) model are separated into two distinct

categories, “mechanism” and “exposure,” the material conditions of life and the physical mechanisms outlined by Benzeval may be interchangeable on a practical level. For example, in an extension of Benzeval and colleagues’ model, many studies suggest that life expectancy and population health tend to be worse in geographic regions where the distribution of wealth is unequal, indicating that the physical and material conditions of life are inextricably intertwined (Baum, 2005; Burtless & Svaton, 2010; Dreier, Mollenkopf, & Swanstrom, 2013; Dunn, Schaub, & Ross, 2007).

The idea is that physical context of living determines the resources available to residents, reinforces healthy or unhealthy behaviors, and thus determines the physical condition of living (Marmot, 2002). This aggregate context of poverty is a popular theoretical explanation for the relationship between income and health as it is impossible to separate individuals from their physical context (Macintyre, Ellaway, & Cummins, 2002; Macintyre, Maciver, & Sooman, 1993; Riva, Gauvin, & Barnett, 2007). Theories of this nature are politically contentious in the United States as they imply a minimum income threshold for life improvement; this implicates ideas like raising the minimum wage and universal health insurance as viable solutions to the health-wealth problem. Material theories also do not account for racial and ethnic differences in mortality and health inequities.

Supplemental to the Benzeval model is the work by Subramanian and Kawachi (2004), who theoretically and conceptually reviewed the literature in search of patterns between income inequality and health in the context of the distribution of wealth in a geographic region, and the aggregate health status of the population (as opposed to individual wealth and individual health). On an aggregate level, Subramanian and Kawachi (2004) noted a statistically concave, or curvilinear, association between the distribution of wealth and population health noting a

"concavity-induced income inequality effect." That is "each additional dollar of income raises individual health by a decreasing amount" (Subramanian and Kawachi, 2004). However, the shape of the relationship between income and health is debated with some scientists assuming a linear relationship between income and health -indicating that gains in health increase consistently as income increases, shown in Figure 2 (Benzeval et al., 2014). However, the shape of the relationship between income and health may also be related to political context and not just neighborhood factors.

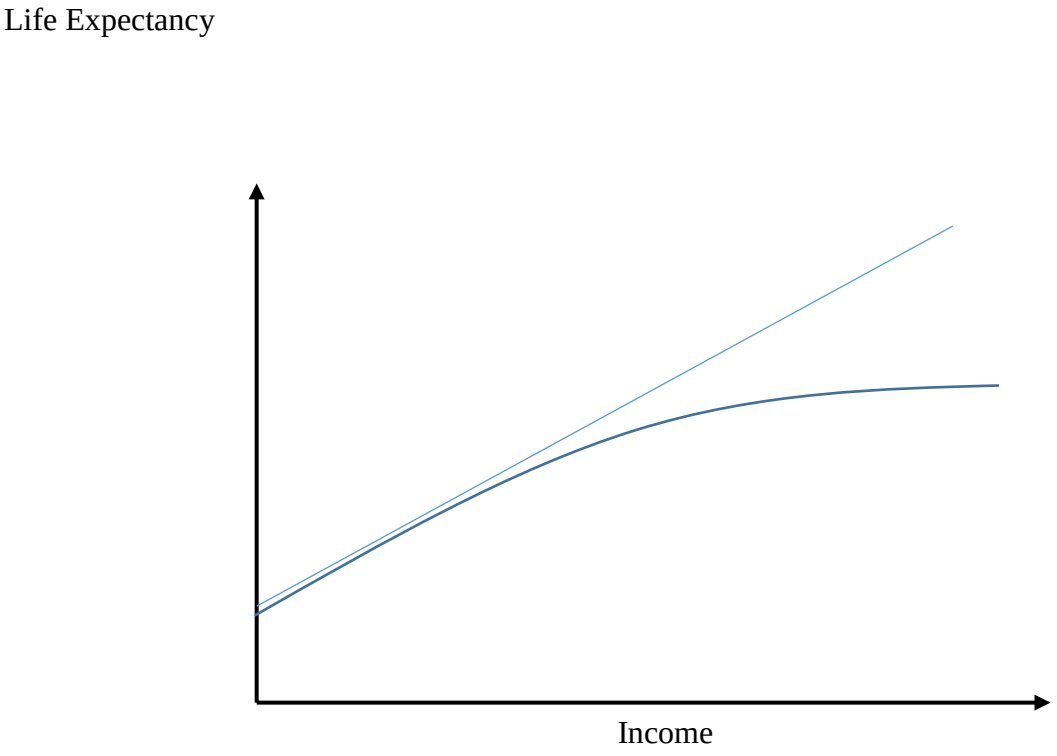


*Figure redesigned from Joseph Rountree Foundation, Benzeval et al., 2014

*Figure 2. Hypothetical Linear and Curvilinear Relationship between Income and Mortality

Subramanian and Kawachi (2004) report that the bulk of studies conducted in the United States found a curvilinear association between income and health; however, they did not always

find this effect to hold true in countries outside of the United States, neither did they attempt to apply or create a theory to explain the patterns they found in the literature. It is surmised that this effect could not be observed in other similar countries as other parts of the "developed world" are "more egalitarian" by nature and include social safety net services in the event that a resident is unable to financially support him- or herself (Subramanian & Kawachi, 2004).

Observations regarding the shape of the income-mortality curve and the presence or absence of egalitarian policies are also important in determining solutions to declining health and growing health inequities in the United States. A curvilinear relationship indicates that a redistribution of wealth (through any mechanism) could have high yields without disrupting the health trajectory of the wealthy as the poor have much to gain while the wealthy should not expect poorer health by losing a little of their income (Benzeval et al., 2014). A linear relationship between income and health means that the rich would have to become slightly less healthy to lift the poor out of early mortality.

It is also true that there are extraneous variables that could influence both earning potential, wealth, and other related conditions, while simultaneously influencing health outcomes. Researchers have found five specific confounding variables of importance that could influence the independent effect of insurance on aggregate health: individual income; educational attainment; racial concentration; regional effects; and the "lag effects" of income inequality on health (Subramanian & Kawachi, 2004). Subramanian and Kawachi (2004) also identify three important concepts to the idea of income inequality and health: "income inequality; relative income; and relative rank" (Subramanian & Kawachi, 2004).

In further operationalizing the association between health and wealth, Michael Marmot (2002) utilized three representations of income: gross national product; individual income; and

inequitably distributed income. The central question Marmot explored was to what extent do these measures influence health outcomes, and can we truly call them causal or simply correlated. Marmot (2002) describes two ways in which income has a causal relationship with health: 1) directly through the "material conditions necessary for biological survival"; and 2) through social participation and the ability to exert control over one's circumstances (Marmot, 2002).

Power, control, and social participation are all part of lifecourse theories that describe the causal pathway between income and health, and health and income (Stronks, van de Mheen, van den Bos, & Mackenbach, 1997). These domains, built on theories of stress and social support, are the basis of the psychosocial and biological relationships in the Benzeval model (Benzeval et al., 2014). Regardless of the direction of the association between the physical, psychosocial, behavioral, and biological factors, income, or socioeconomic position, is an omnipresent factor when considering health outcomes and there are multiple direct and indirect effects of income on health (Marmot, 2002; Subramanian & Kawachi, 2006; Burtless & Svaton, 2010; Martinson, 2012). Infant mortality, a universal benchmark of intercontinental health, is incredibly sensitive to income and consistently has a positively correlated relationship. Social policies that reinforce the material conditions (low access to care, malnutrition, poor quality housing, etc.) of concentrated poverty is a partial explanation of this phenomenon. As previously noted, racial and ethnic disparities also contribute a great deal to health outcomes like infant mortality, but race and ethnicity are not considered in models that only examine the relationship between place, wealth, and health.

Although not expressly mentioned in the work of Benzeval and colleagues (2014), the theoretical frameworks they described that are utilized in this dissertation is parallel to a complex

system theory perspective. The relationships between income, health insurance, biopsychosocial outcomes, and other related factors are complicated, multidisciplinary, and pervade cultural lines. As a result, research that considers causes and solutions to these kinds of problems must take into account this complexity. The application of Complex System Theory takes a cluster of multidisciplinary approaches to a singular problem and works to align fields via collective efficacy (Newell & Meek, 1997; Wolfram, 1985). Complex systems contain "hierarchical components" which, in and of themselves, have levels (Newell & Meek, 1997; Wolfram, 1985). As such, when tackling a problem as large as developing public policy related to income inequality and disparate mortality, complex system theories are necessary to unify sectors. Newell and Meek (1997) conceptually describe complex system theory as a map containing cities connected by networks of roads. Not every city is the same size, not all roads are the same length; nonetheless, they all contribute to the broader reality that is the map, and all components and networks are connected by one mechanism or another (Newell & Meek, 1997).

This study hypothesizes that there is a "webbed" interaction between variables and constructs which further necessitates the method of analysis that is used in this study -structural equation modeling. The conceptual models presented after the literature review attempt to construct webs of interrelated concepts, in line with Benzeval and colleagues (2014), while taking into consideration the fact that there are multiple complex relationships within each measured construct.

Review of Relevant Literature

This literature review includes empirical and theoretical studies on socioeconomic and sociodemographic position; health insurance type and status; health outcomes including self-rated health; and the relationship between socioeconomic position, health insurance type, and

health. Most authors included in the literature review for this study retrospectively analyzed large (greater than 1,000 participants) national data sets that have been accepted by public health, public administration, and health services researchers as having validity and reliability to an extent appropriate for the constructs examined in this paper. Generalizability, racial, ethnic, and gender representation, and sample size challenges are thus avoided in much of literature reviewed, and in this study. This study intends to expand on the body of evidence on health insurance by evaluating Medicare, Medicaid, Private, and Uninsured as separate insurance variables, and considering how the duration of uninsurance influences self-rated health. This study also examines how each of this insurance categories interact with earned income and several sociodemographic variables.

Measures of Socioeconomic Status

Socioeconomic status (SES) is "a composite measure that typically incorporates economic status, measured by income; social status, measured by education; and work status, measured by occupation" (Dutton & Levine, 1989, p. 30). Socioeconomic status represents access to physical resources and thus is often cited in the literature as a predictor for non-financial outcomes (Braveman, Cubbin, Marchi, Egerter, & Chavez, 2001; Shavers, 2007). The composite SES construct may include education as continuous or categorical variable; occupation as a category (professional) or a title (physician); family assets based on family composition, marital status, or household size; and income on the individual, family, or neighborhood levels (American Psychological Association, n.d.; Braveman, Cubbin, Marchi, Egerter, & Chavez, 2001; Cirino, Sevcik, Wolf, Lovett, & Morris, 2002; Cowan et al, 2012; Psaki et al., 2014; Shavers, 2007).

While SES is dynamic throughout the lifespan, individual income is cited as the most consistent measure of SES (Dutton & Levine, 1989, p. 30). In addition to being a stable measure of SES, income is a predictor of all other SES variables -education, occupation, and their correlates- and all other SES variables across the lifespan predict income (American Psychological Association, n.d.; Braveman, Cubbin, Marchi, Egerter, & Chavez, 2001; Cirino, Sevcik, Wolf, Lovett, & Morris, 2002; Cowan et al, 2012; Psaki et al., 2014; Shavers, 2007). As income is both used in the literature as a function of and a determinant of SES, annual household income is used in this study to represent socioeconomic status while other composite indices of SES (education, household size, occupation, etc.) will be used as a predictor of income rather than as combined with income. The purchasing power differences between the rich and the poor are not adequately captured by simply recording household income, as annual income does not necessarily represent wealth (savings, assets, debts, liabilities, etc.); (Bernard, Banthin, & Encinosa, 2009).

Measures of Health

Similar to socioeconomic status, health is a complex construct often represented in the literature as a composite measure rather than a single variable; health is also dynamic in that it changes over time and is sensitive to social and emotional changes in addition to physical changes (Levy & Meltzer, 2004; Macintyre, Ellaway, & Cummins, 2002; Pincus, Esther, DeWalt, & Callahan, 1998). While, in the simplest sense clinically, health is the absence of disease, researchers have determined over time that while diseases have defined clinical specifications, health defies medical specifications and can be rather subjective (Sartorius, 2006). Thus, rather than a single definition, health is on a continuum, over time, with multiple

determinants (Lynch et al., 2004). Having an illness does not mean the absence of health, and having no diagnosed illnesses does not necessarily make one healthy (HealthyPeople.gov, 2017).

As a result, subjective quality of life and self-rated health are widely accepted, non-illness centric ways of representing health currently in the literature (Hamilton & Kawachi, 2012; Kirby & Kaneda, 2010; Lee et al., 2014). Health-related quality of life (HRQOL) is widely regarded in the literature as a complex construct composed of physical, mental, and emotional well-being (Bharmal & Thomas; Fayers & Sprangers, 2002). HRQOL is often used to evaluate the efficacy of clinical treatments as is regarded as a "uniquely personal" and accurate representation of physiological health status and overall clinical well-being (Bharmal & Thomas, 2005; Fayers & Sprangers, 2002)

Summarizing the current literature, Healthy People 2020 operationalizes health in terms of: life expectancy; years potential life lost; physically and mentally unhealthy days; self-assessed health status (including HRQOL); limitation of [physical] activity; and chronic disease prevalence (2017). Studies discussed in this literature review utilize one of more of these operationalizations. At present, the literature is amenable to self-rated health status (or subjective quality of life) as a metric representing health; however, studies on the relationship between health, health insurance, and income may have no choice but to represent health in terms of its absence (clinical health outcomes) rather than presence (present health status) due to data limitations (Bernstein, Chollet, & Peterson, 2010; Black, Espín-Sánchez, French, & Litvak, 2013; Hadley, 2003; Kirby & Kaneda, 2010).

The Relationship between Income and Health Insurance Status

The relationship between income and health insurance status is generally straightforward: on average, as household income increases, the likelihood of being insured increases (Burtless &

Svaton, 2010; Fronstin; 2005; Hamilton & Kawachi, 2013; Lynch et al. 2004; Lynch, Smith, Harper, & Hillemeier, 2004; Martinson, 2012). According to the most recently released U.S. Census Bureau Current Population Survey of Health Coverage in the United States, health insurance references the coverage of "basic health care needs" excluding "single service plans such as accident, disability, dental, vision, or prescription medicine plans" (U.S. Census Bureau, 2016).

The latest Census report of Health Coverage in the United States details that in 2015, 85% of people with an annual household income less than $25,000 had some kind of basic health insurance coverage (U.S. Census Bureau, 2016). This is in comparison to 93% of people with annual household incomes between $75,000 and $100,000, and 96% of persons with annual household income greater than $100,000 (U.S. Census Bureau, 2016). Thus, the relationship between having any kind of health insurance and income is linear and positive; likewise, the relationship between having private insurance and income is linear and positive (Figure 3); (U.S. Census Bureau, 2016). By the same token, the relationship between having government-sponsored health insurance and income is negative, and the relationship between being uninsured and income is negative (U.S. Census Bureau, 2016).

Figure three is a visual demonstration of the statistical relationship between income and health insurance. Even after the passage of the PPACA, as income increases, the probability of having private insurance increases, and the likelihood of having government insurance or no insurance decreases (U.S. Census Bureau, 2016). Nonetheless, as more Americans gain health insurance, health does not necessarily improve, and life expectancy has slightly decreased (Xu, Murphy, Kochanek, & Arias, 2016). Additionally, the relationship between income and health

insurance status does not parallel the relationship between income and health insurance expenditures (Bernard, Banthin, & Encinosa, 2009).

The importance of this positive relationship between income and health insurance is that cost, and thus affordability, of health care services differ vastly around the United States. Healthcare access, therefore, is more than the mere presence or absence of health insurance. Studies have shown that irrespective of health insurance status, the poor do not consume health care resources at the same rate as their non-poor counterparts (Black et al, 2013; Holahan & Spillman, 2002; Kronick, 2009; Moore, Newman, & Fheili, 1992; Starfield & Shi, 2004).

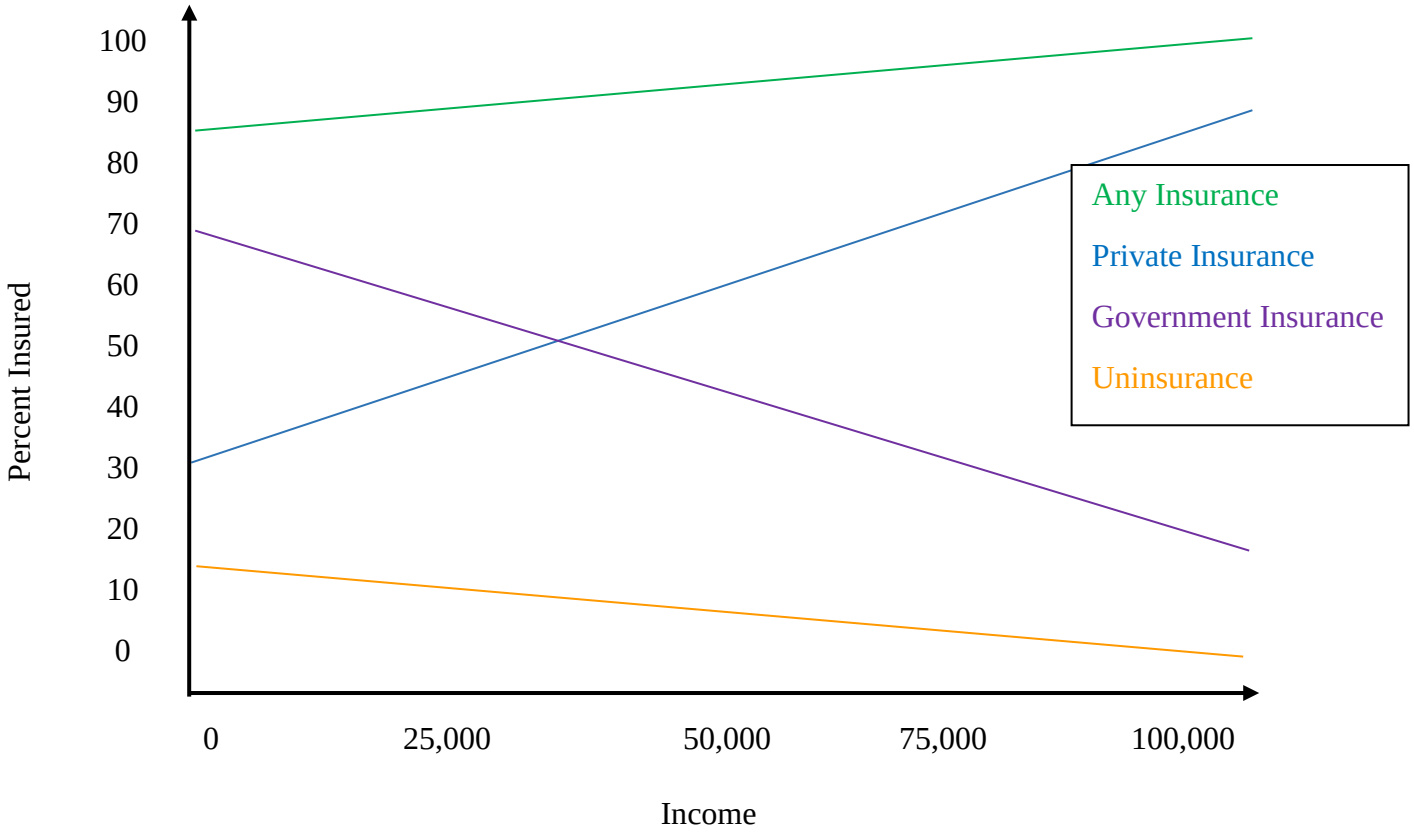


*Figure created from information from the 2015 Current Population Survey report of Health Coverage in the United States (U.S. Census Bureau, 2016)

Figure 3. Percentage of Americans with Medical Insurance Coverage by Type and 2015 Annual Household Income

The Relationship between Health Insurance Status and Health

While there is little contention that poverty restricts access to medical care, and many researchers acknowledge that there are at least some persistent racial and ethnic disparities in health care quality, the literature on the independent effect of health insurance on health is more polarized. In the past 20 years, numerous studies have found that the insured of any kind have an increased life expectancy in comparison than the uninsured of any kind (Hahn & Flood, 1995; Hoffman & Paradise, 2008; Wilper, Wollhandler, Lasser, McCormick, Bor, and Himmelstein, 2009; Arroyave, Cardona, Burdorf, and Avendano, 2013; Spencer, Gaskin, Roberts, 2012; Sommers, Long, and Baicker, 2014).

Since the implementation of the PPACA, the rate of uninsured Americans has steadily decreased, the percentage of Americans with private medical coverage continues to increase, and employer-sponsored insurance plans now account for 56% of all covered lives (U.S. Census Bureau, 2016). Nonetheless, as more Americans gain health insurance, health does not necessarily improve, and life expectancy has slightly decreased (Xu et al., 2016). Additionally, the relationship between income and health insurance status does not parallel the relationship between income and health insurance expenditures (Bernard, Banthin, & Encinosa, 2009).

Wilper et al. (2009) found that being uninsured increases the risk of death and other illnesses even when controlling for factors such as race/ethnicity, income, education, and body mass index (BMI). Wilper and colleagues (2009) provide support for the viewpoint that health insurance status influences health directly. However, acknowledging the fact that this association is not causal in nature, the authors suggest that healthcare access provisions made for the uninsured, such as federally qualified health centers, might not provide protective factors for the uninsured. Wilper and colleagues (2009) suggest that universal health coverage might alleviate the disproportional burden of death for the uninsured, but not without many political challenges.

They also suggest that having the same insurance coverage would reduce stigma (Wilper et al., 2009).

Wilper's study has several limitations. First, the effects of long term insurance or uninsurance is unknown due to limitations of the dataset. Second, cultural beliefs about health insurance which can influence help-seeking behaviors are also unknown. Additionally, the age group included in the sample could limit generalizability, as younger persons have lower mortality rates and thus do not necessarily represent the true effect of insurance on mortality (Wilper, Wollhandler, Lasser, McCormick, Bor, & Himmelstein 2009). Participants were significantly younger than the average life-expectancy in the United States, and thus only 3.1% (351 persons) of the sample experienced death in the time period studied (Wilper, Wollhandler, Lasser, McCormick, Bor, & Himmelstein, 2009).

A study by Sommers, Long, and Baicker (2014) also suggests that health insurance has the potential to reduce mortality. Sommers, Long, and Baicker (2014) sought to determine whether or not the 2006 Massachusetts health care reform reduced mortality from all causes and "causes amenable to health care." Researchers concluded that, when compared to the control group, health insurance reform successfully reduced both all-cause mortality, and mortality related to a lack of health care for ambulatory-sensitive conditions. Additionally, mortality reductions were greatest in counties that had the highest proportion of low-income households. The subgroup analyses in this paper imply that health disparity reduction is interrelated with health insurance coverage.

A primary limitation of this study is that researchers did not have access to data on individual households, but rather data were analyzed at the county level. As such, causation cannot be inferred or necessarily generalized to individuals. Another limitation mentioned by

Sommers and colleagues is that the definition of mortality from "causes amenable to healthcare" can be "somewhat subjective" (Sommers, Long, and Baicker, 2014). While the bivariate analyses did control for certain point in time economic conditions, researchers could not rule out the possibility that several factors other than health insurance may have contributed to the overall mortality reduction in Massachusetts (Sommers, Long, & Baicker, 2014).

Arroyave, Cardona, Burdorf, and Avendano (2013) represents another study showing the positive effects of health insurance on health. The researchers examined whether socioeconomic cardiovascular mortality disparities changed as a result of health insurance expansion. They discovered that socioeconomic disparities in cardiovascular mortality grew at a slower rate during periods of health insurance coverage expansion. As such, the researchers concluded that health insurance might be an important construct in reducing the depth of socioeconomic disparities in cardiovascular mortality. Implications of this study suggest that long term health insurance expansion has the potential to reduce health disparities and improve the health of those who have health insurance.

Limitations of this study include the possibility of what is referred to as the "numerator-denominator bias" in which constructs used in the statistical model come from different national registries potentially producing overestimates of an effect; in this case, the disparity in mortality stratified by socioeconomic status might have been overstated. Additionally, overall, there was still a net increase in the magnitude of socioeconomic mortality disparities. It is simply the rate of increase that was influenced by expansions in medical care (Arroyave, Cardona, Burdorf, & Avendano 2013).

Additional researchers found that uninsurance is associated with clinical characteristics including reduced resource consumption, delaying needed medical care due to cost, forgoing

needed care altogether, and the receipt of inadequate or not end-of-life care (Bharmal & Thomas, 2005). In addition to clinical characteristics, bivariate analyses demonstrate that the uninsured have lower health-rated quality of life (HRQOL) than the insured (Bharmal & Thomas, 2005). Bharmal and Thomas (2005) compared the HRQOL in the long-term privately insured to the long-term uninsured (the publicly insured were excluded from their studies) in the Medical Expenditure Panel Survey and found that uninsurance was statistically significantly associated with reduced HRQOL "which persisted after adjusting for covariates age, gender, race, education, income, the presence or absence of each of nine medical conditions and attitude towards the value of health insurance and health care" (Bharmal & Thomas, 2005, p. 647).

More than any other demographic variable studied, uninsurance had the greatest amount of predictive power for Physical Component Score (PCS) -the physical aspect of health-related quality of life. "Individuals without health insurance had lower PCS scores than the individuals with diabetes, asthma, hypertension, heart disease, angina, myocardial infarction, stroke, or joint pain in the sample" (Bharmal & Thomas, 2005). The uninsured also had lower Mental Component Scored (MCS) -the mental aspect of health- than the insured who had a similar smattering of metabolic and cardiac conditions.

The literature also provides evidence that mortality is due to factors that influence health insurance and not necessarily the health insurance itself (Black, Espín-Sánchez, French, and Litvak, 2013; Card, Dobkin, & Maestas, 2009; Hadley, 2003; Kronick, 2009; Levy & Meltzer, 2001). Six years apart, Black et al. (2013) and Kronick (2009) concluded that the uninsured do not, on average, have worse outcomes than the insured, even though they consumed less health resources. Kronick (2009) similarly concluded that once we adjust for "demographics, health status, and health behavior characteristics, the risk of subsequent mortality is no different for

uninsured respondents than for those covered by the employer-sponsored group insurance at baseline.” The author concluded that when all other factors were held equal, if the only sociodemographic difference between two participants was their insurance status, their probability of survival was “nearly identical” (2009)

These researchers also suggested that "the Institute of Medicine overestimated the health and mortality benefits of health insurance for the uninsured” (Black et al, 2013; Kronick, 2009). Black and colleagues (2013) monitored the influence of health insurance on health and mortality over time and found that the insured and the uninsured have similar rates of early death in spite of different rates of health consumption. While the long-term uninsured do not consume health care resources at the same rate as their long-term insured peers, Black and colleagues (2013) also found no significant differences in their health status. Additionally, medical resource consumption differs greatly by race and ethnicity, not just insurance status (Black et al, 2013).

It is notable that Black and colleagues excluded the publicly insured from their analyses and treated insurance status as dichotomous (insured or uninsured). They surmised that, under certain circumstances, the publicly insured are more socioeconomically disadvantaged than the uninsured and thus would confound their results (Black et al, 2013). This assumption and subsequent condensation of insurance categories is a potential measurement bias in this study and underestimates the differences that may exist between different types of publicly insured and the uninsured.

Notably, studies of the impact of health insurance on health based on hospital data have some important limitations. Researchers tend to run into problems when analyzing hospital data; as Medicare and private insurance companies are overwhelmingly represented in hospital data sets, therefore conclusions for the general populace are often based on older and more affluent

patients who may not represent the socioeconomic or general demographic spread of the general population. As well as many of the conditions included in analyses do not meet the statistical minimum per case to demonstrate an effect for certain insurance groups (Spencer, Gaskin, & Roberts, 2013). Researchers also do not necessarily have data indicating what the patient's medical care experience was prior to hospitalization; and as such, perception of care can only be correlated with the current level of health insurance status. Furthermore, hospital differences might not be adequately accounted for across studies; for example, for hospital-based data pulled over multiple years, researchers have to assume that (1) quality was constant in each hospital across all years included, and (2) clinical data records are accurate and provide adequate information to make appropriate inferences (Card, Dobkin, & Maestas, 2009; Maeng & Martsolf, 2011; Spencer, Gaskin, & Roberts, 2013).

The underlying assumption that insurance status is static rather than dynamic over time is a potential limitation of studies included in this section and subsequent section. The exclusion of public insurance from dichotomous analyses, and subsequent condensation of insurance categories is also a potential measurement bias and underestimates the differences that may exist between the publicly insured and the uninsured. The next section seeks to rectify some of these biases by exploring the relationship between *types* of health insurance status and health outcomes.

The Relationship between Type of Health Insurance and Health

While the previous section explores the relationship between health insurance status (present or absent) and a variety of health outcomes, a growing body of literature suggests that treating health insurance as dichotomous overlooks that not all health insurance policies are the same. As a result, literature in this section outlines evidence that *type* of health insurance is not

only an independent predictor of a myriad of health outcomes, but also, the publicly insured, as a broad category including (Medicare, Medicaid, and Veterans Health Administration Insurance) may have more sociodemographic characteristics in common with the uninsured than with the privately insured. Literature in this section highlights the following themes regarding the relationship between health insurance type and health outcomes: (1) health related quality of life is different across health insurance subgroups and among patients with the same clinical conditions; (2) different types of health insurance produce different health outcomes, and, in some cases, Medicaid recipients do not have statistically different outcomes than the uninsured; (3) the publicly insured, the privately insured, and the uninsured do not consume health care resources at the same rate, and, even within those groups, there are healthcare resource consumption differences based on socioeconomic status; (4) and disparities in care access between publicly insured, privately insured, and uninsured persist in spite of policies meant to protect patients.

Patients who experienced traumatic injuries, patients with gallbladder cancer, patients with rheumatoid arthritis, and patients with critical illnesses requiring intensive clinical care all have similar patterns of health outcomes depending on their health insurance status (Alghman, Schneider, & Castillo, 2016; Chen et al., 2017; Cifaldi, Renaud, Ganguli, & Halpern, 2016; Fowler et al., 2010). The uninsured, followed by Medicaid beneficiaries, have the worst health outcomes when compared with the privately insured (even when Medicaid patients have comparatively high utilization); the uninsured and those on Medicaid have the lowest ranking of self-rated health on average; and these groups experience greater barriers to receiving health services than their privately insured counterparts (Alghman, Schneider, & Castillo, 2016; Chen et al., 2017; Cifaldi et al., 2016; Fowler et al., 2010; Kariisa & Seiber, 2015). Additionally, in

spite of fewer financial barriers due to no copayments and co-insurance policies, Medicare recipients who are dually eligible for Medicaid (i.e. old and poor in most cases) often mirror the Medicaid population, rather than the privately insured, in terms of healthcare utilization and prescriptions for pain-related conditions (Cifaldi et al., 2016).

Among trauma patients (neck, skull, and face fractures, spinal cord injuries, trauma-related joint disorders, etc), the publicly insured and the uninsured report comparable health related quality of life –lower than their privately insured counterparts (Alghman, Schneider, & Castillo, 2016). Among gallbladder cancer patients, the uninsured and Medicaid patients have comparably low 3-year cancer survival rates when compared to the privately insured (Chen et al., 2017). And Medicaid and uninsured patients with rheumatoid arthritis experience the greatest delays in medical care, are least likely to be seen by a rheumatologist, and are least likely to be prescribed disease-modifying antirheumatic drugs (DMARDs) when compared to the privately insured (Cifaldi et al., 2016).

In spite of federal and institutional policies to reduce economic discrimination and disparities in clinical outcomes by income, there is also evidence that patients are still receiving inadequate or delayed hospital care based on their ability to pay for services (Alghman, Schneider, & Castillo, 2016). Alghman, Schneider, and Castillo (2016) explored how this disparity manifests in patients who have experienced a traumatic injury (neck, skull, and face fractures, spinal cord injuries, trauma-related joint disorders, etc.) and noticed disparities in healthcare utilization and outcomes by insurance status. This indicates that the publicly insured, the privately insured, and the uninsured do not consume health care resources at the same rate; furthermore, within those groups, healthcare resource consumption differs based on socioeconomic status and rural or urban status (Alghnam, Schneider, & Castillo, 2016; Cifaldi et

al., 2016; Fowler et al., 2010; Kariisa & Seiber, 2015). When the privately insured are stratified by plan and income, they too perform differently (Reschovsky, Kemper, & Tu, 2000).

Cifaldi and colleagues (2016) found that, among rheumatoid arthritis patients, insurance status significantly predicted health care resource utilization. Reschovsky, Kemper, and Tu (2000) studied only private insurance and compared indemnity insurance, PPOs, open model HMOs, and closed model HMOs. They found that on the continuum from indemnity insurance, to PPOs, to open model HMO, to closed model HMO, changes in primary care utilization slightly increases, but specialist care decreases significantly (Reschovsky, Kemper, & Tu, 2000). Similar studies found either no difference in health care utilization, or that any insurance was better than no insurance in predicting access to health services (Alghman, Schneider, & Castillo, 2016; Reschovsky, Kemper, & Tu, 2000). However, regardless of propensity to access the healthcare system, these same studies found worse clinical outcomes among the uninsured, the publicly insured, and among the privately insured with income barriers (Alghman, Schneider, & Castillo, 2016; Reschovsky, Kemper, & Tu, 2000). While Reschovsky and colleagues (2000) did not find that care delays were not an issue among different types of private insurance groups, managed care enrollees were more likely to "perceive problems in provider access, convenience, and organizational factors." This indicates that the type of health insurance one has may influence the quality of care received in a medical setting, access to care within the medical system, and perception of the care received.

It is possible that health insurance affects health not only because of its effect on access to care but because of its impact on the quality of care. The relationship between insurance type (whether uninsured, publicly insured, underinsured, or privately insured) and the quality of care delivered in a hospital setting has not been widely studied (Maeng & Martsolf, 2011; Spencer,

Gaskin, & Roberts, 2013); however, the present literature consistently asserts that privately insured individuals fared better that their publicly insured or uninsured counterparts, even among Medicare patients (Cifaldi et al., 2016; Spencer, Gaskin, & Roberts, 2013). Additionally, "Medicare patients [appear] particularly vulnerable to receiving inferior care" -even though Medicare is said to increase access overall (Card, Dobkin, & Maestas, 2009).

More studies are needed to demonstrate the independent effects of health insurance type on health outcomes. There are more studies scrutinizing Medicaid than private insurance coverage, and few studies stratify types of private insurance coverage at all (Reschovsky, Kemper, & Tu, 2000; Sommers, Gawande, & Baicker, 2017). As of summer 2017, there were "no large quasi-experimental or randomized trial demonstrating unique health benefits of private insurance" published (Sommers, Gawande, & Baicker, 2017). There are also limited studies on correlations between insurance type and self-related health and health-related quality of life proxies. The few studies there are conclude that health rated quality of life is lower among the uninsured and the privately insured, specifically Medicaid recipients (Alghnam, Schneider, & Castillo, 2016; Bharmal & Thomas, 2005). Though the evidence presented to support the idea that public insurance is statistically significantly different than private insurance, a recurring limitation of studies on the subject is the lack of multi-variate analyses that can statistically account for multiple independent and dependent variables simultaneously, especially for the effect of socioeconomic status on health. Additionally, many studies cite socioeconomic characteristics as a predictor of health outcomes rather than insurance status itself (Kariisa & Seiber, 2015; Zaidenweber, 2011). The next section further explores the relationship between income and health.

The Relationship between Income and Health

Income appears to impact health even when controlling for insurance status, and many researchers question whether insurance is major factor on the causal pathway between income and health (Adler, Boyce, Chesney, Folkman, & Syme, 1993; Andrulis, 1998; Angell, 1993; Ross & Mirowsky, 2000; Zaidenweber, 2011). As income and predictors of income increase (educational attainment and occupation level), health status, self-rated health, and life-expectancy also increase (Braveman et al., 2011; Ross & Mirowsky, 2000). By the same token, the opposite is also true –the poor and uneducated experience more chronic and infectious diseases, report accessing fewer medical resources, have a higher rate of mortality, and report lower self-rated health. Furthermore, these associations hold true irrespective of health insurance status (Adler et al., 1993; Andrulis, 1998; Angell, 1993; Braveman et al., 2011; Ross & Mirowsky, 2000; Zaidenweber, 2011).

Kirby and Kaneda (2010) as well as Allen et al. (2014) assert that, regardless of the PPACA expanding Medicaid in many states and expanding medical care coverage overall, other factors still exist that confound the potential benefits of having health insurance, such as the social stigma of poverty. Patients often believe that they would receive higher quality medical care if they belonged to a different socioeconomic class thus reducing behaviors that increase access to care, creating a self-fulfilling prophecy (Allen, Wright, Harding, & Broffman, 2014; Centers for Disease Control and Prevention, 2010; Schoen, Davis, DesRoches, Donelan, Blendon, 2000). Additionally, it is not just that that the poor perceive suboptimal care –the poor literally have less access to care, as they are less likely to be insured, or possess an insurance (most frequently Medicaid or Medicare-Medicaid dual) that is not accepted by providers in their area (Hoffman & Paradise, 2008; Kariisa & Seiber, 2015). Additionally, socioeconomic factors, like educational attainment and income level, are better predictors of the incidence of metabolic

disorders than having access to medical care (Pincus, Callahan, & Burkhauser, 1987; Pincus, Esther, DeWalt, & Callahan, 1998).

Subramanian and Kawachi (2004 and 2006), Dreier, Mollenkopf, and Swanstrom, (2013), Dunn, Schaub, and Ross (2007), and Smith (1996) posit that income –more specifically, living in concentrated poverty- is also a risk factor for less access to care and reduced quality of care irrespective of the actual material conditions of life for the individual. This idea of the "material conditions of life" is similar to Marmot's (2002) description of two ways in which income has a hypothesized relationship with health/illness: 1) directly through the "material conditions necessary for biological survival"; and 2) through social participation and the ability to exert control over one's life circumstances (Marmot, 2002). This was demonstrated by Wilde, Rosen, Couch, and Muennin (2014) in a recent study with unexpected results.

Wilde, Rosen, Couch, and Muennin (2014) conducted a randomized controlled trial to determine whether a welfare reform program (Jobs First) could influence mortality rates. In their study, three-quarters of participants were long-term welfare recipients who had, on average, less education and work experience than the average person, and had previously been recipients of a welfare benefit. Researchers found that while these participants were more likely than their counterparts (who did not participate in the program) to maintain steady employment, have health insurance, and had higher household incomes by 7% within 3 years, participants in the Jobs First program did not, in fact, experience statistically lower rates of mortality. As a result, researchers concluded that while the program improved participant socioeconomic *and* health insurance status, it did *not* improve patient health. A possible confounding variable is the fact that being poor is psychoneuroimmunologically deleterious to health (i.e. being poor has psychological, neurological, and immunological consequences) and benefits gained from this

program were inadequate to reverse a lifetime of poor health (Wilde, Rosen, Couch, & Muennin, 2014). In other words, while income may be a central predictor of health, interventions that improve income among the poor may not automatically produce better health; similarly, while health insurance status may be a central predictor of health, when the long-term uninsured gain insurance, they do not automatically become healthier. As a result, it is necessary to examine impacts of income on health over time and to explore additional social and demographic characteristics that impact health, predict income, and are predicted by income when considering the continuum of causality between income, insurance, and health. These additional constructs are explored further in the next section.

Factors Influencing Income and Self-Rated Health

This section describes the social and demographic factors included in this study as control variables that influence both income and self-rated health. As previously stated, socioeconomic status is defined in terms of economic status, measured by income; social status, measured by education; and work status, measured by occupation (Dutton & Levine, 1989, p. 30). Nonetheless, a myriad of additional social and demographic characteristics influences the magnitude and direction of income, educational attainment, occupation status, and self-rated health. The following section describes the eight socioeconomic and sociodemographic control variables included in the final path analysis that influence the primary predictor and outcome variables in this study. They are education; geography (region); marital status; age; country of birth (U.S. born or not); ethnicity (Hispanic); race; and sex. While statistically these factors are modeled as independent control variables, this literature review recognizes the intersectionality that exists between them and describes overlap where appropriate.

Educational attainment

While theories and data regarding the relationship between health and marriage and health and geography depend on a variety of other social factors (geography for example interacts with wealth), education consistently, independently predicts both health behaviors and health outcomes (Cutler & Lleras-Muney, 2006; Winkleby, Jatulis, Frank, & Fortmann, 1992). Additionally, the association between education and health is on a linear gradient (more education, better health), and the effects of education hold true for men, women, blacks, and whites alike (Cutler & Lleras-Muney, 2006).

Education is related to health for obvious economic reasons: more education tends to lead to better jobs, higher incomes, and better health insurance without lapses in coverage. Higher income also tends to mean living in better neighborhoods with greater access to health-supporting resources (Cutler & Lleras-Muney, 2006). However, education as an exposure to money only explains part of the variance in health status (Cutler & Lleras-Muney, 2006; Winkleby et al., 1992). In addition to providing access to *things*, education leads to a change in *decision-making* patterns –an intangible resource that endures regardless of occupational status or household income (Cutler & Lleras-Muney, 2006; Winkleby et al., 1992).

In studying this association, Winkleby and colleagues (1992) hypothesized that:

> Education may protect against disease by influencing life-style behaviors, problem-solving abilities, and values. Moreover, education may facilitate the acquisition of positive social, psychological, and economic skills and assets, and may provide insulation from adverse influences. (p. 819)

Additional researchers theorize that, via direct behavioral mechanisms, the uneducated have reduced health literacy, are less likely to use effective contraception, and are less likely to

utilize immunization and prenatal care services (Cutler & Lleras-Muney, 2006; Galama and van Kippersluis, 2010; Prus, 2007; Scambler, 2012). Of course, the economic explanations for the relationship between education and health are still viable.

Geography

In addition to educational differences in health, there is evidence that living in a rural environment may restrict access to medical resources and facilitate the proliferation of poor health behaviors (Hartley, 2004). “Rural residents smoke more, exercise less, have less nutritional diets, and are more likely to be obese than suburban residents” (Hartley, 2004). Income, education, and rural occupational hazards (mining, forestry, agriculture, etc) further complicate the relationship between place and health (Hartley, 2004). Feeling isolated, whether perceived or real, is also cited as a psychological consequence of rural residency (Hartley, 2004). This isolation from resources is the most salient explanation for the relationship between rural residence and health status, and the intersection between poverty and rural residence has a greater influence on health than any positive effects of rural residence.

Marital status

The latter half of the 20th century has seen remarkable changes in both marital belief systems and legal conceptualizations of marriage, yet social and health outcomes related to marital status have remained relatively stable. On average, married people have higher household incomes, married people are more likely to have employer-sponsored health insurance through a spouse, and married people tend to report higher self-rated health and subjective quality of life than their unmarried counterparts (Blanchflower & Oswald, 2004; Grewen, Anderson, Girdler, & Light, 2003; Robles & Kiecolt-Glaser, 2003).

Blanchflower and Oswald (2004) found that marriage and the theoretical construct "happiness" are highly correlated and often converge around physical intimacy. Married people have intercourse more frequently than unmarried people and report higher levels of happiness regardless of income (Blanchflower & Oswald, 2004). Physical contact between intimate partners also predict lower rates of cardiovascular reactivity, thus improving the physiological responses to stress (Grewen, Anderson, Girdler, & Light, 2003; Robles & Kiecolt-Glaser, 2003).

Marriage is also an independent protective factor for health (Johnson, Backlund, Sorlie, & Loveless, 2000; Manzoli, Villari, Pirone, & Boccia, 2007). Unmarried people have a higher risk of cardiovascular disease and cancer than married people (Johnson et al., 2000). All non-married categories (widowed, divorced/separated, and never married) have an elevated risk of death in comparison to married persons –and these effects persist after adjusting for other socioeconomic factors (Johnson et al., 2000; Manzoli et al., 2007).

While these studies may sound like a marriage certificate is the difference between life and death, at least one study that analyzed the quality of marriage determined that while *healthy* marriages are a protective factor for cardiovascular, endocrine, and immune system functioning, *unhealthy* marriages -seemingly on the causal pathway to divorce- have negative consequences for health (Robles & Kiecolt-Glaser, 2003). Nonetheless, whether a marriage is psychologically healthy for both parties involved, the legal status of marriage in the United States grants access to "more than 1,000 federal benefits and protections, many of them financial. With greater economic advantage comes greater access to many other advantages, such as better health care" for married people (Depaulo, 2016). Marriage also does not exist in a sociodemographic vacuum. Age predicts marriage and a host of other health consequences. Age is described in the next section.

Age

Most people can readily appreciate that as age increases, functional health decreases; ageing is inevitable, and age-related decline is expected of all mammalian species on this planet. But the rate at which we deteriorate may be controlled to an extent, and age also comes with many good things: increased age is associated with increased wealth, power, influence, and education (Hansen, Slagsvold, & Moum, 2008). However, without the aforementioned accumulated positive characteristics, premature death is likely. As uninsurance is highly correlated with lower income and unemployment, Hadley and Waidmann (2006) analyzed the Health and Retirement Survey to investigate the consequences of uninsurance in the near elderly. They examined the association between continuous health insurance and mortality for person aged 55-65 and found that "continuous insurance coverage is associated with significantly fewer deaths prior to age 65" (Hadley and Waidmann, 2006). As a result of this study, Hadley and Waidmann (2006) recommended expanding Medicare eligibility to include those aged 55 and up rather than 65. In addition to having a higher risk of mortality as we age, especially when poor, our self-rated health may also decline (Cheng et al, 2013).

In both cross-sectional and longitudinal analyses, the aged are more likely to have reduced self-rated health (Andersen, Christensen, & Frederiksen, 2007; Cheng et al, 2013). Cheng and colleagues (2013) posit that this low ranking of health is due to the increased incidence of multiple comorbid diseases. While the relationship between age, income, and health is a bit straightforward, the relationship between health, income, and country of birth is a bit more complex.

Country of birth

Approximately 14% of the U.S. population -over 43 million people - was born abroad, and, especially among non-whites, many of them are healthier and wealthier than their native-born counterparts (Nicholson, 2017). Nielsen research finds that the median household income for non-native blacks is 30% higher than that of native-born blacks (Nielsen, 2015). The U.S. Census Bureau denotes that the wealthiest non-white group in the United States is Indian-Americans who, on average, earn almost exactly twice as much money per year than the national average ($100,547 compared to $51,939). First generation children may also experience the benefits of parents born somewhere other than the United States.

Hendi, Mehta, and Elo (2015) studied non-native born black children, and black children of foreign-born mothers. They found that these children were healthier across five assessed domains of health: general health status; activity limitations; missed school days; asthma; and allergies (Hendi, Mehta, & Elo, 2015). African origin had the highest level of health when compared to Latin-American and Caribbean origin, but all foreign-born children, and children of foreign-born mothers fared better than all native-born children (Hendi, Mehta, & Elo, 2015). Additionally, “longer duration of US residence among foreign-born mothers was associated with poorer child health” (Hendi, Mehta, & Elo, 2015). Educational attainment, marital status, and family income did not explain a remarkable amount of the variance in health outcomes, and the effect of maternal nativity on child health did not differ across socioeconomic categories (Hendi, Mehta, & Elo, 2015). These results are consistent with previous studies conducted on foreign-born adults which demonstrated that African-born adults have higher self-rated health than Caribbean and Latin-American adults, and all categories have better self-rated health than U.S.-born adults (Hamilton & Hummer, 2011; Read, Emerson, & Tarlov, 2005).

Among foreign-born whites, similar trends hold true. Mehta and Elo (2012) also studied immigrants from the former Soviet Union and found that not only did former Soviet immigrants have better health outcomes, they also had better health behaviors. Foreign-born whites were less likely to smoke or abuse alcohol (Mehta & Elo, 2012). Paradoxically, Russian-born immigrants to the United States also happened to be healthier than Russians in Russia (Mehta, & Elo, 2012). There are a few reasons cited for these differences including the paradox that Mehta and Elo describe in Russian immigrants. Contrary to the U.S. perception that foreigners -especially minorities- flee to this country to escape poverty or seek political asylum, many African, Caribbean, and Latin immigrants especially come to the United States to seek educational and occupational advancement (Nielsen, 2015).

This increased educational attainment, the higher incidence of a skilled workforce, and corresponding high incomes are potential reasons foreign-born residents thrive when they enter the United States. This may also explain the Russian immigration paradox. Immigration itself may be a selection bias as the cost of immigrating precludes poor persons from participating in the process (Mehta & Elo, 2012; Read & Emerson, 2005). There is also evidence that exposure to racism and discrimination in the United States has a significant effect on self-rated health and actual health status (Hamilton & Hummer, 2011).

As racism and discrimination are not unique to the United States however, additional researchers have sought to unpack the relationship between racial origin and self-rated health; Read and Emerson (2005) found evidence that “majority white contexts have deleterious health effects” for non-whites. That is, non-white immigrants from majority white countries fare worse than non-whites from racially mixed countries, and countries where whiteness is the minority (Read & Emerson, 2005). At present, these findings are correlational and may represent latent

constructs, such as societal norms and political processes. However, societies that are more racially egalitarian tend to experience higher population health, and there is evidence that socially reinforced racism is itself an exposure for disease (Gee, Walsemann, & Brondolo, 2012; Read & Emerson, 2005). The next section on race and ethnicity explore racial and ethnic differences in health outcomes in the United States and describes a few of the reasons native-born minorities may have lower self-rated health.

Race and ethnicity

Race-relations in the United States have been tumultuous at best since the origin of the country. And while significant improvements have been made, non-white persons in U.S. still have statistically significantly worse health outcomes across multiple domains of health (Zuvekas & Taliaferro, 2003). Gornick and colleagues (1996) investigated the impact of race and income on mortality among Medicare recipients, and found that Medicare coverage did not predict utilization for minority beneficiaries. Gornick (1996) found a slightly higher incidence of metabolic disorders in non-whites, a lower rate of disease screenings in non-whites, and ultimately, a higher rate of mortality in black Medicare beneficiaries. Black patients and poor patients (whether they are black or white) had similar usage patterns and are more likely to receive suboptimal treatment; for example, black Medicare beneficiaries and poor Medicare beneficiaries (no matter what race) are more likely to have limb amputations rather than parallel, limb-saving surgeries offered to their wealthy and/or white counterparts (Gornick, 1996).

Zuvekas and Taliaferro (2003) examined the roles that insurance coverage, the delivery system, and external factors play in explaining persistent disparities in access among racial and ethnic groups of all ages. Similar to Gornick (1996), they found a great deal of intersectionality between race, ethnicity, and income on the causal pathway to health. Zuvekas and Taliaferro

(2003) also found limited reasonable explanations for the racial disparities observed. Blacks and Hispanics were more likely to seek treatment in emergency rooms, although they were less likely to seek treatment overall (Zuvekas & Taliaferro, 2003). While lower help-seeking behaviors would intuitively indicate better health status and a reduced need for medical care services, the opposite is true (Zuvekas & Taliaferro, 2003). Non-white patients often have lower quality of life, higher rates of metabolic disorders, and higher overall mortality (Gornick, 1996; Zuvekas & Taliaferro, 2003).

It is important to note here that scientists have refuted the traditional conceptualization of "race" as a genetic concept and have favored the sociological and anthropological explanations of race as a social construct instead (David & Collins, 2007; Marks, 1995). David and Collins (2007) specifically studied genetic theories of race to determine if molecular genetics play a role in racial and ethnic disparities in infant mortality. They noted a few important outcomes that point to social explanations for racial and ethnic differences rather than genetic ones: (1) most human genetic variation is continental. More specifically, 90-95% of genetic variation depends on where people live (David & Collins, 2007); thus, black and white Europeans are more genetically similar to each other than they are to black and white Australians. (2) Immigrants who come to the United States are healthier when they arrive, but within one generation, the health outcomes of their children begin to mimic the outcomes of families who have been in the United States for generations (David & Collins, 2007). And (3) whites in the United States have poorer health outcomes than whites in other developed countries -including countries from which they are descended (David & Collins, 2007).

Black people in the United States are more likely to be exposed to environmental pollutants, have increased stress levels, and hold significantly less wealth than their white

counterparts (David & Collins, 2007). David and Collins (2007) posit that socioeconomic and sociodemographic characteristics explain the majority of the variance in health outcomes observed between groups in the U.S. Our social conceptualizations, rather than genetic differences, also play a large role in sex and gender differences in health outcomes in the United States.

Gender

This section describes gender as a biological, dichotomous construct; thus "sex" and "gender" are used interchangeably. The dataset utilized in this dissertation is not amenable to analyzing gender beyond "male and female" and the preponderance of literature reviewed for this dissertation are not sensitive to issues of sex *and* gender. Historically, within and outside the United States, maleness has been the central standard of sex and gender. Women were not permitted to participate in clinical trials or make medical decisions independent of a guardian male, and non-binary genders were not acknowledged at all (Read & Gorman, 2010). As a result, there are enduring social, gender-based differences in how health is described and studied.

"Women work for less pay, in smaller firms, at lower rank, with fewer benefits, less union participation, and more part-time work than men" (Miles & Parker, 2004, p. 366). As a result, women have lower access to employer-sponsored health insurance (Cowan & Schwab, 2017; Miles & Parker, 2004). Male advantages persist when controlling for skills, education, and occupation (Blau & Kahn, 2017; Cowan & Schwab, 2016; Miles & Parker, 2004). Further reinforcing the occupational and financial disadvantages is that women frequently change jobs after giving birth, this reducing the incidence of continuous medical coverage, and making women more susceptible to higher coverage premiums (Blau & Kahn, 2017; Cowan & Schwab, 2016Jones, 2017; King & Botsford, 2009; Miles & Parker, 2004).

Compounding this lower incidence of stable health insurance is the fact that women tend to have higher rates of illness than men, despite higher life-expectancy, and utilize more healthcare resources (Bertakis et al., 2000). While women were 50% of the U.S. population in 2004, partially because of childbearing, they accounted for 57% of all healthcare spending (Cylus et al., 2010). While women live longer than men, on average, women live poorer lives, with more illnesses, and increased functional impairments (Read & Gorman, 2010). Prior to the passage of the PPACA, women were also charged more than men for the same health services (Bertakis et al., 2000). At least one paper examined differences in national health care spending by gender and age and found that "across all payers and services, women spent approximately $1,448 more per capita [per year] than males in health care (Cylus et al., 2010).

Read and Gorman (2010) synthesized gender differences in the U.S. health system, and systematically examined the attention that gender has received in the sociological literature on health disparities over the past three decades. They found clear inequities in mortality (women live longer), but the relationship between gender and morbidity was less clear (Read & Gorman, 2010). Gender, like all of the other socioeconomic and sociodemographic characteristics reviewed, is inextricably intertwined with race/ethnicity, and income.

Literature Summary

Based on a review of the literature, researchers have not fully unpacked the underlying mechanisms that explain the relationships between socioeconomic position, health insurance status, and health. This is one of the primary setbacks to recommending sustainable policies that can garner support for timely implementation. While, it is reasonable to believe that education, geography, marital status, age, country of birth, ethnicity/race and gender influence all converge to influence income and self-rated health, without practical and mechanistic evidence, policy

recommendations are impossible. With the exception of the studies that consider the impact of health reform in a large geographic region, studies tend to aggregate and interpret individual level data without including socio-geographic risk factors which are theoretically important to describing the relationship between income and health. This is likely due to restrictions of publicly available data; similar methodological limitations are also present in the current study. While it is intuitive that the presence of health insurance would predict lower rates of mortality, and some research evidence supports that intuition, there are examples where this is not necessarily the case. Additionally, not all health insurance policies are linked to the same outcomes; as such, it becomes necessary to stratify *types* of insurance, not just whether there *is* insurance.

Additional studies are necessary to: (1) further understand the relationship between self-rated health, health insurance; (2) develop a unified theory of health insurance, socioeconomic status, and health; and (3) inform more theoretically sensitive health insurance policy in the United States. Perhaps universal health coverage works in certain contexts but not others –does this imply that states should be allowed to implement their own universal policies? Perhaps socioeconomic barriers may be alleviated through interventions outside of the medical care system –should hospitals and other healthcare delivery systems be mandated to consider socioeconomic interventions beyond the community health needs assessment provision of the PPACA? At this juncture, the evidence is too conflicting to confidently make a conclusion without additional research.

Conceptual Model

Based on the theoretical framework and literature review, this study aims to investigate the relationships between income, insurance type and status, and self-rated health. Socioeconomic and sociodemographic controls that may influence the primary variables are included in the statistical analyses, but not in the conceptual models. The conceptual models depicted in figures 4-6 indicate the theorized relationships between income, health insurance, and self-rated health. Control variables are pictured in the final paths, but not in the conceptual models below.

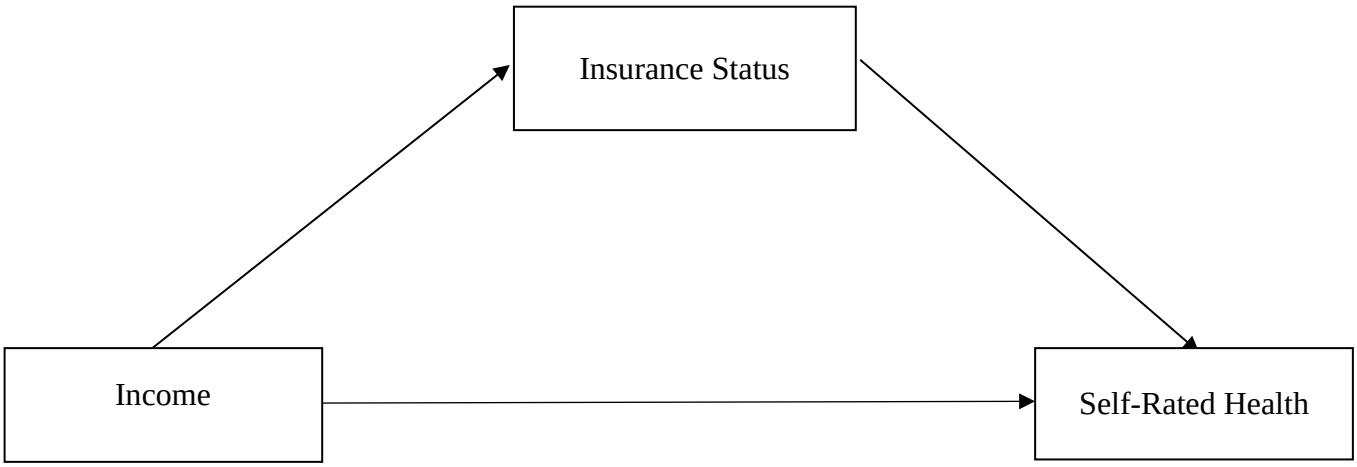


Figure 4. Path Diagram of Income, Insurance Status, and Self-Rated Health

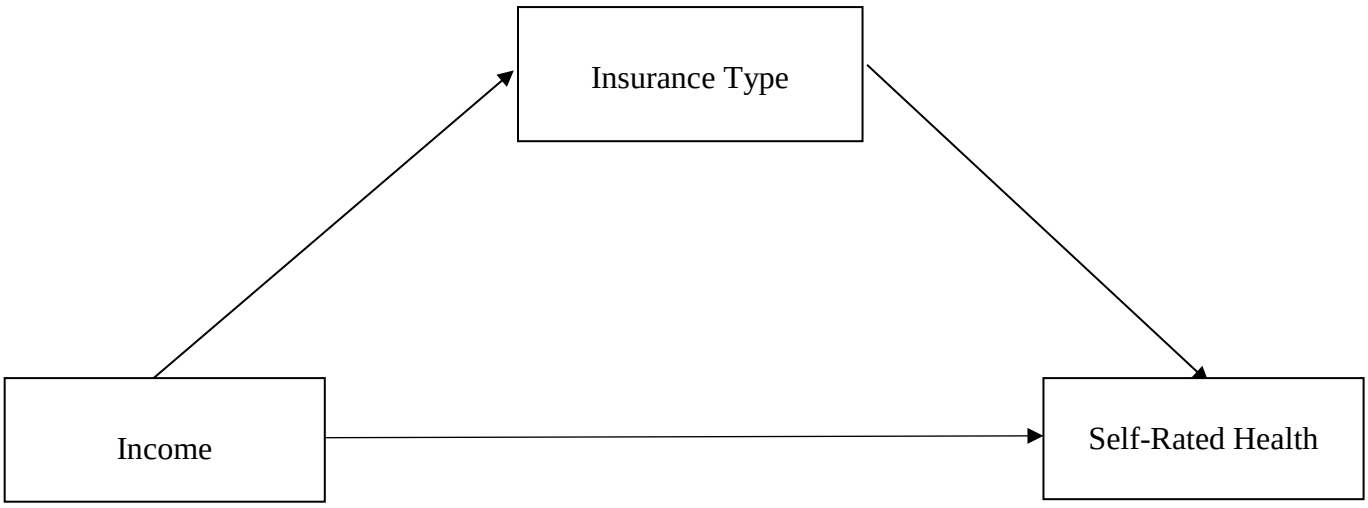


Figure 5. Path Diagram of Income, Insurance Type, and Self-Rated Health

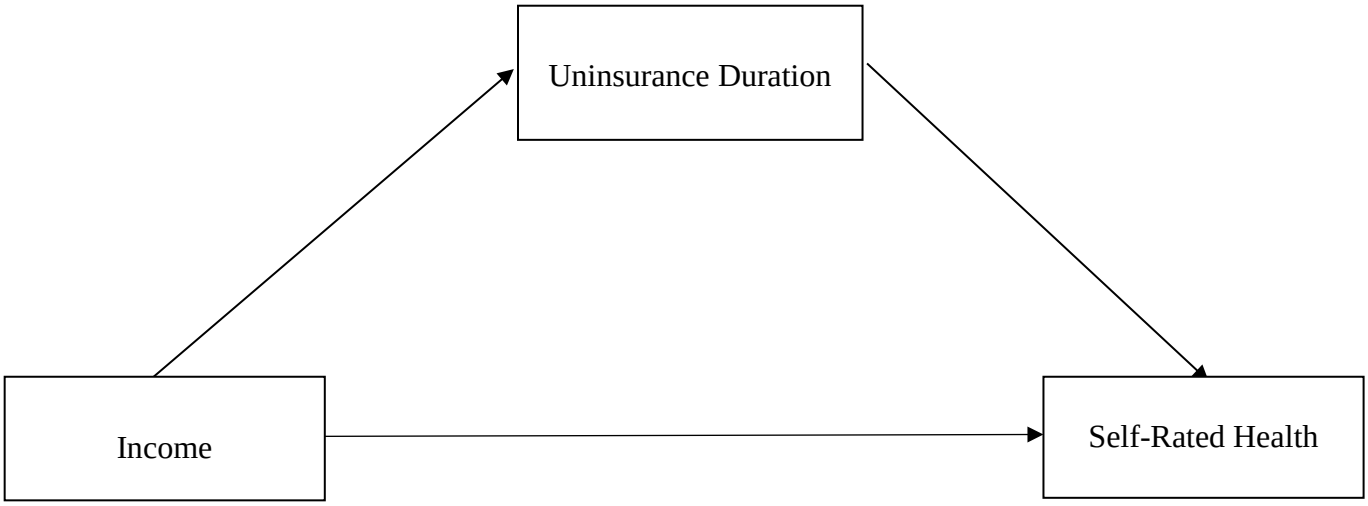


Figure 6. Path Diagram of Income, Uninsurance Duration and Self-Rated Health

CHAPTER THREE: METHODOLOGY

Chapter three discusses the research design, measures of the constructs included in this study, data source utilized, data collection procedures, data preparation techniques, and data analysis. All methodological procedures are based on techniques amenable to the research questions and hypotheses described in the next section.

Research Questions and Hypotheses

The following research questions and hypotheses are the result of the review of the literature and development of the problem statement and study purpose. All hypothetical relationships are represented in this study by observed constructs which are described in detail in subsequent sections of this chapter.

Research Question 1: What is the association between health insurance status and self-rated health?

Hypothesis 1a: People who have insurance have higher self-rated health than those who do not.

Research Question 2: What is the independent effect of insurance type on health?

Hypothesis 2a: People who are privately insured have higher self-rated health than those who have other types of insurance or are uninsured.

Hypothesis 2b: People who have Medicare have higher self-rated health than those who have other types of insurance or are uninsured.

Hypothesis 2c: People who have Medicaid have lower self-rated health than those who have other types of insurance or are uninsured.

Research Question 3: What is the independent effect of income on health insurance?

Hypothesis 3a: Higher income is associated with the presence of health insurance.

Hypothesis 3b: Higher income is associated with private health insurance.

Hypothesis 3e: Higher income is associated with shorter periods of uninsurance.

Research Question 4: What is the independent effect of income on self-rated health?

Hypothesis 4a: Higher income is associated with higher self-rated health.

Research Question 5: Does insurance indirectly effect the relationship between income and self-rated health?

Hypothesis 5a: Higher income predicts the presence of insurance, which in turn is related higher to self-related health.

Hypothesis 5b: Higher income predicts private insurance, which in turn is related to higher to self-related health.

Hypothesis 5c: Higher income predicts Medicare insurance, which in turn is related to higher self-related health.

Hypothesis 5d: Lower income predicts Medicaid insurance, which in turn is related to lower self-related health.

Hypothesis 5e: Lower income predicts uninsurance duration, which in turn is related to lower self-related health.

Research Question 6: What is the association between history of health insurance and self-rated health?

Hypothesis 6a: Longer periods of uninsurance are related to lower self-rated health

Research Design

This study is a non-experimental, retrospective, cross-sectional, secondary data analysis. Due to the sensitive nature of income and health and the availability of data, a true experiment - requiring random selection and random assignment- is not possible. It is unethical, unusual, and impractical to randomize participants to poverty (particularly long-term poverty); consequently, these characteristics may only be observed in the general population with no manipulation. The large national data set used in this study is collected and reported in a manner amenable to a cross-sectional study design. Public use, open-source, secondary data from reputable national surveillance systems already exist; as a result, a retrospective study design is also more feasible than attempting primary data collection on this subject.

Data Sources and Sample

This study is a secondary data analysis of records from the National Health Interview Survey (NHIS). The NHIS is a national cross-section of data, on a range of health topics, collected by the U.S. Census Bureau via a personal household survey (Parsons et al., 2014). Beginning in 1957, the NHIS survey includes topics on health behaviors, health insurance status, frequency of medical office visits, and health services utilization. The NHIS sample includes civilian, noninstitutionalized residents of the U.S., and surveys are conducted face-to-face by U.S. Census Bureau trained interviewers (Parsons et al., 2014). Exclusion criteria include U.S. citizens residing in foreign countries, inmates, residents of long-term care facilities, and active U.S. military personnel (Parsons, et al., 2014).

NHIS questionnaires are broken into four components: Sample Adult, Sample Child, Household, and Family (Parsons et al., 2014). Based on these data, Person and Injury Episode datasets are also generated at the conclusion of the study period. The Household component

reports limited demographic information on all members of a household. The Family component reports the Household demographic information plus additional demographic variables, health status, and socioeconomic position of each member of each family in the household. From each Family component, one sample adult and one sample child (if there are children residing in the home) are randomly selected to answer additional, individual questions on health status, health access, injury, and health behaviors and supplemental questions on disability status (Parsons et al., 2014).

This dissertation utilized NHIS survey year 2016 which was the latest iteration of publicly released NHIS data available at the time the results were pulled. This file included: 59,230 households, containing 97,169 individuals, in 40,875 families. As this study does not contain information on children, cases that reference persons aged under 18 were excluded and 39,450 adults were the final sample of this study. Annually, the NHIS response rate is approximately 80% and the sample is considered to be representative of the United States (Parsons, et al., 2014).

Measures

Table 3 describes the observed predictor, outcome, and control variables in this study in detail. Health insurance status, type, length of time uninsured, income, and self-rated health are the predictor variables in this study. Self-rated health is the primary outcome of this study. Nearly 70 years ago, the World Health Organization specifically described health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (1948); yet, due to the difficulty of capturing the complexity of "health" in one measure, research must make use of indicators of health. In this study, health will be measured in terms of the standard indicator, self-rated health (subjective quality of life). The National Health

Interview Survey questionnaire gauges self-rated health by asking participants one question: "would you say [your] health in general is excellent, very good, good, fair, or poor?" Self-rated health is then coded on a 5-point Likert scale from poor (1) to excellent (5). It is important to include subjective quality of life/ self-rated health as an indicator of "health" as the absence of disease is not equivalent to health, and the presence of disease is not synonymous with low quality of life.

Finding large, public-use datasets that included subjective quality of life, socioeconomic status, *and* health insurance status proved challenging. Thus, while additional metrics of health, wellness, and illness are defined in the literature and included in other data sets, this study prioritized socioeconomic status, health insurance status, and self-rated as the primary variables of interest. The National Health Interview Survey (NHIS) represents the publicly available dataset most amenable to the prioritized variables. As a result of the questions asked during the NHIS surveys and the response rate of other health-related items, self-rated health is the only measure of health included in this study; the primary variable predicting health is income defined by total earnings in 2015.

The following socio-demographic, cultural, and economic factors are included in this study as control variables: educational attainment; employment status; geographic region of residence; marital status; age; country of birth; Hispanic ethnicity; race; and gender (sex). These variables are modeled as they are known to influence income and/or self-rated health. In the dataset, whether geographic region of primary residence is considered "urban or rural" is restricted for public use. The National Health Interview Survey does not contain information on racial concentration or neighborhood level data, and social participation also cannot be gleaned from this dataset. The hypothesized relationships between these variables and the predictor and

outcome variables is shown in conceptual models in Chapter 2 Figures 4-5 and operational details for these variables are found in Table 3.

Table 3. Description of Relevant Variables in 2016 National Health Interview Survey Dataset N = 39,450

Variable Name	Definition	Scale
	Outcome Variable	
Self-rated health	Reported Health Status	Categorical: 1 = Poor; 2 = Fair; 3 = Good; 4 = Very Good; 5 = Excellent
	Predictor Variables	
Health insurance Status	The presence or absence of health insurance	Categorical, Dichotomous: 0 = Uninsured; 1 = Insured
Health insurance Type	Type of health insurance	Categorical: 0 = Uninsured 1 = Medicaid 2 = Dual eligible for Medicare and Medicaid 3 = Medicare 4 = Other insurance 5 = Private insurance
Uninsurance duration	History of insurance measured by the question "how long have you been uninsured?"	Continuous: 0 = Currently insured 1 = 1-6 months 2 = 7-11 months 3 = 12 months 4 = 13-35 months 5 = 36 months of more 6 = Never had insurance
Income	Total earnings last year	Continuous in USD: 1 = $1-$4,999 2 = $5,000-$9,999 3 = $10,000-$14,999 4 = $15,000-$19,999 5 = $20,000-$24,999 6 = $25,000-$34,999 7 = $35,000-$44,999 8 = $45,000-$54,999

Variable Name	Definition	Scale
		9 = $55,000-$64,999 10 = $65,000-$74,999 11 = $75,000 and over
	Control Variables	
Education	Highest grade completed	Continuous: 0 = Never attended/kindergarten only 1 = 1st grade 2 = 2nd grade 3 = 3rd grade 4 = 4th grade 5 = 5th grade 6 = 6th grade 7 = 7th grade 8 = 8th grade 9 = 9th grade 10 = 10th grade 11 = 11th grade 12 = 12th grade, no diploma 13 = GED or High School diploma 14 = Some college, no degree 15 = Associate's degree 16 = Bachelor's degree 17 = Master's degree 18 = Professional and doctoral degrees
Employment	Employment status	Categorical: 0 = Unemployed, looking for work 1 = Unemployed, not looking for work 2 = Employed, not for pay 3 = Employed, for pay
Geography	Geographic region of the U.S. where respondent lives	Categorical: 1 = Northeast; 2 = Midwest ; 3 = South; 4 = West

Variable Name	Definition	Scale
Marital status	Marital status	Categorical: 0 = Divorced 1 = Widowed 2 = Separated 3 = Single 4 = Married
Age	Adults 18 years or older	Continuous in years
U.S. birth	Country of birth, in response to the question: were you born in the United States?	Categorical, Dichotomous: 0 = No; 1 = Yes
Hispanic Ethnicity	Of Hispanic origin	Categorical, Dichotomous: 0 = No; 1 = Yes
Race	Racial self-identification	Categorical: 0 = White 1 = Black 2 = Multiracial, American Indian, or Alaska Native 3= Asian
Sex	Biological sex	Categorical, Dichotomous: 0 = Male; 1 = Female

Procedures

Data Collection

The Centers for Disease Control and Prevention's (CDC) National Center for Health Statistics (NCHS) compiles, weights, and publishes the National Health Interview Survey (NHIS) on the CDC website annually. Public-use NHIS data may be downloaded for free at the NCHS website, thus, data for this study were downloaded directly.

Data Analysis

Data preparation. NHIS data from the NCHS were downloaded as a comma separated value (CSV) file, then imported into IBM SPSS Statistics 24. Six hundred and six (606) variables are coded in the NHIS Person file, thus, impertinent and duplicate recoded variables were removed from the dataset prior to any further examination. Once this initial data cleaning step was completed, univariate statistics were performed on the remaining variables to reveal the quality of the data and determine if key independent and dependent variables contained a sufficient sample. Observations that had extreme outliers that did not correspond to meaningful categorical or continuous values were dropped. For the variable "education," professional (MD, JD, DVM, etc.) and doctoral (PhD, ScD, etc.) degrees were recoded into one category. Nationality is listed in the dataset as 11 different countries and regions (e.g. "Middle East") of birth; this category was recoded as "born in the United States" or "not born in the United States." Marital status was condensed into five categories and included in the path models as "married" or "not married." Race was condensed based on the number of individuals in each category thus American Indian, Alaska Native, and Multiracial were combined. Referent categories were then determined for the remainder of categorical variables (coded as "0").

Univariate & bivariate analyses. Univariate and bivariate analyses were then conducted to determine normality and correlations between variables. Univariate analyses include frequency distributions and measures of dispersion (range, variance, and standard deviation for continuous variables) to examine central tendency, and Chi-square tests were used to examine the association between study variables. Bivariate correlations indicated moderate to strong relationships between each of the study variables, signaling to continue the analysis. True continuous variables in this study (age and income) roughly display univariate normality as evidenced by their histograms and measures of skewness (ranging from -1 to +1) and kurtosis (ranging from -3 to +3). However, the NHIS lists all income about $75,000 as "$75,000 or more"; as a result, the data are normally distributed up until that category (figure 7).

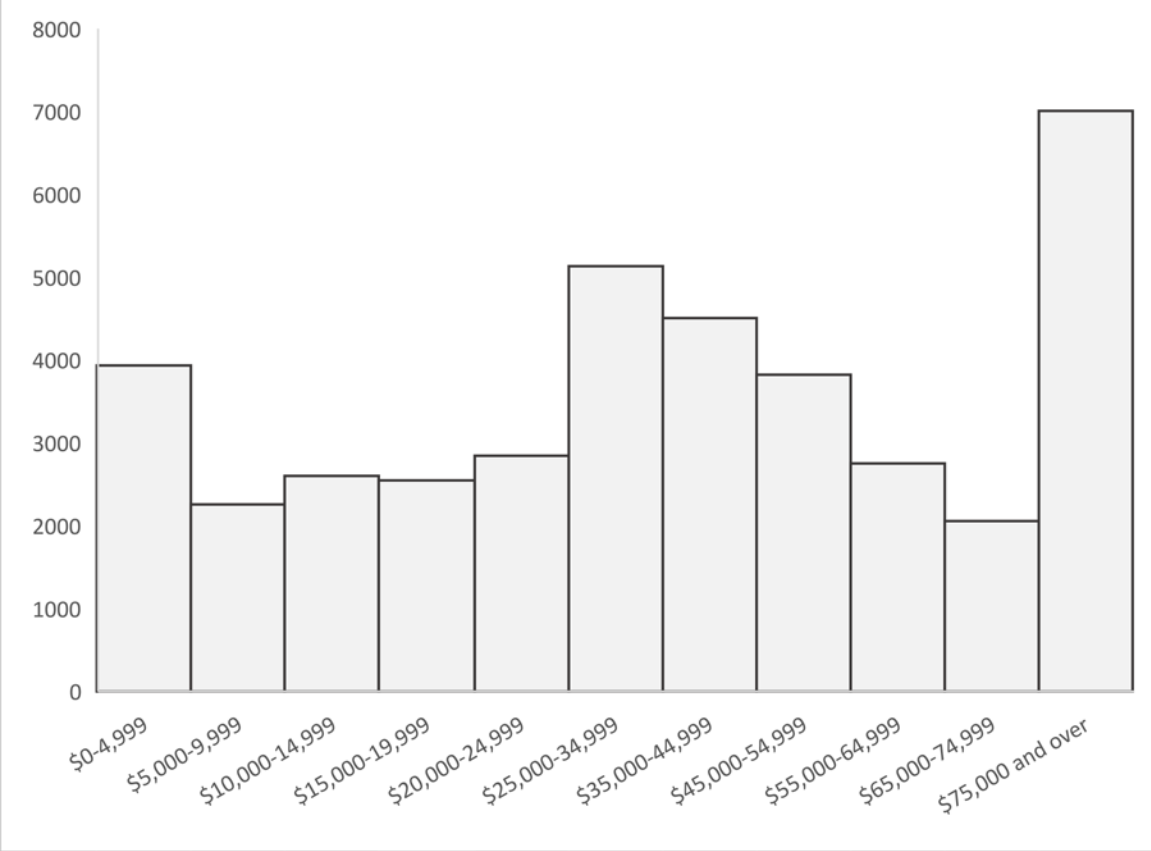


Figure 7. Total Earnings Last Year

The overwhelming majority of U.S. residents (91.2%) are insured and rate their health as "good" to "excellent" (U.S. Census Bureau, 2016). Measures of normality for continuous variables are included in table 4, and histograms/ bar charts, cross tabulations, Chi-squared tests, and bivariate correlations are included in Appendices A-C. Final descriptive statistics of all variables are presented in the next chapter.

Table 4. Variable Normality Tests

Variable	N	Skewness	Standard Error	Kurtosis	Standard Error
Income	39,450	-0.166	0.004	-1.085	0.008
Age	39,450	0.172	0.004	-0.870	0.008

Data Imputation. As path analyses require a complete set of data on all variables, the remaining data were then assessed for missing values per variable. The initial dataset contained 97,169 variables; 23,000 cases were children. These individuals were removed from the dataset. Additionally, as this study centers on income as the primary predictor of insurance and health, those who reported no employment status, income, or education level (and therefore not potential for meaningful socioeconomic imputation) were also removed from the dataset. Persons who self-identify as retired, disabled, homemakers, or students who reported to be unemployed and not looking for work, and who did not report an income were the final group of individuals not included in the final dataset marked for analysis.

Once the aforementioned logical, listwise deletion was completed, the data were again analyzed to determine the existence and magnitude of missing values. At that juncture, very few variables had missing values. For seven variables (uninsurance duration, self-rated health, educational attainment, work status, marital status, U.S. birth, and race), less than 5% of

observations per variable were missing. As a result, the remainder of missing values were imputed using stochastic regression imputation in SPSS AMOS. This imputation technique serves to predict observed variables based on other similar variables in the dataset. Imputation was the chosen multivariate step rather than additional listwise deletion in order to preserve explanatory power in the study.

Path analyses. At the conclusion of univariate, bivariate, and imputation analyses, the multivariate path model was analyzed via IBM SPSS AMOS version 24. Path analysis is the analytical method of choice in this study to test the association between correlated predictor variables (income, insurance status, insurance type, uninsurance duration), and the outcome variable (self-rated health) as well as the control variables. While there are several kinds of structural equation models, path analysis is the SEM method with the greatest potential to represent the variables in this study as most are correlated, and all are observed (Wan, 2002). Path analyses are essentially a series of multiple linear regression models with the flexibility to determine the relationship between multiple observed or latent exogenous and endogenous variables simultaneously (Wan, 2002). On a more practical level, path analyses are also helpful in visualizing the theoretical relationship between latent observed variables. Furthermore, path analyses also enable us to isolate the direct and indirect effects of income on health insurance and health insurance on self-rated health.

Eight sociodemographic and socioeconomic control variables, some with greater than 10 ordinal categories, are included in the initial path models. There are more control variables included in the primary path model than is feasible to practically interpret; thus, bivariate modeling was used to specify and trim the final model used to test the listed hypotheses. Each control variable was included in the study as a main effect in order to determine its impact on the

path prior to any trimming, and any non-significant paths were eliminated. Figures 7-9 demonstrate the structural models of the hypotheses included in this study and the control variables. The statistical models were analyzed with each of the health insurance variables as independent from the others.

Model Fit. Model fit was assessed using several indicators that are available in SPSS AMOS: root mean square error of approximation (RMSEA); comparative fit index (CFI); and three relative fit indices [incremental fit index (IFI), normed fit index (NFI), and the Tucker-Lewis index (TLI)] were all used to determine if the models were a good fit for the data. All initial models indicated that several paths were not a good fit with the data. As a result, several paths were removed from analysis, and covariance paths were added between several of the control variables. The final models all had relatively good fit, and all included paths were significant at the 0.01 level. The fit indices, significance values, and power analysis are included in chapter four (findings).

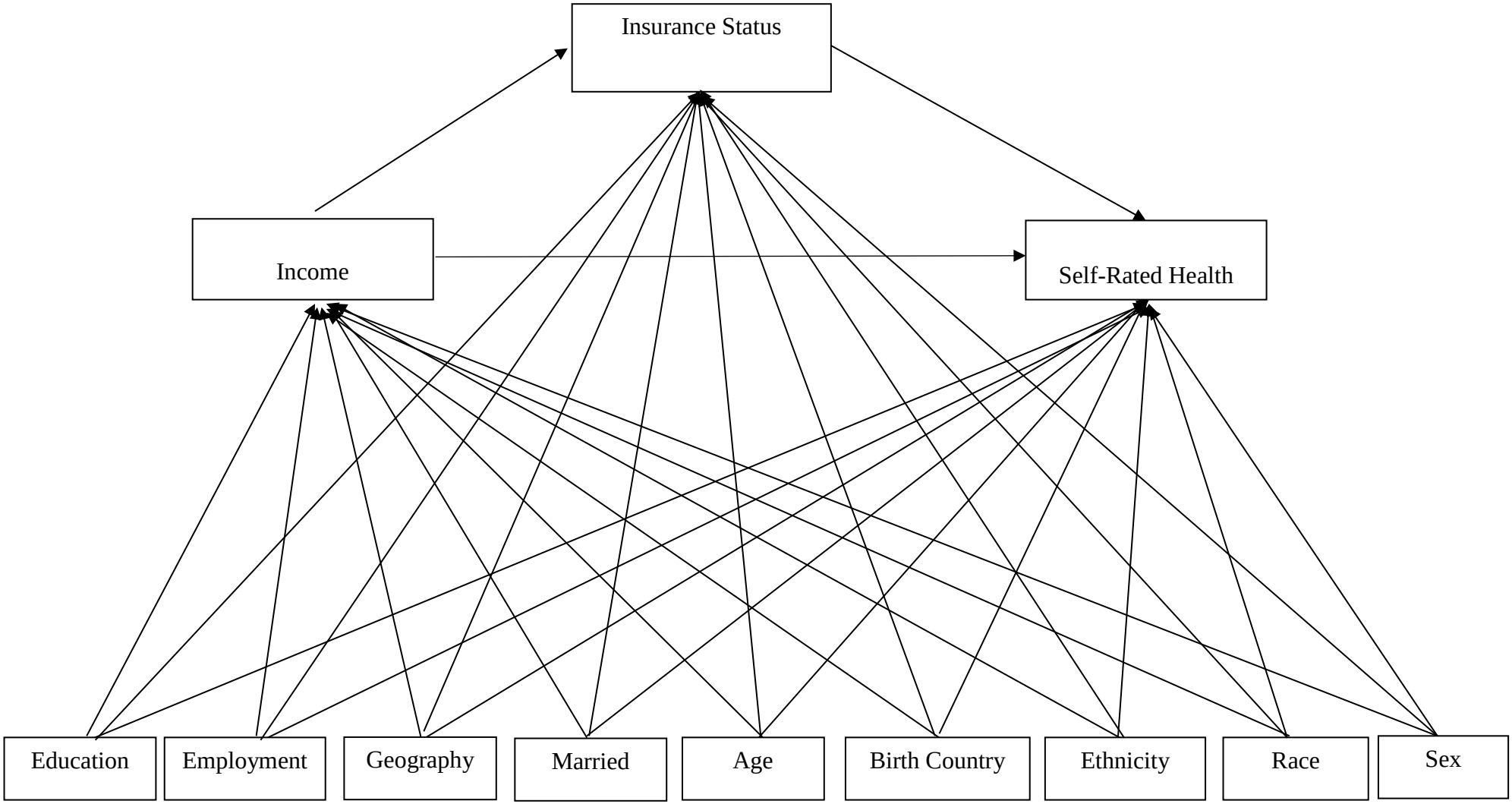


Figure 8. Structural Model of Income, Insurance Status, Self-Rated Health, and Control Variables

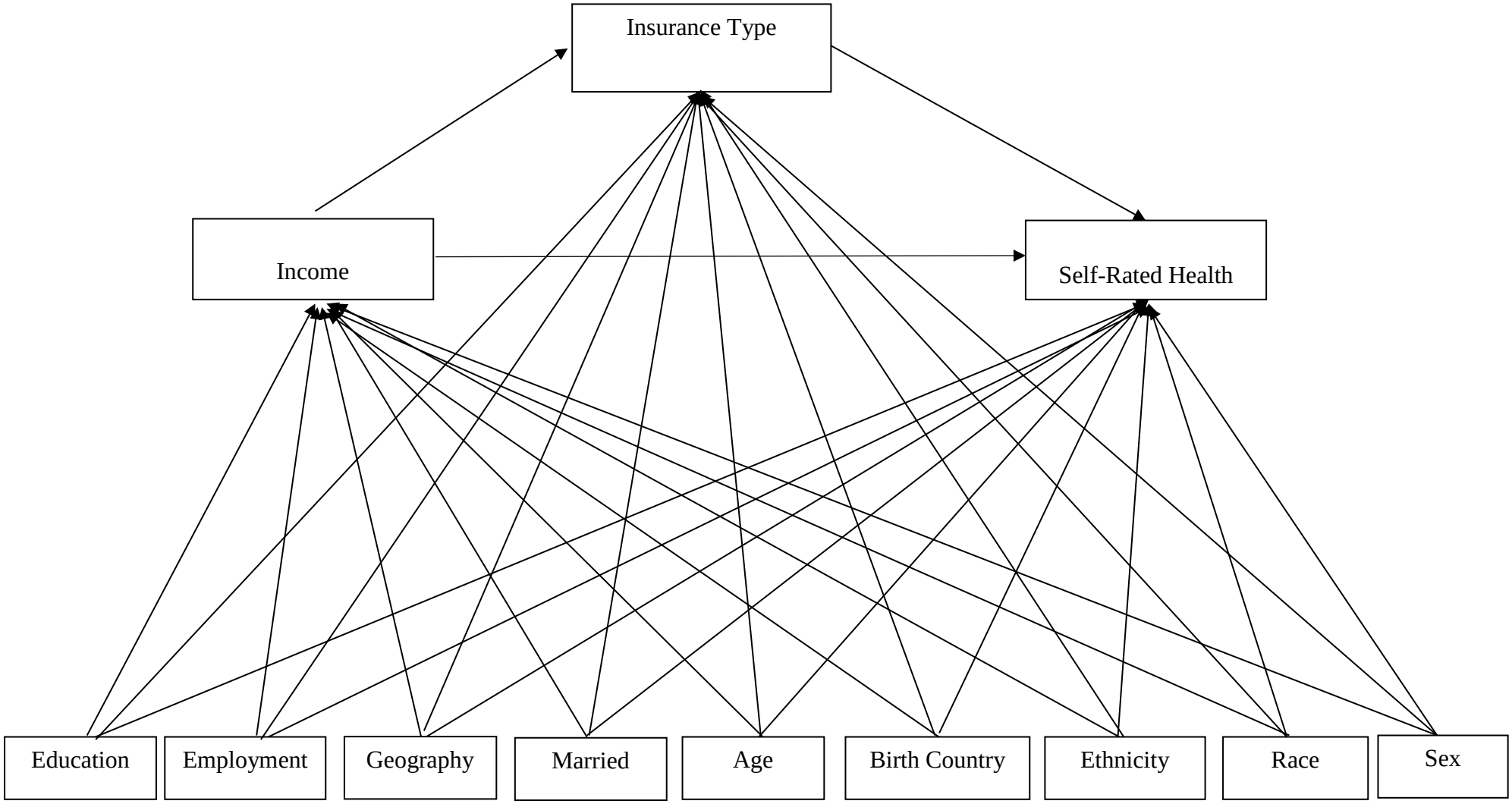


Figure 9 Structural Model of Income, Insurance Type, Self-Rated Health, and Control Variables

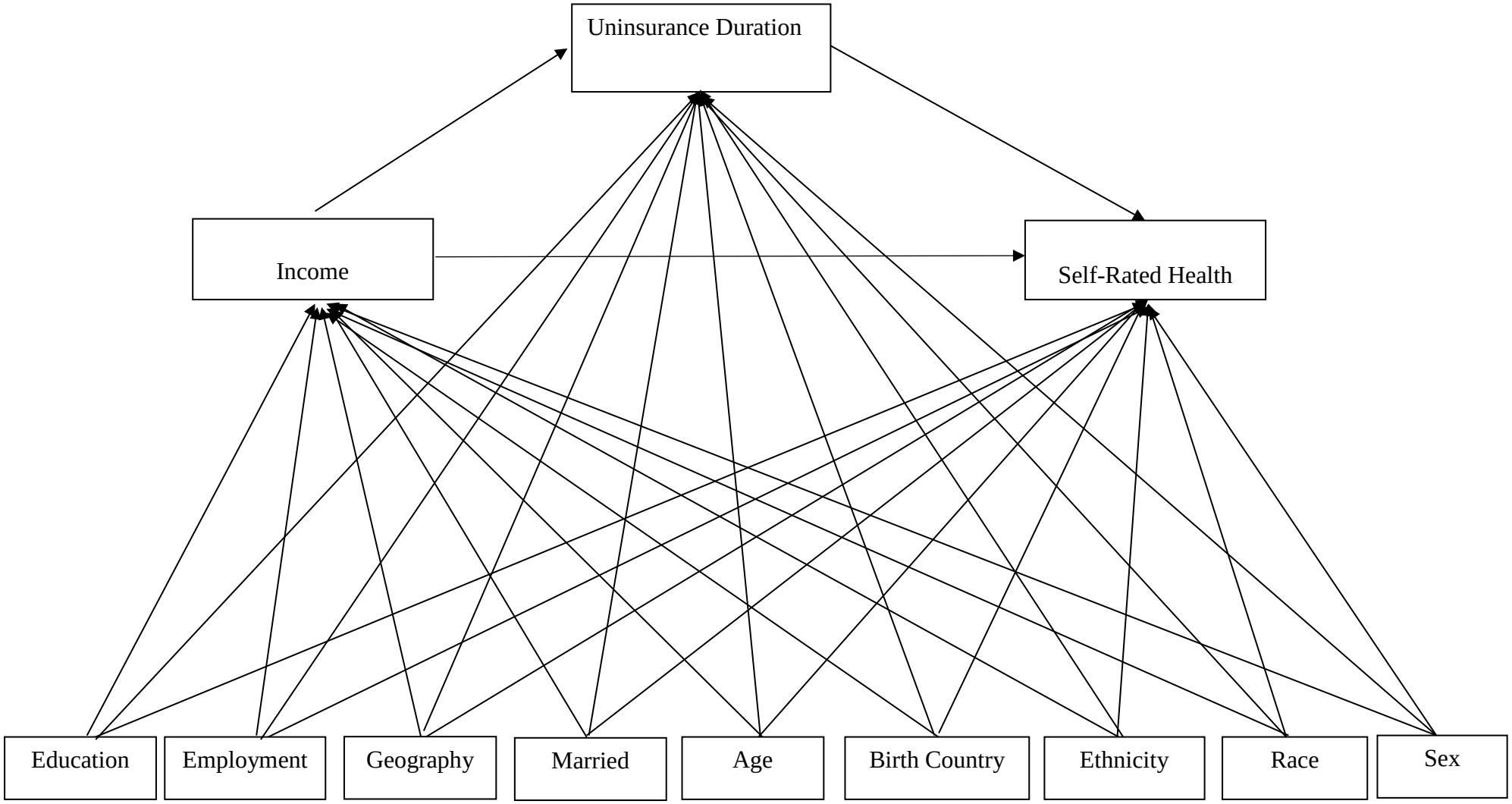


Figure 10 Structural Model of Income, Uninsurance Duration, Self-Rated Health, and Control Variables

CHAPTER FOUR: FINDINGS

Chapter four describes the findings of the statistical analyses conducted for this study. The first portion of this chapter is an overview of the descriptive statistics outlining the nature of each variable. The chapter then reports results from the models that were tested to answer each of the research questions and related hypotheses. Support for or against each hypothesis is also reported by topic in this chapter.

Descriptive Statistics

Table 5 provides the descriptive statistics for each variable included in the path, post imputation. The final sample size was 39,450. No missing values remained after a stochastic regression imputation. Data are presented in the order they appear in the path model. The study sample was approximately half male (51%) and half female (49%). The sample was less racially diverse than the United States (81% white, 10% black, 14% Hispanic, 5% Asian), but had a large enough sample of non-white respondents (over 7,000) for race to be included as a construct. The majority (86%) of the sample did not self-identify as Hispanic. Most of this sample was born in the United States (84%). The average age of the sample was 42.93, more than half were married (57%), almost half (48%) an associate's degree or higher, and most (86%) were employed for pay. Forty-nine percent of the sample reported an annual income of less than $35,000 and 51% of $35,000 or more, with 18% reporting an annual household income of $75,000 or more. Thirty-three percent of the sample described their geographic region of primary residence to be South U.S., 27% report living in the West U.S., 22% live in the Midwest, and 17% live in the Northeast U.S. More than a third (69%) rated their health as "good" or "excellent." Three-quarters of the sample (75%) had private insurance, and one-quarter was uninsured. Nine percent of the U.S.

population is uninsured, thus uninsurance is represented relatively accurately in this study (10% uninsured).

Table 5. Descriptive Statistics, Post Imputation (N = 39,450)

Variable	Frequency	Percent	National Average
Income*			
$0-$4,999	3,935	10.0	
$5,000-$9,999	2,257	5.7	11.2 (under $15k)
$10,000-$14,999	2,601	6.6	
$15,000-$19,999	2,546	6.5	
$20,000-$24,999	2,843	7.2	9.6 ($15-24.9k)
$25,000-$34,999	5,133	13.0	9.4
$35,000-$44,999	4,505	11.4	12.9 ($35-49.9k)
$45,000-$54,999	3,820	9.7	
$55,000-$64,999	2,749	7.0	17.0 ($50-74.9k)
$65,000-$74,999	2,056	5.2	
$75,000 and over	7,005	17.8	40
Health Insurance Type			
Uninsured	4,223	10.7	
Medicaid	3,310	8.4	
Medicare	802	2.0	
Dual Eligible (for Medicare and Medicaid)	590	0.1	
Other Insurance	1,348	3.4	
Private Insurance	29,708	75.3	
Health Insurance Status†			
Uninsured	4,223	10.7	9.0
Insured	35,227	89.3	91.0

Variable	Frequency	Percent	National Average
Length of Time Uninsured			
1-6 months	885	2.2	
7-11 months	379	1.0	
12 months	263	0.7	
13-35 months	531	1.3	
36 months or more	1,117	2.8	
Never had insurance	770	2.0	
Currently insured	35,370	89.7	
Self-Rated Health			
Poor	271	0.7	
Fair	2,254	5.7	
Good	9,858	25.0	
Very Good	14,630	37.1	
Excellent	12,436	31.5	
Education*			
Never attended school	87	0.2	
1st-12th grade, no diploma	3,298	8.4	
HS diploma/GED	9,262	23.5	
Some college	7,796	19.8	
Associate's degree	4,993	12.7	
Bachelor's degree	8,823	22.4	
Master's degree	3,815	9.7	30.3 (BA or higher)
Doctorate	1,370	3.5	
Employment Status*			
Unemployed, looking for work	2,401	6.1	
Unemployed, not looking for work (retired, disabled, etc.)	2,962	7.5	

Variable	Frequency	Percent	National Average
Employed, not for pay (intern, volunteer, etc)	275	0.7	
Employed, for pay	33,812	85.7	63.1
Geography			
Northeast	6,796	17.2	
Midwest	8,827	22.4	
South	13,042	33.1	
West	10,785	27.3	
Marital Status			
Divorced	4,494	11.4	
Widowed	793	2.0	
Separated	776	2.0	
Single	10,857	27.5	
Married	22,530	57.1	
Born in the U.S.*			
Yes	33,221	84.2	86.8
No	6,229	15.8	13.2
Hispanic Ethnicity*			
Yes	5,588	14.2	18.1
No	33,862	85.8	81.9
Race*			
White	32,126	81.4	76.6
Black	3,922	9.9	13.4
Asian	2,074	5.3	5.8
American Indian, Alaska Native, or Multiracial	1,320	3.3	4.0
Sex*			

Variable	Frequency	Percent	National Average
Male	20,172	51.1	49.2
Female	19,279	48.9	50.8

	Minimum	Maximum	Mean	Standard Deviation
Age	18	85	42.93	14.48

National Data Sources:
* 2016 Current Population Survey, U.S. Census Bureau
† 2016 National Health Interview Survey, Centers for Disease Control and Prevention

Path Analysis

Path models were structured according to the hypothesized relationships described in chapter two. Analysis of the initial models indicated that several paths were not statistically significant, and fit indices demonstrated that the models were not a good fit for the data. As a result, several paths were trimmed from analysis, and covariance paths were added between several of the control variables. Model fit was assessed using: root mean square error of approximation (RMSEA) with values between 0.05 and 0.10 considered fair fit. Comparative fit index (CFI) and three relative fit indices [incremental fit index (IFI), normed fit index (NFI), and the Tucker-Lewis index (TLI)] were also used to determine if the models were a good fit for the data. Values range from 0.0 to 1.0 and values approaching 1.0 (above 0.9 is best) demonstrate best fit. The final models all had relatively good fit, and all included paths were significant at the 0.01 or below level. The fit indices and standardized coefficients of determination are described per model below and table 6 indicates the referent categories for the nominal scale variables in the model, with the exception of geographic region of primary residence. All models were optimized as far as possible to attain the best possible fit, and only statistically significant paths were included; as a result, given the data, models could not be further improved.

Table 6. Variable Categories in Models

Category	Referent	In Model
Insurance Status	Uninsured	Insured
Work Status	Unemployed	Employed
Marital Status	Married	Unmarried
Race	White	Non-white
Sex	Male	Female

Model One: Insurance Status (Insured or Uninsured)

The first path model examines insurance status –whether the individual had insurance or not. Figure 11 demonstrates the final path model for this insurance variable with corresponding regression weights and variances for each variable in the model. Table 7 lists standardized regression coefficients in order of the strength of the association between variables indicating which predictors exerted the most influence on which outcomes. Table 8 presents the goodness of fit indices. In this model, sex and geographic region of primary residence did not statistically significantly predict self-rated health, and race did not statistically significantly predict the presence or absence of insurance. As a result, those paths were trimmed to improve model fit. Income, insurance status, and the remaining sociodemographic and socioeconomic variables statistically significantly predicted self-rated health. Educational attainment covaried with sex and employment, marital status covaried with sex and age, and U.S. birth covaried with race and Hispanic ethnicity.

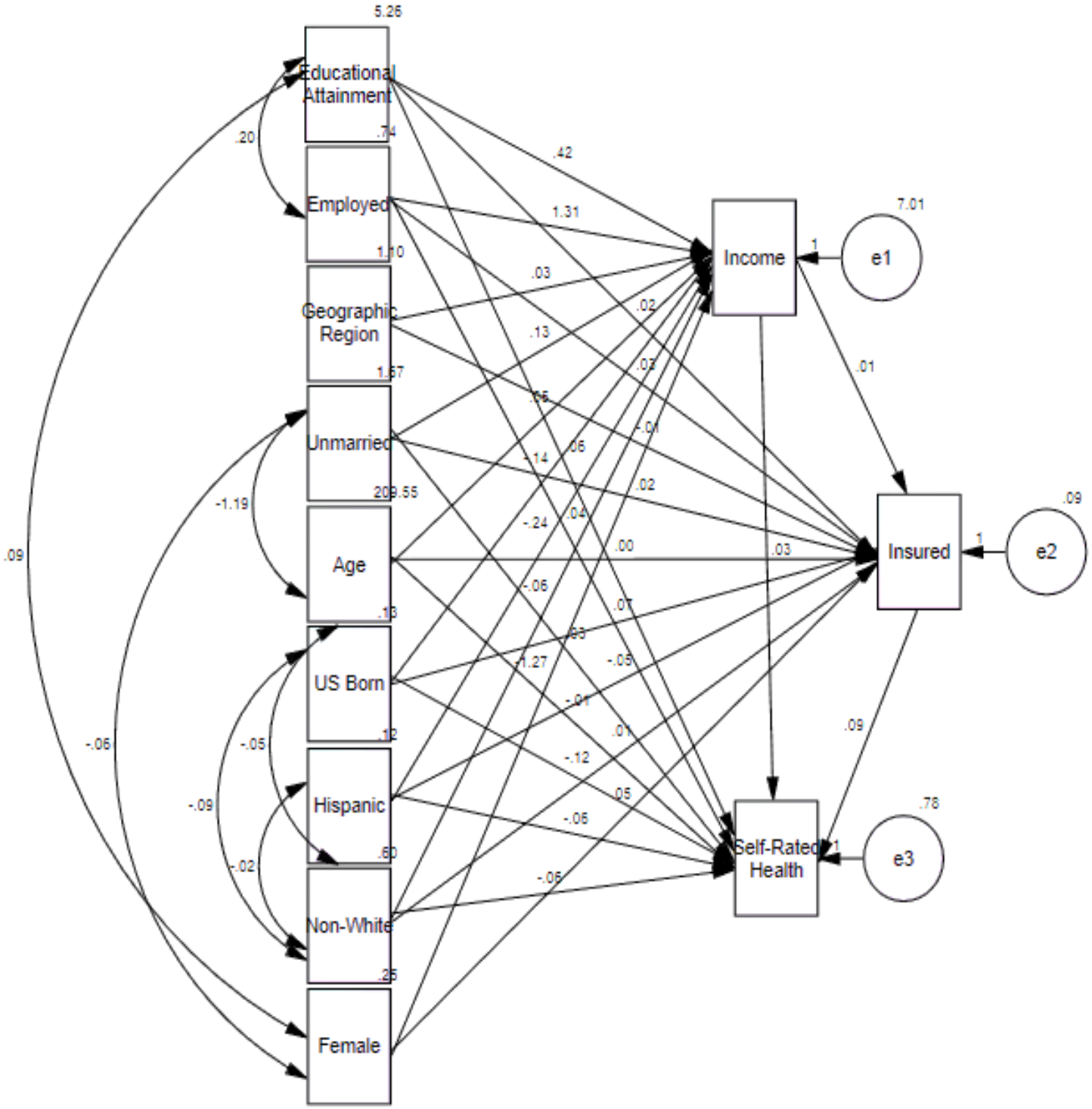


Figure 11. Model 1, Insurance Status

Among the statistically significant socioeconomic and sociodemographic variables, being employed, having higher education, being male, being older, and being married had the strongest influence on income as measured by their standardized coefficients. Higher education and income had the highest influence on insurance status as measured by their standardized coefficients; and younger age and more education had the highest influence on self-rated health as predicted by its standardized coefficients. In this model, income has a statistically significant direct effect on self-rated health, and a statistically significant indirect effect on self-rated health through insurance status (all at the $p < 0.001$ level). Income also had a stronger direct effect on self-rated health than being insured. Table 8 lists the goodness of fit statistics and revealed a moderate but adequate fit of the data. The root mean square error was on the high end of acceptable (RMSEA = 0.079) and the relative measures were on the low end of acceptable (CFI, IFI, NFI = 0.831).

Table 7. Insurance Status Path Statistics

Path (relationship)	Standardized β	Standard Error	P-value
Income ← Employed	.337	.005	<0.001
Income ← Education	.298	.002	<0.001
Income ← Female	-.193	.008	<0.001
Income ← Age	.167	.000	<0.001
Income ← Unmarried	-.148	.003	<0.001
Income ← Hispanic Ethnicity	-.026	.014	<0.001
Income ← Non-white	-.026	.006	<0.001
Income ← Geography	.007	.004	<0.001
Income ← U.S. Born	-.006	.014	<0.001
Insured ← Education	.151	.000	<0.001
Insured ← Income	.106	.000	<0.001

Path (relationship)	Standardized β	Standard Error	P-value
Insured ◄— U.S. Born	.079	.002	<0.001
Insured ◄— Female	.073	.001	<0.001
Insured ◄—Unmarried	-.066	.000	<0.001
Insured ◄— Hispanic Ethnicity	-.064	.002	<0.001
Insured ◄— Age	.053	.000	<0.001
Insured ◄— Employed	.044	.001	<0.001
Insured ◄—Geography	-.028	.000	<0.001
Self-Rated Health◄— Age	-.207	.000	<0.001
Self-Rated Health ◄— Education	.142	.001	<0.001
Self-Rated Health◄— Income	.088	.001	<0.001
Self-Rated Health◄— Non-white	-.054	.002	<0.001
Self-Rated Health◄— U.S. Born	-.044	.005	<0.001
Self-Rated Health◄— Employed	.034	.002	<0.001
Self-Rated Health◄— Insured	.032	.005	<0.001
Self-Rated Health ◄— Unmarried	-.030	.001	<0.001
Self-Rated Health ◄— Hispanic Ethnicity	-.024	.005	<0.001

Table 8. Goodness of Fit Indices for Insurance Status

Test	Abbreviation	Value
Root mean square error of approximation	RMSEA	0.079
Comparative fit index	CFI	0.831
Normed fit index	NFI	0.831
Tucker-Lewis index	TLI	0.652
Incremental fit index	IFI	0.831

Model Two: Private Insurance

The second path model examines private insurance. Figure 12 demonstrates the final path model for this insurance variable with corresponding regression weights and variances for each variable in the model. Table 9 lists standardized regression coefficients in order of the strength of the association between variables indicating which predictors exerted the most influence on which outcomes. Table 10 presents the goodness of fit indices. In this model, geographic region of primary residence did not statistically significantly predict self-rated health, thus, that path was trimmed to improve model fit. Income, insurance status, and the remaining sociodemographic and socioeconomic variables all statistically significantly predicted self-rated health. Educational attainment covaries with sex and employment, marital status covaried with sex and age, and U.S. birth covaried with race and Hispanic ethnicity.

Among the statistically significant socioeconomic and sociodemographic variables, being employed, having higher education, being male, being older, and being married had the strongest influence on income as measured by their standardized coefficients. Higher income, higher education, and being employed had the greatest influence on private insurance status as measured by their standardized coefficients; and younger age and higher education had the highest influence on self-rated health as predicted by its standardized coefficients.

In this model, income has a statistically significant direct effect on self-rated health, and a statistically significant indirect effect on self-rated health through private insurance (all at the $p < 0.001$ level). Income exerted a larger influence on private insurance status than any other insurance category included in this study. Income also had a stronger direct effect on self-rated health than private insurance. Table 10 lists the goodness of fit statistics and revealed a moderate but adequate fit of the data. The root mean square error was on the high end of

acceptable (RMSEA = 0.082) and the relative measures were on the low end of acceptable (CFI, IFI, NFI = 0.846).

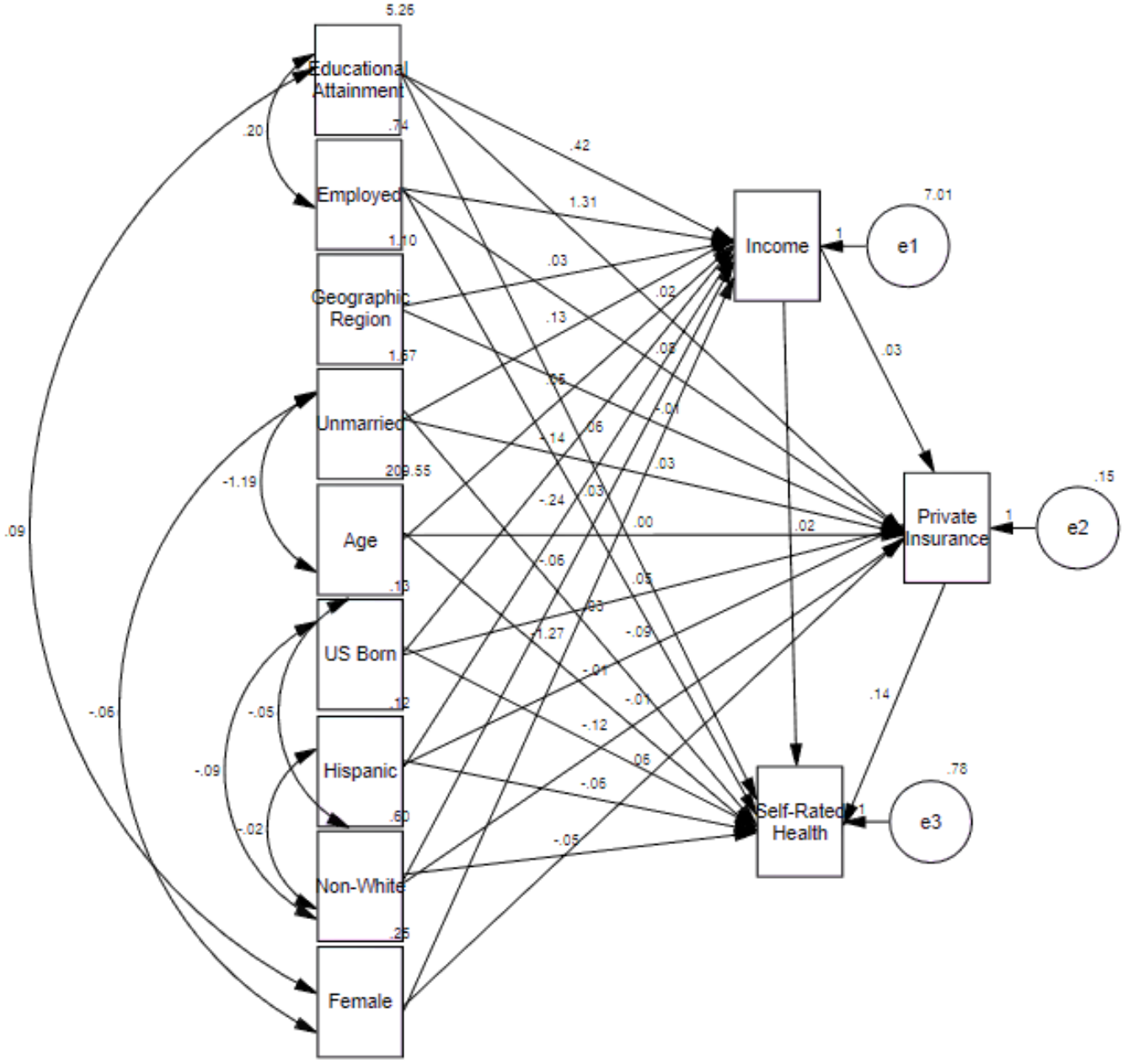


Figure 12. Model 2, Private Insurance

Table 9. Private Insurance Path Statistics

Path (relationship)	Standardized β	Standard Error	P-value
Income ◄— Employed	.337	.005	<0.001
Income ◄— Education	.298	.002	<0.001
Income ◄— Female	-.193	.008	<0.001
Income ◄— Age	.167	.000	<0.001
Income ◄— Unmarried	-.148	.003	<0.001
Income ◄— Non-white	-.026	.006	<0.001
Income ◄— Hispanic Ethnicity	-.026	.014	<0.001
Income ◄— Geography	.007	.004	<0.001
Income ◄— U.S. Born	-.006	.014	<0.001
Private Insurance ◄— Income	.260	.000	<0.001
Private Insurance ◄— Education	.131	.000	<0.001
Private Insurance ◄— Employed	.129	.001	<0.001
Private Insurance ◄— Unmarried	.088	.000	<0.001
Private Insurance ◄— Hispanic Ethnicity	-.079	.002	<0.001
Private Insurance ◄— Female	.066	.001	<0.001
Private Insurance ◄— Non-white	-.050	.001	<0.001
Private Insurance ◄— Age	-.046	.000	<0.001
Private Insurance ◄— U.S. Born	.038	.002	<0.001
Private Insurance ◄— Geography	-.036	.001	<0.001
Self-Rated Health ◄— Age	-.202	.000	<0.001
Self-Rated Health ◄— Education	.140	.001	<0.001
Self-Rated Health ◄— Income	.073	.001	<0.001
Self-Rated Health ◄— Private Insurance	.065	.004	<0.001
Self-Rated Health ◄— Non-white	-.051	.002	<0.001
Self-Rated Health ◄— U.S. Born	-.044	.005	<0.001
Self-Rated Health ◄— Employed	.028	.002	<0.001

Path (relationship)	Standardized β	Standard Error	P-value
Self-Rated Health ◄— Unmarried	-.026	.001	<0.001
Self-Rated Health ◄— Hispanic Ethnicity	-.021	.005	<0.001
Self-Rated Health ◄— Female	-.007	.001	<0.001

Table 10. Goodness of Fit Indices for Private Insurance

Test	Abbreviation	Value
Root mean square error of approximation	RMSEA	0.082
Comparative fit index	CFI	0.846
Normed fit index	NFI	0.846
Tucker-Lewis index	TLI	0.662
Incremental fit index	IFI	0.846

Model Three: Medicare

The third path model examines Medicare. Figure 13 demonstrates the final path model for this insurance variable with corresponding regression weights and variances for each variable in the model. Table 11 lists standardized regression coefficients in order of the strength of the association between variables indicating which predictors exerted the most influence on which outcomes. Table 12 presents the goodness of fit indices. In this model, geographic region of primary residence, U.S. birth, and ethnicity did not statistically significantly predict Medicare; and geographic region of primary residence and sex did not statistically significantly predict self-rated health. Thus, those paths were trimmed to improve model fit. Income, insurance status, and the remaining sociodemographic and socioeconomic variables statistically significantly predicted self-rated health. Educational attainment covaries with sex and employment, marital status covaried with sex and age, and U.S. birth covaried with race and Hispanic ethnicity.

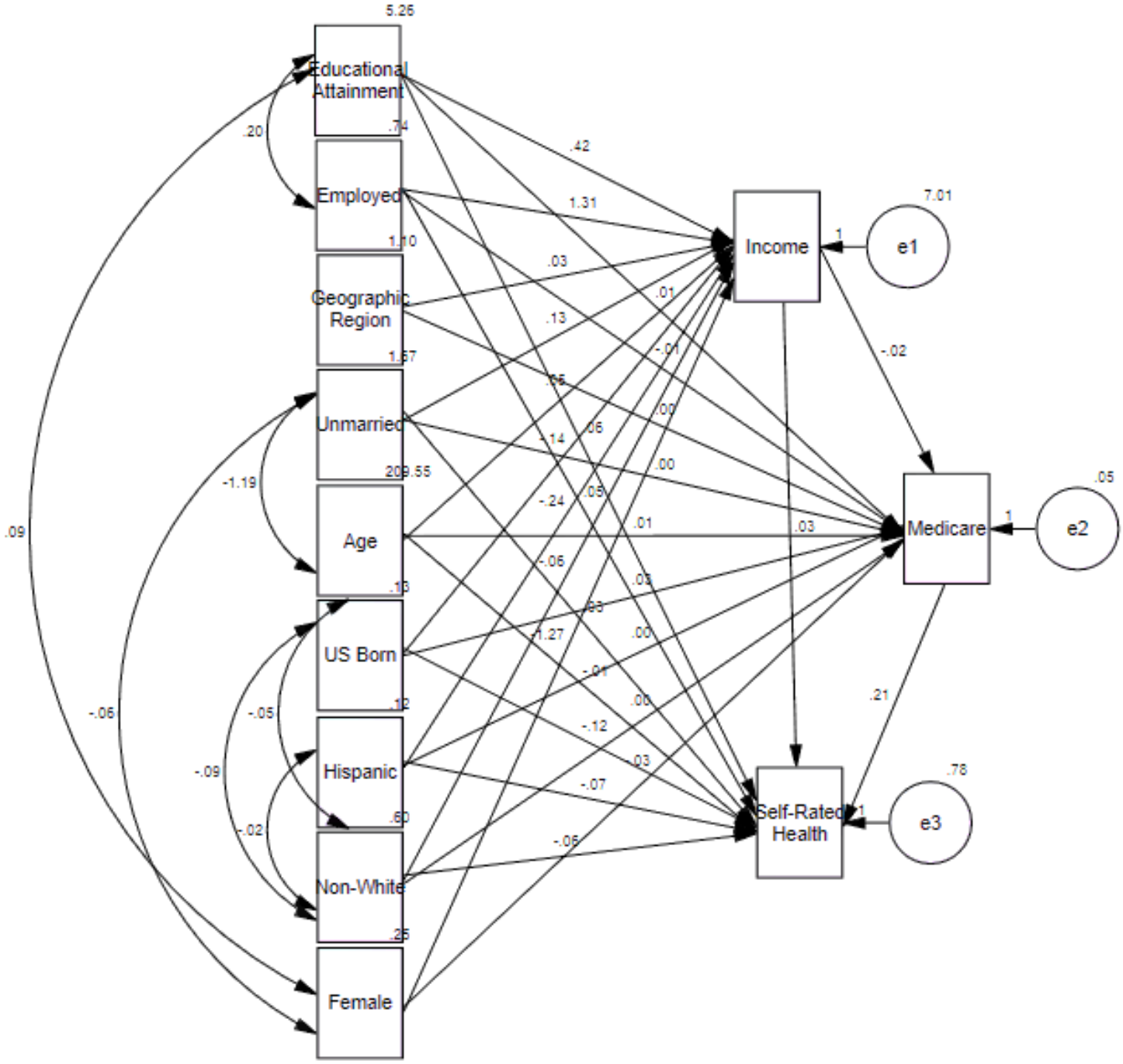


Figure 13. Model 3, Medicare

Among the statistically significant socioeconomic and sociodemographic variables, being employed, having higher education, being male, being older, and being married had the strongest influence on income as measured by their standardized coefficients. Lower income and being older had the highest influence predicting Medicare as measured by their standardized coefficients; and younger age and higher education had the highest influence on self-rated health as predicted by its standardized coefficients.

In this model, income has a statistically significant direct effect on self-rated health, and a statistically significant indirect effect on self-rated health through Medicare (all at the $p < 0.001$ level). Income also had a stronger direct effect on self-rated health than Medicare. Table 12 lists the goodness of fit statistics and revealed a moderate but adequate fit of the data. The root mean square error was on the high end of acceptable (RMSEA = 0.077) and the relative measures were on the low end of acceptable (CFI, IFI, NFI = 0.857).

Table 11. Medicare Path Statistics

Path (relationship)	Standardized β	Standard Error	P-value
Income ← Employed	.337	.005	<0.001
Income ← Education	.298	.002	<0.001
Income ← Female	-.193	.008	<0.001
Income ← Age	.167	.000	<0.001
Income ← Unmarried	-.148	.003	<0.001
Income ← Non-white	-.026	.006	<0.001
Income ← Hispanic Ethnicity	-.026	.014	<0.001
Income ← Geography	.007	.004	<0.001
Income ← U.S. Born	-.006	.014	<0.001
Medicare ← Age	.534	.000	<0.001

Path (relationship)	Standardized β	Standard Error	P-value
Medicare ← Income	-.214	.000	<0.001
Medicare ← Education	.083	.000	<0.001
Medicare ← Unmarried	.075	.000	<0.001
Medicare ← Employed	-.067	.000	<0.001
Medicare ← Female	-.057	.001	<0.001
Medicare ← Non-white	-.024	.001	<0.001
Self-Rated Health ← Age	-.237	.000	<0.001
Self-Rated Health ← Education	.144	.001	<0.001
Self-Rated Health ← Income	.103	.001	<0.001
Self-Rated Health ← Medicare	.060	.007	<0.001
Self-Rated Health ← Non-white	-.053	.002	<0.001
Self-Rated Health ← U.S. Born	-.044	.005	<0.001
Self-Rated Health ← Employed	.040	.002	<0.001
Self-Rated Health ← Unmarried	-.036	.001	<0.001
Self-Rated Health ← Hispanic Ethnicity	-.027	.005	<0.001

Table 12. Goodness of Fit Indices for Medicare

Test	Abbreviation	Value
Root mean square error of approximation	RMSEA	0.077
Comparative fit index	CFI	0.857
Normed fit index	NFI	0.857
Tucker-Lewis index	TLI	0.722
Incremental fit index	IFI	0.857

Model Four: Medicaid

The fourth path model examines Medicaid. Figure 14 demonstrates the final path model for this insurance variable with corresponding regression weights and variances for each variable in the model. Table 13 lists standardized regression coefficients in order of the strength of the association between variables indicating which predictors exerted the most influence on which outcomes. And Table 14 presents the goodness of fit indices. In this model, U.S. birth did not statistically significantly predict having Medicaid; and geographic region of primary residence and sex did not statistically significantly predict self-rated health. Thus, those paths were trimmed to improve model fit. Income, insurance status, and the remaining sociodemographic and socioeconomic variables statistically significantly predicted self-rated health. Educational attainment covaries with sex and employment, marital status covaried with sex and age, and U.S. birth covaried with race and Hispanic ethnicity.

Among the statistically significant socioeconomic and sociodemographic variables, being employed, higher education, being male, being older, and being married had the strongest influence on income as measured by their standardized coefficients. Lower income and unemployment highest influence on Medicaid as measured by their standardized coefficients; and younger age and higher educational attainment had the highest influence on self-rated health as predicted by its standardized coefficients.

In this model, income has a statistically significant direct effect on self-rated health, and a statistically significant indirect effect on self-rated health through Medicaid (all at the $p < 0.001$ level). Income also had a slightly stronger direct effect on self-rated health than Medicaid, and Medicaid had a negative effect on self-rated health. Table 14 lists the goodness of fit statistics and revealed a moderate but adequate fit of the data. The root mean square error was on the high

end of acceptable (RMSEA = 0.079) and the relative measures were on the low end of acceptable (CFI, IFI, NFI = 0.834).

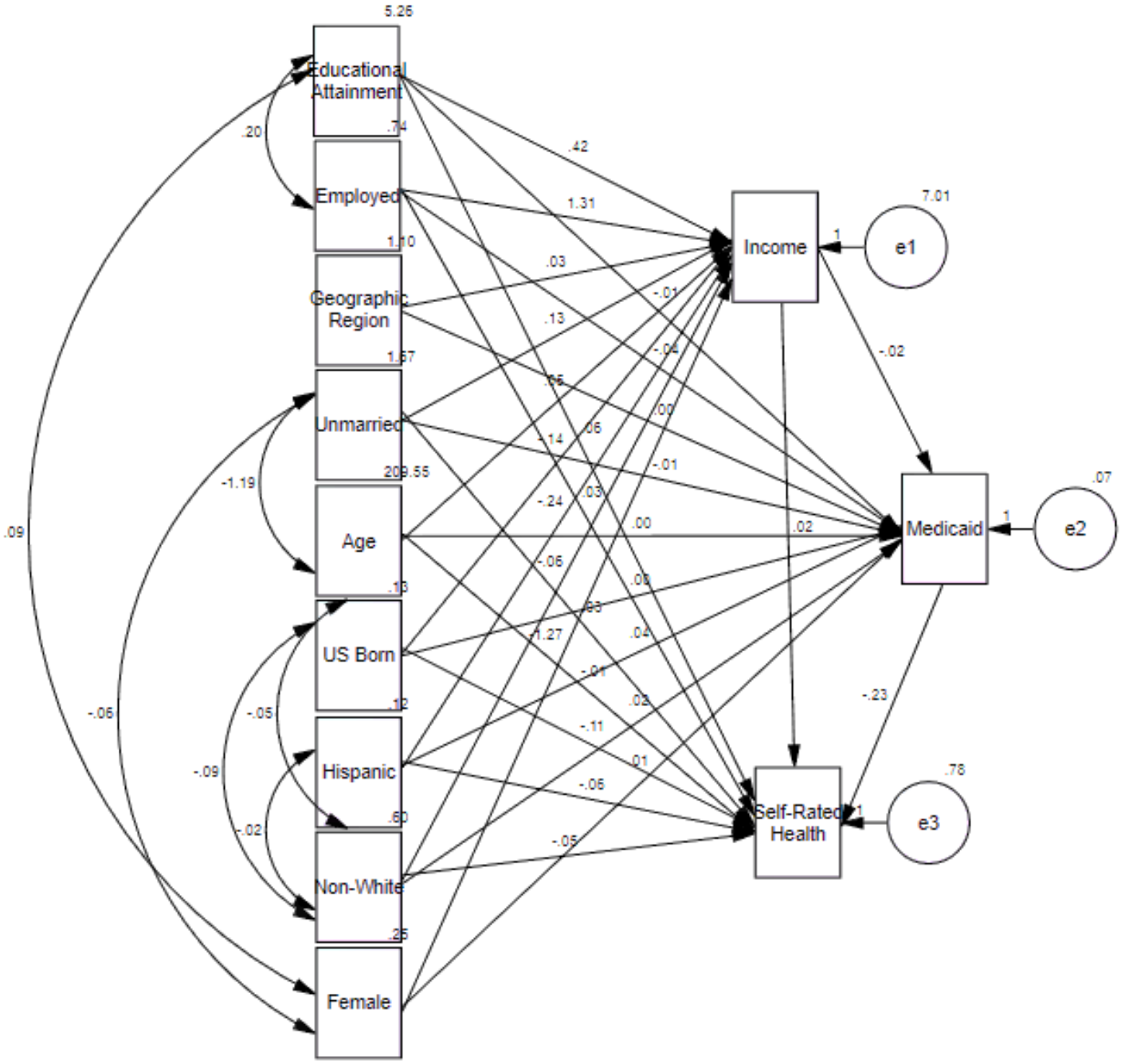


Figure 14. Model 4, Medicaid

Table 13. Medicaid Path Statistics

Path (relationship)	Standardized β	Standard Error	P-value
Income ◄— Employed	.337	.005	<0.001
Income ◄— Education	.298	.002	<0.001
Income ◄— Female	-.193	.008	<0.001
Income ◄— Age	.167	.000	<0.001
Income ◄— Unmarried	-.148	.003	<0.001
Income ◄— Geography	.007	.004	<0.001
Income ◄— U.S. Born	-.006	.014	<0.001
Income ◄— Non-white	-.026	.006	<0.001
Income ◄— Hispanic Ethnicity	-.026	.014	<0.001
Medicaid ◄— Income	-.188	.000	<0.001
Medicaid ◄— Employed	-.105	.001	<0.001
Medicaid ◄— Education	-.071	.000	<0.001
Medicaid ◄— Non-white	.065	.001	<0.001
Medicaid ◄— Unmarried	.061	.000	<0.001
Medicaid ◄— Age	-.054	.000	<0.001
Medicaid ◄— Hispanic Ethnicity	.047	.001	<0.001
Medicaid ◄— Geography	-.006	.000	<0.001
Medicaid ◄— Female	.024	.001	<0.001
Self-Rated Health ◄— Age	-.209	.000	<0.001
Self-Rated Health ◄— Education	.143	.001	<0.001
Self-Rated Health ◄— Income	.077	.001	<0.001
Self-Rated Health ◄— Medicaid	-.070	.005	<0.001
Self-Rated Health ◄— Non-white	-.050	.002	<0.001
Self-Rated Health ◄— U.S. Born	-.041	.005	<0.001
Self-Rated Health ◄— Unmarried	-.028	.001	<0.001
Self-Rated Health ◄— Employed	.028	.002	<0.001

Path (relationship)	Standardized β	Standard Error	P-value
Self-Rated Health ◄— Hispanic Ethnicity	-.023	.005	<0.001

Table 14. Goodness of Fit Indices for Medicaid

Test	Abbreviation	Value
Root mean square error of approximation	RMSEA	0.079
Comparative fit index	CFI	0.834
Normed fit index	NFI	0.834
Tucker-Lewis index	TLI	0.658
Incremental fit index	IFI	0.834

Model Five: Uninsurance Duration

The fifth path model examines the length of time someone has been uninsured, or "uninsurance duration." Figure 15 demonstrates the final path model for this insurance variable with corresponding regression weights and variances for each variable in the model. Table 15 lists standardized regression coefficients in order of the strength of the association between variables indicating which predictors exerted the most influence on which outcomes. Table 16 presents the goodness of fit indices. In this model, geographic region of primary residence and sex did not statistically significantly predict self-rated health. Thus, those paths were trimmed to improve model fit. Income, insurance status, and the remaining sociodemographic and socioeconomic variables statistically significantly predicted self-rated health. Educational attainment covaries with sex and employment, marital status covaried with sex and age, and U.S. birth covaried with race and Hispanic ethnicity.

Among the statistically significant socioeconomic and sociodemographic variables, being employed, higher education, being male, older age, and being married had the strongest influence on income as measured by their standardized coefficients. Lower educational attainment, lower income, and being foreign born had the highest influence on uninsurance duration as measured by their standardized coefficients; and younger age and higher education had the highest influence on self-rated health as predicted by its standardized coefficients.

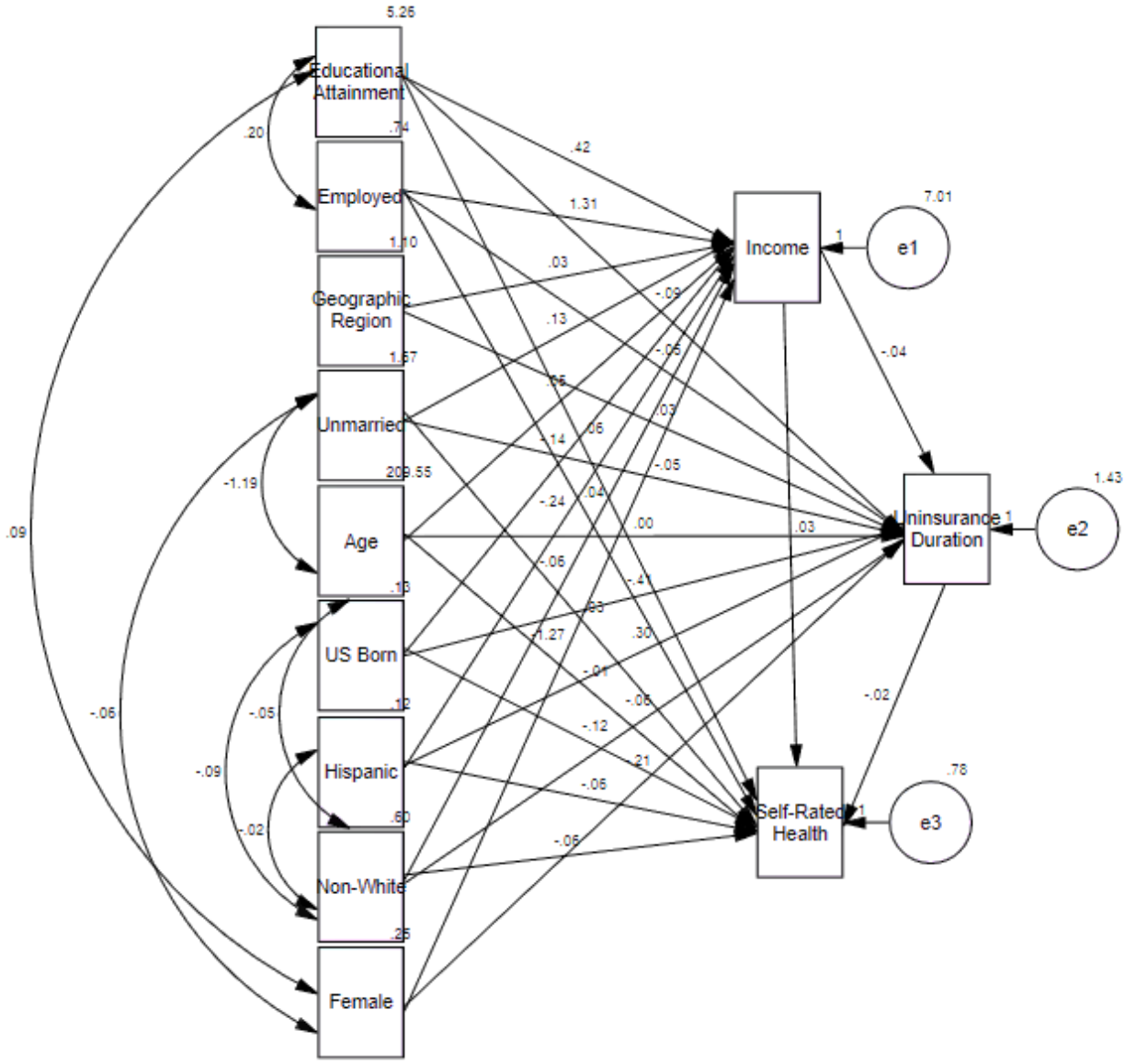


Figure 15. Model 5, Length of Time Uninsured

In this model, income has a statistically significant direct effect on self-rated health, and a statistically significant indirect effect on self-rated health through uninsurance duration (all at the $p < 0.001$ level). Income also had a stronger direct effect on self-rated health than uninsurance duration, and uninsurance duration had a negative effect on self-rated health. Table 16 lists the goodness of fit statistics and revealed a moderate but adequate fit of the data. The root mean square error was on the high end of acceptable (RMSEA = 0.080) and the relative measures were on the low end of acceptable (CFI, IFI, NFI = 0.834).

Table 15. Uninsurance Duration Path Statistics

Path (relationship)	Standardized β	Standard Error	P-value
Income ◄— Employed	.337	.005	<0.001
Income ◄— Education	.298	.002	<0.001
Income ◄— Female	-.199	.008	<0.001
Income ◄— Age	.167	.000	<0.001
Income ◄— Unmarried	-.148	.003	<0.001
Income ◄— Geography	.007	.004	<0.001
Income ◄— U.S. Born	-.006	.014	<0.001
Income ◄— Hispanic Ethnicity	-.026	.014	<0.001
Income ◄— Non-white	-.026	.006	<0.001
Uninsurance Duration ◄— Education	-.167	.001	<0.001
Uninsurance Duration ◄— Income	-.112	.001	<0.001
Uninsurance Duration ◄— U.S. Born	-.109	.006	<0.001
Uninsurance Duration ◄— Hispanic Ethnicity	.089	.006	<0.001
Uninsurance Duration ◄— Female	-.083	.004	<0.001
Uninsurance Duration ◄— Unmarried	-.055	.001	<0.001
Uninsurance Duration ◄— Age	-.027	.000	<0.001
Uninsurance Duration ◄— Geography	.024	.002	<0.001

Path (relationship)	Standardized β	Standard Error	P-value
Uninsurance Duration ◄— Non-white	-.018	.003	<0.001
Uninsurance Duration ◄— Employed	-.011	.002	<0.001
Self-Rated Health ◄— Age	-.206	.000	<0.001
Self-Rated Health ◄— Education	.144	.001	<0.001
Self-Rated Health ◄— Income	.089	.001	<0.001
Self-Rated Health ◄— Non-white	-.055	.002	<0.001
Self-Rated Health ◄— U.S. Born	-.044	.005	<0.001
Self-Rated Health ◄— Employed	.035	.002	<0.001
Self-Rated Health ◄— Unmarried	-.031	.001	<0.001
Self-Rated Health ◄— Hispanic Ethnicity	-.024	.005	<0.001
Self-Rated Health ◄— Uninsurance Duration	-.023	.001	<0.001

Table 16. Goodness of Fit Indices for Uninsurance Duration

Test	Abbreviation	Value
Root mean square error of approximation	RMSEA	0.080
Comparative fit index	CFI	0.834
Normed fit index	NFI	0.834
Tucker-Lewis index	TLI	0.646
Incremental fit index	IFI	0.834

Support for Research Questions and Hypotheses

Research Question One

Research question one examined the association between health insurance status and self-rated health, hypothesizing that people who have insurance have higher self-rated health than those who do not. This hypothesis was supported as insurance was statistically significantly

associated with self-rated health at the $p < 0.001$ level, and the association was positive indicating support for the hypothesis.

Research Question Two

Research question two examined the independent effect of insurance type on health, hypothesizing that people who are privately insured have higher self-rated health than those who have other insurance types or no insurance at all. People who have Medicare have higher self-rated health than those who have other insurance types or no insurance at all. And people who have Medicaid have lower self-rated health thank those who have other types of insurance or are uninsured. All insurance statuses -private, Medicare, Medicaid, and uninsured- statistically significantly predict self-rated health at the $p < 0.001$ level. Their standardized regression coefficients do support the hypothesis that private insurance predicts the highest self-rated health in comparison to the other insurance statuses. However, private insurance ($\beta = .065$) and Medicare ($\beta = .060$) had relatively close coefficients. Medicaid and being uninsured were both negatively associated with self-rated health, and had weaker coefficients than private insurance and Medicare. People who have Medicaid do indeed have lower self-rated health than those who have other types of insurance but being uninsured is a stronger predictor of lower self-rated health than Medicaid.

Research Question Three

Research question three examined the independent effect of income on health insurance, hypothesizing that higher income is associated with: (1) the presence of health insurance (model 1), (2) private health insurance (model 2), and (3) shorter periods of uninsurance (model 5). All hypotheses are supported by the models. The path between income and health insurance is statistically significant at the $p > 0.001$ level, and the standardized regression coefficient

describing the relationship is 0.106, indicating a positive relationship between income and having health insurance.

Higher income is statistically significantly associated with having a private insurance policy. The standardized regression coefficient for this path is positive and represents the strongest association between income and an insurance variable ($\beta = .260$). The path between income and uninsurance duration is also statistically significant at the $p < 0.001$ level, and the standardized regression coefficient of the relationship is -0.112, indicating a negative relationship. That is, higher income is related to a lower period of uninsurance.

Research Question Four

Research question four examined the independent effect of income on self-rated health, hypothesizing that higher income is associated with higher self-rated health. In all five models, the path between income and self-rated health are statistically significant at the $p < 0.001$ level. This hypothesis was supported as all the standardized regression coefficients were also positive, indicating that higher income is related to greater self-rated health.

Research Question Five

Research question five examines whether insurance indirectly effects the relationship between income and self-rated health, hypothesizing that higher income predicts the presence of private insurance and Medicare, and lower income predicts Medicaid and uninsurance, which in turn is related to self-related health. These hypotheses are supported as private insurance and Medicare positively predicted self-rated health, and Medicaid and being uninsured inversely predicted self-rated health. Lower income predicted having Medicaid, being uninsured, and longer periods of being uninsured, which is in turn related to lower self-rated health. Figures 11-15 demonstrates these relationships. In these models, income statistically significantly predicts

the presence and type of insurance, which statistically significantly predicts self-rated health at the $p < 0.001$ level. In addition to income directly effecting self-rated health, all models also demonstrate that income indirectly effects self-rated health via insurance status. All paths are statistically significantly associated, but the standardized regression coefficient representing the path between income and self-rated health coefficients decrease when any insurance category is added to the models.

Research Question Six

Research question six examined the association between history of health insurance and self-rated health, hypothesizing that longer periods of uninsurance are related to lower self-rated health. This hypothesis was supported as uninsurance duration was statistically significantly associated with self-rated health, and the association as negative indicating that as duration of time uninsured increases, self-rated health decreases.

CHAPTER FIVE: CONCLUSION

Chapter five concludes this study with a summary of the findings, new contributions to the literature, and policy implications of the findings. Chapter five also reviews the limitations of this study before making recommendations for future studies on the subject.

Summary of Findings

The purpose of this study was to explore the relationships between income, health insurance, and health. More precisely, this research investigated whether earned income is related to insurance status on the one hand and self-rated health on the other; whether the association between income and self-rated health is indirectly affected by the presence of private health insurance; and whether there are differences in self-rated health between the privately insured, the publicly insured, and the uninsured. This study explored these relationships by hypothesizing that: people who have any insurance have higher self-rated health than those who do not have insurance; people who have private insurance or Medicare have better self-rated health than people who have Medicaid or are uninsured; higher income is associated with having private insurance and higher self-rated health; lower income predicts Medicaid, uninsurance, and longer durations of uninsurance; and longer periods of uninsurance are related to lower self-rated health

As hypothesized, higher income contributed to having health insurance, and in particular private insurance. Among all included predictor variables, higher income and private insurance were predictors of higher self-rated health, and lower income and Medicaid were predictors of lower self-rated health. Age and education, two control variables, exerted an influence on self-rated health: older respondents had lower self-rated health, and more educated respondents had higher self-rated health. These findings are intuitive and consistent with the literature on

sociodemographic variables and health (Cifaldi et al., 2016; Cutler & Lleras-Muney, 2006; Hansen, Slagsvold, & Moum, 2008; Reschovsky, Kemper, & Tu, 2000; Winkleby, Jatulis, Frank, & Fortmann, 1992). Additionally, the presence of insurance, having private insurance, and the length of time uninsured indirectly affects the relationship between income and self-rated health. Income was statistically significantly related to self-rated health in a direct relationship, but it was also significantly related to self-rated health indirectly through insurance.

Higher income was statistically significantly associated with being employed, higher levels of formal education, and being male. Age was a statistically significant predictor of Medicare and represented the direct path to Medicare with the highest standardized coefficient. Income statistically significantly predicted of Medicaid and represented the direct path to Medicaid with the highest standardized coefficient. Given that Medicare eligibility is age-dependent and Medicaid eligibility is income-dependent, these relationships were as expected. Race, ethnicity, geographic region of primary residence, and U.S. birth had relatively low standardized coefficients in comparison to the other direct paths; however, all relationships were statistically significantly related to all health insurance categories, income, and self-rated health. Consistent with the literature, educational attainment, employment, marriage, age, and sex/gender consistently and statistically significantly predicted self-rated health (Cifaldi et al., 2016; Cutler & Lleras-Muney, 2006; Hansen, Slagsvold, & Moum, 2008; Reschovsky, Kemper, & Tu, 2000; Winkleby, Jatulis, Frank, & Fortmann, 1992). Results from this study also affirms the public health assertion that economic status is the single most important social determinant of health, regardless of race or ethnicity (Braveman & Gottlieb, 2014; Stringhini et al., 2010).

New Contributions to the Literature

While some studies show that having health insurance is associated with better health outcomes and other studies show that socioeconomic status is associated with health outcomes, few studies have explored these relationships as interrelated (Dreier, Mollenkopf, & Swanstrom, 2013; Subramanian & Kawachi, 2004). This study demonstrated the interrelatedness of health insurance and income. While this study could not determine the causal mechanisms between health insurance, income, and self-rated health, it added to the body of knowledge examining whether health insurance has a direct effect of health, and/or is an indirect effect between income and health.

Discussed further in the next section, this study demonstrated that income and health insurance likely work in tandem to produce self-rated health, and likely a myriad of other health outcomes. As a result, future research and policy should explore relationships of *both* insurance *and* income rather than either/or. Health is undoubtedly a complex social, behavioral, and biological construct; thus, it is essential to identify the mechanisms that interact with income and health insurance -and how exactly income and health insurance work together- to determine appropriate health policies that could increase quality of life and possibly reduce mortality.

A unique aspect of this study is the finding that public insurance categories (Medicare and Medicaid) are not similar enough to be combined into one research category. This study affirms that the health of persons with Medicaid is more similar to persons who are uninsured, and the health of persons with private insurance is more similar to those with Medicare. The uninsured, those on Medicaid, and those with lower income have the lowest ranking of self-rated health on average, and these groups experience greater barriers to receiving health services than their privately insured, Medicare, and higher income counterparts (Alghman, Schneider, &

Castillo, 2016; Chen et al., 2017; Cifaldi et al., 2016; Fowler et al., 2010; Kariisa & Seiber, 2015).

Policy Implications Based on New Findings

Based on the aforementioned findings, giving the poor and the sick Medicaid may mean they have insurance, but it does not mean that they have better health. In the near future as the U.S. Congress reconvenes and considers whether to amend or repeal and replace the Patient Protection and Affordable Care Act, it is important that they consider the socioeconomic implications of coverage with no access. Legislators must also consider incentivizing providers to accept Medicaid, requiring states to expand Medicaid, further exploring health equity indices in evaluating Medicaid and Medicare, and reducing barriers to accessing other social programs that improve economic self-sufficiency. Furthermore, the political argument for "Medicare for all" does indeed warrant further investigation, as, even though Medicare patients are older than the average insured person and are often on a fixed income, in this study, Medicare patients report similar self-rated health to those who are privately insured.

As a determinant of health that both directly and indirectly impacts health, income should also be assessed for inclusion in patient risk scores in population health management systems. Based on the relationship between self-rated health and income, the likelihood of experiencing a clinical event that reduces health could be predicated on income. As a result, as hospital systems are developing their population health models, healthcare payers and providers who stratify patient risk as an impetus for the distribution of clinical resources should consider income as their socioeconomic stratification category.

As a condition for maintaining their tax-exempt status, not-for-profit hospitals are mandated by the Patient Protection and Affordable Care Act to conduct Community Health

Needs Assessments (CHNAs) and to produce implementation plans to address some identified community needs. As part of the implementation planning process, results from this study provide some support for prioritizing patient interventions that have a direct influence on socioeconomic constraints. The merit of tax-exemption has been called into question by legislators as it has become increasingly difficult to distinguish between for-profit and not-for-profit hospital systems both financially and by the proportion of charity care they complete (Burke et al., 2014; Colombo, 2005; Ferdinand, Epane, & Menachemi, 2014; Rubin, Sing, & Jacobson, 2013). Implementation plans that are meaningful, impactful, and demonstrate improved population health outcomes could be a basic requirement to help the public and legislators determine which hospitals are appropriately utilizing the tax relief and which are not.

Though tax write-offs for treating Medicaid and uninsured patients is considered one type of community benefit, as the burden of proof for tax-exemption increases, hospitals may also justify tax-exemption through other economic community investments and activities related to their needs assessments (Somerville, 2012, p. 3). The PPACA may also be amended to strengthen the tax-exempt hospital requirements. At present, the Patient Protection and Affordable Care Act neither incentivizes tax-exempt hospitals to include socioeconomic considerations in their implementation plans, nor does it penalize hospitals who do not include socioeconomic considerations. As health insurance indirectly effects the relationship between income and self-rated health, legislators should consider including additional penalties or incentives in the CHNA section of the PPACA for socioeconomic considerations.

Stated elsewhere in this study, the distribution of resources in the United Stated often limits the effectiveness of health insurance and other social programs that do not address the larger social conditions (Starfield & Birn, 2007; Zaidenweber, 2011). Increasing health insurance

coverage without addressing the larger context of the patient greatly underestimates the limitations of health insurance and ignores potential solutions to the looming healthcare crisis in the United States. By the same token, restraining access to health insurance without addressing the material conditions of life may have even more severe consequences for the American people.

This also means that, when studying health outcomes, collapsing Medicare and Medicaid patients into one single "public insurance" category in research is inaccurate and loses important nuances between both groups. The observed differences in health between Medicare and Medicaid patients is likely due to the fundamental socioeconomic differences between Medicare and Medicaid patients. Families with low-income, pregnant women who are uninsured, persons with a qualifying disability, and some children are the eligible Medicaid population. These persons would likely be uninsured if Medicaid did not exist. By the same token, the preponderance of Medicare recipients are persons over 65, many of whom are retired and have accumulated wealth over their lifetime. Additionally, even for the Medicare recipients who do not have many physical resources, the social stigma of poverty that often accompanies Medicaid reduces access to care (Allen, Wright, Harding, & Broffman, 2014). This reasoning follows the finding that socioeconomic status may play a substantial role in determining health and highlights the significance of economic policy as a consideration for health reform.

Limitations & Recommendations

The primary constraint of this study was the availability of data. Several large, national data sets contain health data, and many contain social and economic variables, and health insurance records. Very few national datasets contain all of the above. Complete datasets on the subject that could be considered a representative sample of the United States also proved difficult

to find. Secondary datasets also tend to be incomplete. Data on a more granular level were also unavailable to determine the influence of concentrated poverty on the availability of resources and self-rated health.

Some specific limitations of the measures due to the availability of data include the following: in the dataset, whether geographic region of primary residence is considered "urban or rural" is restricted for public use and was not include in this study; the National Health Interview Survey (NHIS) does not contain information on racial concentration or neighborhood level data, and social participation also could not be gleaned from this dataset; the dataset also did not include a correlate of "underinsurance" which concerns people who have insurance but not enough to cover their basic medical needs. The NHIS also does not report income as a continuous variable; rather, income is reported in categories, and stops at "$75,000 and above." This was a major limitation of the dataset, considering the main independent variable was earned income. Other datasets that include health insurance information and specific health outcomes were evaluated, but they did not include information on as broad a range of socioeconomic and sociodemographic factors; as a result, despite these limitations, the NHIS was the most comprehensive and complete dataset equipped to evaluate the hypotheses of this study.

Another constraint of this study was the inability (due to lack of measures) to consider physical health outcomes and healthcare service utilization to corroborate the relationship between study variables and self-rated health, and what it means for health behaviors and outcomes. Though self-rated health is a significant predictor of physical health status, it is not possible to determine the magnitude of the relationship for respondents in this study.

The issue of causality is another limitation. As a retrospective, secondary data analysis there is no opportunity to truly determine causality. While the goal of all social science is to

determine the causes and consequences of complex phenomena, causality is rarely within the realm of possibility for social studies, particularly those that are retrospective (Chambliss & Schutt, 2006, p. 106). Causality requires three basic assumptions: (1) there must be an empirical association between the independent and dependent variables; (2) the independent variables must occur before the dependent variables; and (3) the observed relationships must not be due to a spurious association (another variable outside of the independent and dependent ones) (Chambliss & Schutt, 2006, p. 108). In a retrospective secondary data analysis, only assumption one can be known with certainty. While this study tested the theory that insurance status affects self-rated health, the inverse could also be true.

Additionally, while some of the variance in self-rated health is due to the included variables, we do not know if the variables that were not included in this study could explain away any of the observed associations. On the causal pathway between income and self-rated health are a myriad of mediating and/or moderating variables that predict the relationship. This study, however, did not have the variables available to consider all of these possible factors. Model complexity and explanatory power was thus limited by the variables included. This study was also unable to produce a qualitative validation of respondent self-rated health. While quantitative data describe outcomes, they are powerless to explain the causal mechanisms that are often best explored qualitatively. For example, one of the theoretical mechanisms used to inform this study considers social support and social capital as constructs related to income that directly produce health. Persons with limited financial resources are less likely to have social support and low social support has been qualitatively linked to health (Blaxter, 1990). However, this study was unable to consider these kinds of constructs.

Though the National Health Interview Survey is a national representative sample, generalizability may be constrained due to selection bias. The cases that were included in the final study could be statistically significantly different than those who did not respond to the survey. The sample also did not include an adequate sample of those who are dually eligible for Medicare and Medicaid; thus, those beneficiaries were not included in this study. Additionally, this study only took into account cases that included enough responses to adequately impute missing variables without causing conceptual problems. It is recommended that the study be conducted again utilizing a different year of data if these data categories have better representation -for example, the 2017 data were released shortly after this study was completed.

There were also limitations of the statistical model used in the study. In comparison to a full structural equation model that includes latent constructs, a path analysis of observed variables has a more restrictive set of parameters and does not account for measurement error. Also, the model also did not include all of the potential relationships that could exist between variables in the study. For example, there is likely a reciprocal relationship between income and self-rated health in than income may predict health, but health may also predict income. This reciprocal relationship was not included in this study as the theoretical foundation of the health to income path is relatively unstable.

Nonetheless, the use of a path analysis with its ability to compare multiple paths was an advantage over regression and other similar, less multivariate analyses. A path analysis was ultimately chosen as the variables in the dataset are observed, and there was not an adequate amount of complete, continuous, predictor variables in the dataset to create additional and important latent constructs. For example, “health” is a complex construct that is predicated on many factors -but these factors are not contained in the dataset; as a result, rather than treating

health as latent, the more simple observed variable "self-rated health" was included as an observed variable. Thus, while path models have limitations, the technique was still the most appropriate for the hypotheses in the study and the NHIS data.

Future Research

Future research should include longitudinal analyses of the data to determine how the relationship between study variables may change (or not change) over time. It would also be helpful in developing more specific public policies if studies took into account the geographic region of primary residence and included concentrated poverty as a determinant of health to determine any social and economic differences between being poor and living around poverty.

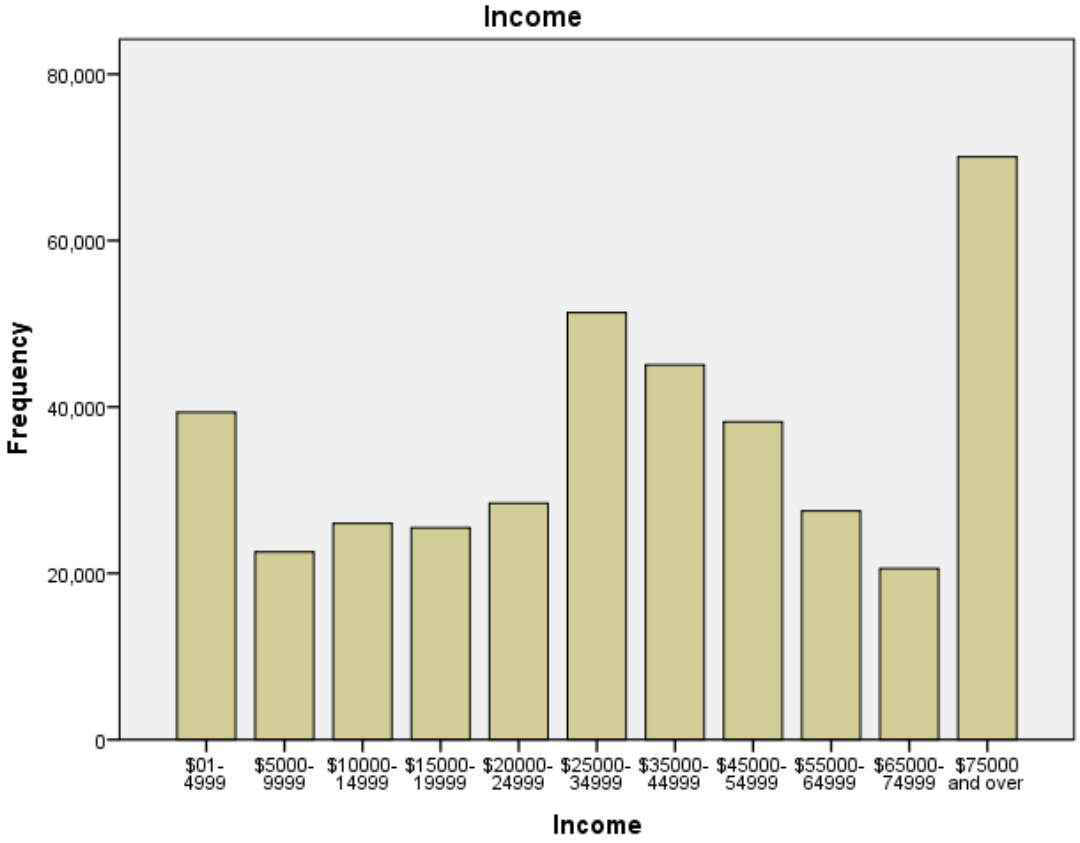
Additional studies utilizing different datasets, other outcomes (such as mental health status), and qualitative follow-ups are also recommended. For example, the NHIS does include measures of out-of-pocket healthcare expenses and a variable on the ability to pay for needed medical bills. These constructs may be combined to produce an additional variable: underinsurance. While the theoretical models included in this study do not include a discussion of underinsurance, future studies predicated on other theoretical mechanisms could include this construct as a predictor of self-rated health. The Commonwealth Fund estimated that 23% of the adults under 65 who had health insurance in 2014 had such high out-of-pocket medical expenses and deductibles relative to their income, that they may as well have been uninsured (Collins, Rasmussen, Beutel, & Doty, 2015). While persons who were likely "underinsured" were included in this study in the "insured" category, analyzing their self-rated health based on their ability to pay for their healthcare expenses could provide additional insight into the complex interaction between income and health insurance.

Considering the weakness of the theoretical and literature-established relationship on the path from insurance back to income, this study did not hypothesize a bi-directional path between income and insurance. However, there is likely a reciprocal relationship between insurance and income, thus, additional studies should consider this model to further contribute to the literature on the subject. Future studies could also examine the influence of socioeconomic status on healthcare utilization and the effect of income and insurance status on specific chronic and infectious conditions.

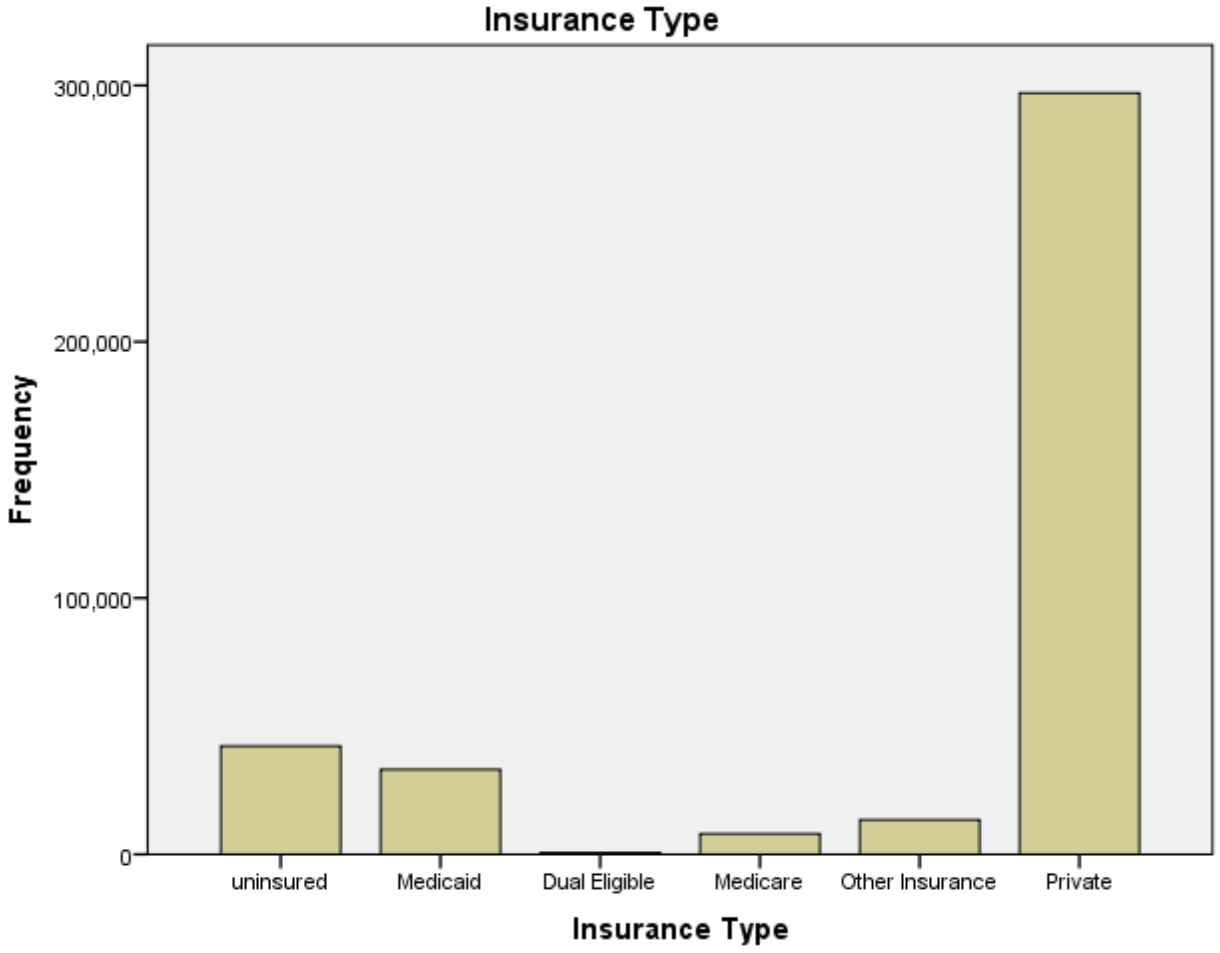
Ultimately, Maslow's Hierarchy of Needs is applicable and relevant to the discussion of self-rated health. It should be desirous of any democratic society that their citizens move progressively closer to self-actualization, so they may contribute to society. If basic needs are not met, regardless of how much insurance the government or private employers make available, this will not naturally yield productive members of society. Thus, the challenge of legislatively connecting health insurance to socioeconomic status is one central to democracy. The Theory of Relative Deprivation, the Inverse Equity Hypothesis, and the Lifecycle Utility Maximization mechanism described in chapter 2 of this dissertation indicate the need for future studies that examine the relationship between income, health, and society.

APPENDIX A: FREQUENCY TABLES AND BAR CHARTS

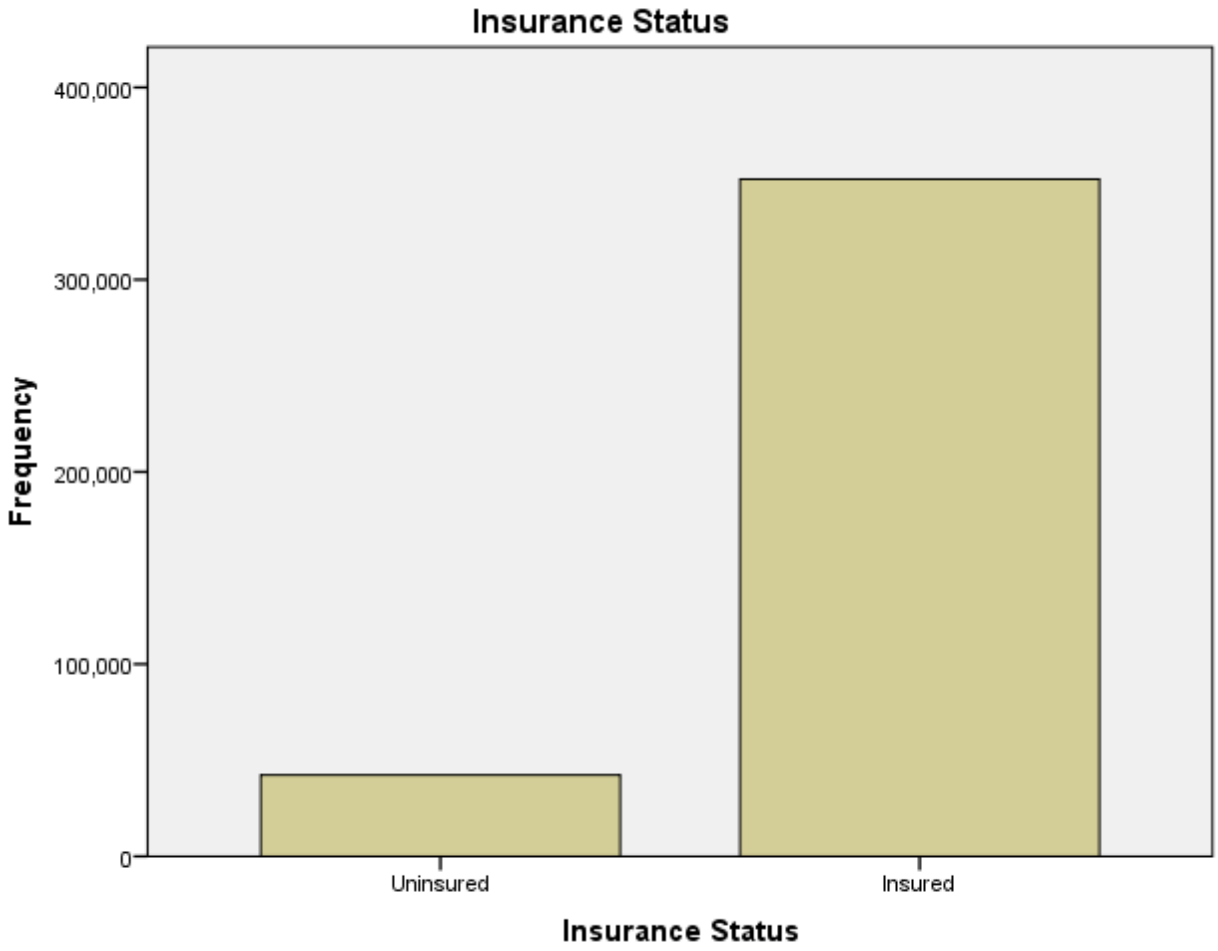
Income			
		Frequency	Percent
Valid	$01-4999	39350	10.0
	$5000-9999	22570	5.7
	$10000-14999	26010	6.6
	$15000-19999	25460	6.5
	$20000-24999	28430	7.2
	$25000-34999	51330	13.0
	$35000-44999	45050	11.4
	$45000-54999	38200	9.7
	$55000-64999	27490	7.0
	$65000-74999	20560	5.2
	$75000 and over	70050	17.8
	Total	394500	100.0



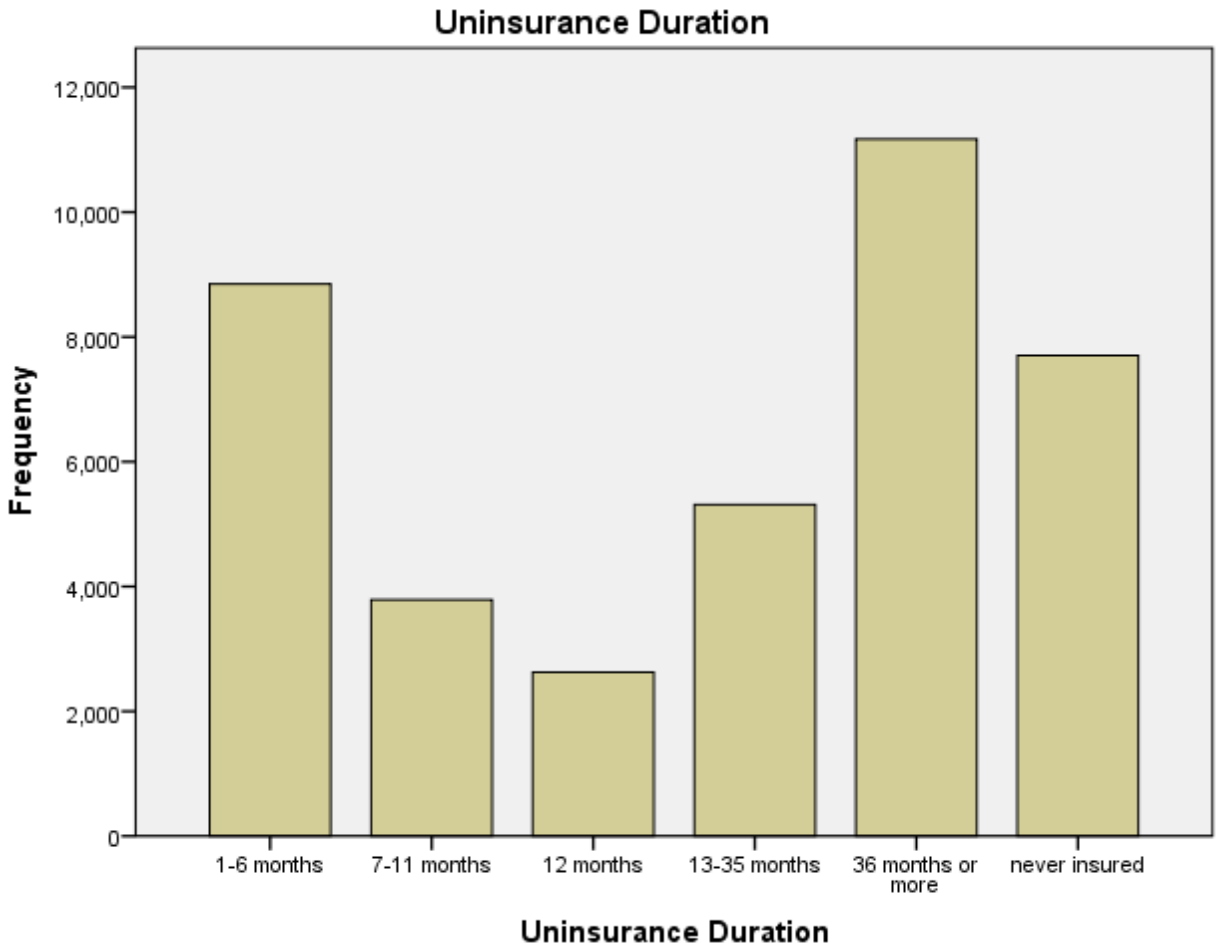
Insurance Type			
		Frequency	Percent
Valid	uninsured	42230	10.7
	Medicaid	33100	8.4
	Dual Eligible	590	.1
	Medicare	8020	2.0
	Other Insurance	13480	3.4
	Private	297080	75.3
	Total	394500	100.0



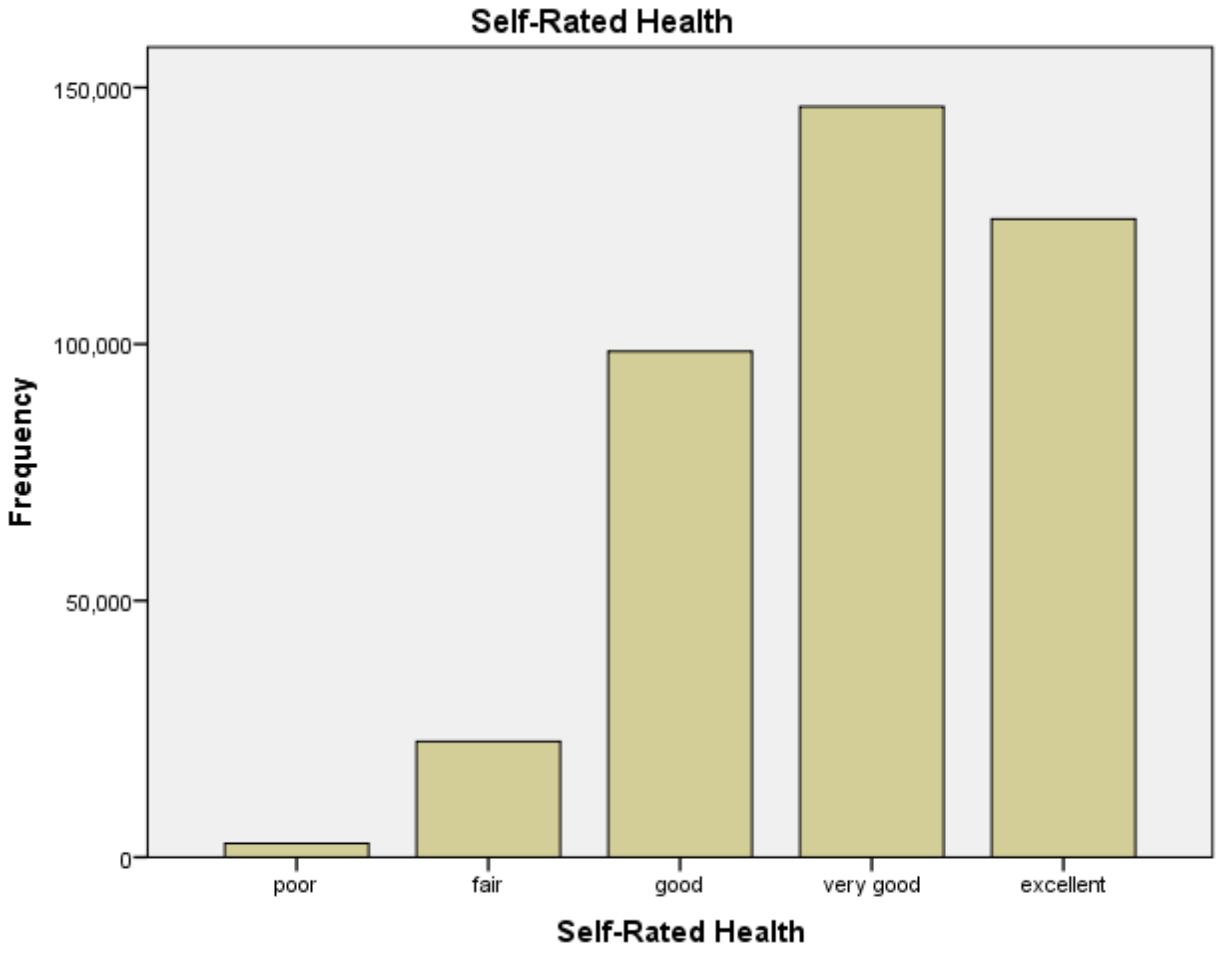
Insurance Status			
		Frequency	Percent
Valid	Uninsured	42230	10.7
	Insured	352270	89.3
	Total	394500	100.0



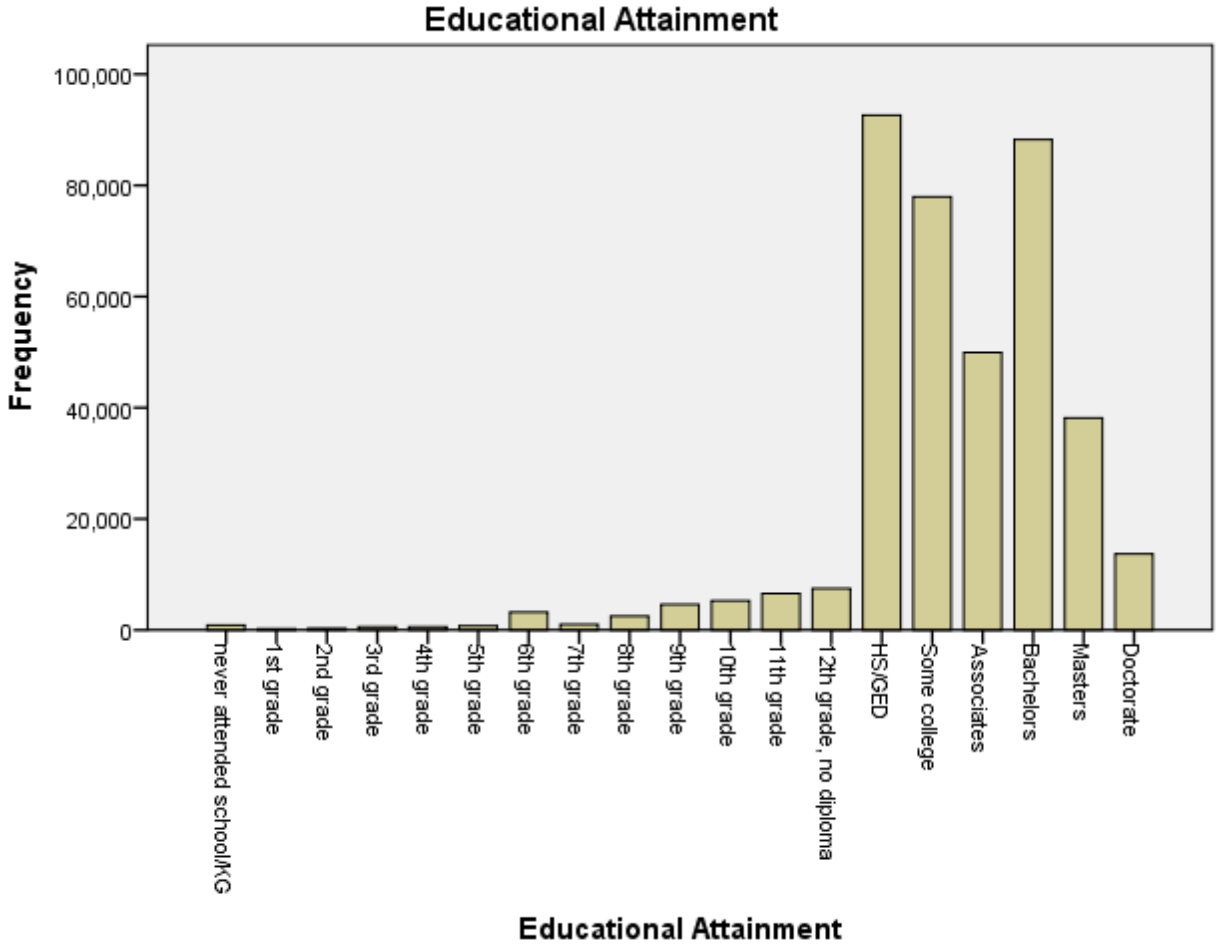
Uninsurance Duration			
		Frequency	Percent
Valid	1-6 months	8847	2.2
	7-11 months	3787	1.0
	12 months	2626	.7
	13-35 months	5312	1.3
	36 months or more	11171	2.8
	never insured	7701	2.0
	Total	39444	10.0
Missing	Currently insured	353696	89.7
	System	1360	.3
	Total	355056	90.0
Total		394500	100.0



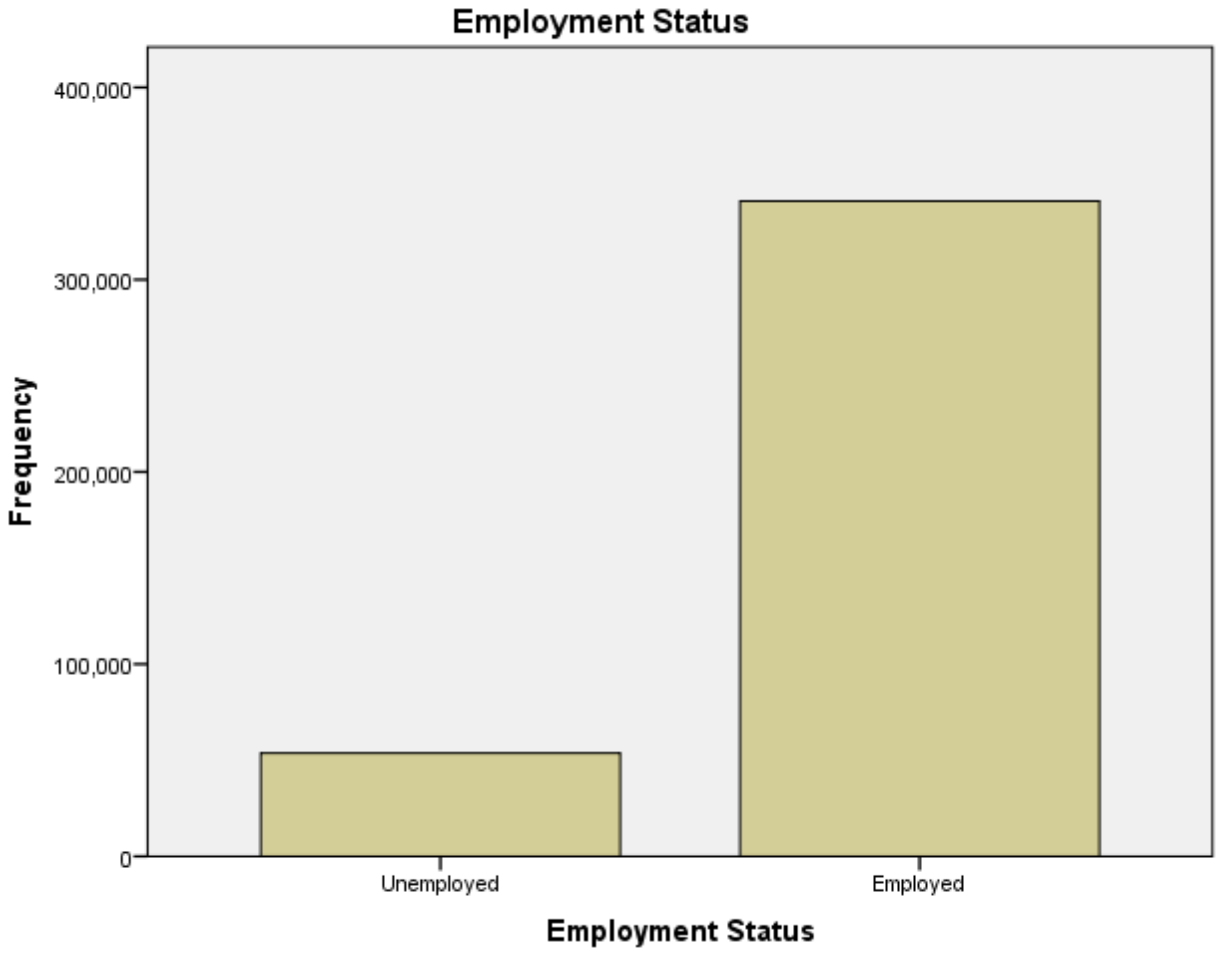
Self-Rated Health			
		Frequency	Percent
Valid	poor	2711	.7
	fair	22540	5.7
	good	98579	25.0
	very good	146299	37.1
	excellent	124362	31.5
	Total	394491	100.0
Missing	System	9	.0
Total		394500	100.0



Educational Attainment			
		Frequency	Percent
Valid	never attended school/KG	870	.2
	1st grade	220	.1
	2nd grade	280	.1
	3rd grade	550	.1
	4th grade	560	.1
	5th grade	760	.2
	6th grade	3211	.8
	7th grade	1013	.3
	8th grade	2493	.6
	9th grade	4585	1.2
	10th grade	5286	1.3
	11th grade	6574	1.7
	12th grade, no diploma	7452	1.9
	HS/GED	92622	23.5
	Some college	77955	19.8
	Associates	49933	12.7
	Bachelors	88229	22.4
	Masters	38153	9.7
	Doctorate	13695	3.5
	Total	394441	100.0
Missing	System	59	.0
Total		394500	100.0

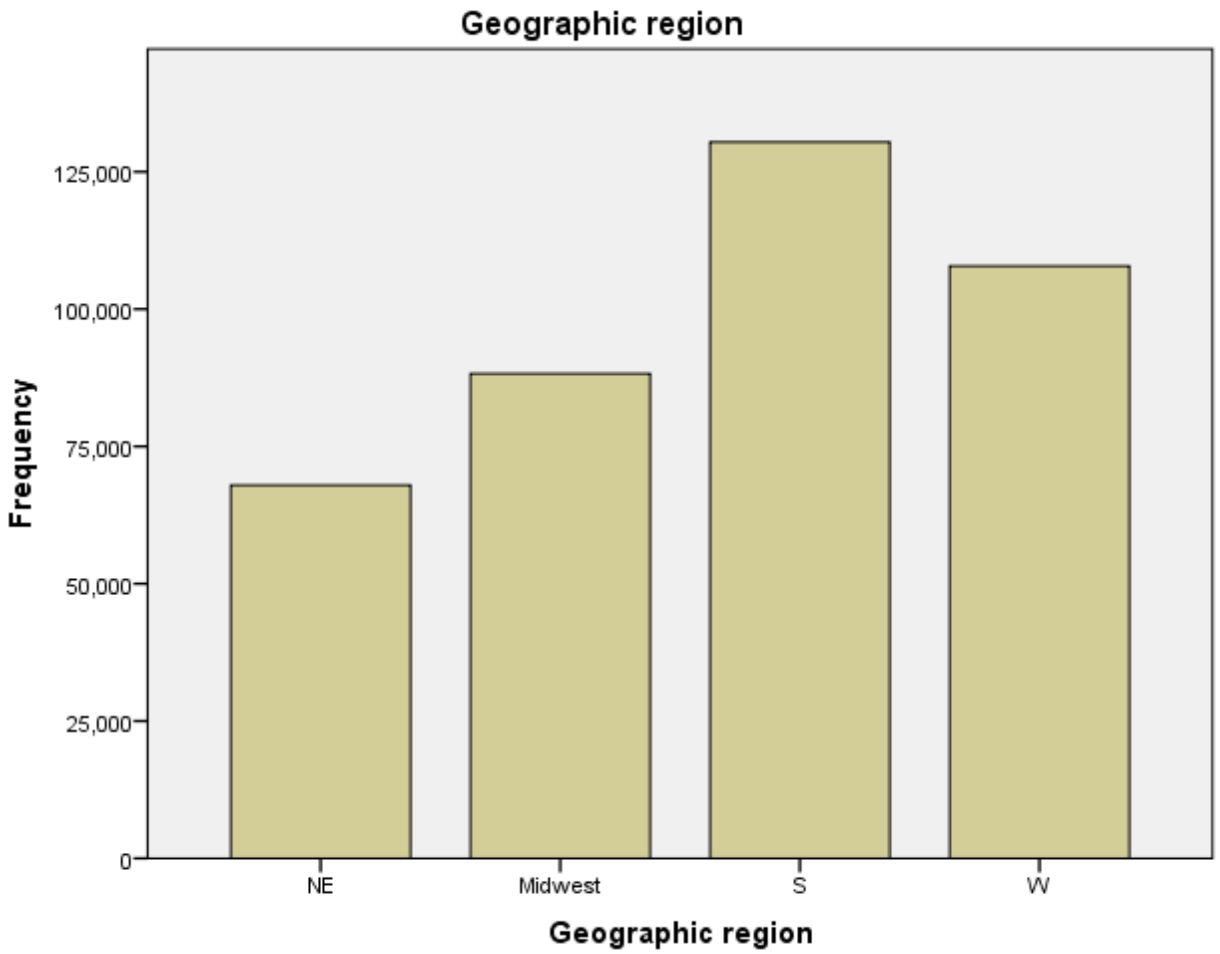

Educational Attainment
Frequency
100,000
80,000
60,000
40,000
20,000
0
Never attended school/KG
1st grade
2nd grade
3rd grade
4th grade
5th grade
6th grade
7th grade
8th grade
9th grade
10th grade
11th grade
12th grade, no diploma
HS/GED
Some college
Associates
Bachelors
Masters
Doctorate
Educational Attainment

Employment Status			
		Frequency	Percent
Valid	Unemployed	53631	13.6
	Employed	340869	86.4
	Total	394500	100.0



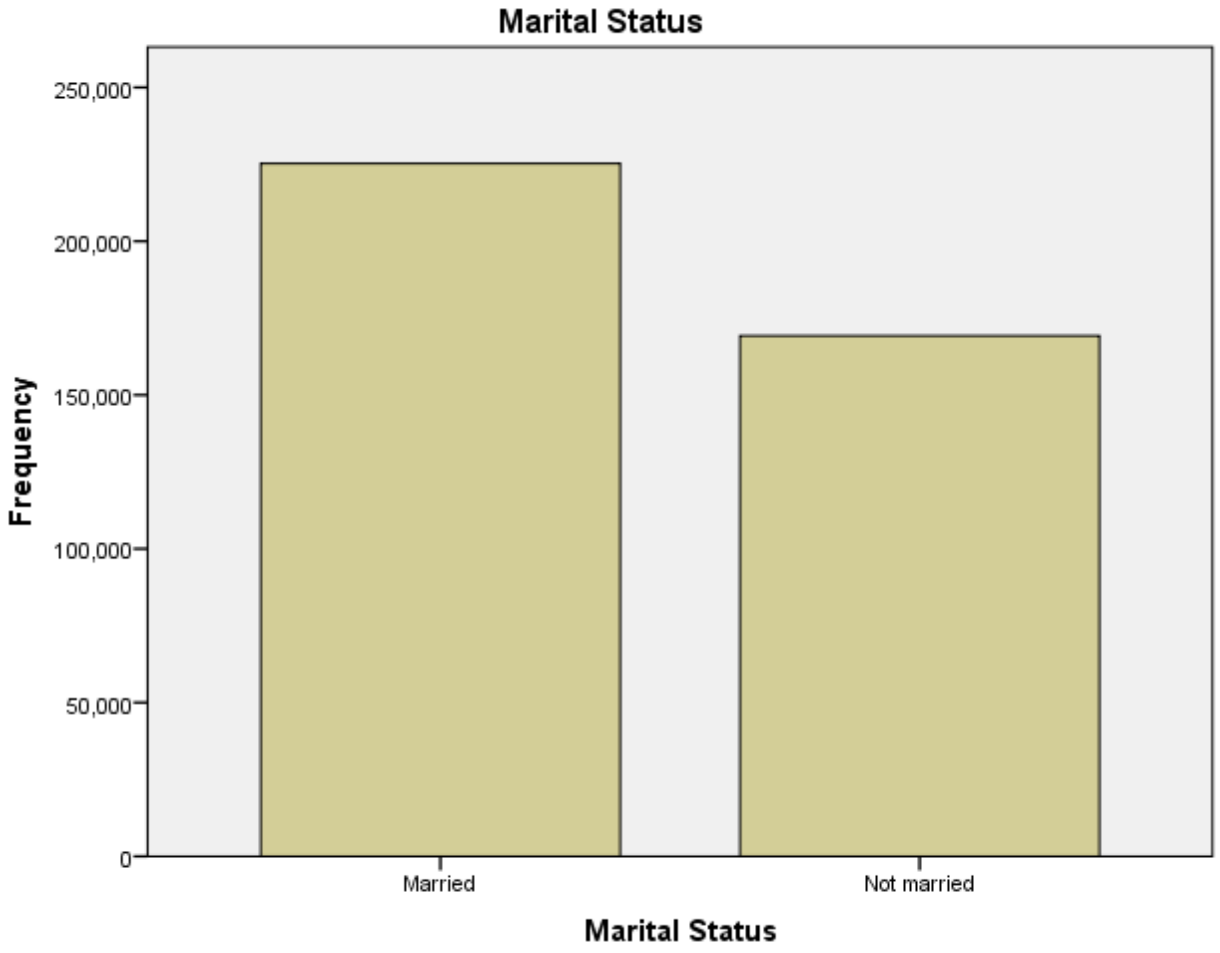
Geographic Region of Primary Residence

		Frequency	Percent
Valid	NE	67960	17.2
	Midwest	88270	22.4
	S	130420	33.1
	W	107850	27.3
	Total	394500	100.0



Marital Status

		Frequency	Percent
Valid	Married	225247	57.1
	Not married	169253	42.9
	Total	394500	100.0



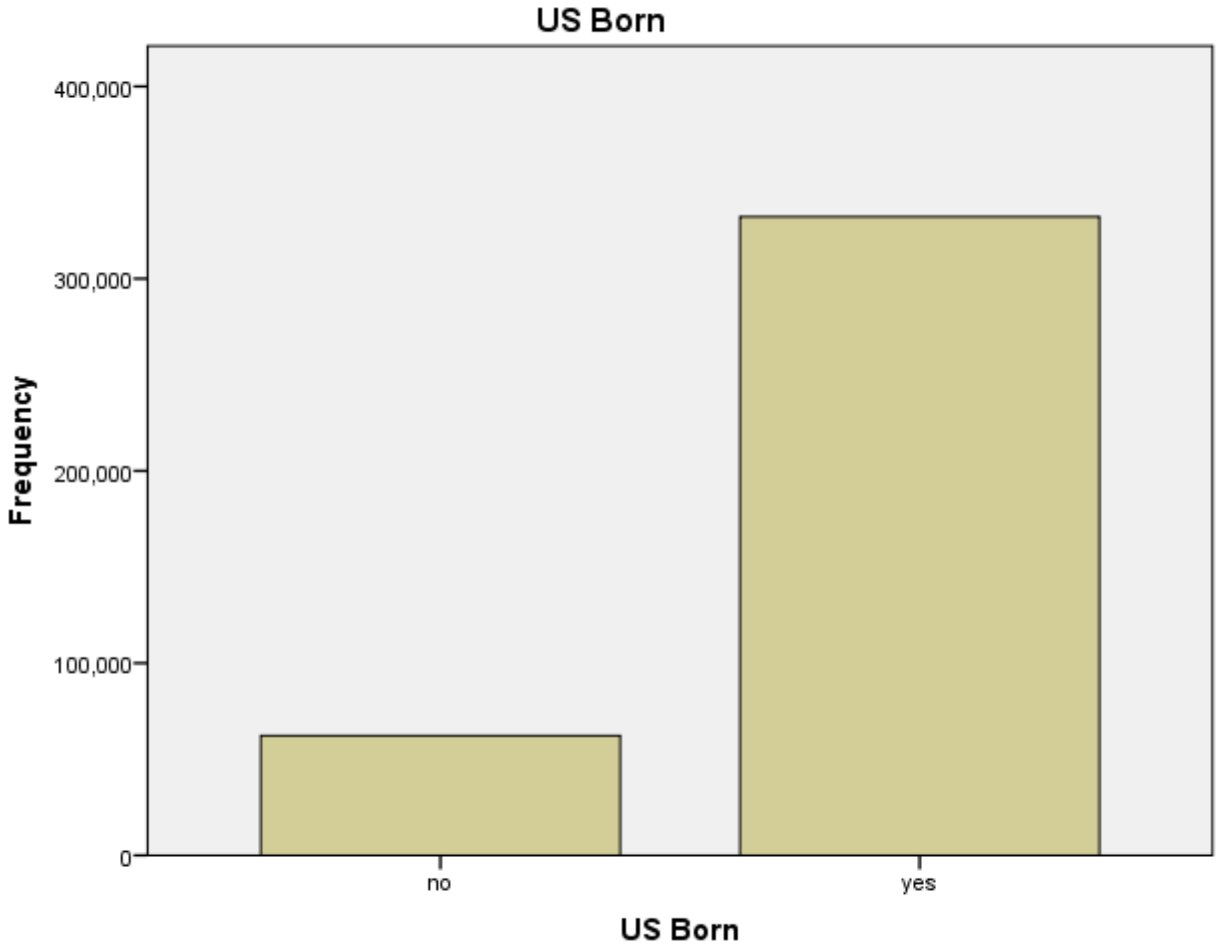
Age

		Frequency	Percent
Valid	18	5310	1.3
	19	6150	1.6
	20	6720	1.7
	21	6430	1.6
	22	6690	1.7
	23	7000	1.8
	24	7340	1.9
	25	8190	2.1
	26	7930	2.0
	27	8500	2.2
	28	8490	2.2
	29	8270	2.1
	30	8760	2.2
	31	8330	2.1
	32	8450	2.1
	33	9020	2.3
	34	9030	2.3
	35	8940	2.3
	36	8560	2.2
	37	8760	2.2
	38	8410	2.1
	39	8220	2.1
	40	8050	2.0
	41	7470	1.9
	42	7990	2.0
	43	8010	2.0
	44	8030	2.0
	45	9010	2.3
	46	8660	2.2
	47	8340	2.1
	48	7540	1.9
	49	7590	1.9
	50	8280	2.1
	51	8420	2.1
	52	8870	2.2
	53	8680	2.2
	54	8210	2.1
	55	8230	2.1
	56	8340	2.1

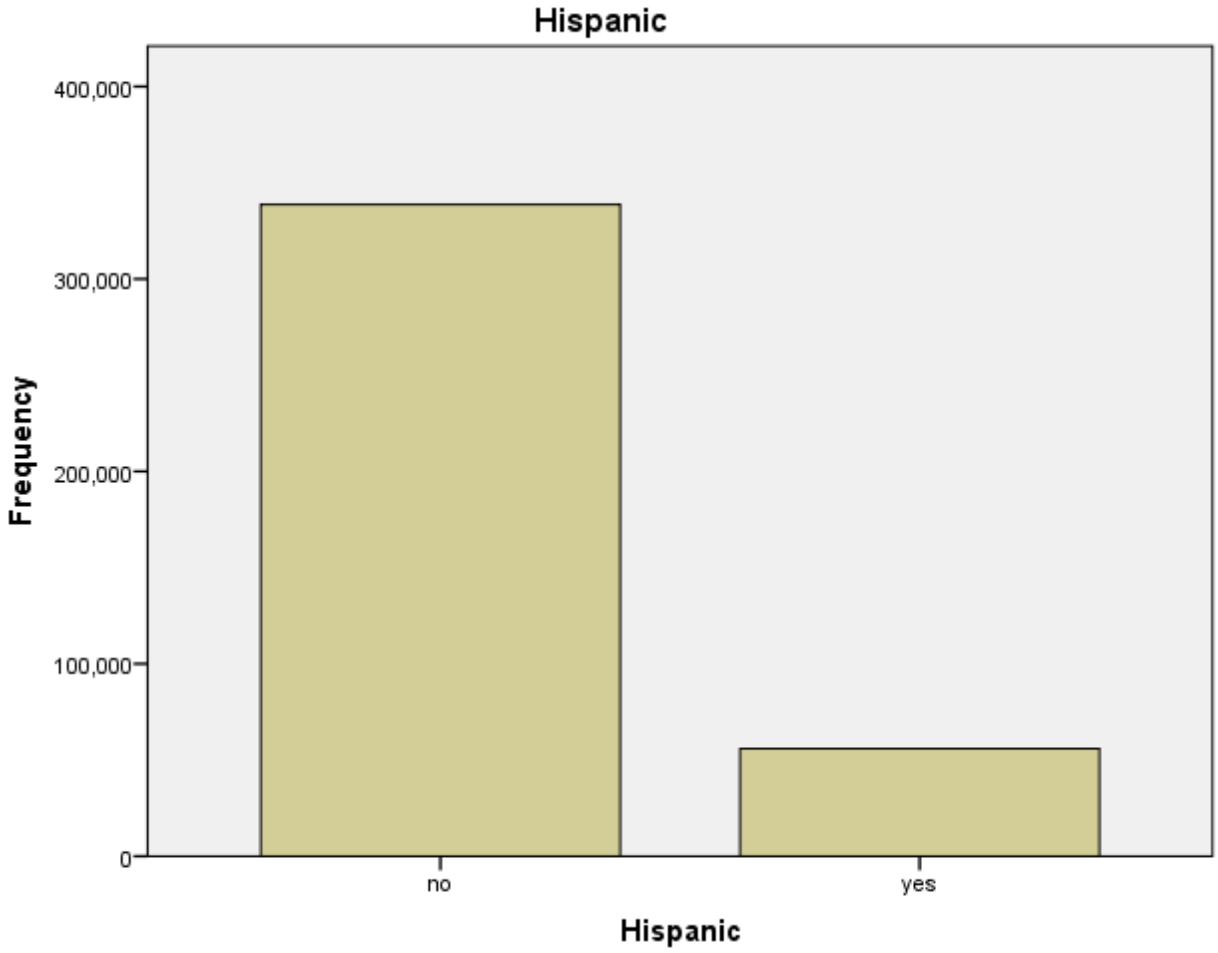
57	7780	2.0
58	7580	1.9
59	7620	1.9
60	7250	1.8
61	6570	1.7
62	6170	1.6
63	5560	1.4
64	5130	1.3
65	4550	1.2
66	3500	.9
67	3300	.8
68	2960	.8
69	2760	.7
70	1830	.5
71	1280	.3
72	1380	.3
73	1280	.3
74	830	.2
75	960	.2
76	690	.2
77	560	.1
78	320	.1
79	300	.1
80	220	.1
81	180	.0
82	140	.0
83	160	.0
84	130	.0
85 or older	290	.1
Total	394500	100.0


Age
Frequency
10,000
8,000
6,000
4,000
2,000
0
18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80 82 84
Age

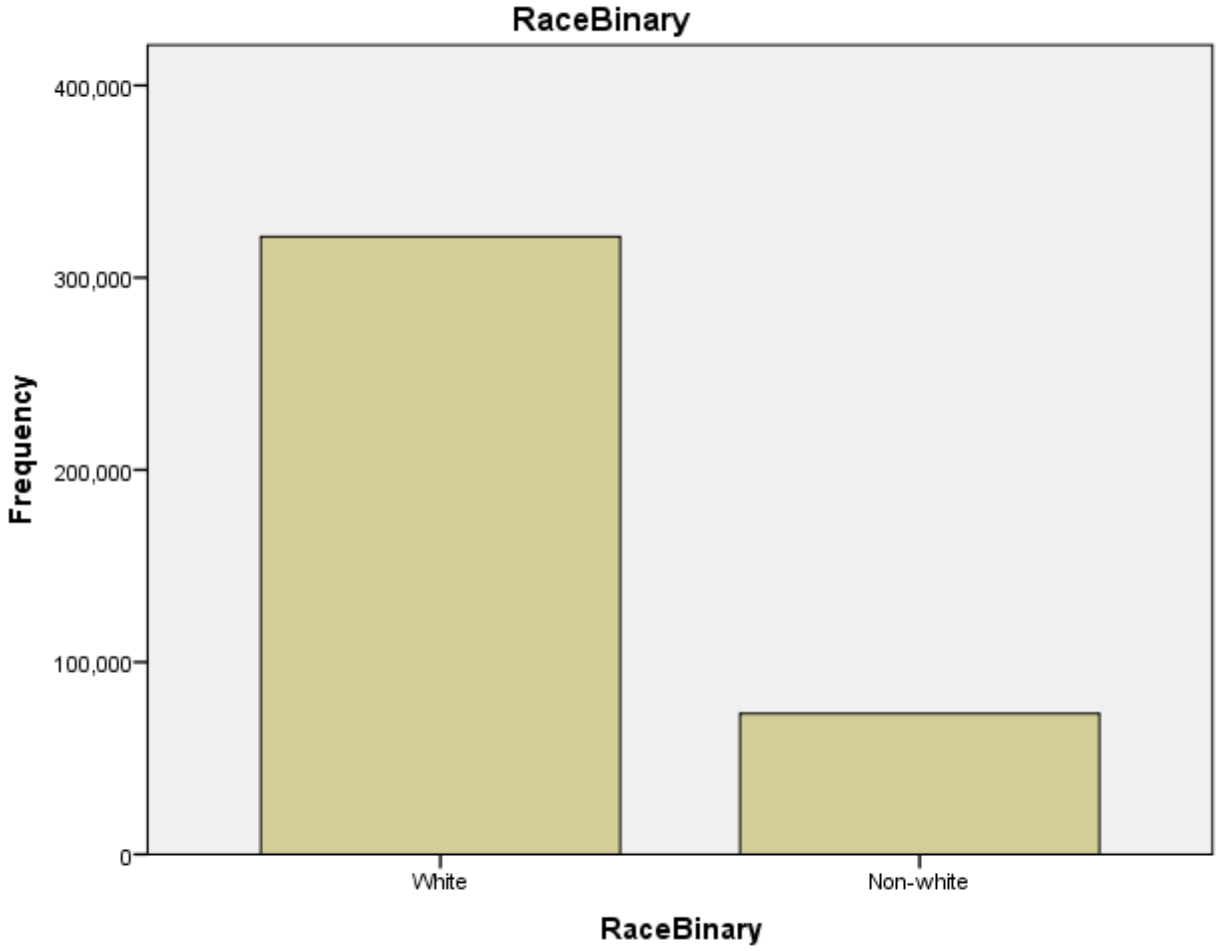
US Born			
		Frequency	Percent
Valid	no	62282	15.8
	yes	332213	84.2
	Total	394495	100.0
Missing	System	5	.0
Total		394500	100.0



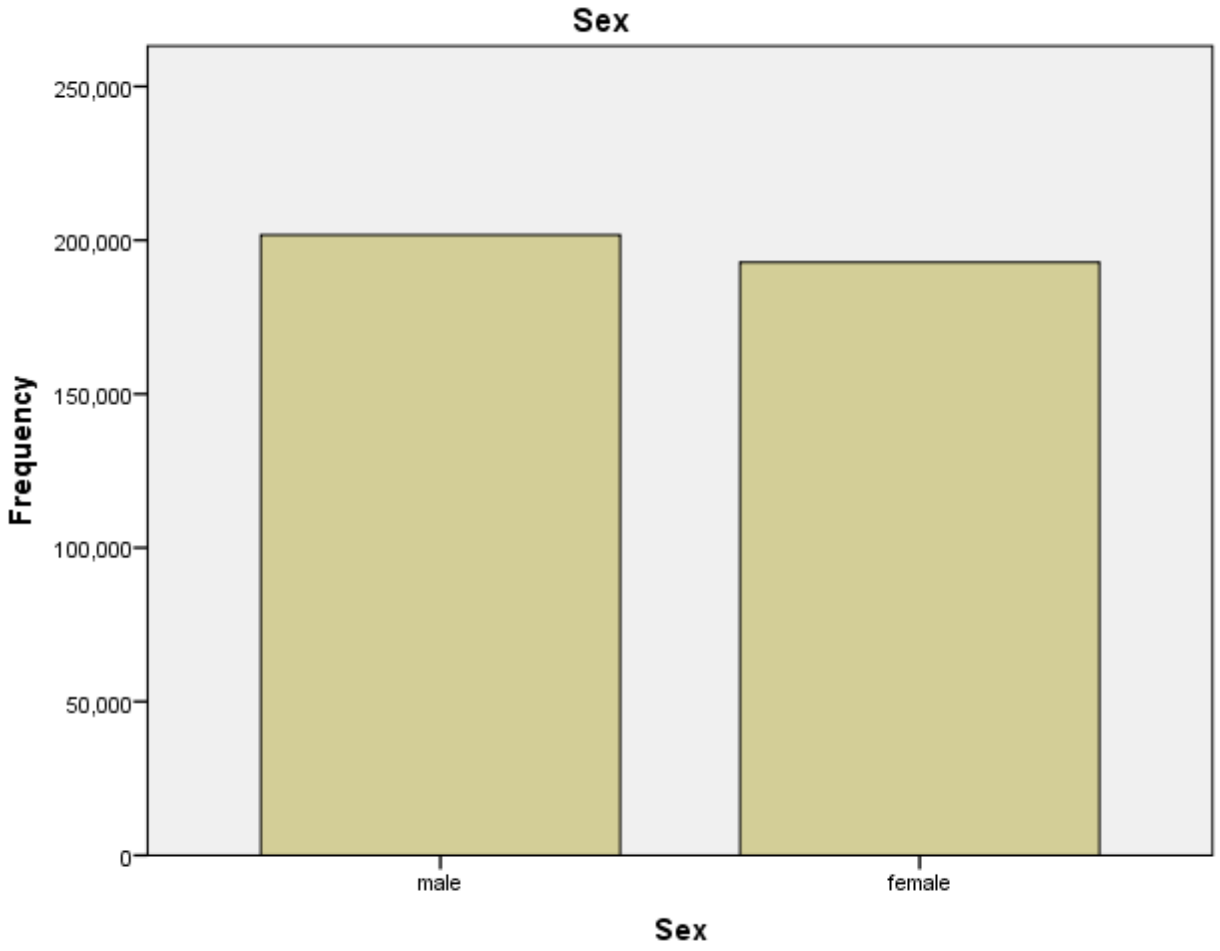
Hispanic			
		Frequency	Percent
Valid	no	338620	85.8
	yes	55880	14.2
	Total	394500	100.0



Race Binary			
		Frequency	Percent
Valid	White	321264	81.4
	Non-white	73236	18.6
	Total	394500	100.0



		Sex	
		Frequency	Percent
Valid	male	201720	51.1
	female	192780	48.9
	Total	394500	100.0



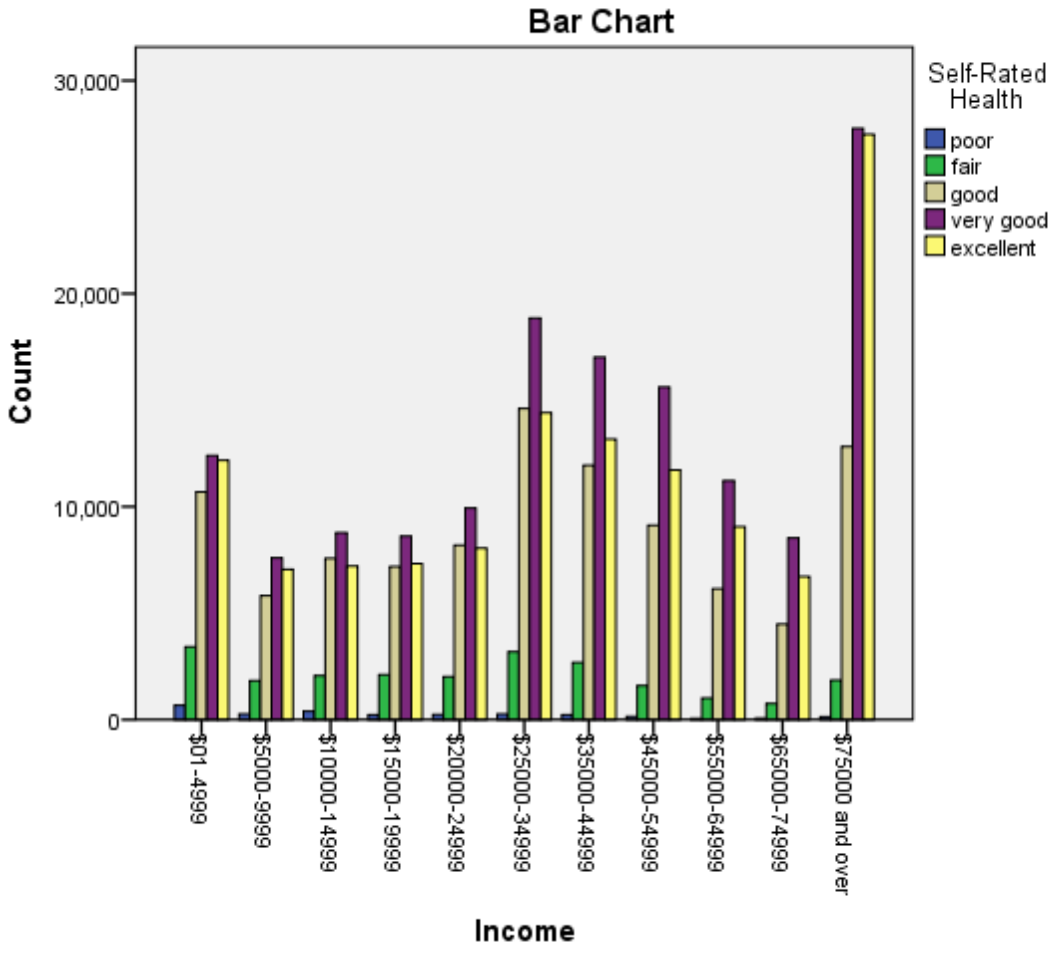
APPENDIX B: CROSS TABULATIONS

Income by Self-Rated Health

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	9790.722[a]	40	.000
Likelihood Ratio	9906.968	40	.000
Linear-by-Linear Association	5934.485	1	.000
N of Valid Cases	394491		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 141.29.

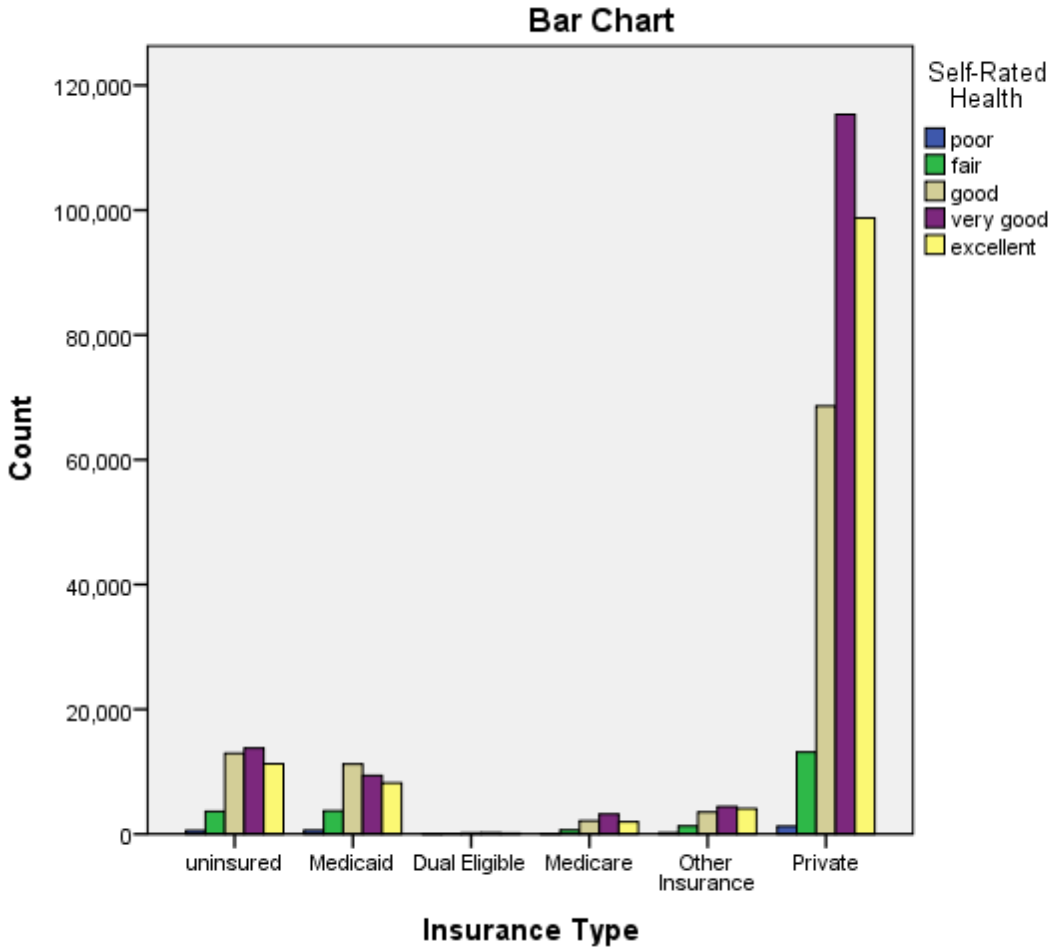


Insurance Type by Self-Rated Health

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	9979.197[a]	20	.000
Likelihood Ratio	9029.178	20	.000
Linear-by-Linear Association	6385.032	1	.000
N of Valid Cases	394491		

a. 1 cells (3.3%) have expected count less than 5. The minimum expected count is 4.05.

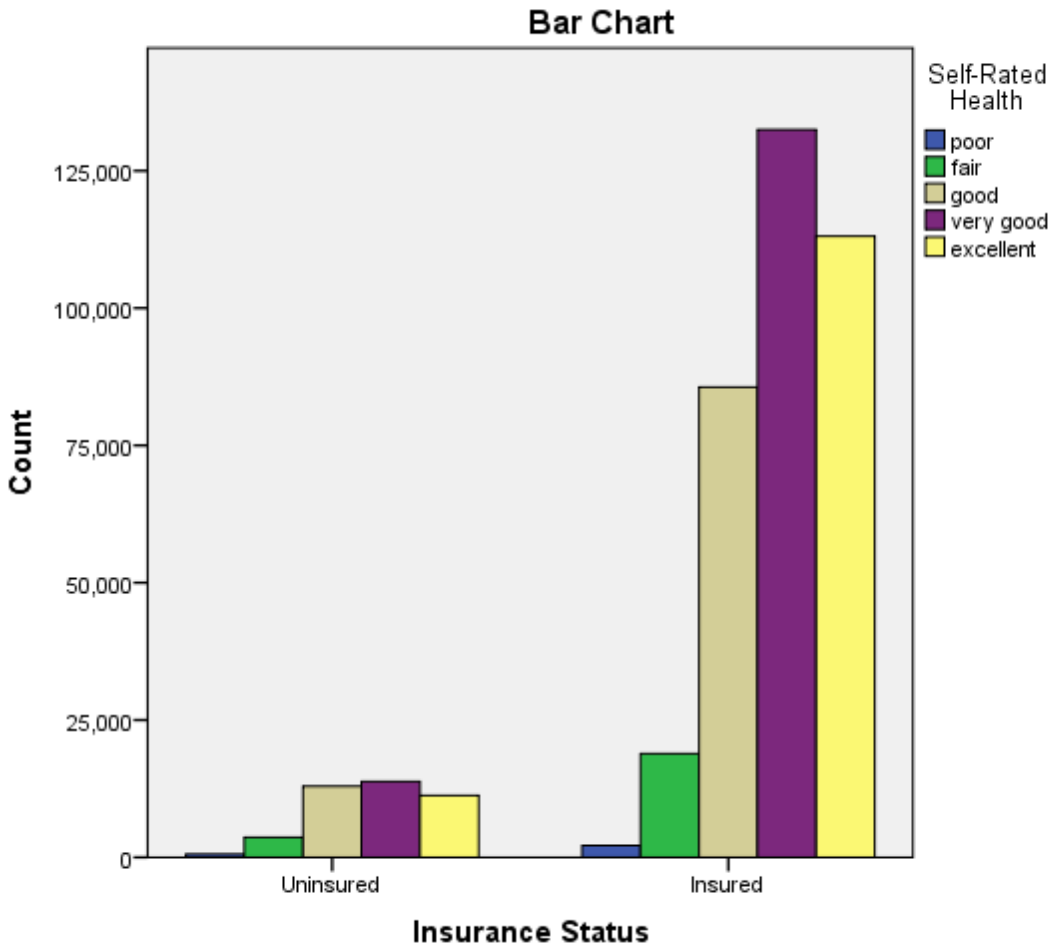


Insurance Status by Self-Rated Health

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	2224.563[a]	4	.000
Likelihood Ratio	2070.339	4	.000
Linear-by-Linear Association	1873.249	1	.000
N of Valid Cases	394491		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 290.20.

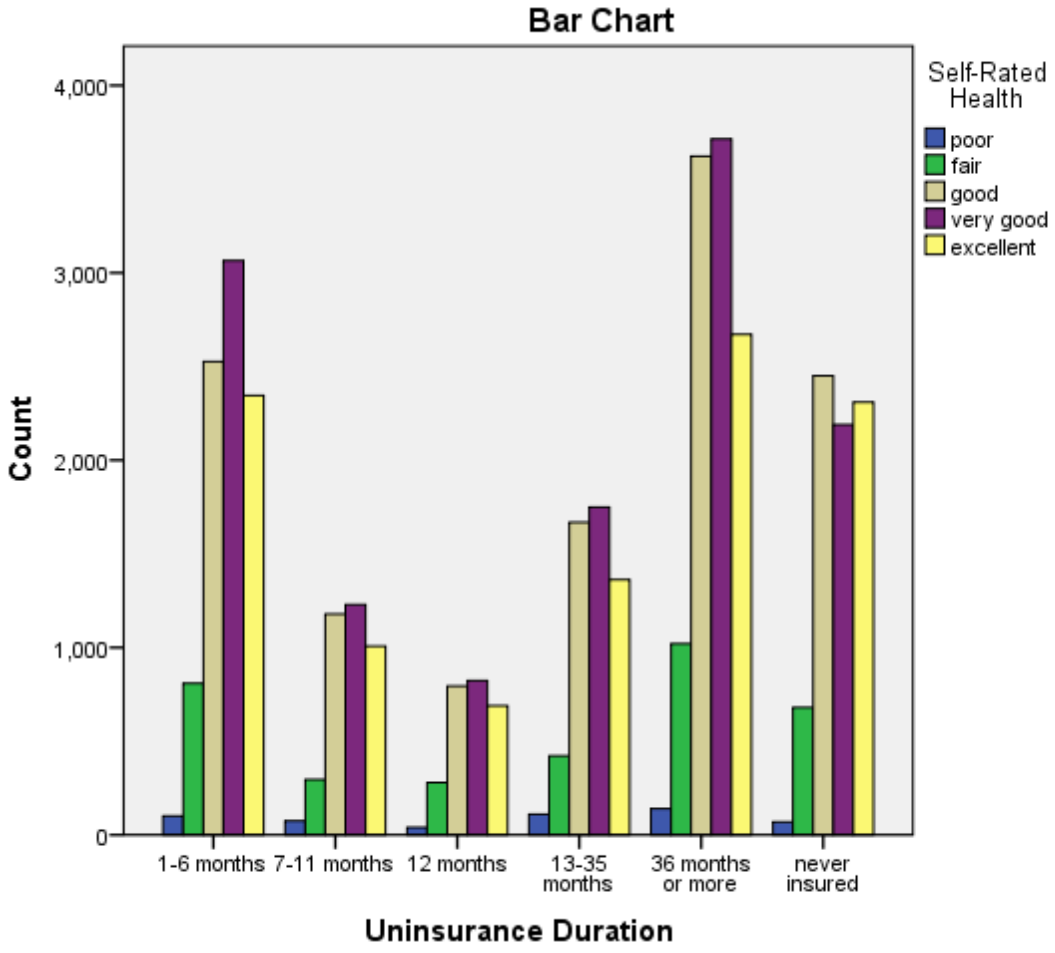


Uninsurance Duration by Self-Rated Health

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	213.900[a]	20	.000
Likelihood Ratio	212.105	20	.000
Linear-by-Linear Association	1.621	1	.203
N of Valid Cases	39443		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 35.69.



APPENDIX C: BIVARIATE CORRELATION

Correlations

		Income	Insurance Type	Insurance Status	Uninsurance Duration	Self-Rated Health
Income	Pearson Correlation	1	.371**	.203**	-.110**	.123**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	394500	394500	394500	39444	394491
Insurance Type	Pearson Correlation	.371**	1	.778**	.[b]	.127**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	394500	394500	394500	39444	394491
Insurance Status	Pearson Correlation	.203**	.778**	1	.[b]	.069**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	394500	394500	394500	39444	394491
Uninsurance Duration	Pearson Correlation	-.110**	.[b]	.[b]	1	-.006
	Sig. (2-tailed)	.000	.000	.000		.203
	N	39444	39444	39444	39444	39443
Self-Rated Health	Pearson Correlation	.123**	.127**	.069**	-.006	1
	Sig. (2-tailed)	.000	.000	.000	.203	
	N	394491	394491	394491	39443	394491

**. Correlation is significant at the 0.01 level (2-tailed).

b. Cannot be computed because at least one of the variables is constant.

Correlations

		Income	Self-Rated Health	Educational Attainment	Geographic region	Age	US Born
Income	Pearson Correlation	1	.123**	.339**	-.016**	.235**	.046**
	Sig. (2-tailed)		.000	.000	.000	.000	.000
	N	394500	394491	394441	394500	394500	394495
Self-Rated Health	Pearson Correlation	.123**	1	.176**	-.009**	-.159**	.012**
	Sig. (2-tailed)	.000		.000	.000	.000	.000
	N	394491	394491	394432	394491	394491	394486
Educational Attainment	Pearson Correlation	.339**	.176**	1	-.040**	.049**	.195**
	Sig. (2-tailed)	.000	.000		.000	.000	.000
	N	394441	394432	394441	394441	394441	394436
Geographic region	Pearson Correlation	-.016**	-.009**	-.040**	1	-.038**	-.074**
	Sig. (2-tailed)	.000	.000	.000		.000	.000
	N	394500	394491	394441	394500	394500	394495
Age	Pearson Correlation	.235**	-.159**	.049**	-.038**	1	-.004**
	Sig. (2-tailed)	.000	.000	.000	.000		.005
	N	394500	394491	394441	394500	394500	394495
US Born	Pearson Correlation	.046**	.012**	.195**	-.074**	-.004**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.005	
	N	394495	394486	394436	394495	394495	394495

**. Correlation is significant at the 0.01 level (2-tailed).

Additional sociodemographic variables were all binary

APPENDIX D: IRB EXEMPTION LETTER

University of Central Florida Institutional Review Board
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407-823-2901, 407-882-2012 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

NOT HUMAN RESEARCH DETERMINATION

From: **UCF Institutional Review Board #1**
FWA00000351, IRB00001138

To: **Atalie Ashley West**

Date: **January 26, 2018**

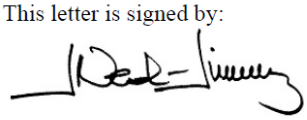
Dear Researcher:

On 01/26/2018, the IRB determined that the following proposed activity is not human research as defined by DHHS regulations at 45 CFR 46 or FDA regulations at 21 CFR 50/56:

Type of Review:	Not Human Research Determination
Project Title:	Interaction Between Income, Health Insurance, and Self-Rated Health: A Path Analysis
Investigator:	Atalie Ashley West
IRB ID:	SBE-18-13739
Funding Agency:	
Grant Title:	
Research ID:	N/A

University of Central Florida IRB review and approval is not required. This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are to be made and there are questions about whether these activities are research involving human subjects, please contact the IRB office to discuss the proposed changes.

This letter is signed by:



Signature applied by Jennifer Neal-Jimenez on 01/26/2018 11:28:07 AM EST

Designated Reviewer

APPENDIX E: COPYRIGHT PERMISSION LETTER

Joseph Rowntree Foundation
The Homestead 40 Water End York YO30 6WP

27 August 2018

Dear Joseph Rowntree Foundation:

I am in the process of completing a doctoral dissertation at the University of Central Florida entitled “Interaction Between Income, Health Insurance, and Self-Rated Health: a Path Analysis.”

For this dissertation, I am requesting permission to reprint Figure 4 (Pathways between income and health) of the following work:

Benzeval, M., Bond, L., Campbell, M., Egan, M., Lorenc, T., Petticrew, M., & Popham, F. (2014). How does money influence health? Joseph Rountree Foundation Report. Retrieved from https://www.jrf.org.uk/sites/default/files/jrf/migrated/files/income-health-poverty-full.pdf

This request is for a non-exclusive, irrevocable, and royalty-free permission, and it is not intended to interfere with other uses of the same work by you. These rights will in no way restrict republication of the material in any other form by you or by others authorized by you. I hope that you will support our educational programs by granting this permission. I am pleased to include a full citation to the work and other acknowledgement as you might request.

I would greatly appreciate your permission. If you require any additional information, please do not hesitate to contact me at the address, email address or number below.

Sincere regards,
Atalie Ashley West, MPH, CPH

PERMISSION GRANTED FOR THE USE REQUESTED ABOVE:

By: Matthew Stead, Communications Administrator, Joseph Rountree Foundation

Date: 28 August 2018

LIST OF REFERENCES

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