INEQUITIES IN PHYSICAL FUNCTION AND EMOTIONAL WELL-BEING IN FRAIL MEDICARE MEDICAID OLDER ADULT ENROLLEES

by

Kathy Denise Wright

A dissertation submitted to the faculty of
The University of Utah
in partial fulfillment of the requirements for the degree of

Doctor of Philosophy

College of Nursing

The University of Utah

August 2013

The University of Utah Graduate School

STATEMENT OF DISSERTATION APPROVAL

The dissertation of **Kathy Denise Wright**

has been approved by the following supervisory committee members:

Ginette A. Pepper	, Chair	**3-22-13**
		Date Approved
Michael Caserta	, Member	**3-22-13**
		Date Approved
Bob Wong	, Member	**3-22-13**
		Date Approved
Cherie Brunker	, Member	**3-22-13**
		Date Approved
Diana L. Morris	, Member	**3-22-13**
		Date Approved

and by **Maureen Keefe**, Chair of the Department of **The College of Nursing**

and by Donna M. White, Interim Dean of The Graduate School.

ABSTRACT

Medicare Medicaid enrollees experience worse health as compared to Medicare-only older adults. This excess burden of chronic illness is potentially greater for African Americans. The purpose of this dissertation was to use House's model of Social Inequalities in Health and Aging to describe the ecosociopolitical and biopsychosocial factors that contribute to inequities in physical function and emotional well-being in frail Medicare Medicaid older adult enrollees.

Synthesis of the literature revealed that low income, race (African American), and residence in disadvantaged neighborhoods were associated with a greater risk of depressive symptoms. Racism and discrimination also negatively impacted African American older adults. Resilience manifested through coping strategies such as spirituality and religion may explain the paradox of lower depressive symptoms for African American older adults as compared to Caucasians in the face of greater cumulative stressors over the life course.

Geographic Information Systems linked two datasets-After Discharge Care Management of Low-Income Frail Elderly (AD-LIFE) and American Community Survey (ACS) to provide missing data. Secondary path analysis was conducted using 337 subjects from the AD-LIFE study to test House's model of

pathways that lead directly and indirectly from race to physical function and emotional well-being, controlling for age, gender, neighborhood poverty, socioeconomic status (education and income), and health behaviors among frail Medicare Medicaid older adults. Model fit was demonstrated *($\Delta\chi^2$32.932, df 29, $\chi^{2/df}$ 1.136, TLI=.954, CFI=.976, and RMSEA (90%)=.02 (.000, .048)*. Creation of a path from race to physical function and emotional well-being did not improve model fit. Inequities were found with significant paths from gender to income (*β=.309, p< .001*), *race to* neighborhood poverty (*-.273 p < .001*), and race to education (*β=.117, p< .05)*. Only a few pathways hypothesized in House's model were confirmed in this study, which may be related to restricted range of economic status incumbent in the target population and exclusion of some constructs from the model testing due to unavailability of data. Structured and Physical activities were significant direct paths to health outcomes. Results support development of community-based interventions that incorporate resilience strategies to promote mental and physical health in this vulnerable population.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACKNOWLEDGMENTS

I would like to thank God for giving me strength. Thank you to my husband, James, and my daughter, Kathleen, for a happy home. Thank you to May Wykle, PhD, RN, FAAN, and Diana Morris, PhD, RN, FAAN, for planting the seed; to Amy Berman, MSN, for watering the seed; and to Ginette Pepper, PhD, RN, FAAN, for making me grow. I would also like to acknowledge the following individuals for their support and mentorship throughout my dissertation work:

Michael Caserta, PhD

Bob Wong, PhD

Cherie Brunker, MD

Faye Gary, PhD, RN, FAAN and Hossein N. Yarandi, PhD

Ms. Janet Jackson

Kyle Allen, MD

In loving memory of Roberta and Maxie Miller

I would also like to acknowledge my peers in the first Gerontological Nursing Cohort (Bristlecone Pine) at The University of Utah College of Nursing, Hartford Center of Geriatric Nursing Excellence, and Dr. Phoebe McNelly and staff at The University of Utah Digit Lab for geospatial information systems support. Thank you to my good friend Lynn Shell for helping me along this

journey, to Lisa Young for frequent pep talks, and to my sisters (Charlene and Maxine) for prayers. Thank you to the faculty of the Sigma Theta Tau Geriatric Nursing Leadership Academy for developing as a leader in gerontological nursing. Lastly, I would like to recognize the following funding sources for my doctoral education: The John A. Hartford Foundation, the Ray and Tye Noorda Family Foundation, the Substance Abuse and Mental Health Services Administration Minority Fellowship Program at the American Nurses Association, and Summa Health System Post-Acute Care and Senior Services and Summa Health Services Research and Education Institute.

CHAPTER 1

INTRODUCTION

Statement of the Problem

The Centers for Medicare and Medicaid Services (CMS) administer two federally funded health insurance programs: Medicare and Medicaid. Medicare provides health insurance coverage for people age 65 or older, some disabled people under age 65, and people of all ages with end-stage renal disease. In contrast, Medicaid is a state-administered insurance program that provides medical benefits to groups of low-income people. The states determine eligibility for Medicaid based on one of the following criteria: categorically needy, medically needy, or special groups.

Persons with both Medicare and Medicaid, formerly known as the "dual eligible," represent 18% of the Medicare population, but 31% of the cost in the Medicare budget (MEDPAC, 2011). Yet this excess spending does not lead to improved health outcomes. Indeed, in 2008, Medicare Medicaid enrollees accounted for one-third of all Medicare hospital days (Jiang, Wier, Potter, & Burgess, 2010). Medicare Medicaid enrollees also experience worse health as compared to Medicare-only older adults. Three out of five Medicare Medicaid enrollees have multiple chronic conditions (Kronick, Bella, Gilmer, & Sommers,

2007). Thirty-seven percent have cardiovascular disease and 20% have one or more psychological and mental cognitive conditions (Kronick et al., 2007). This excess burden of chronic illness can be potentially greater for African Americans, since cardiovascular disease is the leading cause of death in and out of the hospital setting for African Americans (Clark et al., 2001; Institutes of Medicine, 2006).

A greater number of Medicare Medicaid enrollees are African Americans, Hispanics, females, and persons with less than a high school education as compared to Medicare-only older adults (MEDPAC, 2011). The biopsychosocial determinants of health, such as gender, stress, and discrimination, have been hypothesized to predispose those at a lower socioeconomic status (SES) to poorer health outcomes (Herd, Goesling, & House, 2007; House, 2002; Link & Phelan, 1995). However, inequities in physical function remain between non-Hispanic Blacks and non-Hispanic Caucasians despite equivalent SES (August & Sorkin, 2010; Mendes de Leon, Barnes, Bienias, et al., 2005). The Double Jeopardy Theory (Biegel, 1991) supports the belief that age-related discrimination and minority status create a double disadvantage for non-Hispanic Blacks as compared to non-Hispanic Whites. Additional research is needed to understand the SES and biopsychosocial factors that create these inequities and to describe the differences; based on such research, interventions can be developed that are targeted to the Medicare Medicaid enrollee.

Theoretical Framework

A combination of trait and environmental factors contributes to the increased incidence of depression and chronic illness among Medicare Medicaid older adults (Coughlin, Waidmann, & O'Malley-Watts, 2009; Herd, Goesling, & House, 2007). House's conceptual framework of Social Inequalities in Health and Aging demonstrates the interrelated parts that lead to inequities in health outcomes (House, 2002). See Figure 1.1. This model has been applied to studies of environmental, psychological, and SES inequities that contribute to conditions such as diabetes and cardiovascular disease (House, 2002; Schultz et al., 2005).

In House's model, the effects of race, ethnicity, and gender are mediated by SES and explanatory variables (medical care, insurance, psychological risk factors, and physical, chemical, and social environmental hazards) to produce poor health outcomes (mortality, institutionalization, morbidity, functional limitations, poor self-rated health, cognitive impairment, and depression). House's conceptual framework and nine other models of health inequities were recommended by the Institutes of Medicine (IOM) in a report examining health disparities as exemplars to examine disparities in health outcomes (IOM, 2006). These models and theories of inequities represent pathways to understanding the gaps and provide a compelling choice of researchable variables.

House and other models illustrate logical pathways for understanding inequities in health outcomes. Both the terms *disparities* and *inequities* are used in the literature to refer to differences in health as a result of belonging to a socially disadvantaged group (Braveman, 2006). The terms are often used

interchangeably in the Centers for Disease Control and Prevention Health Disparities and Inequalities Report (2011). It is not clear whether there is consensus and clarity among researchers regarding the definition of these constructs. For the purpose of this dissertation research, the term *inequity* was used to describe disparities and differences that contribute to poor health outcomes of a disadvantaged group (older adult Medicare Medicaid enrollees). The term *inequities* implies that these differences are "unfair, avoidable and unjust" (Whitehead, 1992, p. 5). A model of social inequities in health and aging were used in this dissertation to describe the differences in health outcomes by race. Race as an advantage or disadvantage has not yet been explored in the literature within a group of frail, low-income, low-education Medicare Medicaid older adult enrollees.

Purpose of the Study

The purpose of this study was to test House's Model of Social Inequalities in Health and Aging as a way of describing the inequities between African American and Caucasian older-adult Medicare Medicaid enrollees that contribute to poor physical function and poor emotional well-being. This study addressed whether inequities in health outcomes by race create a "double disadvantage," thereby widening the health-disparity gap between African Americans and Caucasians in this group. For the remainder of this study, non-Hispanic Black and non-Hispanic White are referenced as African American and Caucasian, respectively.

First, a synthesis of published literature will describe the risk factors defined in House's model that contribute to depressive symptoms and clinical depression in African American older adults. Second, the process of using Geospatial Information Systems to build a data set to test House's model with a sample of frail Medicare Medicaid older-adult enrollees will be described. Finally, a secondary analysis tests House's Model of Inequalities in Health and Aging in African American and Caucasian older-adult Medicare Medicaid enrollees to determine if race impacts physical function and emotional well-being. The long-term goal of the study is to develop and test interventions to interrupt modifiable pathways that contribute to poor health outcomes.

Significance of the Study

Research on the inequities in older-adult Medicare Medicaid enrollees is imperative to determine the negative impact of chronic illness on the quality of life and the resulting financial strain on the healthcare system. The study is innovative because it tested an established framework of inequities in a population with poor outcomes and high healthcare costs as a way of understanding the pathways to inequities.

Racial and ethnic minority groups, low-income groups, women, and older adults (age 65 and over) were identified in the top nine priority populations to target improved health outcomes and decreased health care costs (Agency for Healthcare Research and Quality, 2002, 2012). The study supports the mission of the Center for Medicare and Medicaid Innovation (CMSI) to improve health by "addressing the underlying causes of poor health, such as physical inactivity,

behavioral risk factors, lack of preventive care and poor nutrition" (CMSI, 2011). Additionally, the study addresses the strategic mission and plan of the National Institute of Nursing Research (NINR, 2010), which encompasses quality of life and health disparities.

Once we understand these different pathways to inequities in poor physical function and poor emotional well-being, community- and individual-centered solutions can be developed to reduce the inequities. The study provided data on the pathways that contribute to limited physical function and poor emotional well-being in African Americans as compared to Caucasians.

Models of care to support minority older populations and strategies to examine mental health inequities were listed among the recommendations for the future of research in geropsychiatric nursing (Buckwalter, Evans, & Beck, 2011). Results of this study will be used as pilot data for future research to create and test interventions that tackle the biopsychosocial needs of vulnerable African American and Caucasian older adults.

Specific Aims and Research Questions

Specific Aim 1

To conduct a literature synthesis guided by House's model of factors that contributes to depressive symptoms and depression in African American older adults.

Research Question 1A

What are the variables in House's model that contributes to depression and depressive symptoms in African Americans as compared to Caucasians?

Research Question 2A

What contributes to resilience in the presence of risk factors for depression and depressive symptoms in African American older adults?

Specific Aim 2

To provide an exemplar of Geographic Information Systems (GIS) to test House's model. Research Question 2A Can GIS be used to link data to support the path analysis of House's model in a sample of frail Medicare Medicaid older adults?

Specific Aim 3

To test a conceptual framework for understanding social inequities in health and aging to explore the pathways that lead to physical function and emotional well-being by race.

Research Question 3A

When income, health behaviors (smoking, formal exercise, and physical activity), age, gender, neighborhood poverty, and socioeconomic status (education, income) are controlled, does race directly or indirectly impact physical function in frail Medicare Medicaid older adults?

Research Question 3B

When income, health behaviors (smoking, formal exercise, and physical activity), age, gender, neighborhood poverty, and socioeconomic status (education, income) are controlled, does race directly or indirectly impact emotional well-being in frail Medicare Medicaid older adults?

Organization of Manuscript

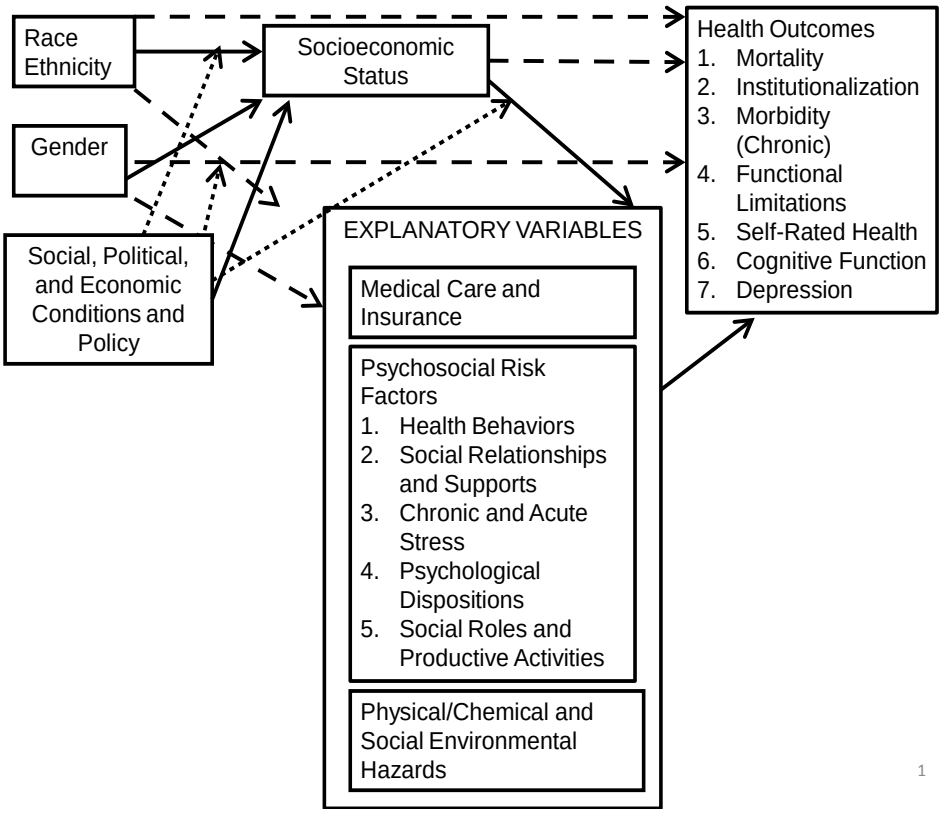
The organization of this seven-chapter manuscript was adapted from the dissertation of Margaret Mary Joyce (2009), submitted to the faculty of the University of Utah. The manuscript contains three chapters that summarize findings as follows:

Chapter 4—"The Depression Risk Paradox. Factors that Influence Depression and Depressive Symptoms in African American Older Adults"—reports the results of SPECIFIC AIM 1.

Chapter 5—"Using Geographic Information Systems to Overcome Limitations of a Secondary Analysis"—reports the results SPECIFIC AIM 2.

Chapter 6—"Do Frail Medicare Medicaid Older-Adult Enrollees Differ in Physical Function and Emotional Well-being by Race?"—contains results of SPECIFIC AIM 3.

Chapter 7 provides a summary to unite Chapters 4 through 6 and gives contributions and implications for research and health policy.



Solid line=major path. Dash line=minor path. Dot line=interactive effect.

Figure 1.1 House's Model of Social Inequalities in Health and Aging (House, 2002).

References

Agency for Healthcare Quality and Research (2002).*The high concentration of U.S. health care expenditures.* Retrieved from http://www.ahrq.gov/research/ria19/expendria.htm

Agency for Healthcare Research and Quality, U.S. Department of Health and Human Services (2012). National health care disparities report 2011. Retrieved from www.ahrq.gov/qual/qrdr11.htm

August, K. J., & Sorkin, D. H. (2010). Racial ethnic disparities indicators of physical health status: Do they still exist throughout late life? *Journal of the American Geriatrics Society, 58*(10), 2009–2015. doi:10.111?j.152-5415.2010.03033.x

Biegel, D. E., Magaziner, J., & Baum, M. (1991). Social support networks of white and black elderly people at risk for institutionalization. *Health and Social Work, 16*(4), 245–257.

Buckwalter, K., Evans, L. K., & Beck, C. (2011). Knowledge development for mental health of older adults. A white paper for SBE 2020: Future Research in the Social, Behavioral & Economic Sciences by the Geropsychiatric Nursing Collaborative. Retrieved from http://www.nsf.gov/sbe/sbe_2020/submission_detail.cfm?upld_id=85

Center for Medicare & Medicaid Innovation. *Mission statement*. Retrieved from http://innovations.cms.gov/

Clark, L. T., Ferdinand, K. C., Flack, J. M., Gavin, J. R. 3rd, Hall, W. D., Reed, J. W., Saunder, E., Valantine, H. A., Watson, J., Wenger, N. K., & Wright, J. T. (2001). Coronary heart disease in African Americans. *Heart Disease*, *3*(2), 97–108.

Coughlin,T., Waidmann, T., & O'Malley-Watts, M. (2009) *Kaiser commission on Medicaid and the uninsured. Where does the burden lie? Medicaid and Medicare spending for dual eligible beneficiaries.* Retrieved from http://www.kff.org/medicaid/upload/7895-2.pdf

Herd, P., Goesling, B., & House, J. S. (2007). Socioeconomic position and health: The differential effects of education versus income on the onset versus progression of health problems. *Journal of Health and Social Behavior, 48*(3), 223–238.

House, J. S. (2002). Understanding social factors and inequalities in health: 20th century progress and 21st century prospects. *Journal of Health and Social Behavior, 43*(2), 125–142.

Institute of Medicine (2006). *Examining the health disparities research plan of the National Institutes of Health: Unfinished business*. Retrieved from http://www.nap.edu/catalog/11602.html

Jiang, H. J., Wier, L. M., Potter, D. E. B., & Burgess, J. (2008). *Hospitalizations for potentially preventable conditions among Medicare-Medicaid dual eligibles. HCUP Statistical Brief #96.* Retrieved from http://www.hcup-us.ahrq.gov/reports/statbriefs/sb96.pdf

Joyce, M. M. (2009). *Dimensions of dyspnea in lung cancer.* (Doctoral dissertation, University of Utah). Retrieved from http://content.lib.utah.edu/cdm4/document.php?CISOROOT=/us-etd2&CISOPTR=167728&REC=1

Kronick, R., Bella, M., Gilmer, T. P., & Sommers, S. A. (2007). *The faces of Medicaid II: Recognizing the care needs of people with multiple chronic conditions. Center for Health Care Strategies, Inc.* Retrieved from http://www.chcs.org/publications3960/publications_show.htm?doc_id=540806

Link, B. G., & Phelan, J. (1995). Social conditions as fundamental causes of disease. *Journal of Health and Social Behavior* (Extra Issue), 80–94.

MedPac (2011). *A data book: Health care spending and the Medicare program*. Retrieved from http://www.medpac.gov/chapters/Jun11DataBookSec3.pdf

Mendes de Leon, C. F., Barnes, L. L., Bienias, J. L., Skarupski, K. A., & Evans, D. A. (2005). Racial disparities in disability: Recent evidence from self-reported and performance-based disability measures in a population-based study of older adults. *Journal of Gerontology: Social Sciences, 60B*(5), S263–S271.

National Institutes of Nursing Research (2010). National Institutes of Nursing research mission and strategic plan. Retrieved from http://www.ninr.nih.gov/AboutNINR/NINRMissionandStrategicPlan/

Phelan, J. C., Link, B. G., & Tehranifar, P. (2010). Social conditions as fundamental causes of health inequalities: Theory, evidence and policy implications. *Journal of Health and Social Behavior, 51*, S28–S40.

Whitehead, M. (1992). The concepts and principles of equity in health. Retrieved from http://salud.ciee.flacso.org.ar/flacso/optativas/equity_and_health.pdf

CHAPTER 2

REVIEW OF LITERATURE

Introduction

The review of relevant literature begins with an overview of the cause of inequities that contribute to poor physical function and poor emotional well-being, including socioeconomic inequities, stress exposure, and racial discrimination**.** This is followed by health policy and medical care issues that produce inequities. House's (2002) framework of social inequalities in health and aging encompasses many of the social determinants of health, such as socioeconomic status (SES), that impact health outcomes.

In the review of relevant literature, health outcomes are limited to the variables measured in the study: physical function and emotional well-being. Depression and depressive symptoms as a component of emotional well-being impacted by social inequalities are reviewed in Chapter 4 (Specific Aim 1).

Inequities and Disparities

Socioeconomic individuals at a lower socioeconomic status are at risk for increased morbidity and mortality, a risk that has remained consistent throughout history (IOM, 2006; Link & Phelan, 1995; Phelan, Link, & Tehranifar, 2010). Fundamental-Cause Theory attributes these differences to distinct dimensions of

SES that include multiple resources, knowledge, and social capital that have a protective effect on health (Link & Phelan, 1995; Phelan et al., 2010). Those who are at a higher SES level have more resources and social supports to confer a protective effect on future health outcomes (Link & Phelan, 1995; Phelan et al., 2010). Interventions that address only individual risk may not change the impact of SES on health (Link & Phelan, 1995). In addition, changes in health policies that do not include an increase in income may not lead to improvement in health for all economic levels (Herd, Goesling, & House, 2007). As seen in a study of Social Security income by state, even minimal increases in income conferred positive benefits on health in older adults despite level of education (Arno, House, Viola, & Schechter, 2011; Herd, Schoeni, & House, 2008).

The impact of income versus education is controversial. Higher education does not necessarily confer better health benefits in minorities (IOM, 2006). For example, in a study of periodontitis in an older population, African Americans with higher education and income levels had a greater prevalence of periodontal disease than Caucasians and Mexican Americans (Borrell, Burt, Neighbors, & Taylor, 2008). In general, African Americans had lower educational levels, lower income, and lived in poorer neighborhoods (Williams & Jackson, 2005). Level of education determines the life course that leads to occupation and income, both of which translate to improved access to care and management of chronic conditions (Herd et al., 2007; Link & Phelan, 1995). Completion of an education exposes the individual to other social networks and resources to promote self-

efficacy, and an adequate income provides resources to promote better coping with stress.

Stress Exposure

Limited financial resources and chronic illness create added stress for older adults. *Allostatic load* is the body's response to chronic stress that results in disease. Allostatic load is based on the body's response to stress and the protective effects of the central nervous system, the hypothalamic-pituitary-adrenal axis (HPA), the cardiovascular system, the metabolic system, and the immune system (McEwen, 1998). Over time and under excessive exposure to stress, an increase in allostatic load results in cardiovascular illness, hypertension, and obesity (McEwen, 1998). If the brain is in a prolonged state of stress, then the allostatic systems remain turned on, which results in increased accumulation of abdominal fat, atrophy of nerve cells in the hippocampus, and bone mineral loss (McEwen, 2000).

As the brain ages, the older adult is more vulnerable to the effects of the allostatic load. The cumulative effect of chronic stress suppresses the immune system by lowering the level of natural-killer cells and B- and T-lymphocytes, thereby increasing susceptibility to infections (Cohen & Herbert, 1996). This can be even more devastating to the health of African Americans because chronic stress in African Americans as compared to Caucasians results in an increased engagement in unhealthy behaviors, such as overeating, smoking, and using alcohol (Jackson, Knight, & Rafferty, 2010).

In a study of the first two waves of America's Changing Lives Survey, Jackson et al. (2010) determined that the stress-buffering role of unhealthy behaviors had a strong positive correlation with major depression in Caucasians and an inverse relationship in African Americans. It was hypothesized that engagement in unhealthy behaviors by African Americans inhibits the HPA axis to decrease the release of corticotropin-releasing factor (CRF), which decreases feelings of anxiety (Dallman et al., 2003). Unfortunately, this chronic activation of the HPA axis contributes to Type 2 diabetes and cardiovascular disease in African Americans (Jackson et al., 2010). Poor health behaviors were also seen to have a significant negative interaction with depression in African Americans. African Americans who did not engage in poor health behaviors had a greater incidence of depression (Mezuk et al., 2010). Exposure to differential stress and negative life events is thought to have contributed to inequities among races (Lantz, House, Mero, & Williams, 2005). The differences in the level of stress among African Americans and Caucasians may be the result of the additive stress of negative life events, such as racism and discrimination.

Racism and Discrimination

Persistent and chronic stress as a result of racism and discrimination creates an increased burden on the body's allostatic balance and results in poor health outcomes (Pearlin, Schieman, Fazio, & Meersman, 2005). Racism and discrimination can have a direct effect on SES as a result of residential segregation and redlining by financial institutions (Williams, 1999). This results in a disproportionate number of African Americans living in areas near undesirable

locations (such as landfills, warehouses, and factories) that impact health (Brown, 1995; Williams, 1999).

Clark (2004) noted that a perception of lifetime discrimination varied with age and race. Because they lived in the era before civil rights, African Americans over the age of 65 did not acknowledge subtler forms of racism as compared to middle-aged and younger African Americans. Due to the dearth of research on the consequences of racism and discrimination along with inadequate explication of the construct in the older adult population, limited information is available on the impact of racism in this cohort. Racism that was perceived and/or real created a sense of threat, harm, or challenge that resulted in both psychological and physiological responses (Clark, 2004).

Psychological responses to racism include increased anxiety, anger, and feelings of hopelessness (Clark, 2004; Williams & Williams-Morris, 2000). These are all factors that contribute to poor emotional well-being. In a study of 570 African American adults, discrimination was directly related to depressive symptoms and anxiety (Banks, Kohn-Wood, & Spencer, 2006). These responses translate directly to the psychological dispositions in House's model that have major additive causal paths to health outcomes (see Figure 1.1). As an example, "everyday" discrimination has been linked to cardiovascular disease in African American older adults through an increased level of C-reactive protein (CRP) (Lewis, Aiello, Leurgans, Kelly, & Barnes, 2010).

Health Policy

Policies to increase the number of minority providers to address health behaviors have the potential to reduce the impact of cardiovascular disease and BMI among African Americans. Increasing the number of providers would address the lack of cultural connection between African American patients and Caucasian providers that created barriers to care (Millet, Close & Arthur, 2010). Through increasing the number of African American health care providers, the barriers to accessing care by African Americans related to fear of mistreatment and withholding of care can be addressed. The fear of mistreatment and withholding of treatment influenced the decision of African Americans to access care, decreased utilization of services, and reduced participation in health outcomes research (LaVeist, Nickerson, & Bowie, 2000; Lichtenberg, Brown, Jackson, & Washington, 2004; Taxis, 2006). In an effort to decrease inequities in care through social policy, the Minority Health and Health Inequities Research and Education Act of 2000 was established to promote research along with recruitment and retention of minority scientists and providers (Public Law 106-525, 2000).

In House's conceptual framework, social policies and programs are integral to address inequities created by SES that impact health outcomes (Arno et al., 2011; Herd et al., 2008). Herd et al. (2008) purported that these programs should have impact on individuals and communities upstream instead of downstream to increase social capital for the disadvantaged. Upstream changes are considered to be those that impact social and economic policies as opposed

to downstream measures, which include healthcare and behavioral change at the individual level (Herd et al., 2008).

Through increasing the financial resources to programs to support Medicare Medicaid older-adult enrollees, health outcomes can be improved. For example, in states where there was an increase of $100 per month in Social Security income, a 1.8% decline in the probability of having a mobility limitation among this low-income group was noted (Herd et al., 2008). By providing services and resources to those at the lower end of the social/economic stratum, we can increase their social capital and improve health. One such program that has the potential to increase social capital for low-income older adults is community-based long-term care.

Community-based long-term care programs provide services to low-income elders who otherwise would be at risk for institutionalization (National Association for Area Agencies on Aging, 2011). The benefits of such programs administered through the state level Area Agencies on Aging extend beyond the primary objective to reduce long-term care placement (Muramatsu, Yin, & Hedeker, 2010).

However, Fundamental Cause Theory challenges the focus of upstream risk reduction, as eliminating one factor will not eliminate the disparity because other factors will emerge (Link & Phelan, 1995). For instance, the smoking ban in public places improved the health of those at a higher SES level, but increased second-hand smoke exposure to children in lower SES (Link & Phelan, 1995).

Another upstream health policy that could adversely affect outcomes in at-risk populations is the Medicare Prescription Drug Improvement and Modernization Act of 2003 (Medicare Part D). In January 2006, Medicaid recipients lost their Medicaid prescription coverage and were switched to Medicare Part D. With Medicaid there were no co-pays; but Medicare Medicaid enrollees now have copays with each medication because of Medicare D. Although copays range from $1 to $3 per prescription, the number of medications required per chronic condition could result in a cumulative cost that could discourage utilization, which could potentially lead to further decline. This provided an example of how “good” policy can negatively impact utilization in Medicare Medicaid enrollees (Donohue, 2006; Donohue, Huskamp, & Zuvekas, 2009; Schlosberg, 2004).

Changes in prescription coverage have also forced providers to alter medication regimens in vulnerable populations. In a study of 908 Medicare Medicaid enrollees receiving psychiatric care who experienced medication switches, individuals with discontinuations and other access problems had three times the rate of suicidal ideations or behavior problems as compared to those who had no changes in medications (Mościcki et al., 2010). In a large randomly selected survey of Medicare Medicaid enrollees with psychiatric conditions (1,193), more than half reported problems in accessing medications and continuity of care (West et al., 2007). Governmental services and resources that support health promotion, like Medicare D, must be examined for a “ripple” effect

across all levels of economic status to prevent further inequities in access to care and unintended consequences.

Medical Care and Insurance

Since the inception of Medicare in 1965, healthcare coverage has improved access to care. Yet inequities remain along racial and SES lines (Walker et al., 2010). In a comparison of middle-aged and older African American and Hispanic adults age 65 and older, access to care remained below Healthy People 2010 benchmarks for both (Walker et al., 2010). Access to medical care for low-income and Medicare Medicaid enrollees can vary according to type of service and condition.

Moon and Shin (2005) reviewed a total of 3,221 cases of the household component of the Medicare Expenditure Panel Survey (MEPS) to assess utilization of office-based physician visits, outpatient physician visits, and agency-related home healthcare services (Moon & Shin, 2005). In this sample, Medicare Medicaid enrollees were more likely to participate in office-based visits and home-care services (Moon & Shin, 2005). African Americans utilized more outpatient hospital-based visits as compared to Caucasians. The rationale for this increased utilization of services among African Americans was due to their having a higher burden of chronic illness and co-morbidities, such as diabetes and disability, prior to entering Medicare/Medicaid (Moon & Shin, 2005). Medicare Medicaid enrollees utilized more outpatient care but continue to have poorer health outcomes.

In a study of mental health and substance abuse service use, Andersen's Behavioral Health Model—which purports use of health services based on predisposing factors, need, and vulnerability—was explored to explain differences in service use among adults (Stockdale, Tang, Zhang, Belin, & Wells, 2007). Non-Caucasians, the poor, the uninsured, and the elderly had a lower likelihood of mental health service use (Stockdale et al., 2007). In older adults, insurance coverage did not improve utilization of mental health services except in areas of high managed-care penetration (Stockdale et al., 2007).

Medicare Advantage plans that cover Part A and Part B of Medicare are offered by private insurance companies (Medicare, 2013). Medicare Medicaid-eligible older adults can elect to receive coverage from a Medicaid Managed Care program (MMC) instead of Medicare. In a large longitudinal cohort study of MMC and Medicare Medicaid enrollees participating in MMC, the Medicare Medicaid older adults had a greater decline in physical and mental components summary scores of the SF-36® and worse self-rated health compared to MMC group alone (Lied & Haffer, 2004). Similar to Medicare Medicaid enrollees with traditional Medicare, Medicare Medicaid enrollees in Medicare Advantage plans tend to have worse health and more depressive symptoms as compared to Medicare Advantage only enrollees (Lied & Haffer, 2004). The inequities in health outcomes were attributed to a higher percentage of disability in the Medicare Medicaid population and delayed access to care during middle age that resulted in untreated chronic health problems (Lied & Haffer, 2004; Walker et al., 2010). These inequities have been seen in other studies as well, suggesting that

those who are low-income and minority are entering into Medicare with a greater burden of chronic illness (Walker et al., 2010).

Since 1998, the Centers for Medicare and Medicaid Services (CMS) adopted the Medicare Health Outcomes Survey, which included the use of the SF-36® to measure mental and physical health outcomes (Jones, Jones, & Miller, 2004). Studies utilizing this data set have found that chronic disease has a negative impact on mental and physical health over time, and preventative measures and care management promote optimal health (Jones, Jones & Miller, 2004). Care management of the complex needs of Medicare Medicaid older adults is a major initiative of the Centers for Medicare Medicaid Innovations (Department of Health and Human Services, 2010). In an effort to contain cost and improve care for Medicaid enrollees, the Medicaid expansion plan allows states to collaborate with Area Agencies on Aging and insurance providers to deliver cost-effective, high-quality care to Medicaid enrollees (U.S. House of Representatives, 2010). Older adults participating in community-based long-term care that also have Medicaid would elect to participate in an insurance company Medicaid Managed Care program. The state remains responsible for the cost incurred by those who choose not to participate and who instead retain traditional Medicaid.

Programs of All-Inclusive Care (PACE) provide another model of intensive care coordination to manage frail Medicare Medicaid enrollees at risk for institutionalization. The PACE program has been in existence since 1973, beginning with the first program in the San Francisco Chinatown area (Hirth,

Baskins, & Dever-Bumba, 2008). PACE programs are funded via capitated payments through Medicare and Medicaid or via monthly fee to those not eligible for Medicaid. The PACE model provides a continuum of care services from primary care, day care, acute services, and long-term care services. These services are managed by the PACE center utilizing an interdisciplinary team of healthcare professionals (Hirth et al., 2008). The PACE programs have been shown to decrease hospitalizations and nursing home admissions while improving quality of life for recipients (Hirth et al., 2008; Wieland et al., 2000). However, state regulations, startup costs, and overhead make these programs challenging to implement (Gross, Temkin-Greener, Kunitz, & Mukamel, 2004; Hirth et al., 2008).

Health Outcomes

Physical Function

August and Sorkin (2010) conducted an analysis of the California Health Interview Survey of 40,631individuals over the age of 55 to determine if racial and ethnic inequities exist in physical health over time. The greatest disparity existed between African Americans and non-Hispanic Caucasians, with African Americans reporting greater difficulty in performing activities of daily living (August & Sorkin, 2010). Using data from a population-based (*n*=6,158), longitudinal study of a biracial urban population, Mendes De Leon and associates (2005) found that older African Americans reported higher levels of disability and had lower levels on a performance-based measure of physical function. African American/Caucasian differences in disability were significantly greater among

women than men and tended to change slightly over time, although not in a consistent pattern. Cumulative disadvantage of low income and low education can contribute to the widened gap of physical impairment in older adults (Kim & Durden, 2007).

Both income and education are factors that contributed to cumulative disadvantage in minorities. In a large study of functional status in African American (*n*=16,870) as compared to Caucasian (*n*=186,086) older adults, education and income were significant mediating variables that explained 90% of racial differences in functional limitations in men and 75% in women (Fuller-Thomson, Nuru-Jeter, Minkler, & Guralnik, 2009). Education has also been seen to have a greater role in longitudinal functional limitations than income (House, Lantz & Herd, 2005; Zimmer & House, 2003). Indeed, African Americans between the ages of 65 and 75 are particularly at risk for disability over time that may be the result of cumulative disadvantage (Fuller-Thomson et al., 2009; Mendes de Leon et al., 1997).

Life-space mobility is another measurement that determines function in older adults. Life-space is described as the specific area in which a person moves over a certain period of time (Baker, Bodner, & Allman, 2003). Age and diabetes have been seen to predict a decrease in life-space over time in African Americans and Caucasians (Allman, Baker, Maisiak, Sims, & Roseman, 2004). A greater restricted life-space has been associated with increased mortality in older adults. Those who have not traveled up to 8 years beyond their yard or driveway are 1.6 times more likely to die than those who travel outside town after

controlling for age, sex, race, and education (Boyle, Buchman, Barnes, James, & Bennett, 2010). Factors that could potentially impact mobility in one's environment include neighborhood safety and neighborhood cohesion.

Neighborhood safety can have a greater impact on physical activity in older adults than SES. After controlling for SES, demographic characteristics, and functional limitations, older adults who perceived their neighborhood to be safe had an 8% greater rate of leisure-time physical activity than those who felt unsafe (Tucker-Seeley, Subramanian, Li, & Sorensen, 2009). One explanation for perceived sense of safety is neighborhood social cohesion. Older adults in socially cohesive neighborhoods are more likely to report walking as an activity (Fisher, Li, Michael, & Cleveland, 2004). In contrast, despite low neighborhood SES, those at a low SES are more likely to report walking as compared to those at a higher SES due to a lack of transportation (Ross, 2000). Neighborhood social cohesion appears to have a buffering effect in unsafe neighborhoods (Ross & Jang, 2000). In areas of high crime (such as vandalism, graffiti, danger, noise, dirt, and drugs), social ties with neighbors reduce levels of fear and mistrust among young and old (Ross & Jang, 2000). In addition, emotional well-being is impacted by neighborhood cohesion and physical mobility.

Mobility problems and older age increase the risk of developing depressive symptoms in elderly adults. In a study by Lampinen and Heikkinen (2003), older adults who were mobility-disabled and had a sedentary lifestyle had a higher risk (*or=2.44*) for depressive symptoms at follow-up as compared to those who were physically active. This supports the hypothesis that limited

physical function results in depressive symptoms. Conversely, others have found that increasing levels of depressive symptoms cause a decrease in function.

Increasing levels of depressive symptoms were predictive of greater physical decline over a 4-year period (Penninx et al., 1998). Unfortunately, there was only one African American person in the study, supporting the need to conduct more ethnically diverse research. Penninx et al. (1998) hypothesized that depressive symptoms caused functional decline by increasing sympathetic tone, decreasing vagal tone, and causing immunosuppression. Depressed mood may enhance susceptibility to disease and result in decreased physical health in general. Also, persistent somatic symptoms, which are more prevalent in African Americans than Caucasians (Blazer, Landerman, Hays, Simonsick, & Saunders, 1998), may worsen health status over time (Penninx et al., 1998).

In contrast, Everson-Rose et al. (2005) conducted a study of 4,069 older adults, of whom 61% were African American, to determine if depressive symptoms predicted physical decline in the elderly. These results were dissimilar to Penninix's findings in that depressive symptoms did not consistently contribute to functional decline over time. Yet in older, less-educated African American women, a higher score on the CES-D at baseline was predictive of lower physical performance in the future. Other longitudinal models are needed to understand the relationship between depressive symptomatology and physical health.

Emotional Well-Being/Depression

Depressive symptoms detected in measurement of emotional well-being have been found to be a significant predictor of mortality among elderly adults

(Blazer & Hybels, 2004). In a Cox proportional hazards model of data collected over 10 years, items from the Centers for Epidemiological Studies–Depression that reflected a negative affect (lack of hope, lack of enjoyment, and lack of happiness) were more predictive of mortality than symptoms such as anhedonia and sleep problems (Blazer & Hybels, 2004). Treatment outcomes can be impacted by poor emotional-well-being in low-income elders. Those with low income and comorbid anxiety are 73% more likely to respond poorly to depression treatment and have a 1.45 times greater risk of suicidal ideations than higher-income older adults (Cohen, Gilman, Houck, Szanto, & Reynolds, 2009).

The incidence of mental health problems varies across minority groups. In a sample of 635 Hispanic and African American older adults to asses mental health in senior housing, 26% had major depressive disorder and 12% had generalized anxiety (Robison et al., 2009). In addition, the effects of stress on mental health had a greater impact in Hispanic older adults as compared to African Americans. Other environmental stressors, such as crime and lead exposure, have been linked to psychiatric symptoms (Beach, Schulz, Castle, & Rosen, 2010; Brown, 1995; Rhodes & Spiro, 2003; Wright, Cummings, Karlamangla, & Aneshensel, 2009).

A secondary analysis of data from a large 10-year longitudinal study was used to determine neighborhood cohesion and stressors with depressive symptoms. Social cohesion was defined on four-item scale that included people's willingness to help, neighbors getting along, neighbor trust, and

neighbors sharing the same values. Social cohesion, aesthetic quality, and violence correlated with depressive symptoms among residents (Mair et al., 2008). Low social cohesion, poor neighborhood aesthetics, and high crime were associated with higher mean scores for men and women on the CES-D (Mair et al., 2008). Authors recommended future research on environmental stressors such as neighborhood aesthetic quality, violence, and social cohesion.

Acute and chronic stress is impacted by the amount and quality of social supports in older adults. To support the argument that social isolation contributes to depression, a cross-lagged design study of perceived loneliness and depression was conducted to establish temporal order. Loneliness predicted depressive symptoms, but depressive symptoms did not predict loneliness. This held true regardless of multiple factors such as race, gender ethnicity, social support, or negative life events (Cacioppo, Hawkley, & Thisted, 2010). Loneliness did, however, decrease over time from middle age to older years. Conversely, in African Americans compared to Caucasians, greater social network was associated with increased stress and depressive symptoms. This may be related to the African American caregivers' level of stress and disadvantage that creates distress for the older adult (Biegel, Magaziner, & Baum, 1991). The quality of social support can promote or hinder health through promotion of healthy behaviors and/or creating a sense of meaning or coherence that fosters health (House, Landis, & Umberson, 1988).

The association between mental health and health behaviors, such as not smoking, has been documented in older adults. There is a greater risk of

smoking in the presence of depression among older Health Maintenance Organization members (Green, Polen, & Brody, 2003). Second-hand exposure to smoke was hypothesized to lead to an increase in depressive symptoms as a result of lower levels of dopamine and *y*-aminobutyric acid, which are associated with mood disorders (Petty, 1995). In the National Health and Nutrition Examination Survey (NHANES), the association was detected between second-hand smoke measured by serum cotinine and depressive symptoms s determined in a cross-section of noninstitutionalized civilian U.S. population. Among those who never smoked, second-hand exposure was positively associated with depression after adjusting for age, gender, race/ethnicity, and education (Bandiera et al., 2010).

Conclusion

The review of the literature supports the causal paths in House's model that contribute to poor health outcomes. Income and education were both factors that contributed to the inequities in African Americans as compared to Caucasians to address the reciprocal and controversial relationship of income and education. The two variables were separated to determine the amount of variance that each contributes to physical function and emotional well-being. Age was added to the model, since older adults are very heterogeneous in terms of function. Blacks between the ages of 65 and 75 were particularly at risk for disability over time that may be the result of cumulative disadvantage (Fuller-Thomson et al., 2009; Mendes de Leon et al., 1997).

As demonstrated in the review of literature, the complexities of the inequities that lead to poor health outcomes include multiple factors such as race, insurance, health policy, and racism and discrimination. These factors, particularly in African American older adults, have contributed to poorer function and excess disability (August & Sorkin, 2010; Fuller-Thomson et al., 2009; Kim & Durden, 2007; Mendes De Leon et al., 2005). African Americans tend to have lower education, have lower income, and live in poorer neighborhoods (Williams & Jackson, 2005).

Exposure to cumulative stress resulting from racism and discrimination increased the allostatic load, which in turn increased the risk of cardiovascular disease, obesity, and hypertension (Banks et al., 2006; Clark, 2004; Gee, Walsemann, & Brondolo, 2012; Lewis et al., 2010; McEwen, 1998, 2000; Perlin et al., 2005; Williams & Williams-Morris, 2000). Resources, knowledge, and social capital can have a protective effect on health (Herd et al., 2007; Link & Phelan, 1995; Phelan et al., 2010). Conversely, education may or may not confer additional health benefits (Borrell et al., 2008; IOM, 2006). Access to care through the provision of policies to support vulnerable older adults can also improve health outcomes. However, continuous monitoring is required to ensure that well-intended programs do not result in adverse outcomes for those at a lower SES.

The continuous thread throughout this study is House's Model of Social Inequalities in Health and Aging. Chapters 4 to 6 illustrate use of this model and contribute substantive knowledge for future research.

References

Allman, R. M., Baker, P. S., Maisiak, R. M., Sims, R. V., & Roseman, J. M. (2004). Racial similarities and differences in predictors of mobility change over eighteen months. *Journal of General Internal Medicine, 19*, 1118–1126.

Arno, P. S., House, J. S., Viola, D., & Schechter, C. (2011). Social security and mortality. The role of income support policies and population health in the United States. *Journal of Public Health Policy*, *32*, 1–17. doi:10.1057/jphp.2011.2

August, K. J., & Sorkin, D. H. (2010). Racial ethnic inequities indicators of physical health status: Do they still exist throughout late life? *Journal of the American Geriatrics Society, 58*(10), 2009–2015. doi:10.111?j.152-5415.2010.03033.x

Baker, P. S., Bodner, E. V., & Allman, R. M. (2003). Measuring life-space mobility in community-dwelling older adults. *Journal of the American Geriatrics Society, 51*(11), 1610–1614.

Bandiera, F. C., Arheart, K. L, Caban-Martinez, A. J., Fleming, L. E., McCollister, K., Dietz, N. A., LeBlanc, W. G., Davila, E. P., Lewis, J. E., Serdar, B., & Lee, D. J. (2010). Secondhand smoke exposure and depressive symptoms. *Psychosomatic Medicine, 71*(1), 68–72. doi:10.1097/PSY.0b013e3181c6c8b5

Banks, K. H., Kohn-Wood, L. P., & Spencer, M. (2006). An examination of the African American experience of everyday discrimination and symptoms of psychological distress. *Community Mental Health Journal, 42*(6), 555–570.

Beach, S. R., Schulz, R., Castle, N. G., & Rosen, J. (2010). Financial exploitation and psychological mistreatment among older adults: Differences between African Americans and non-African Americans in a population-based survey. *The Gerontologist, 50*(6), 744–757. doi:10.1093/geront/gnq053

Biegel, D. E., Magaziner, J., & Baum, M. (1991). Social support networks of Caucasian and African American elderly people at risk for institutionalization. *Health and Social Work, 16*(4), 245–257.

Blazer, D. G., Landerman, L. R., Hays, J. C., Simonsick, E. M. & Saunders, W. B. (1998). Symptoms of depression among community-dwelling elderly

African American adults and Caucasian older adults. *Psychological Medicine, 28*(6), 1311–1320.

Blazer, D., & Hybels, C. (2004). What symptoms of depression predict mortality in community- dwelling elders? *Journal of the American Geriatrics Society*, *52*, 2052–2056.

Borrell, L. N., Burt, B. A., Neighbors, H. W., & Taylor, G. W. (2008). Social factors and periodontitis an older population. *American Journal of Public Health, 94*, 748–754.

Boyle, P. A., Buchman, A. S., Barnes, L. L., James, B. D., & Bennett, D. A. (2010). Association between life space and risk of mortality in advanced age. *Journal of the American Geriatrics Society, 58*(10), 1926–1930. doi:10.1111/j.1532-5415.2010.03058.x

Brown, P. (1995). Race, class and environmental health. A review and systematization of the literature. *Environmental Research*, *69*, 15–30.

Cacioppo, J. T., Hawkley, L. C., & Thisted, R. A. (2010). Perceived social isolation makes me sad: 5-year cross-lagged analyses of loneliness and depressive symptomatology in Chicago health, aging, and social relations study. *Psychology and Aging, 25*(2), 453–463.

Clark, R. (2004). Perceived racism and health inequities: A proposed model. In N. B. Anderson, R. A. Bulatao, & B. Cohen (Eds.), *Critical perspectives on racial and ethnic differences in health in late life* (pp. 543–565). Washington, DC: National Academy of Sciences.

Coughlin, T., Waidmann, T. & O'Malley-Watts, M. (2009). *Kaiser Commission on Medicaid and the Uninsured. Where does the burden lie? Medicaid and Medicare spending for dual eligible beneficiaries.* Retrieved from http://www.kff.org/medicaid/upload/7895-2.pdf

Cohen, S., & Herbert, T. B. (1996). Health psychology: Psychological factors and physical disease from the perspective of human psychoneuroimmunology. *Annual Review of Psychology, 47*, 113–142. doi:10.1007/s00127-008-0436-8

Cohen, A., Gilman, S., Houck, P. R., Szanto, K., & Reynolds, C. F. (2009). Socioeconomic status and anxiety as predictors of antidepressant

treatment response and suicidal ideation in older adults. *Social Psychiatry Psychiatric Epidemiology, 44*, 272–277.

Dallman, M. F., Akana, S. F., Laugero,K. D., Gomez, F., Manalo, S., Bell, M. E., & Bhatnagar, S. (2003). A spoonful of sugar: Feedback signals of energy stores and corticosterone regulate responses to chronic stress. *Physiology & Behavior, 79*, 3–12.

Donohue, J. (2006). Mental health in the Medicare Part D for mentally ill dual eligibles: A challenge for Medicare. *Health Affairs, 25*(3), 707–719. doi:10.1377/hlthaff.25.3.707

Donohue, J. M., Huskamp, H. A., & Zuvekas, S. H. (2009). Dual eligibles with mental disorders and Medicare Part D: How are they faring? *Health Affairs, 28*(3), 746–759. doi:10.1377/hlthaff.28.3.746

Everson-Rose, S. A., Skarupski, K. A., Bienias, J. L., Wilson, R. S., Evans, D. A., & Mendes de Leon, C. F. (2005). Do depressive symptoms predict declines in physical performance in an elderly, biracial population? *Psychosomatic Medicine, 67*, 609–615.

Fisher, K. J., Li, F., Michael, Y., & Cleveland, M. (2004). Neighborhood-level influences on physical activity among older adults: A multilevel analysis. *Journal of Aging and Physical Activity, 11*, 45–63.

Fuller-Thompson, E., Nuru-Jeter, A., Minkler, M., & Guralnik, J. M., (2009). African American-Caucasian inequities in disability among older Americans. *Journal of Aging and Health, 21*(5), 677–698. doi:10.1177/0898264309338296

Gee, C., Walsemann, K. M., & Brondolo, E. (2012). A life course perspective on how racism may be related to health inequalities. *American Journal of Public Health, 102,* 967–974. doi:10.2105/AJPH.2012.300666

Green, C. A., Polen, M. R., & Brody, K. K. (2003). Depression, functional status, treatment for psychiatric problems, and the health-related practices of elderly HMO members. *American Journal of Health Promotion, 17*(4), 269–275.

Gross, D. L., Temkin-Greener, H., Kunitz, S., & Mukamel, D. B. (2004). The growing pains of integrated health care for the elderly: Lessons from the expansion of PACE. *The Milbank Quarterly, 82*(2), 257–282.

Herd, P., Goesling, B., & House, J. S. (2007). Socioeconomic position and health: The differential effects of education versus income on the onset versus progression of health problems. *Journal of Health and Social Behavior, 48*(3), 223–238.

Herd, P., Schoeni, R., & House, J. S. (2008). Upstream solutions: Does supplemental security income program reduce disability in the elderly? *The Milbank Quarterly, 86*(1), 5–45.

Hirth, V., Baskins, J., & Dever-Bumba, M. (2008). Program of all-inclusive care (PACE): Past, present, and future. *Journal of the American Medical Directors Association, 10*, 155–160.

House, J. S., Landis, K. R., & Umberson, D. (1988). Social relationships and health. *Science*, *241*(4865), 540–545.

House, J. S. (2002) Understanding social factors and inequalities in health: 20th century progress and 21st century prospects. *Journal of Health and Social Behavior, 43*(2), 125–142.

House, J. S., Lantz, P. M., & Herd, P. (2005). Continuity and change in the social stratification of aging and health over the life course: Evidence from a nationally representative longitudinal study from 1986 to 2001/2002 (Americans' Changing Lives Study). *Journals of Gerontology, 60B*(Special Issue II), 15–26.

Jackson, J. S., Knight, K. M., & Rafferty, J. A. (2010). Race and unhealthy behaviors: Chronic stress, the HPA axis, and physical and mental health inequities over the life course. *American Journal of Public Health, 100*(5), 933–939.

Jones, N., Jones, S. L., & Miller, N. A. (2004). The Medicare health outcomes survey program: Overview, context, and near-term prospects. *BioMed Central, 2*(33), 1–10. doi:10.1186/1477-7525-2-33

Kim, J., & Durden, E. (2007). Socioeconomic status and age trajectories of health. *Social Science & Medicine, 65*, 2489–2502. doi:10.1016/j.socscimed.2007.07.022

Lampinen, P., & Heikkinen, E. (2003). Reduced mobility and physical activity as predictors of depressive symptoms among community-dwelling older adults: An eight-year follow-up study. *Aging Clinical and Experimental Research, 15*(3), 205–211.

Lantz, P. M., House, J. S., Mero, R. P., & Williams, D. R. (2005). Stress, life events, and socioeconomic inequities in health: Results from the Americans' changing lives study. *Journal of Health and Social Behavior, 46*(3), 274–288.

LaVeist, T. A., Nickerson, K. J., & Bowie, J. V. (2000). Attitudes about racism, medical mistrust, and satisfaction with care among African American and Caucasian cardiac patients. *Medical Care Research and Review, 57*(1), 146–161.

Lewis, T. T., Aiello, A. E., Leurgans, S., Kelly, J., & Barnes, L. L. (2010). Self-reported experiences of everyday discrimination are associated with elevated c-reactive protein levels in older African American adults. *Brain, Behavior, and Immunity, 24*, 438–443.

Lichtenberg, P. A., Brown, D. R., Jackson, J. S., & Washington, O. (2004). Normative health research experiences among African American elders. *Journal of Aging and Health*, *16*(5), 78S–92S. doi:10.1177/0898264304268150

Lied, T. R., & Haffer, S. C. (2004). Health status of dually eligible beneficiaries in managed care plans. *Health Care Financing Review, 25*(4), 59–74.

Mair, C., Diez Roux, A. V., Shen, M., Shea, S., Seeman, T., Echeverria, S., & O'Meara, E. S. (2008). Cross-sectional and longitudinal associations of neighborhood cohesion and stressors with depressive symptoms in the multiethnic study of atherosclerosis. *Annals of Epidemiology, 19*, 49–57. doi:10.1016/j.annepidem.2008.10.002

McEwen, B. S. (1998). Protective and damaging effects of stress mediators. *The New England Journal of Medicine, 338*(3), 171–179.

McEwen, B. S. (2000). Allostasis, allostatic load, and the aging nervous system: Role of excitatory amino acids and excitotoxicity. *Neurochemical Research, 25*(9/10), 1219–1231.

Medicare (2013). *Medicare advantage plan.* Retrieved from http://www.medicare.gov/sign-up-change-plans/medicare-health-plans/medicare-advantage-plans/medicare-advantage-plans.html

Medicaid.gov Affordable Care Act. Retrieved from http://www.medicaid.gov/AffordableCareAct/Affordable-Care-Act.html

Mendes de Leon, C. F., Beckett, L. A., Fillenbaum, G. G., Brock, D. B., Branch, L. G., Evans, D. A., & Berkman, L. F. (1997). African American-Caucasian differences in risk of becoming disabled and recovering from disability in old age: A longitudinal analysis of two EPESE populations. *American Journal of Epidemiology, 145*(6), 488–497.

Mendes de Leon, C. F., Barnes, L. L., Bienias, J. L., Skarupski, K. A., & Evans, D. A. (2005). Racial inequities in disability: Recent evidence from self-reported and performance-based disability measures in a population-based study of older adults. *Journal of Gerontology: Social Sciences, 60B*(5), S263–S271.

Mezuk, B., Rafferty, J. A., Kershaw, K. N., Hudson, D., Abdou, C. M., Lee, H., Eaton, W. W., & Jackson, J. S. (2010). Reconsidering the role of social disadvantage in physical and mental health: Stressful life events, health behaviors, race and depression. *American Journal of Epidemiology, 172*(11), 1238–1249. doi:10.1093?aje/kwq283

Millet, P. E., Close, K. S., & Arthur, C. G. (2010). Beyond Tuskegee. Why African Americans do not participate in research. In R. L. Hampton, T. P. Gullotta, & R. L. Crowel (Eds.), *Handbook of African American health* (pp. 51–79). New York: The Guilford Press.

Moon, S., & Shin, J. (2005). Racial differences in health care use among Medicare only and dual eligibles. *The Journal of Health and Human Services Administration, 28*(3), 326–345.

Mościcki, E. K., West, J. C., Rae, D. S., Rubio-Stipec, M., Wilk, J. E., & Reǵier, D. A. (2010). Suicidality is associated with medication access problems in

publically insured psychiatric patients. *Journal of Clinical Psychiatry, 71*(12), 1657–1663.

Muramatsu, N., Yin, H., & Hedeker, D. (2010). Functional declines, social support, and mental health in the elderly: Does living in a state supportive of home and community-based services make a difference? *Social Science & Medicine, 70*, 1050–1058. doi:10.1016/j.socscimed.2009.12.005

National Area Agency on Aging*. About N4A.* Retrieved from http://n4a.org/about-n4a/

Pearlin, L. I., Schieman, S., Fazio E. M., & Meersman, S. C. (2005). Stress, health, and the life course: Some conceptual perspectives. *Journal of Health and Social Behavior, 46*(2), 205–219.

Penninx, B. W. J. H., Guralink, J. M., Ferrucci, L., Simonsick, E. M., Deeg, D. J. H., & Wallace, R. B. (1998). Depressive symptoms and physical decline in community-dwelling older persons. *Journal of the American Medical Association, 27*(3), 1720–1726. doi:10.1001/jama.279/21/1720

Petty, F. (1995). GABA and mood disorders: A brief review and hypothesis. *Journal of Affective Disorders*, *34*(4), 275–281.

Phelan, J. C., Link, B. G., & Tehranifar, P. (2010). Social conditions as fundamental causes of health inequalities: Theory, evidence and policy implications. *Journal of Health and Social Behavior, 51*, S28–S40.

Public Law 106-525 (2000). Minority health and health inequities research and education act of 2000*.* Retrieved from http://www.gpoaccess.gov/serialset/cdocuments/sd106-30/pdf/pl106-525.pdf

Rhodes, D., Spiro, A. 3rd, Aro, A., & Hu, H. (2003). Relationship of bone and blood lead levels to psychiatric symptoms: The normative aging study. *Journal of Occupational Environmental Medicine, 45*(11), 1144–1151.

Robison, J., Schensul, J. J., Coman, E., Diefenbach, G. J., Radda, K. E., Gaztambide, S., & Disch, W. B. (2009). Mental health in senior housing: Racial/ethnic patterns and correlations of major depressive disorder.

Aging and Mental Health, 13(5), 659–673. doi:10.1080/13607860802607298

Ross, C. E. (2000). Walking, exercising and smoking: Does neighborhood matter? *Social Science and Medicine, 51*(4), 265–274.

Ross, C. E., & Jang, S. J. (2000). Neighborhood disorder, fear and mistrust: The buffering role of social ties with neighbors. *American Journal of Community Psychology, 28*, 401–420.

Schlosberg, C. (2004). The Medicare prescription drug, improvement and modernization act and the impact on care of people with chronic illness: Benefit design and implementation issues. *Care Management Journals, 5*(2), 113–121.

Stockdale, S. E., Tang, L., Zhang, L., Belin, T. R., & Wells, K. (2007). The effects of health sector market factors and vulnerable group membership on access to alcohol, drug, and mental health care. *Health Services Research, 42*(3), 1020–1040. doi:10.111/j.1475-6773:2006.00636.x

Taxis, C. J. (2006). Attitudes, values, and questions of African Americans regarding participation in hospice programs. *Journal of Hospice and Palliative Nursing, 8*(2), 77–85.

Tucker-Seely, R. D., Subramanian, S. V., Li, Y., & Sorensen, G. (2009). Neighborhood safety, socioeconomic status and physical activity in older adults. *American Journal of Preventative Medicine, 37*(3), 207–213. doi:10.1016/j.amepre.2009.06.005

U. S. House of Representatives. (2010). Patient protection and affordable care act health-related portions of the health care and education reconciliation act 2010. Retrieved from http://housedocs.house.gov/energycommerce/ppacacon.pdf

Walker, O. K., Steers, N., Liang, L., Morales, L. S., Forge, N., Jones, L., & Brown, A. F. (2010). The vulnerability of middle-aged and older adults in a multiethnic, low-income area: Contributions of age, ethnicity, and health insurance. *Journal of the American Geriatrics Society, 58*(12), 2416–2422.

West, J. C., Wilk, J. E., Muszynski, I. L., Rae, D. S., Rubio-Stipec, M., Alter, C.

L., Narrow, W. E., & Regier, D. A. (2007). Medication access and continuity: The experiences of dual eligible psychiatric patients during the first 4 months of the Medicare prescription drug benefit. *American Journal of Psychiatry, 164*(55), 789–796.

Wieland, D., Lamb, V. L., Sutton, S. R., Boland, R., Clark, M., Friedman, S., Brummel-Smith, K., & Eleazer, P. G. (2000). Hospitalization in the program of all-inclusive care for elderly (pace): Rates, concomitants, and predictors. *Journal of the American Geriatrics Society, 48*(11), 1373–1380.

Williams, D. R. (1999). Race, socioeconomic status, and health. The added effects of racism and discrimination. *Annals of the New York Academy of Sciences, 896*, 173–188.

Williams, D. R., & Williams-Morris, R. (2000). Racism and mental health: The African American experience. *Ethnicity & Health, 5*(3/4), 243–268. doi:10.1080/135578500200009356

Williams, D. R., & Jackson, P. B. (2005). Social sources of racial inequities in health. *Health Affairs, 24*(2), 325–335.

Wright, R. G., Cummings, J. R., Karlamangla, A. S., & Aneshensel, C. S. (2009). Urban neighborhood context and change in depressive symptoms in late life. *Journal of Gerontology: Social Sciences, 64B*(2), 247–251.

Zimmer, A., & House, J. S. (2003). Education, income, and functional limitation transitions among American adults: Contrasting onset and progression. *International Journal of Epidemiology, 32*, 1089–1097. doi:10.1093/ije/dyg254

CHAPTER 3

RESEARCH DESIGN AND METHODS

Introduction

The purpose of this chapter is to outline methods that undergirded the study. First, I completed Specific Aim 1 by summarizing the methods used to conduct the synthesis of published literature on social inequities that contribute to depressive symptoms and depression in African American older adults and the paradox of resilience. Second, I completed Specific Aim 2 by describing the utilization of Geographic Information Systems in a secondary analysis. Finally, I fulfilled Specific Aim 3 by using a path analysis to apply House's (2002) model of social inequities in health and aging to a sample of older adult Medicare Medicaid enrollees.

Specific Aim 1 Methods

In this literature synthesis guided by House's model of factors that contribute to depressive symptoms and depression in African American older adults, the following questions were considered:

Research Question 1A

What are the variables in House's model that contributes to depression and depressive symptoms in African Americans as compared to Caucasians?

Research Question 2A

What contributes to resilience in the presence of risk factors for depression and depressive symptoms in African American older adults?

Methodology

The literature synthesis included studies that met the following criteria: mean age of sample ≥50, community-dwelling Caucasian and African American older adults residing in the United States of America, and publications limited to the past 10 years that were published in the English language. Studies with less than a 10% African American representation were excluded.

Articles were identified through a search of PubMed, PsychInfo, and the Cumulative Index of Nursing and Allied Health (CINHAL) databases. Subsets of reference lists of selected publications were reviewed to complete the ancestral search. Search terms used to obtain literature included *psychosocial stressors*, *environment*, *low income*, *education*, and *social inequalities*. Using the Boolean operator "AND," each search term was combined with *depression*, *depressive symptoms*, *older adults*, *race*, or *African American*. *Depression* and *depressive symptoms* were both used as search terms to expand the selection of literature.

Scholarly publications were selected based on scientific rigor for qualitative and quantitative studies (Lincoln & Guba, 1985; Shadish, Cook, & Campbell, 2006). To achieve scientific rigor, quantitative studies had to contain at least a 10% representation of African Americans in the sample. The mean age of participants had to be ≥ 65. Sample size, measurement validity, and research design (experimental, quasi-experimental, nonexperimental) were also reviewed prior to inclusion in the synthesis. Small studies without a sound methodological

design were excluded (Shadish et al., 2006). The merit of qualitative studies was evaluated by length of observation, description of observations, consistency of findings, and methodology (content analysis, grounded theory, qualitative descriptive) to establish credibility (Lincoln & Guba, 1985). The final articles for the synthesis were reviewed to create a succinct organization of topics by devising a strategy for planning known as a *grid of common points* (Henning, 2011). A grid of common points allowed the authors to group material into categories to organize the synthesis. Specifics regarding this procedure are provided in Chapter 4.

Specific Aim 2 Methods

An exemplar of Geographic Information Systems (GIS) was used to test House's model and answer the following: Research Question 2A Can GIS be used to link data to support the path analysis of House's model in a sample of frail Medicare Medicaid older adults? Methodology A case exemplar was used to describe the process of gathering missing data from national data sets, such as the American Community Survey, to complete the secondary analysis. Three primary steps were identified to construct the case exemplar:

1. Identification of the construct of interest and generation of a list of possible indicators.
2. Identification of the databases and selection of the variables.
3. Linkage of the data to the subjects in the secondary analysis.

A detailed description of this process is provided in Chapter 5.

Specific Aim 3 Methods

A secondary analysis was conducted to test a conceptual framework for understanding social inequalities in health and aging to explore the pathways that lead to physical function and emotional well-being by race to answer the following:

Research Question 3A

When income, health behaviors (smoking, formal exercise, and physical activity), age, gender, neighborhood poverty, and socioeconomic status (education, income) are controlled, does race directly or indirectly impact physical function in frail Medicare Medicaid older adults?

Research Question 3B

When income, health behaviors (smoking, formal exercise, and physical activity), age, gender, neighborhood poverty, and socioeconomic status (education, income) are controlled, does race directly or indirectly impact emotional well-being in frail Medicare Medicaid older adults?

Design

One of the five principles of generalized causal inference is causal explanation (Shadish et al., 2002). A nonexperimental descriptive correlational design was used to produce causal explanations of the relationships in House's model that result in physical limitations and poor emotional well-being in the Medicare Medicaid enrollee. House's model is the explanatory theory needed to make a causal inference to support generalization of findings to the Medicare

Medicaid enrollee. However, a threat to the study validity is that generalizability is limited to Medicare Medicaid enrollees in northeast Ohio, as they would be the most similar to the sample in this study.

Sample

The data for this secondary analysis were obtained from baseline data of the After Discharge Care Management of Low Income Frail Elderly (AD-LIFE) trial. The AD-LIFE trial was a randomized controlled trial to test the effectiveness of an interdisciplinary nurse-led care-management intervention funded through the Agency for Health Quality and Research (AHRQ) R01 HS014539 (Allen et al., 2011; Wright, Hazelett, Jarjoura, & Allen, 2007). The AD-LIFE intervention included a hospital discharge phone call, in-home geriatric assessment by an advanced practice nurse (APN), interdisciplinary team report to a primary-care physician, and ongoing follow-up by a nurse care manager for 12 months.

The current study involved 337older adults in an acute-care setting who met the following criteria: age 65 years and older; hospitalized with likelihood of returning home; Medicare Medicaid enrollee; in the Medicaid waiver program; at least one chronic condition (congestive heart failure, chronic obstructive pulmonary disease, diabetes mellitus, stroke, osteoarthritis, osteoporosis, hypertension, or coronary artery disease); and a deficit in one activity of daily living or two instrumental activities of daily living prior to hospitalization. Persons who had a major psychiatric illness, who failed the short portable mental status questionnaire (score ≥ 5), who were terminally ill, who were on dialysis, who

were in hospice care, or who were chemically dependent were excluded in the primary AD-LIFE data set and were not available for this study.

African Americans represented 30% (106) and Caucasians 68% (231) of the 337 participants in the current study. Minority representation was greater than the state average of 12.4% African Americans. There were 46% (*n*=115) who had less than a high school education and a mean age of 74.7 *(sd=7.3*).

Theoretical effect size in structural equation modeling (SEM) was based on the literature. A sample size of 200 or greater provides enough power to statistically detect a moderate effect by reducing the amount of error variance. Sample sizes less than 200 increases the amount of error in the model (Bryne, 2010; Hair, Anderson, Tatham, & Black, 2006; Kline, 2011). The proposed data for the secondary analysis met the assumption of at least 200 subjects needed for a robust analysis (Munro, 2005). Statistically significant variables $p < .05$ were retained in the model. Chapter 6 provides a detailed review of the process to retain variables through the use of modification indices in AMOS 7.0.

Measurement

Predictor Variables

Table 3.1 provides a list of each predictor variable, description, and level of data that were utilized for the study.

Race

African American equals 0 and non-Hispanic Caucasian equals 1 as obtained from the AD-LIFE baseline data.

Gender

Male equals 1 and female equals 0 as obtained from AD-LIFE baseline data.

Education

Data regarding education were collected at time of enrollment in the AD-LIFE study trial from each subject and were categorized as follows: none = 0, less than high school graduate = 1, high school graduate (including equivalency) = 2, some college or associate degree = 3, bachelor's degree = 4, graduate work or graduate degree = 5.

Income

At time of enrollment in the AD-LIFE trial, subjects were asked to indicate their current occupation or occupation prior to retirement. GIS was used to link occupation to the American Community Survey 2006–2010 and occupation by median earnings in the past 12 months for the civilian-employed populations 16+ in a specific job. For example, the median income of a person in a service occupation (waitress) per census track would be $18,000 based on data from the last 12 months. Each subject's occupation was grouped into one of five categories: (1) management, business, science, and arts; (2) service occupations; (3) sales and office occupations; (4) natural resources, construction, and maintenance; or (5) production, transportation, and material moving.

The American Community Survey does not replace the decennial census long form; the methodology for data collection differs from the U.S. Census.

Census data uses a single measurement (one date) as compared to the American Community Survey, which uses continuous measurement and a rolling sample. Data were collected monthly in the American Community Survey with an average reported every 60 months. Sample representation for the U.S. Census is one in six households as compared to one in forty households for the American Community Survey (American Community Survey, 2008).

Geographic Information Systems were used to link income and economic variables to subjects in the AD-LIFE study by census tract. Economic conditions were then measured as percent of persons at or below the poverty level. See Chapter 5 for additional detail.

Health Behaviors

Self-reported health behaviors were obtained from study participants at time of enrollment in the AD-LIFE trial. Physical activity involves planned repetitive skeletal muscle movement that expends energy (Thompson, Buchner, Piňa, et al., 2003). In the current study, physical activity—such as walking—was collected in minutes per week. Unstructured physical activity—such as housework—was collected in minutes per week. Smoking as an adverse health behavior was documented as the number of cigarettes per day (0 to 100).

Outcome Variables (Endogenous Variables)

Physical Function and Emotional Well-being

The SF-12® is comprised of two component summary scores: the physical component score (PCS) and the mental component score (MCS). These

component scores include eight concepts: physical functioning; role limitations due to physical health; social functioning; bodily pain; general mental health; role limitations due to emotional problems; vitality (energy and fatigue); and general health perception.

Scores for the PCS and MCS were weighted and taken from each of the eight concepts, with some of the items weighing more on PCS than MCS and vice versa. Physical function questions examined any problems doing work as a result of physical health and identified level of activity, such as vacuuming or climbing stairs. Questions more specific to emotional well-being included identifying emotions, such as feeling downhearted and blue, as well as determining the perceived impact of emotional problems on completing tasks or activities.

Baseline component scores on the SF-12® from the AD-LIFE trial were used in the current study. Respondents answered items on the SF-12® on a 5- to 6-point scale with 1= “not at all or all of the time” and 6= “none of the time.” The score for the physical functioning was based on seven items summed for a total physical function score with a possible range of 10 to 30. Four items on the SF-12® were dichotomous and one item was a self-rated health question on a Likert scale.

Internal consistency and reliability for the physical components summary scale and mental components summary scale was .80 and .78, respectively, in the African Americans (*n*=1721) (Larson, Schlundt, Patel , Beard, & Hargreaves, 2008). Item-convergent validity was ≥.40, which indicated that the items met the

criteria of ≥.40 established by the others (Stewart, Hays, & Ware, 1988). In a factor analysis of 985 noninstitutionalized community-dwelling African American older adults by Cerin et al. (2010), the Cronbach's alpha for the mental health subscale was greater than the physical health subscale at a Cronbach's alpha of .76 and .45, respectively. This indicated that the SF-12® has greater internal consistency for measuring the construct of mental health in community-dwelling African American older adults (Cerin, Cresci, Jankowski, & Lichtenberg, 2010).

In a study of 187 older adults living a retirement community, the SF-12® had a Cronbach alpha coefficient of .89 and test/retest reliability of .73–.86 (Resnick & Parker, 2001). The Cronbach alpha coefficient for the current study was .69, which is within the recommended standards for group-level analysis (Nunnally & Bernstein, 1994). The SF-12® is a good instrument to use with older adults of various racial and ethnic backgrounds and has been shown to have good construct validity, convergent and discriminant validity, and concurrent validity in low-income African Americans (Larson et al., 2008).

Analysis

Path analysis is a special case of structural equation modeling. Predictive ordering of the variables is used to test causal order (Klem, 1995). Path analysis differs from multiple regression in that more than one dependent variable can be tested (Burant, 2011; Crowley & Fan, 1997; Hoyle & Smith, 1994).

Logic, theory, and empirical (LTE) evidence were utilized to determine the direction and relationship between predictor variables and outcomes as described in House's model (Kercher, 2005). Through a review of the literature,

the LTE of pathways in House's conceptual framework were supported. In House's conceptual framework, race/ethnicity and gender have a major causal pathway through SES. The explanatory variables (smoking, exercise, activity) have a major additive causal path to the health outcomes (poor emotional well-being and functional limitations). Social/political/economic conditions and policy have a moderating effect on race/ethnicity, gender, and SES. There are minor or residual additive causal paths from race/ethnicity, gender, and SES to health outcomes.

Temporally ordered variables were analyzed using a path analysis of 337 Medicare Medicaid enrollees. House's conceptual framework has established pathways based on LTE. Significant regression weights $p < .05$ were reported for each pathway in the model.

The following steps were used in the modeling procedure to test assumptions and fit indices:

1. Test for linearity (partial plots linear and quadratic lines), variability (scatter plots), normal distribution (skewness -3 to 3, kurtosis -8 to 8), and absence of outliers (DfBeta) via SPSS® version 18.0 (Myers, 1990; Tabachnick & Fidell, 2007).
2. Internal consistency was reported on the SF-12® using Cronbach's alpha (Field, 2009). One disadvantage of the Cronbach's alpha is the more items on the measurement scale, the greater the coefficient alpha (Field, 2009). SPSS® version 18.0 using the reliability command was done to run both unstandardized and standardized items (Kercher, 2005). Alpha if item

deleted was reviewed to improve the coefficient alpha for scales <.80 (Kercher, 2005). No items were removed as it did not improve the *coefficient alpha at 0.69.*

3. AMOS version 17 (Arbuckle, 2006) was used to draw standardized solutions to show a recursive model diagram.
4. Statistically significant parameter estimates were retained in the model, and modifications to pathways were made to create the best-fitting model (Arbuckle, 2006; Bryne, 2010; Hair et al., 1995; Hu & Bentler, 1999; Kenny, 2012).
5. Fit indices were based on the following (Kline, 2011):
    a. Chi Square with the lowest degrees of freedom.
    b. Comparative Fit Index (CFI) of at least .90.
    c. Tucker-Lewis Index (TLI) at .90 or greater.
    d. Root Mean Square Error of Approximation (RMSEA) at .05 or lower.
6. Iterations of each model were saved until the final model with the best fit was completed.

Paths were added in the following order to achieve the final model:

1. Percent poverty (PercPoverty) to income by occupation at retirement (OCCUPINCOM)
2. Gender to income by occupation at retirement (OCCUPINCOM)
3. Number of cigarettes smoked (KN1_SMOK) per week to physical activity (KN1_EXR2)

4. Doubled-headed arrow of error term for physical component summary score (E6) to mental component summary score (E7)
5. Age to mental component summary score (AGG_MENT)
6. Age to physical component summary score (AGG_PHYS)

All paths were freely estimated and the residual error terms were included for each endogenous variable to acknowledge "residual error in the prediction of an unobserved variable" (Bryne, 2010, p. 9). Parameter estimates for each covariance were set at zero. The statistical indices that were used included chi square degrees of freedom ratio ($\chi^{2/df}$) and of fit indices for the model, the Tucker Lewis Index, comparative fit indices (CFI), and root mean square error of approximation (RMSEA).

The fit indices measure the variance and covariance in a hypothesized model (House's Model of Social Inequalities and Aging) and the sample to determine the pathways to the outcome variables (Bryne, 2010). The χ^2 represents the likelihood that the variances, covariances, and error variances would exceed the χ^2 if the null hypothesis is accepted (Bryne, 2010). The CFI and TLI indicate the improvement of the model from the independent model that has zero correlations (Kline, 2011). Correlations for the CFI and TLI above .95 indicated a good model fit (Hu & Bentler, 1999).

A better-fitting model depends on the strength of the correlations in the data (Kenny, 2012). The TLI is more closely connected to the $\chi^{2/}df$ as compared to the CFI χ^2 – df in the model. If the CFI is less than one, it will always be larger than the TLI. The values for the $\chi^{2/}df$ *and* RMSEA are smaller than the TLI and

CFI. RMSEA is based on noncentrality parameter (Kenny, 2012). Smaller sample sizes and χ^2 can artificially inflate the RMSEA (Kenny, 2012). A RMSEA with a value of .06 or lower is considered to be a fit between observed data and the hypothesized model (Hu & Bentler, 1999).

Human Subjects

Participants who were admitted to acute care from the community were given informed consent by a research nurse from the AD-LIFE study. Data used f or the current study were a cross-section of baseline information at enrollment.

A collaborative agreement was arranged between Summa Health System IRB and the University of Utah IRB to designate Summa Health System as the primary IRB and University of Utah as the secondary IRB of record. After completion of a business associates agreement by the University of Utah Digit Lab, the Joint Investigational Review Board from Summa Health System Department of Research and The University of Utah approved the current study. Data were transferred from an encrypted computer located at Summa Health System in Akron, Ohio, to a Summa Health System IRB-approved encrypted flash drive.

Table 3.1

Data Collection for Analysis

Data	Description	Levels of Measurement
Age	Years	Interval/Ratio
Race	African American Caucasian	Nominal/Categorical
Gender	Male Female	Categorical
Education	6 levels of education	Ordinal
Income	Occupation at retirement as proxy for income obtained from the American Community Survey 2006–2010).	Interval
Economic Conditions	Percent of persons at or below poverty level obtained from the American Community Survey 2006–2010	Interval
Smoking	Number of cigarettes per day.	Nominal/Categorical
Sedentary	Structured activity (for example, going to gym, workout video, swimming, Tai Chai, etc.) recorded in minutes of exercise per week. Unstructured activity (for example, housework, mowing, walking at work, gardening, etc.) recorded in minutes of physical activity per week.	Interval/Ratio Interval/Ratio
Functional Limitations	SF-12® item scale physical components summary score as proxy for functional limitations.	Interval/Ratio
Poor Emotional-wellbeing	SF-12® item scale mental components summary score as proxy for depression defined as poor emotional-wellbeing.	Interval/Ratio

References

Allen, K., Hazelett, S., Jarjoura, J.,Wright, K., Fosnight, K., Kropp, K., Hua, K., & Pfister, E. (2011) The after discharge care management of low-income frail elderly (AD-LIFE) randomized trial: Theoretical framework and study design. *Population Health Management, 14*(0), 1–6. doi:10.1089/pop.2010.0016

American Community Survey (2008). Limitations. Retrieved from http://www.census.gov/acs/www/methodology/limitations/

Andresen, E. M., Malmgren, J. A., Carter, W. B., & Patrick, D. L. (1994). Screening for depression in well older adults: Evaluation of a short form of the CES-D (Center for Epidemiological Studies Depression Scale). *American Journal of Preventative Medicine*, *10*(2), 77–84.

Arbuckle, J. L. (2006). *Amos 7.0 user's guide.* Chicago: SPSS®.

Boutin-Foster, C. (2008). An item-level analysis of the center for epidemiologic studies depression scale (CES-D) by race and ethnicity in patients with coronary artery disease. *International Journal of Geriatric Psychiatry, 23*, 1034–1039. doi:10.100/gps.2029

Burant, C. (2011). Structural equation modeling: Is it really just spaghetti and meatballs? [PowerPoint slides]. February 24, 2011.

Bryne, B. M. (2010). *Structural equation modeling with AMOS. Basic concepts, applications and programming.* New York: Routledge Taylor & Francis Group.

Cerin, P. A., Cresci, K., Jankowski, T. B., & Lichtenberg, P. A. (2010). Reliability and validity of the short-form health survey in a sample of community-dwelling African American older. *Journal of Nursing Measurement, 18*(1), 49–59.

Cheng, S. T., & Chan, A. C. M. (2005). The center for studies depression scale in older Chinese: Thresholds for long and short forms. *International Journal of Geriatric Psychiatry, 20,* 465–470. doi:10.1003/gps.1314

Cleary, A. T. (1968). Test bias: Prediction of grades of Negro and White students in integrated colleges. *Journal of Educational Measurement, 5*(2), 115–124.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. Hillsdale, NJ: Lawrence Erlbaum.

Crowley, S. L., & Fan, X. (1997). Structural equation modeling. Basic concepts and application in personality assessment research. *Journal of Personality Assessment, 68*(3), 508–531.

Field, A. (2009). *Discovering statistics using SPSS*® (3rd ed.). Los Angeles, CA: Sage.

Green, S. B., & Salkind, N. J. (2008). *Using SPSS® for Windows and Macintosh. Analyzing and understanding data* (5th ed.). Upper Saddle River, NJ: Pearson Prentice Hall.

Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (1995). *Multivariate data analysis* (4th ed.). Englewood Cliffs, NJ: Prentice-Hall.

Henning, T. B. (2011). Literature review: Synthesizing multiple sources. Retrieved from http://www.iupui.edu/~uwc/pdf/Literature%20Review%20and%20Synthesis.pdf

House, J. S. (2002). Understanding social factors and inequalities in health: 20th century progress and 21st century prospects. *Journal of Health and Social Behavior, 43*(2), 125–142.

Hoyle, R. H., & Smith, G. T. (1994). Formulating clinical research hypotheses as structural equation models: A conceptual overview. *Journal of Consulting and Clinical Psychology, 62*(3), 429–440.

Irwin, M., Artin, K. H., & Oxman, M. N. (1999). Screening for depression in the older adult. Criterion validity of the 10-item center for epidemiological studies depression scale (CES-D). *Archives of Internal Medicine, 159*, 1701–1704.

Katz, S., Down, T. D., Cash, H. R., & Grotz, R. C. (1970). Progress in the development of the index of ADL. *The Gerontologist, 10*(1), 20–30.

Kercher, K. (2005). *Advanced multivariate analysis: Path analysis.* Unpublished manuscript, Department of Nursing, Case Western Reserve University, Cleveland, Ohio.

Kline, R. B. (2011). *Principles and practice of structural equation modeling* (3rd ed.). New York: The Guilford Press.

Larson, C. O., Schlundt, D., Patel, K., Beard, K., & Hargreaves, M. (2008). Validity of the SF-12 for use in low-income African American community-based research initiative (REACH 2010). *Public Health Research, Practice and Policy, 5*(2), 1–14.

Lawton, M. P., & Brody, E. M. (1969). Assessment of older people: Self-maintaining and instrumental activities of daily living. *The Gerontologist, 9*(3), 179–186.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Newbury Park, CA: Sage Publications.

Munro, B. H. (2005). *Statistical methods for health care research* (5th ed.). Philadelphia: Lippincott Williams & Wilkins.

Osborne, J. (2002). Notes on the use of data transformations. *Practical Assessment, Research and Evaluation, 8*(6). Retrieved from http://pareonline.net/getvn.asp?v=8&n=6

Resnick, B., & Parker, R. (2001). Simplified scoring and psychometrics of the revised 12-item short-form health survey. *Outcomes Management in Nursing Practice, 5*(4),161–166.

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

SPSS® Base for Windows 12.0 (2003). *User guide*. Retrieved from http://safemanuals.com/314159.php?k=5f858cab0f8bfc29c2d8a2a343fcbbf8&ID=116476&q=SPSS® BASE 12.0&cM=-1

Sriwattanakomen, R., McPherron, J., Chatman, J., Morse, J. Q., Martire, L. M., Karp, J. F., Houck, P. R., Bensasi, S., Houle, J., Stack, J. A., Woods, M., Block, B., Thomas, S. B., Quinn, S. & Reynolds III, C. F. (2010). A comparison of the frequencies of risk factors for depression in older black and white participants in a study of indicated prevention. *International Psychogeriatrics, 22*(8), 1240–1247. doi:10.1017/S1041610210001523

Stewart, A. L., Hays, R. D., & Ware, J. E., Jr. (1988). The MOS short-form general health survey. *Medical Care, 26*(7), 724–735.

Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.) Boston: Pearson.

Thompson, P. D., Buchner, D., Piňa, I. L., et al. (2003). Exercise and physical activity in the prevention and treatment of atherosclerotic cardiovascular disease: A statement from the council on clinical cardiology (subcommittee on exercise, rehabilitation, and prevention) and the council on nutrition, physical activity, and metabolism (subcommittee on physical activity). *Circulation*, *107*, 3109–3116. doi:10.1161/01.CIR.0000075572.40158.77

Thorndike, R. L. (1971). Concepts of culture-fairness. *Journal of Educational Measurement, 8*(2), 63–70.

Ware, J., Kosinski, M., & Keller, S. D. (1996). A 12-item short-form health survey: Construction of scales and preliminary tests of reliability and validity. *Medical Care, 34*(3), 220–233.

Weissman, M. M., Sholomskas, D. Pottenger, M. Prusoff, B. A., & Locke, B. Z. (1977). Assessing depressive symptoms in five psychiatric populations: A validation study. *American Journal of Epidemiology*, *106*(3), 203–214.

Wright, K., Hazelett, S., Jarjoura, D., & Allen, K. (2007) The AD-LIFE trial. Working to integrate medical and psychosocial care management models. *Home Health Care Nurse, 25*(5), 308–314.

Yang, F. M., Tommett, D., & Jones, R. N. (2009). Disparities in self-reported geriatric depressive symptoms due to sociodemographic differences: An extension of the bi-factor item response theory model for use in differential item functioning. *Journal of Psychiatric Research, 43*(12), 1025–1035. doi:10.1016/j.psychires.2008.12.007

CHAPTER 4

FACTORS THAT INFLUENCE DEPRESSION AND DEPRESSIVE SYMPTOMS IN AFRICAN AMERICAN OLDER ADULTS: THE DEPRESSION RISK PARADOX

Abstract

By 2020, depression will rank second in disease burden to cardiovascular disease. A paradox exists between the number of risk factors and prevalence of depression in African Americans as compared to Caucasians, though studies are inconsistent regarding the extent of depressive symptoms by race. The purpose of the current study was to conduct a literature synthesis guided by House's model of factors that contributes to depressive symptoms and depression in African American older adults.

Relevant articles were identified through PubMed, PsychInfo, and Cumulative Index of Nursing and Allied Health (CINHAL) databases and ancestral search. A total of 1319 articles were reviewed; 1148 were excluded based on the abstract and title. Of those that remained, 171 were evaluated for inclusion criteria: ≥10% of sample African American; mean age equal to or greater than 50; depression outcome (vs. predictor) variable; and publication

limited to the past 10 years that were published in the English language. The total sample was 15 articles.

Social determinants of health were associated: Those who were low-income and lived in disadvantaged neighborhoods had greater depressive symptoms. Neighborhood disadvantage included a cluster of factors such as percentage of persons at or below poverty level, persons on public assistance, poor esthetics, and crime. Individual-level stressors, such as racism and discrimination, negatively impacted African American older adults. Resilience was manifested through coping strategies such as spirituality and religion; this may explain the paradox of lower depressive symptoms for African American older adults as compared to Caucasians in the face of greater cumulative stressors over the life course.

Future research should include learning from the strengths of African Americans older adults that may buffer depressive symptoms, which can benefit all older adults—not just African Americans.

Introduction

Depression is the most prevalent mental health problem in older adults, with 7.7% reporting current depression and 15.7% reporting lifelong depression (Centers for Disease Control, 2009). Both depression and depressive symptoms are linked to worse health outcomes in older adults.

For this synthesis paper, *depression* was defined as a positive screen through the use of a standardized tool and or diagnosis of depression as indicated in the Diagnostic Criteria from DSM-IV (American Psychological

Association, 1994). *Depressive symptom* was defined as the endorsement of one or more clinically significant items on a standardized screening tool, such as the Center for Epidemiological Studies-Depression (CES-D), and/or in the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) (American Psychiatric Association, 1994; Weissman, Sholomskas, Pottenger, Prusoff, & Locke, 1977). Depressive symptoms, also known as *subsyndromal depression*, have a 10% prevalence rate in older persons and contribute to an increased risk of depression and morbidity (Grabovich, Lu, Tang, Tu,& Lyness, 2010; Kessler, Zhao, Blazer, & Swartz, 1997).

The consequences of depression include functional impairment, decreased mobility, and cognitive dysfunction (Hackstaff, 2009; Hybels, Blazer, Pieper, Landerman, & Steffens, 2009; Jang, Borenstein, Chiriboga, & Mortimer, 2005; Lampinen & Heikkinen, 2003; McDougall, Vaughan, Acee, & Becker, 2007). Depression is among the top six conditions—along with chronic kidney disease, chronic obstructive pulmonary disease, diabetes, and heart failure—that lead to excessive costs to Medicare (Schneider, O'Donnell, & Dean, 2009). As compared to older adults without depressive symptoms, ambulatory costs and inpatient costs were 43% to 51% higher for those with depressive symptoms (Kanton, Lin, Russo, & Unützer, 2003). Greater length of stay in acute-care facilities and frequent readmissions have both been linked to depressive symptoms and depression for older adults with comorbid conditions like congestive heart failure and diabetes (Chapman, Perry, & Strine, 2005; Cienchanowski, Kanton, & Russo, 2000)..

The prevalence of risk factors for depression—such as low socioeconomic status, living alone, functional disability, obesity, cognitive impairment, and substance abuse—are greater in African Americans, yet rates of depression in African Americans are similar to those in Caucasians (Rubio et al., 2011; Sriwattanakomen et al., 2010; Williams et al., 2007). In most other medical conditions—such as diabetes, heart disease, and obesity—the prevalence is greater in African Americans than Caucasians (Schiller, Lucas, Ward, & Peregoy, 2010).

A paradox exists between the prevalence of risk factors and rates of depression and depressive symptoms in African Americans as compared to Caucasians (Jackson & Knight, 2006; Jackson, Knight, & Rafferty, 2010; Keyes, 2009). Selection bias and measurement error are methodological limitations believed to contribute to this paradox (Keyes, Barnes, & Bates, 2011).

More recent studies use a mental-physical health paradox that focuses on differences in the mechanisms of coping with stressors. Unhealthy behaviors used to cope with stressors have been hypothesized to have a protective psychological effect on African Americans (Jackson et al., 2010; Mezuk et al., 2010). Unhealthy behaviors such as overeating, smoking, and alcohol use inhibit the hypothalamus-pituitary-adrenal (HPA) axis to decrease the release of corticotropin-releasing factor (CRF), which decreases feelings of anxiety (Dallman et al., 2003). Conversely, in an analysis of the 43,093 participants from the National Epidemiologic Survey on Alcohol and Related Conditions, there was no difference in the impact of unhealthy behaviors on stress, coping, and

depression in African Americans when compared to Caucasians (Keyes et al., 2011).

Disparities in clinical presentation, treatment, and access to care for depression between Caucasian and non-Caucasian older adults indicate that depression may be underdiagnosed and undertreated in non-Caucasians (Cabin & Fahs, 2011; Chiriboga, Yee, & Jang, 2005; Miller et al., 2004; Strothers et al., 2005). In a study of Medicare beneficiaries from 2001 through 2005, African Americans were 53% less likely to receive a depression diagnosis than non-Hispanic Whites. Of those African Americans diagnosed with depression, 45% were less likely than Caucasians to receive treatment (Akincigil et al., 2012). African American older adults and men of all races were half as likely as Caucasians to use an antidepressant (Grunebaum, Oquendo, & Manly, 2008). Regardless of age, African Americans who reported a diagnosis of major depressive disorder experienced greater disability associated with the diagnosis as compared to Caucasians (Williams et al., 2007).

Explanations for disparities are multifaceted and include factors such as stigma, biological predisposition, racism, discrimination, cultural influences, and environment (Banks, Kohn-Wood, & Spencer, 2006; Clark, 2004; Gary, 2005; Jackson et al., 2010; Lewis, Aiello, Leurgans, Kelly, & Barnes, 2010). Theoretical models of health disparities and inequities guide researchers to design interventions to address differences that are “are avoidable and unjust” (Whitehead, 1992, p. 5).

House’s (2002) conceptual framework of social inequities in health and

aging explores the complexities of inequities that lead to disparities in health outcomes (see Figure 4.1). Grounded in stress and coping theory, this model has been applied to studies examining the role of environmental, psychological, and socioeconomic status inequities in conditions such as diabetes and cardiovascular disease (House, 2002). In House's model, the influence of race, ethnicity, and gender follow a pathway through socioeconomic status, access to medical care, socio-environmental hazards, and psychosocial risk factors that produce adverse health outcomes. The specific psychosocial risk factors mentioned by House (2002) are health behaviors, social relationships and supports, chronic and acute stress, psychological dispositions (traits), social roles, and productive activities. These psychosocial risk factors mediate the influence of race and ethnicity on health outcomes. Social, political, and economic conditions and policy have a moderating effect on race, ethnicity, gender, and socioeconomic status. The presence or absence of supportive health policy has a major impact on health behaviors, emotional states, and environment. These pathways will be elaborated on further in the synthesis of the literature.

Purpose

Guided by House's model of social inequalities of health and aging, the purpose of this literature synthesis was to describe risk factors that contribute to depressive symptoms and depression in African American older adults. In addition, the synthesis will determine whether race has an opposite effect in

House's model because African Americans at a lower socioeconomic status may report less depression and fewer depressive symptoms than others.

Although House's model encompasses more health outcomes (mortality, Institutionalization, morbidity, functional limitations, self-rated health, and cognitive function), the primary focus of this synthesis was depression and depressive symptoms as health outcomes impacted by inequities in health and aging. Through understanding a multifaceted pathway to depression, researchers can improve diagnoses and access to care in identification and treatment of depression in African American older adults versus their Caucasian counterparts. In turn, these interventions would help reduce the disability associated with depression in African American older adults (Williams et al., 2007).

Methodology

Articles were identified through a search of PubMed, PsychInfo, and the Cumulative Index of Nursing and Allied Health (CINHAL) databases. Subsets of reference lists of selected publications were reviewed to complete the ancestral search. Search terms used to obtain literature were *psychosocial stressors*, *environment*, *low-income*, *education*, and *social inequities*. Using the Boolean operator "AND," each search term was combined with *depression*, *depressive symptoms*, *older adults*, *race*, or *African American*. *Depression* and *depressive symptoms* were both used as search terms to expand the selection of literature.

Depression and clinically significant depressive symptoms are linked to adverse outcomes in older adults (Blazer & Hybels, 2004; Everson-Rose et al., 2005; Green, Polen, & Brody, 2003). Small studies without a sound

methodological design or use of invalidated or poorly validated measures were excluded (Shadish, Cook, & Campbell, 2006). The merit of qualitative studies was evaluated by length of observation, description of observations, consistency of findings, and methodology (content analysis, grounded theory, qualitative descriptive) to establish credibility (Lincoln & Guba, 1985). Scholarly publications were selected based on scientific rigor for qualitative and quantitative studies (Lincoln & Guba, 1985; Shadish et al., 2006).

The literature synthesis included studies that met the following criteria: mean age of sample ≥50 depression outcome (vs. predictor) variable; publications limited to the past 10 years that were published in the English language; and community-dwelling Caucasian and African American older adults residing in the United States of America. The latter inclusion criterion was selected due to the history of institutional slavery, racism, and discrimination in the U.S. that contributed to stress and risk for disease (Clark, 2004; Pearlin, Schieman, Fazio, & Mersman, 2005). The experience of being African American or Black would be uniquely different if the country of origin were not the United States. Non-peer-reviewed journals, review articles, case reports, commentaries, nd studies with less than a 10% African American representation were excluded.

Of the 1319 articles, 15 articles were selected that met inclusion and quality criteria (see Figure 4.2). The final articles for the synthesis were reviewed to create a succinct organization of topics by devising a strategy for planning known as a *grid of common points* (Henning, 2011). A grid of common points allowed the authors to group material into categories to organize the synthesis.

The common points were derived from four groups: ideas or words that repeated, conflicts or contradictions, the main research questions, and answers to the main research questions. These answers to research questions became the risk factors for depression and depressive symptoms in older adults. The risk factors were then linked to variables in House's model. Race, gender, economic conditions, socioeconomic status, and explanatory variables (social environmental and social cohesion) were the primary categories of variables that contributed to depression and depressive symptoms. This synthesis does not provide all of the potential paths in House's model that could contribute to depression and depressive symptoms. Only those predictors that resulted from the synthesis were included. Table 4.1 provides a summary of the risk factors that were identified as well as the number of articles in which they were reported.

Results

House's model purports that a series of pathways to depression have minor, moderate, or major effects. This synthesis identified the common variables, including race, gender, economic conditions, socioeconomic status, and explanatory variables (social environmental and social cohesion) as a myriad of factors embodied in House's model that increased the risk of depressive symptoms and/or depression in African American older adults as compared to Caucasians. Table 4.2 is a description of each study, percentage of African American participants, mean age, and findings.

Race, Gender, and Economic Conditions

House's model describes race as a minor additive direct pathway to depression, with major influences being mediated through socioeconomic status and other explanatory variables. The relationship between racial identity and depression is unclear. Numbers of studies that focus on older African Americans and the psychological effects of racism and discrimination are sparse. Most of the literature focused on younger rather than older African American adults' cumulative stress over time. Stress that resulted from temporary and distant trauma in the form of racism, discrimination, and loss contributed to depressive symptoms (George & Lynch, 2003). In a latent growth curve analysis over a 6-year interval, an increase in loss-related events predicted an increase in depressive symptoms over time. Although African Americans and Caucasians reported depressive symptoms at the same rate, stress-related growth explained more of the variance for African Americans (R^2 =.67) than Caucasians (R^2 =.21). There was a positive correlation between race-related stress experienced by African Americans resultant from racism and discrimination (standardized canonical function coefficient =.26, structure coefficient= .84, and structural squared coefficient= 71%) and depressive symptoms (Carter & Reynolds, 2011). Carter and Reynolds hypothesized that higher social class creates distance between African American individuals that contributes to race-related stress. Among African Americans, those at a lower socioeconomic level experience greater stress from racism and discrimination. In multivariate analysis, greater symptoms of depression in older African Americans with hypertension have been

correlated with high stress (β=1.617, *p*<.001) and low social support (β=-.460, *p*<.001).

In longitudinal analysis, race was unrelated to changes in depressive symptoms over time and was measured at baseline and 3 years (Sachs-Ericsson, Plant, & Blazer, 2005). When socioeconomic status—defined as low level of education and problems in meeting needs—were included in the analysis, Caucasians endorsed more depressive symptoms than African Americans (*F*=6.89, *p*=0.01). After adjustment for socioeconomic status, African Americans endorsed more depressive symptoms than Whites (*F*=7.00, *p* =.01). After 3 years, problems meeting basic needs (*z*=4.25, *p*=.001) and years of education (*z*=4.25, *p*=.0.05) suppressed the relationship between race and depressive symptoms.

Likewise, in a 3-year longitudinal study of urban older adults, the relationship between neighborhood-level sociodemographic disadvantage and depressive symptoms did not change over time in models that controlled for individual-level characteristics (Wright, Cummings, Karlamangla, & Aneshensel, 2009). Rather, symptoms of depression increased significantly over time for persons who lived in areas of neighborhood-level sociodemographic disadvantage. Individual characteristics—such as being African American as compared to non-Hispanic White, low socioeconomic status, need for assistance in daily living activities, poor health, and being female—were more significant risk factors for depressive symptoms than environment. Gender is mediated by socioeconomic status and does not have a direct path to depression in House's

model. The type of neighborhood a person lives in may be influenced by education and income. Both low education and low income have been found to cause poor health outcomes (Herd, Goesling, & House, 2007; House, 2002; Link & Phelan, 1995).

Economic conditions represent a major additive pathway through socioeconomic status to health outcomes in House's model. Poor economic conditions are reflective of neighborhood disadvantage that impacted depressive symptoms in older adults. Utilizing data from the Health and Retirement Study, Wright, Ko, and Aneshensel (2011) explored the impact of neighborhood context and socioeconomic status on depressive symptoms. Neighborhood socioeconomic disadvantage (residents aged 25 or older without a high school degree, households receiving public assistance income, residents living below the poverty level, and residents aged 16 or older who are unemployed) was related to an increase in depressive symptoms (Kubzansky et al., 2005; Wright et al., 2011).

Variables associated with a greater number of depressive symptoms were being female (β= 0.208, p<0.001), African American (β=0.180, SE p=0.05), Hispanic (β=0.638, p<0.001), widowed (β=0.580, p<0.001), separated or divorced (β=0.359, p<0.001), and having fewer years of education (β=-0.105, p<.001). The greatest number of depressive symptoms were reported by the "young old" (52 to 63 years of age, β=-0.019, p=0.05) with low wealth (household income β=-0.333, p<.001; household wealth B=-0.913, SE 0.350, p, 0.01) in the most disadvantaged neighborhoods (β=0.109, p<0.05). After sociodemographic

variables were controlled, the effects of proportion of Hispanics and African Americans in neighborhoods on prevalence of depressive symptoms were not sustained.

Conversely, Schootman et al. (2007) found that residing in a disadvantaged neighborhood did not increase depressive symptoms. They investigated the association between location of residence and clinically relevant levels of depressive symptoms in middle-aged (51 to 65 years of age) African Americans using data from the African American Health Study and found no association between the subject's location (disadvantaged neighborhood) and incident of depressive symptoms. This was a 3-year longitudinal study in which 21.1% (998 subjects) reported clinically relevant depressive symptoms at baseline and 12.7% (672) reported symptoms at 3 years. Persons with individual characteristics such as low income, severe chronic diseases, limitations in visual acuity, and prior hospitalizations were more likely to develop clinically relevant symptoms in unadjusted analysis as opposed to location of residence. The comparisons of individual and neighborhood factors may have contributed to the contradictory findings.

Social Political Conditions

The influences of individual versus neighborhood characteristics (Glymour, Mujahid, Wu, White, & Tchetgen Tchetgen, 2010; Hybels et al., 2006; Wright et al., 2009; Wright et al., 2011) were also identified in Cabin and Fahs's (2011) study describing the interrelationship between individual and neighborhood effects in predicting depression among community-dwelling older

adults. Individual factors such as visual impairment ($R^{2=}$.048, p<.000), frequent falling ($R^{2=}$.082, p<.000), lower income ($R^{2=}$.106, p<.000) and low neighborhood satisfaction ($R^{2=}$.140, p=.000) were associated with an increase in depression in both African Americans and Caucasians.

In a study by Glymour et al. (2010), the authors controlled for race and ethnicity that could potentially confound the relationship between neighborhood socioeconomic status and health. Living in a disadvantaged neighborhood did not predict elevated depressive symptoms in either African American or Caucasian participants (OR, 0.97; 95% confidence interval, 0.81-1.16). These findings were similar to those in a multilevel modeling study by Hybels et al. (2006) to determine if neighborhood socioeconomic characteristics were associated independent of individual characteristics in the presentation of depressive symptoms. No differences were seen by race. However, in this study of 2998 individuals, increased depressive symptoms were associated with younger age (*PE*=-0.0375, *SE*=0.0112, *t*=-3.34, *p*<.0008), being widowed (*t*=-2.58, *p*<.0099), having lower income ($10,000–$14,999) (*t*=-1.95, *p*=.05), or having some functional limitation (*t*=-14.89, *p*<.0001).

Psychosocial Variables (Social Environment and Social Cohesion)

The explanatory variables in House's model (social environment, chronic and acute stress due to racism) mediate the indirect effects of race, gender, and economic conditions on depression. These were just of few of the explanatory variables that have the potential to impact health outcomes in the model. Social environmental factors such as neighborhood stability and social cohesion

influence the relationship between neighborhood and depressive symptoms. Aneshensel et al. (2007) hypothesized that neighborhood stability would have a protective effect from depressive symptoms since experiencing more symptoms would be associated with low socioeconomic status, high concentration of ethnic minorities, residential instability, and low proportion of adults aged 65 and older. Results suggested that stable neighborhoods with a greater concentration of older adults were associated with increased depressive symptoms (β =.724, *p*=.01). The racial and age mix of individuals within a neighborhood could have impacted the protective effect seen in other studies of neighborhood stability. The findings of Beard et al. (2009) and Aneshensel et al. (2009) were similar. Characteristics that predicted worsening depressive symptoms included residential stability, neighborhood socioeconomic influences, and racial ethnic composition (principal factor analysis with an orthogonal varimax rotation; factor loadings ranged from 0.513-0.92).

By contrast, Kubzansky et al. (2005) found better mental health when older adults lived around other older adults. The study was derived from the New Haven component of Established Populations for Epidemiologic Studies of the Elderly in 1982 using 1980 census data. Individual-level characteristics somewhat attenuated results, but neighborhood poverty remained a significant predictor of depression.

Echeverria, Diez-Roux, Shea, Borrell, and Jackson (2008) examined the associations between social cohesion and neighborhood problems (noise, heavy traffic, violence) with depression and health behaviors. Respondents were asked

to rate various types of neighborhood problems, such as excessive noise, trash, litter, and violence. Older adults living in the least problematic neighborhoods were significantly less likely to be depressed (*OR*, -0.36; 95% confidence interval, -0.42,-0.30) and less likely to engage in unhealthy behaviors such as smoking (*OR*, 0.81, 95% confidence interval, 0.68, 0.96). In less socially cohesive neighborhoods, older adults were more likely to be depressed, smoke, and not walk for exercise. The relationship between more socially cohesive neighborhoods and rates of depression was not statistically significant The impact of neighborhood problems and poor neighborhood cohesion remained the same after adjusting for individual level variables (*OR*, -0.21, 95% confidence interval -0.29, -0.13).

In a study by Mair et al. (2008) of 2,619 healthy adults aged 45 to 84, lower levels of social cohesion, poor aesthetic quality, and higher levels of violence were associated with higher mean depression scores in both men and women (*p*=.01, adjusted mean difference in CES-D per 1 standard deviation increase in summary score of age, race, ethnicity, income, and neighborhood-level characteristics in women OR,-1.01, 95% confidence interval -1.85, -0.17; in men -1.08,CI=-1.88,-0.28). Greater income, older age, and higher levels of education were each associated with lowered risk of depressive symptoms for both men and women.

Discussion and Implications for Research

In this synthesis, neighborhood characteristics such as disarray, poverty, and poor cohesion, along with individual characteristics of age, race, and gender,

were the most commonly reported factors that contributed to the most depressive symptoms and depression in African American older adults. According to House's model (Figure 4.1), minority status, low education, and low income have a causal pathway to depression. These risk factors would have implications for African American older adults since they are more likely to report disability, have lower income, and reside in more disadvantaged neighborhoods as compared to Caucasians (August & Sorkin, 2010; Fuller-Thompson, Nuru-Jeter, Minkler, & Guralnik, 2009; Mendes de Leon, Barnes, Bienias, Skarupski, & Evans, 2005).

Risk factors that predict health status—such as income, gender, stress, and discrimination—have been hypothesized to predispose those at a lower socioeconomic status to poorer health outcomes (Herd et al., 2007; House, 2002; Link & Phelan, 1995). A consistent finding in health research in the United States is that individuals with a lower income and minority status had greater physical disability and worse health outcomes (Allman, Baker, Maisiak, Sims, & Roseman, 2004; Clark, 2004; Smedley, Stith, & Nelson, 2003). House's model purports that race (minority status) would have an adverse effect on health outcomes. However, based on the findings from this synthesis, a paradox does exist in African American older adults: Lower socioeconomic status does not consistently translate into adverse mental health outcomes (Jackson et al., 2010; Williams & Williams-Morris, 2000). A limitation of this synthesis was that all of the possible risk factors that may have contributed to depression and depressive symptoms were not included.

In addition to theories on the differences related to measurement error and mechanism in stress and coping, as elucidated by others (Jackson et al., 2010; Keyes et al., 2011), this paradox could also be explained by resiliency of African Americans through use of spirituality as a coping mechanism. *Resiliency* is the ability of a person to "bounce back" or have good outcomes despite exposure to multiple risk factors (Atikinson, Martin, & Rankin, 2008; Rutter, 2006). The construct of resilience is dynamic, situational, and involves both intrapersonal and environmental factors (Ong, Bergeman, & Boker, 2009; Tusaie & Dyer, 2004). Personal factors include optimism, humor, and belief systems (Tusaie & Dyer, 2004). Spirituality and religion in the African American community is viewed as the preferred coping strategy to buffer the increased risk factors that may contribute to less depression and fewer depressive symptoms (Jang & Johnson, 2004; Marks, Nesteruk, Swanson, Garrison, & Davis, 2005; Utsey, Adams, & Bolden, 2000; Utsey, Ponterotto, Reynolds, & Cancelli, 2000).

Spirituality is a resource that contributes to resilience in the presence of greater exposure to risk and lower prevalence of depressive symptoms in African American as compared to Caucasian older adults (Gitlin, Hauck, Dennis, & Schulz, 2007; June, Segal, Coolidge, & Klebe, 2009; Wittink, Joo, Lewis, & Barg, 2009). Mofidi and colleagues (2006) examined the relationship between the dimension of spirituality, spiritual experiences, and depressive symptoms. Spiritual experiences were measured using the six-item Daily Spiritual Experiences Scale (Underwood & Teresi, 2002) that included statements such as

"I feel God's presence," "I feel thankful for my blessings" and "I feel deep inner peace or harmony."

An evaluation of stress loss was included in a structural equation model to allow for testing of theoretical relationships between latent constructs of spirituality and depressive symptoms (Mofidi et al., 2006). Results indicated that those who reported greater spiritual experiences reported fewer symptoms of depression (x^2 [49, *N*=626]=202.998, *p*< 0.05, Comparative Fit Index=.968, Tucker Lewis Index= .979, and RMSEA=.071). Spirituality had a protective effect in both African American and Caucasian older adults.

In a study of 72 community-dwelling older adults, total religiousness contributed significantly to reasons for living in the regression model (Beta=-0.50, *p*<0.001) and social supports (Beta= 0.30, p<0.001). For African American older adults, the reason for living accounted for 55% of the variance in the regression model as compared to 9% for Caucasians (June et al., 2009). Lessons learned from the use of spirituality by African American older adults to promote resilience may help researchers design interventions for other ethnicities to buffer the effects of neighborhood environment on depression and depressive symptoms.

Conclusion

Guided by House's model of social inequalities of health and aging, this literature synthesis described factors that contributed to depressive symptoms and/or depression in African American older adults. The results of the literature synthesis supported the pathways in House's model. Age was not included in House's model but had an influence on depressive symptoms and depression in

the young old. Women, African Americans, younger old (aged 55 to 63), and low-income older adults experienced more depressive symptoms and depression.

Because of racial segregation, African Americans are concentrated in areas of high poverty, substandard housing, high crime rates, and limited access to quality health care (Beach, Schulz, Castle, & Rosen, 2010; Brown, 1995; Mezuk et al., 2010). A greater proportion of African Americans live in census tracts with high numbers of socioeconomically disadvantaged people. The concept of compound disadvantage—an interaction between low income and living in socioeconomically disadvantaged neighborhoods—was associated with increased depressive symptoms among the poorest residents. Environmental press plateaus in late life, at which point neighborhood characteristics cease to influence depressive symptomatology (Wright et al., 2009). House's model, which encompasses multiple pathways to depression, can be used to structure interventions to target both individual and environmental factors to reduce disparities in diagnosis and treatment of depression in African American older adults.

In House's model, policies had both a significant mediating and moderating effect on SES. Since Census 2010 data are now available, future research is needed to reflect the decline in the United States economy that may have further impacted the health of African American older adults. Health policies should incorporate changes in the environment that promote control strategies on a neighborhood level to support the individual. Learning about depression in African Americans from a strengths perspective (resiliency through spirituality)

rather than a risk orientation would lead to developing health policy directed toward environmental, socioeconomic, and social cohesion for all older adults.

Table 4.1

Risk Factors for Depression and Depressive Symptoms in Included Articles (*N=15)*

Risk factor	% articles (Number)
Neighborhood disadvantage (included a cluster of factors, percentage of low income, public assistance, poor esthetics, and crime)	40% (6)
Low income	27% (4)
Race (African-American)	27% (4)
Widowed or divorced	20% (3)
Low education	20% (3)
Low social cohesion	20% (3)
Social cohesion within the neighborhood	20% (3)
Gender (Female)	20% (3)
Age (52-63 years old)	20% (3)
Neighborhood with greater percentage of older adults	13% (2)
Stress attributed to racism and discrimination	13% (2)
Limited function	13% (2)
Low vision	13% (2)
Neuroticism	6% (1)
Falls	6% (1)
Frequent contact with social supports	6% (1)
Poor health	6% (1)

Table 4.2

Articles Included in Synthesis

Author	Description	Percent African American	Mean Age in years	Findings
Sachs-Ericsson & Blazer, 2005	Longitudinal study. Biracial sample (*N*=4,162) to determine the relationship between race, socioeconomic factors and depressive symptoms.	45% (2061)	73.57 (*SD*=6.73)	Socioeconomic variables (education & problems meeting needs) mediated the relationship between race and depressive symptoms.
Wright et al., 2011	Longitudinal study (*N*=4,805) to examine the relationship between neighborhood characteristics (socioeconomic disadvantage, affluence and racial ethnic composition) and depressive symptoms.	13.18% (633)	51-61 Mean not provided	Persons with low wealth in the most disadvantaged neighborhoods report the most depressive symptoms. Individual characteristics (age 52-63, African American, female, widowed, divorced, low income, low education) reported greater depressive symptoms.
Schootman et al., 2007	Longitudinal study (*N*=998) to investigate the relationship between neighborhood environment and symptoms of depression.	100% (998)	51-65	No association between the subject's location and the incidence of clinically relevant symptoms of depression.

Table 4.2 Continued

Author	Description	Percent African American	Mean Age	Findings
Wright et al., 2009	Survey data from three waves of the Study of Assets and Health Dynamics Among the Oldest Old (Time 1 *N*= 3,442; Time 2 *N*= 2,632; Time 3 *N*= 1,871)= to determine the relationship between neighborhood sociodemographic characteristics and change over time in late-life depression symptoms	Time 1= 17.14% Time 2= 16.11% Time 3= 15.98%	Time 1= 77.20 (5.40) Time 2= 76.57 (5.40) Time 3= 75.88 (4.90)	Individual characteristics (younger old, female, being African American) as compared to non-Hispanic White, low socioeconomic status, activities of daily living assistance and poor health. In oldest old, individual characteristics may be a more important risk factor than environment
Glymour et al., 2010	Longitudinal study (*N*= over 4000) aged 55-65 in the national Health and Retirement Study to determine the relationship between neighborhood disadvantage; self assessed health, disability and depressive symptoms.	14% (Not provided)	All participants aged 55-65	Living in disadvantaged neighborhoods did not predict elevated depressive symptoms.
Hybels et al., 2006	Multilevel model (*N*=2,998) to determine if neighborhood or individual characteristics influenced depressive symptoms.	35.1% (1049)	75.3 (5.8)	No racial difference. Individual characteristics influenced level of depressive symptoms; not neighborhood.

Table 4.2 Continued

Author	Description	Percent African American	Mean Age	Findings
Cabin & Fahs, 2011	Data from Brookdale Demonstration Project (*N*=1,870) to determine the interrelationship between individual and neighborhood effects in the prediction of depression	19.8% (370)	All participants 60 and over. Mean age not provided.	Individual risk factors (i.e., falls, low vision) were more predictive of depression than neighborhood effects.
Aneshensel et al., 2007	Survey data from 1993 and 1990 census tract data (*N*= 3,442) to determine whether depressive symptoms among older persons systematically vary across urban neighborhoods	10.16% (350)	77.15(5.69)	Significant variance in depressive symptoms across census tracts but was mostly accounted for at the individual level.
Kubzansky et al., 2005	Multianalytical framework (*N*= 2,109) to examine the relation between neighborhood context and risk of depressive symptoms	16% (337)	75.1 (.18)	Despite individual characteristics, those living in poor neighborhood experienced more depressive symptoms. Greater concentration of older adults in a neighborhood was associated with less depressive symptoms.

Table 4.2 Continued

Author	Description	Percent African American	Mean Age	Findings
Dennis et al., 2008	Exploration of the role of stress and social support as predictors of depression in African American sample with hypertension.	100% (194)	58.3 (12.2)	Stress and social support predicted the level of depression. As stress increased, depression increased. Younger age and female gender were also predictive of depression.
Echeverria et al., 2008	Multi-ethnic study (*N*=5,943) to determine the association between measures of neighborhood problems, neighborhood social cohesion, and depression,	27.4% (1628)	61.8 (Not provided)	Neighborhood problems and poor social cohesion were associated with an increase in depressive symptoms. No difference noted by race.
Mair et al., 2008	Healthy adults (*N*= 2,619) to determine the associations of neighborhood social cohesion, violence, and aesthetic quality with depressive symptoms.	41.6% (1089)	Mean not provided. 71% over age 55.	Lower levels of social cohesion, poor aesthetic quality, and higher levels of violence were associated with greater depressive symptoms.

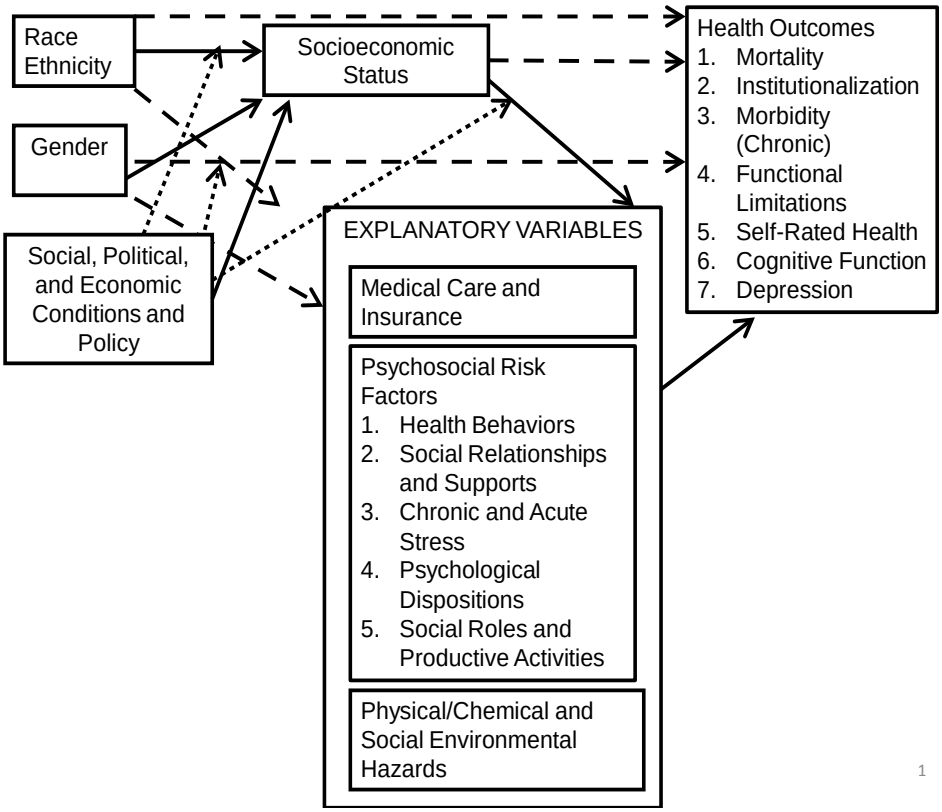


Figure 4.1 Solid line=major path. Dash line=minor path. Dot line=interactive effect

Sociodemographic, Political, Socioeconomic, Individual, and Environmental Linkages to Health Outcomes: Depression (House, 2002).

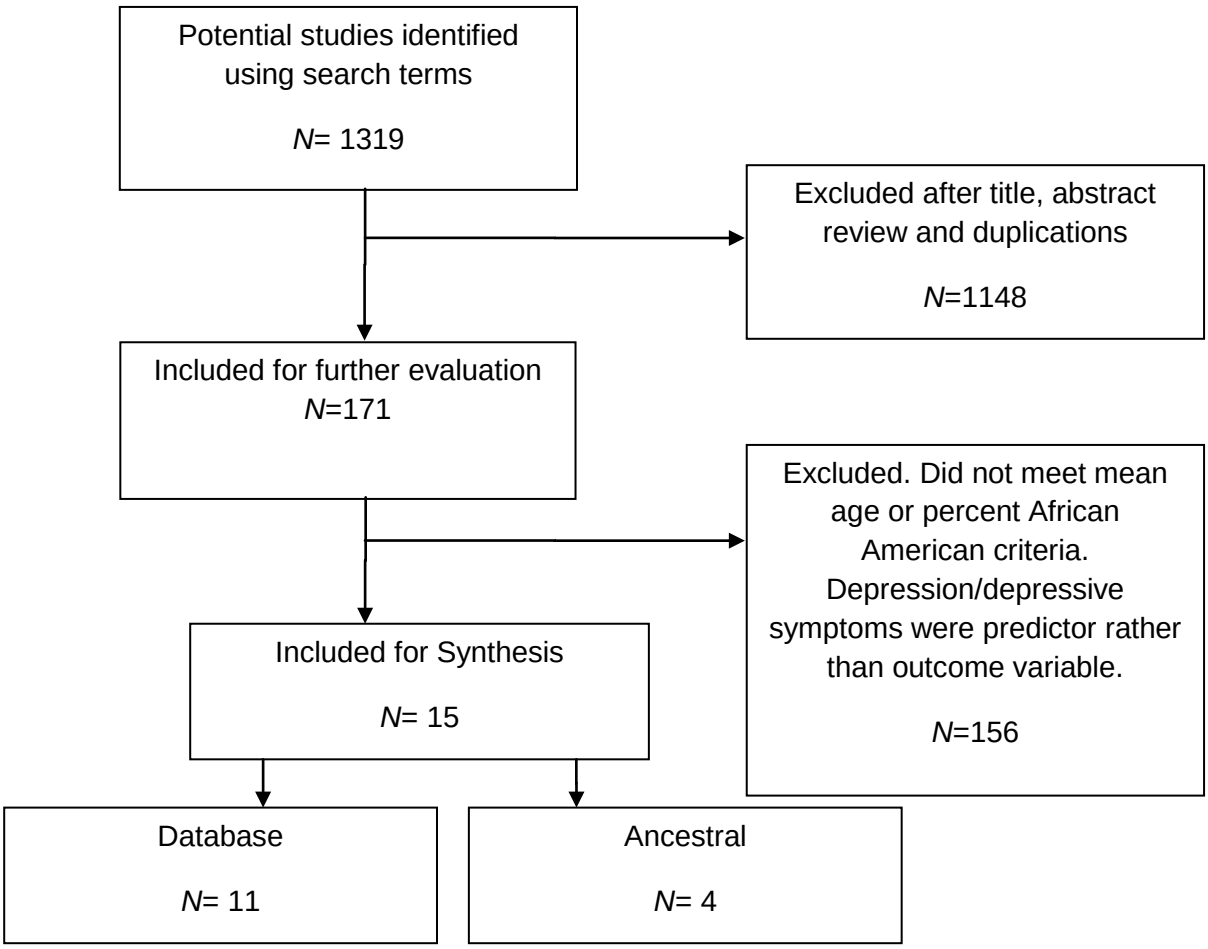


Figure 4.2 Diagram of Synthesis Results

References

Akincigil, A., Olfson, M., Siegel, M., Zurlo, K. A., Walkup, J. T., & Crystal, S. (2012). Racial and ethnic disparities in depression care in community-dwelling elderly in the United States. *American Journal of Public Health, 102*,319–328. doi:10.2105/AJPH.2011.300349

Allman, R. M., Baker, P. S., Maisiak, R. M., Sims, R. V., & Roseman, J. M. (2004). Racial similarities and differences in predictors of mobility change over eighteen months. *Journal of General Internal Medicine, 19*, 1118–1126.

American Psychiatric Association (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: American Psychiatric Association.

Aneshensel, C. S., Wright, R. G., Miller-Martinez, D., Botticello, A. L., Karlamangla, A. S., & Seeman, T. E. (2007). Urban neighborhoods and depressive symptoms among older adults. *Journal of Gerontology: Social Sciences, 62B*(1), S52–S59.

Atikinson, P. A., Martin, C. R., & Rankin, J. (2009). Resilience revisited. *Journal of Psychiatric and Mental Health Nursing, 16*, 137–145.

August, K. J., & Sorkin, D. H. (2010). Racial ethnic disparities indicators of physical health status: Do they still exist throughout late life? *Journal of the American Geriatrics Society, 58*, 2009–2015. doi:10.111?j.152-5415.2010.03033.x

Banks, K. H., Kohn-Wood, L. P., & Spencer, M. (2006). An examination of the African American experience of everyday discrimination and symptoms of psychological distress. *Community Mental Health Journal, 42*(6), 555–570.

Beach, S. R., Schulz, R., Castle, N. G., & Rosen, J. (2010). Financial exploitation and psychological mistreatment among older adults: Differences between African Americans and non-African Americans in a population-based survey. *The Gerontologist, 50*, 744–757. doi:10.1093/geront/gnq053

Beard, J. R., Cerdá, M., Blaney, S., Ahern, J., Vlahov, D. & Galea, S. (2009). Neighborhood characteristics and change in depressive symptoms among older residents of New York City. *American Journal of Public Health, 99*, 1308–1314. doi:10.2105/AJPH.2007.125104

Blazer, D., & Hybels, C. (2004). What symptoms of depression predict mortality in community-dwelling elders? *Journal of the American Geriatrics Society, 52*(12), 2052–2056.

Brown, P. (1995). Race, class and environmental health. A review and systematization of the literature. *Environmental Research, 69*, 15–30.

Cabin, W. D., & Fahs, M. C. (2011). Eyes wide open or not: Developing a model for predicting depression among older Americans. *Home Health Care Management & Practice, 23*, 342–355. doi:10.1177/1084822310384924

Carter, T. R., & Reynolds, A. L. (2011). Race-related stress, racial identity status attitudes, and emotional reactions of black Americans. *Cultural Diversity and Ethnic Minority Psychology, 17*, 156–162. doi:10.1037/a0023358

Centers for Disease Control and Prevention and National Association of Chronic Disease Directors (2009). *The state of mental health and aging in America. Issue brief 1: What do the data tell us?* Retrieved from http://www.cdc.gov/aging/pdf/mental_health.pdf

Chapman, D. P., Perry, G. S., & Strine, T. W. (2005). The vital link between chronic disease and depressive symptoms. *Prevention Chronic Disease Public Health Research, Practice and Policy, 2*, 1–10. Retrieved from http://www.cdc.gov/pcd/issues/2005/jan/pdf/04_0066.pdf

Chiriboga, D. A., Yee, B. W. K., & Jang, Y. (2005). Minority and cultural issues in late-life depression. *Clinical Psychology: Science and Practice, 12*, 358–363. doi:10.1093/clipsy/bpi042

Cienchanowski, P. S., Kanton, W. J., & Russo, J. E. (2000). Depression and diabetes: Impact of depressive symptoms on adherence, function, and cost. *Archives of Internal Medicine, 160*(21), 3278–3285.

Clark, R. (2004) Perceived racism and health disparities: A proposed mode. In N. B. Anderson, R. A. Bulatao, & B. Cohen (Eds.), *Critical perspectives on racial and ethnic differences in health in late life.* (pp. 543–565). Washington, DC: National Academy of Sciences.

Dallman, M. F., Akana, S. F., Laugero,K. D., Gomez, F., Manalo, S., Bell, M. E., & Bhatnagar, S. (2003). A spoonful of sugar: Feedback signals of energy stores and corticosterone regulate responses to chronic stress. *Physiology & Behavior, 79*, 3–12.

Echeverria, S., Diez-Roux, A. V., Shea, S., Borrell, L. N., & Jackson, S. (2008). Associations of neighborhood problems and neighborhood social cohesion with mental health and health behaviors: The multi-ethnic study of atherosclerosis. *Health & Place, 14*, 853–865. doi:org/10.1016/j.healthplace.2008.01.004

Everson-Rose, S. A., Skarupski, K. A., Bienias, J. L., Wilson, R. S., Evans, D. A., & Mendes DeLeon, C. F. (2005). Do depressive symptoms predict

declines in physical performance in an elderly, biracial population? *Psychosomatic Medicine, 67*, 609–615.

Fuller-Thompson, E., Nuru-Jeter, A., Minkler, M., & Guralnik, J. M. (2009). Black-white disparities in disability among older Americans. *Journal of Aging and Health, 21*, 677–698. doi:10.1177/0898264309338296

Gary, F. A. (2005). Stigma: Barrier to mental health care among ethnic minorities. *Issues in Mental Health Nursing, 26*, 979–999. doi:10.1080/01612840500280638

George, L. K., & Lynch, S. M. (2003). Race differences in depressive symptoms: A dynamic perspective on stress exposure and vulnerability. *Journal of Health and Social Behavior, 44*(3), 353–369.

Gitlin, L. N., Hauck, W. W., Dennis, M. P., & Schulz, R. (2007). Depressive symptoms in older African American and white adults with functional difficulties: The role of control strategies. *Journal of the American Geriatrics Society, 55*, 1023–1030. doi:10.1111/j.1532-5415.2007.01224.x

Glymour, M. M., Mujahid, M., Wu, Q., White, K., & Tchetgen Tchetgen, E. J. (2010). Neighborhood disadvantage and self-assed health, disability, and depressive symptoms: Longitudinal results from the health and retirement study. *Annals of Epidemiology, 20*(11), 856–861. doi:10.1016/j.annepidem.2010.08.003

Grabovich, A. Lu, N., Tang, W., Tu, X., & Lyness, J. M. (2010). Outcomes of subsyndromal depression in older primary care patients. *American Journal of Geriatric Psychiatry*, *18*, 227–235. doi:10.1097/JGP.0b013e3181cb87d6

Green, C. A., Polen, M. R., & Brody, K. K. (2003). Depression, functional status, treatment for psychiatric problems, and the health-related practices of elderly HMO members. *American Journal of Health Promotion, 17*(4), 269–275.

Grunebaum, M. F., Oquendo, M. A., & Manly, J. J. (2008). Depressive symptoms and antidepressant use in a random sample of ethnically diverse, urban elder persons. *Journal of Affective Disorders, 105*(1–3), 273–277.

Hackstaff, L. (2009). Factors associated with frailty in chronically ill older adults. *Social Work in Health Care, 48*, 798–811.

Henning, T. B. (2011). *Literature review: Synthesizing multiple sources*. Retrieved from

http://www.iupui.edu/~uwc/pdf/Literature%20Review%20and%20Synthesis.pdf

Herd, P., Goesling, B., & House, J. S. (2007). Socioeconomic position and health: The differential effects of education versus income on the onset versus progression of health problems. *Journal of Health and Social Behavior, 48*(3), 223–238.

House, J. S. (2002). Understanding social factors and inequalities in health: 20th century progress and 21st century prospects. *Journal of Health and Social Behavior, 43*(2), 125–142.

Hybels, C. F., Blazer, D. G., Pieper, C. F., Burchett, B. M., Hays, J. C., Fillenbaum, G. G., Kubazansky, L., & Berkman, L. F. (2006). Sociodemographic characteristics of the neighborhood and depressive symptoms in older adults: Using multilevel modeling in geriatric psychiatry. *American Journal of Geriatric Psychiatry, 14*(6), 498–506. doi:10.1097/YCO.0b013e32833ad70b

Hybels, C. F., Blazer, D. G., Pieper, C. F., Landerman, L. R., & Steffens, D. C. (2009). Profiles of depressive symptoms in older adults diagnosed with major depression: A latent cluster analysis. *American Journal of Geriatric Psychiatry, 17*, 387–396. doi:10.1097?JGP.0b013e31819431ff

Jackson, J. S. & Knight, K. M. (2006). Race and self-regulatory behaviors: The role of the stress response and HPA axis in physical and mental health disparities. In L. L. Cartensen & K. W. Schaie (Eds.), *Social structure, aging, and self-regulation in the elderly* (pp. 189–207). New York: Springer.

Jackson, J. S., Knight, K. M., & Rafferty, J. A. (2010). Race and unhealthy behaviors: Chronic stress, the HPA axis, and physical and mental health disparities over the life course. *American Journal of Public Health, 100*(5), 933–939.

Jang, S. J., & Johnson, B. R. (2004). Explaining religious effects on distress among African Americans. *Journal of the Scientific Study of Religion, 43*, 239–260. doi:10.1111/j.1468-5906.2004.00230.x

Jang, Y., Borenstein, A. R., Chiriboga, D. A., & Mortimer, J. A. (2005). Depressive symptoms among African American and white older adults. *Journal of Gerontology; Psychological Sciences, 60B*(6), P313–P319.

June, A., Segal, D., Coolidge, F. L., & Klebe, K. (2009). Religiousness, social support and reasons for living in African American and European

American older adults: An exploratory study. *Aging & Mental Health, 13*(5), 753–760.

Kanton, W., Lin, E., Russo, J., & Unützer, J. (2003). Increased medical costs of a population-based sample of depressed elderly patients. *Archives of General Psychiatry, 60*(9), 897–903.

Kessler, R. C., Zhao, S., Blazer, D. G., & Swartz, M. (1997). Prevalence, correlates, and course of minor depression and major depression in the national comorbidity survey. *Journal of Affective Disorders, 45,* 19–30.

Keyes, C. L. M. (2009). The black–white paradox in health: Flourishing in the face of social inequality and discrimination. *Journal of Personality*, *77*, 1677–1706. doi:10.1111/j.1467-6494.2009.00597.x

Keyes, K. M., Barnes, D. M., & Bates, L. M. (2011). Stress, coping and depression: Testing a new hypothesis in a prospectively studied general population sample of U.S. born Whites and Blacks. *Social Science & Medicine*, *72*, 650–659. doi:10.1016/j.socscimed.2010.12.005

Kubzansky, L. D., Subramanian, S. V., Kawachi, I., Fay, M. E., Soobader, M., & Berkman, L. F. (2005). Neighborhood contextual influences on depressive symptoms in the elderly. *American Journal of Epidemiology*, *162*(3), 253–260. doi:10.1093/aje/kwi185

Lampinen, P., & Heikkinen, E. (2003). Reduced mobility and physical activity as predictors of depressive symptoms among community-dwelling older adults: An eight-year follow-up study. *Aging Clinical and Experimental Research, 15*(3), 205–211.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Retrieved from http://www.qualres.org/HomeLinc-3684.html

Link, B. G., & Phelan, J. (1995). Social conditions as fundamental cause of disease. *Journal of Health and Social Behavior* (Extra Issue), 80-94.

Lewis, T. T., Aiello, A. E., Leurgans, S., Kelly, J., & Barnes, L. L. (2010). Self-reported experiences of everyday discrimination are associated with elevated c-reactive protein levels in older African American adults. *Brain, Behavior, and Immunity, 24*, 438–443.

Mair, C., Diez Roux, A. V., Shen, M., Shea, S., Seeman, T., Echeverría, S., & O'Mera, E. S. (2008). Cross-sectional and longitudinal associations of neighborhood cohesion and stressors with depressive symptoms in the multiethnic study of atherosclerosis. *Annals of Epidemiology, 19*, 49–57. doi:10.1016/j.annepidem.2008.10.002

Marks, L., Nesteruk, O., Swanson, M., Garrison, B., & Davis, T. (2005). Religion and health among African Americans: A qualitative examination. *Research on Aging, 27*, 447–474. doi:10.1177/0164027505276252

McDougall, G. J., Vaughan, P., Acee, T., & Becker, H. (2007). Memory performance, depression, and mild cognitive impairment in Black and White community elders. *Ethnicity and Disease*, *17*(2), 381–388.

Mendes de Leon, C. F., Barnes, L. L., Bienias, J. L., Skarupski, K. A., & Evans, D. A. (2005). Racial disparities in disability: Recent evidence from self-reported and performance-based disability measures in a population-based study of older adults. *Journal of Gerontology: Social Sciences, 60B*(5), S263–S271.

Mezuk, B., Rafferty, J. A., Kershaw, K. N., Hudson, D., Abdou, C. M., Lee, H., . . . & Jackson, J. S. (2010). Reconsidering the role of social disadvantage in physical and mental health: Stressful life events, health behaviors, race and depression. *American Journal of Epidemiology, 172*, 1238–1249. doi:10.1093?aje/kwq283

Miller, D. K., Malmstrom, T. K., Joshi, S., Andresen, E. M., Morley, J. E., & Wolinsky, F. D. (2004). Clinically relevant levels of depressive symptoms in community-dwelling middle aged African Americans. *Journal of the American Geriatrics Society, 52*(5), 741–748.

Mofidi, M., DeVellis, R. F., Blazer, D. G., DeVellis, B. M., Panter, A. T., & Jordan, J. M. (2006). Spirituality and depressive symptoms in a racially diverse US sample of community dwelling adults. *The Journal of Nervous and Mental Disease, 194*, 975–977. doi:10.1097/01.nmd.0000243825.14449.de

Ong, D. A., Bergeman, C. S., & Boker, S. M. (2009). Resilience comes of age: Defining features in later adulthood. *Journal of Personality, 77*, 1777–1804. doi:10.1111/j.1467-6494.00600.x

Pearlin, L. I., Schieman, S., Fazio, E. M., & Mersman, S. C. (2005). Stress, health and the life course: Some conceptual perspectives. *Journal of Health and Social Behavior*, *46*(2), 205–219.

Rubio, J. M., Markowitz, J. C., Alegrıá, A., Pérez-Fuentes, G., Liu, S., Lin, K., & Blanco, C. (2011). Epidemiology of chronic and nonchronic major depressive disorder: Result from the national epidemiologic survey on alcohol and related conditions. *Depression and Anxiety, 28*, 622–663. doi:10.1002/da.20864

Rutter, M. (2006). Implications of resilience concepts for scientific understanding. *Annals of the New York Academy of Science, 1094*, 1–12. doi:10.1196/annals.1376.002

Sachs-Ericsson, N., Plant, E. A., & Blazer, D. G. (2005). Racial differences in the frequency of depressive symptoms among community dwelling elders: The role of socioeconomic factors. *Aging & Mental Health, 9*(3), 201–209.

Schiller, J. S., Lucas, J. W., Ward, B. W., & Peregoy, J. A. (2010). *National Center for Health Statistics. Vital Health Statistics. Summary health statistics for U.S. adults: National Health Interview Survey (*Library of Congress Catalog No. 362.1'0973'021s—dc21). Retrieved from http://www.cdc.gov/nchs/data/series/sr_10/sr10_252.pdf

Schneider, K. M., O'Donnell, B. E., & Dean, D. (2009). Prevalence of multiple chronic conditions in the United States Medicare population. *Health and Quality of Life Outcomes*, *7*, 1–11. doi:10.1186/1477-7525-7-82

Schootman, M., Andersen, E. M., Wolinsky, F. D., Malmstrom, T. K., Miller, J. P., & Miller, D. K. (2007). Neighborhood environment and the incidence of depressive symptoms among middle-aged African Americans. *Journal of Epidemiology Community Health, 61*, 527–532. doi:10.1136/jech.2006.050088

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

Smedley, B. D., Stith, A. Y., & Nelson, A. R. (2003). *Unequal treatment: Confronting racial and ethnic disparities in health care*. Washington, DC: The National Academies Press.

Sriwattanakomen, R., McPherron, J., Chatman, J., Morse, J. Q., Martire, L. M., Karp, J. F., . . . & Reynolds III, C. F. (2010). A comparison of the frequencies of risk factors for depression in older black and white participants in a study of indicated prevention. *International Psychogeriatrics, 22*, 1240–1247. doi:10.1017/S1041610210001523

Strothers, H. S., Rust, G., Minor, P., Fresh, E., Druss, B., & Satcher, D. (2005). Disparities in antidepressant treatment in Medicaid elderly diagnosed with depression. *Journal of the American Geriatrics Society, 53*(3), 456–461.

Tusaie, K., & Dyer, J. (2004). Resilience: A historical review of the construct. *Holistic Nursing Practice, 18*(1), 3–8.

Underwood, L. G., & Teresi, J. A. (2002). The daily spiritual experiences scale: Development, theoretical description, reliability, exploratory factor analysis and preliminary construct validity using health-related data. *Annals of Behavioral Medicine*, *24*, 22–33.

Utsey, S. O., Adams, E. P., & Bolden, M. A. (2000). Development and initial validation of the Africultural coping systems inventory. *Journal of Black Psychology, 26*, 194–215. doi:10.1177/0095798400026002005

Utsey, S. O., Ponterotto, J., Reynolds, A., & Cancelli, A. (2000). Racial/ethnic discrimination, coping, life statisfaction, and self-esteem among African Americans. *Journal of Counseling and Development, 78*(1), 72–80.

Weissman, M. M., Sholomskas, D., Pottenger, M., Prusoff, B .A., & Locke, B. Z. (1977). Assessing depressive symptoms in five psychiatric populations: A validation study. *American Journal of Epidemiology, 106*(3), 203–214.

Williams, D. R., González, H. M., Neighbors, J., Neese, R., Abelson, J. M., Sweetman, J., & Jackson, J. S. (2007). Prevalence and distribution of major depressive disorder in African Americans, Caribbean blacks and non-Hispanic whites. Results from the national survey of American life. *Archives of General Psychiatry, 64*, 52–59. doi:10.1001/archpsyc.64.3.305

Williams, D. R., & Williams-Morris, R. (2000). Racism and mental health: The African American experience. *Ethnicity & Health, 5*, 243–268. doi:10.1080/135578500200009356

Whitehead, M. (1992). *The concepts and principles of equity in health*. Retrieved from http://salud.ciee.flacso.org.ar/flacso/optativas/equity_and_health.pdf

Wittink, M. N., Joo, J. H., Lewis, L. M., & Barg, F. K. (2009). Losing faith and using faith: Older African Americans discuss spirituality, religious activities and depression. *Journal of General Internal Medicine, 24*, 402–407. doi:10.1007/s11606-008-0897-1

Wright, R. G., Cummings, J. R., Karlamangla, A. S., & Aneshensel, C. S. (2009). Urban neighborhood context and change in depressive symptoms in late life. *Journal of Gerontology: Social Sciences*, *64B*, 247–251. doi:10.1093/geronb/gbn016

Wright, R. G., Ko, M. J., & Aneshensel, C. S. (2011). Urban neighborhoods and depressive symptoms in late middle age. *Research on Aging, 33*, 28–50. doi:10.1177/0164027510383048

CHAPTER 5

USING GEOGRAPHIC INFORMATION SYSTEMS TO OVERCOME LIMITATIONS OF A SECONDARY ANALYSIS

Abstract

Medicare Medicaid enrollees have poorer emotional and physical health as compared to Medicare only enrollees. House's Model of Social Inequalities in Health and Aging posits that individual, environmental, and policy factors contribute to poorer health outcomes. Often variables needed to test models of inequities are not available for secondary analysis in a primary data set from an intervention or descriptive study. The purpose of this paper was to provide an exemplar of using Geographic Information Systems (GIS) to link data from national datasets to interpolate missing variables, enabling the use of path analysis to test House's model in a sample of frail Medicare Medicaid older adults.

Using a sample of 337 older adults from the After Discharge Care Management of Low-Income Frail Elderly (AD-LIFE) study, GIS was used to link baseline data from the AD-LIFE study to the American Community Survey (ACS) to provide missing data on socioeconomic variables. Eligible participants included in the secondary analysis had received both Medicare and Medicaid,

had at least one chronic condition, and had at least one deficit in activities of daily living or instrumental activities of daily living.

Three primary steps were identified to construct the case exemplar: (1) Identification of the construct of interest and generation of a list of possible indicators, (2) identification of the databases and selection of the variables, and (3) linkage of the data to the subjects in the secondary analysis. Socio-demographic data completeness ranged from 93% to 100% for the ACS. Percent of persons living at or below the poverty level and median income per pre-retirement occupation were linked to the AD-LIFE baseline data. Variables from House's model that were not accessible for all subjects from the local databases include crime and environmental lead levels.

GIS provided an avenue to collect missing data from a primary data set through national data. This offers an opportunity for researchers to incorporate GIS in NIH-funded data sharing plans.

Introduction

The Centers for Medicare and Medicaid Services (CMS) administer two federally funded insurance programs: Medicare, for those aged 65 and older, and Medicaid, for those with low income. Based on income, a person can be eligible for both Medicare and Medicaid. A greater number of persons who are covered by both Medicare and Medicaid are African Americans, Hispanic, female, and have less than a high school education as compared to older adults covered only by Medicare (MEDPAC, 2011).

Multiple social, psychological, and biological factors contribute to disparities in health outcomes for minorities. Poor quality of care, health illiteracy, and provider mistrust of minorities are among the many identified causes that contribute to disparities in care (Bennett, Chen, Soroui, & White, 2009; Hunt, Gaba, & Lavizzo-Mourey, 2005; Popescu, Cram, & Vaughan-Sarrazin, 2011; Skinner, Chandra, Staiger, et al., 2005). Innovative research strategies are needed to identify causal pathways and develop solutions that incorporate multiple sources of individual, economic, and environmental interventions.

The use of Geographic Information Systems (GIS) offers an innovative approach to building linkages between health services research and access to psychosocial-economic environmental data that impact health outcomes. GIS provides researchers with the opportunity to test theoretical models using existing data while reducing costs of data collection. In epidemiology and public health, large secondary data sets are used to reduce the expense of data collection (Boslaugh, 2007). The purpose of this discussion is to provide an exemplar of the use of GIS to augment a secondary data analysis to test a health disparities conceptual model.

What is GIS? History and Research Applications

The use of spatial analysis began around 1854 in the United Kingdom by John Snowe, the father of modern epidemiology, who was looking at the location of wells during the cholera epidemic (Longley & Batty, 1996). GIS research has roots in epidemiology through the tracking of public health, access to care, and description of economic conditions that impact health outcomes. In 1998, the

Public Health Disparities Geocoding Project was developed to geocode public health data using census area based socioeconomic measures (Public Health Disparities Geocoding Project, 1998). Linking geocoded census tract data with public health surveillance data revealed that the risk of disease increased with census tract poverty (Krieger et al., 2005).

The definition of Geographical Information Systems is any computer-based system that can be used to integrate and analyze spatial data (Cromley & McLafferty, 2012). Geomatics is the science of collecting, storing, and processing spatial information (Cromley & McLafferty, 2012). Similar to global positioning systems used in automobiles, GIS integrates spatial data to track events on the earth's surface. This permits census data to be linked to geographic regions at a more granular level. Topologically Integrated Geographic Encoding and Reference Line (TIGER/Line) data were developed for U.S. Census tracking in the 1990s (Cromley & McLafferty, 2012). TIGER/Line data are often used to geocode, a process of assigning a coordinate (such as latitude and longitude) to data based on a location (Cromley & McLafferty, 2012).

Review of the Literature

Geographic information science has been used to describe health disparities associated with race and income. Linking a disease management registry to identify persons with Type 2 diabetes and socioeconomic status data from the Census 2000, disparities were found between neighborhood socioeconomic status and A1c level (Geraghty, Balsbaugh, Nuovo, & Tandon,

2010). Individuals living in lower-income neighborhoods had higher A1c levels, indicative of less controlled Type 2 diabetes.

The prevalence of obesity, which is a risk factor for diabetes, was explored using GIS to identify neighborhood socioeconomic resources, built environmental and cultural orientation for Latino and White residents in Utah (Wen & Maloney, 2011). The Utah Population Database was merged with census data and three GIS-based databases to generate both individual and neighborhood-level variables (Wen & Maloney, 2011). Latinos in segregated neighborhoods had greater levels of obesity (OR=1.08; p< 0.01). After controlling for immigrant concentration, the rates were even greater (OR= 1.27; p<0.01).

GIS has also been used to localize areas of inequity and identify quality of care disparities. For instance, a study conducted in a large managed-care organization identified disparities in Health Employer Data and Information Set (HEDIS) quality measures by race (Fremont et al., 2005).

Geocoded patient data at a census block level linked race, ethnicity, and socioeconomic status (SES) to quality measures of cardiovascular and diabetes care from 10 Medicare Managed Care and commercial plans. The quality indicators measured were annual glycosolated hemoglobin, low-density lipoprotein, urine protein levels, dilated eye exam, and beta-blocker drug prescription for myocardial infarction. A greater percentage of members with diabetes and cardiovascular problems lived in areas that were predominately African American or low income. Both racial and SES disparities were seen in

most of the quality indicators, with differences being greater among commercial plan enrollees than Medicare enrollees (Fremont et al., 2005).

Disparities in health have been shown in areas of census tract poverty, and adjusting for race and poverty decreased the disparities (Kreiger et al., 2005). GIS in combination with insurance plans and census tract data provided an opportunity for insurers to monitor quality in neighborhoods and groups of enrollees.

Race, SES, environmental toxins, and neighborhood walkabilty are all factors that have been imputed using GIS (Butler, Ambs, Reedy, & Bowles, 2011; Li, Hammer, Cardinal, & Vongjaturapat, 2009; Quon Huber, Van Egeren, Pierce, & Foster-Fisherman, 2009; Weis, Maantay, & Fahs, 2010). Yet few studies have used GIS to impute data to substantiate a theoretical model. The following is a case exemplar of how GIS was used to combine multiple data sources in a secondary analysis guided by a theoretical model. American Community Survey (an ongoing survey under the United States Department of Commerce) and After Discharge Care Management of Low Income Frail Elderly (AD-LIFE) health data were used to create a secondary analysis using a model of social inequities in health and aging.

Disparities in Physical Function and Emotional Well-being

The prevalence of disability and cognitive impairment has been shown to be greater in African American older adults as compared to Caucasians (August & Sorkin, 2010; Barnes et al., 2011; Fuller-Thompson, Nuru-Jeter, Minkler, M., & Guralnik, 2009; Kelley-Moore & Ferraro, 2004; Mendes de Leon et al., 2005).

The biopsychosocial determinants of health—such as gender, stress, and discrimination—have been hypothesized to predispose those at a lower SES to poorer health outcomes (Herd, Goesling, & House 2007; House, 2002; Link & Phelan, 1995). When SES is taken into consideration, both African American and Caucasian older adults with less than an eighth-grade education have greater physical and cognitive impairment as compared to those with greater than a high school education (Barnes et al., 2011).

Despite low or high SES, African Americans continue to have a greater disease burden than Caucasians (Barnes et al., 2011). House's (2002) model of social inequities in health and aging provides a model for the investigation of factors that create these disparities within the older adult community-dwelling Medicare Medicaid eligible population by race, disparities that contribute to poorer physical function and emotional well-being.

Exemplar: Using GIS in Model Testing

House's conceptual framework of social inequities in health and aging explains the complex interactions among multiple inequities from diverse domains that lead to poor health outcomes (House, 2002). See Figure 5.1. This model is grounded in theories of stress and coping from the social science of intrinsic factors and external stressors as the cause of disease. In House's model, the effects of race, ethnicity, and gender are mediated by SES. There are both direct and indirect pathways from SES to health outcomes; indirect pathways are through a cluster of variables known as explanatory variables. These explanatory variables include medical care and insurance, psychosocial

risk factors, and socio-environmental hazards. The model has been applied to studies of environmental, psychological, and SES inequities that contribute to racial disparities in conditions such as diabetes and cardiovascular disease (House, 2002; Schultz et al., 2005). We chose to conduct a secondary analysis of data from the After Discharge Care Management of Low Income Frail Elderly study (Allen et al., 2011; Wright, Hazelett, Jarjoura, & Allen, 2007) to identify disparities in a sample of community-dwelling frail Medicare Medicaid older adults.

The After Discharge Care Management of Low Income Frail Elderly (AD-LIFE) trial was a randomized controlled trial to test the effectiveness of an interdisciplinary nurse-led care management intervention funded through the Agency for Health Quality and Research (Wright et al., 2007; Allen et al., 2011). Participants were 65 or older, eligible for both Medicare and Medicaid, had at least one or more deficits in activities of daily living or instrumental activities of daily living, and had one or more chronic medical conditions. The AD-LIFE intervention included a hospital discharge phone call, in-home geriatric assessment by an advanced practice nurse, an interdisciplinary team report to a primary-care physician, and ongoing follow-up by a nurse care manager for twelve months. A registered nurse collaborated with the patient and primary-care physician to accomplish the patient's goals as devised by the patient.

Constructs and Measurements

The first step to using GIS to combine data from multiple sources is to identify the construct(s) of interest and generate lists of possible indicators.

House's theoretical model directed the selection of variables in our study. We used three steps to incorporating GIS in our research methodology:

1. Identified the construct of interest and generate a list of possible indicators.
2. Identified the databases and select the variables.
3. Linked the data to the subject.

First, we identified the following predictor constructs from House's model (see Figure 5.1): race, ethnicity, gender, social political, economic, policy, socioeconomic status, explanatory variables, and health outcomes. From left to right on House's model (see Figure 5.1), we began to identify measurement of constructs for our modified House model (see Figure 5.2). Percentage of persons in a neighborhood at or below the poverty line was used to measure the economic construct in House's model. Although age is not indicated as a variable that contributes to inequities in health outcomes in House's model, we decided to include age in the current study due to the heterogeneity of physical and mental health among older adults that could have a significant effect on health outcomes (Moineddin et al., 2010; Kobayashi & Prus, 2012).

Instead of including both income and education in a socioeconomic status composite variable, as seen in House's model, we chose to separate education from income as income data were not collected from participants in the AD-LIFE trial. Years of education were operationalized as years of school completed and were entered into analysis as a separate variable (Barnes et al., 2011; Herd et al., 2007). Since all subjects were eligible for both Medicare and

Medicaid, we deleted the construct for medical care and insurance due to lack of variance. We also eliminated individualized explanatory variables (social relationships and supports, chronic and acute stress, psychosocial dispositions, social roles, and productive activities) because data were not available.

The only health behaviors that were accessible from the AD-LIFE data were self-report of physical activity (such as walking, swimming, Tai Chi) and unstructured physical activities (such as housekeeping and gardening) in minutes per week; smoking; and alcohol consumption. Alcohol consumption was eliminated as a health behavior variable in this study because alcohol use was part of the exclusion criteria for the AD-LIFE study. Only 5% (26) of 530 subjects reported alcohol use; exclusion of those who use alcohol resulted in a potentially atypical group. A health-related quality of life scale, the SF12®, was used to measure the outcomes of physical and mental health at baseline (Ware, Kosinski, & Keller, 1996).

The second step to using GIS is to identify databases to link multiple sources of information. We planned to combine and link multiple sources to obtain information that was missing from the AD-LIFE data set to support our constructs of interest. Neighborhood crime and lead levels were variables that we chose to investigate as environmental hazards that impact physical activity and mood in older adults (Rhodes, Spiro, Aro, & Hu, 2003; Ross, 2000; Ross & Jang, 2000; Tucker-Seely, Subramanian, Li, & Sorensen, 2009).We were looking for physical, chemical, and environmental hazards as seen in House's model (see Figure 5.1).

We contacted the local city police department to obtain a police district boundary shapefile in order to assign each study participant to 1 of the 12 districts. The district information also contained crime data for each district. However, participants from the AD-LIFE study lived in cities outside of the area served by the urban police department, and the smaller police departments did not use spatial mapping techniques to report crime data. More than half of the sample size would have been eliminated if we retained only urban subjects. Thus, we decided to remove crime from our model. We also found a similar problem when we investigated the use of lead level data, as these data were also unavailable; as a result, we removed environmental hazards from the model. (See Figure 5.2.)

In 2010, the U.S. Census eliminated the long-form collection of data and switched to a 10-question short form that does not include socioeconomic status data. Census 2010 covers only four main areas: persons, households, housing units, and group quarters (Census 2010). The American Community Survey (ACS) has been tasked with replacing the information previously collected by the U.S. Census long form. ACS data is collected in 1-, 3-, or 5-year estimates. The methodology of data collection for the U.S. Census 2010 and ACS are not comparable. Sample representation for the Census 2010 was 1 in 1 households as compared to 1 in 40 households for the ACS. The challenge with smaller sample sizes, as seen in the American Community Survey, is the risk of larger sampling errors. The 5-year estimate period (American Community Survey, 2006–2010) may not adequately reflect changes in the economy related to

changes in the job market that create a fluctuation in yearly annual income. ACS data reported at the Census 2010 tract level were used for the general variable categories.

Last, Esri's ArcGIS10.0 desktop software was used to spatially link the geocoded patient addresses to the corresponding census tract with a 100% match rate. The census tract is an aggregation of census blocks containing 1200–8000 people (Cromley & McLafferty, 2012) and is identified by the unique Federal Information Processing Standards Publication (FIP) code assigned to each census tract (Federal Information Processing Standards Publications, 2010).

Since income was not collected in the AD-LIFE, we used the American Community Survey (2006–2010) data on median income by occupation. A proxy of occupation at retirement was used to assign a yearly income to persons in the current study because income impacts health outcomes over the life course (Herd et al., 2007; House, Lantz, & Herd, 2005; Kim & Durden, 2007; Zimmer & House, 2003). We obtained the percentage of persons whose income in the past 12 months was at or below the poverty line and occupation by income in the past 12 month from the ACS. The yearly earnings based on occupation at retirement were grouped into four categories per census tract: (1) management, business, sciences, and arts; (2) service, sales, and office; (3) natural resources, construction, and maintenance; and (4) production, transportation, and moving material.

The data from ACS were then merged with data obtained from the AD-LIFE study to an Excel spread sheet (refer to Table 5.1). The Excel data were then transferred to SPSS for statistical analysis. Mapping technology helped us visualize the distribution of participants in the study (refer to Figure 5.3). The map provided an additional approach to checking variability in data that is an assumption of multivariate analysis (Munro, 2005). AD-LIFE participants were disbursed throughout the counties. GIS was capable of storing data, managing data, retrieving data, and integrating data from different sources.

As demonstrated through this case exemplar, collection of data from multiple sources allowed us to support a model of social inequities in health and aging (refer to Figure 5.2). A path analysis of House's model that included variables from two sources (AD-LIFE and ACS) was completed. The results of that analysis will be disseminated in a future manuscript.

Human Subjects and HIPPA

In GIS research, the full address rather than just the zip code is the most reliable source for obtaining latitude and longitude used in geocoding, because participants are more likely to report an incorrect zip code than an incorrect address (P. McNeally, personal communication, March 7, 2012). If addresses are used from covered entities—such as hospitals under Health Insurance Portability and Accountability Act (HIPPA) regulation—additional measures are taken to secure the data (Department of Health and Human Services, 2002).The De-Identification of Protected Health Information is maintained by providers that require identifiable information, such as addresses for billing

purposes or other transactions (Croner, 2003). There are also exemptions when identification is used in research, payment, and/or public safety (Croner, 2003).

To comply with HIPPA standards, the covered entities may enter into a binding contract—such as a business associates' agreement—with the noncovered entity to protect access to identifiable data (Davenhall, 2002; Department of Health and Human Services, 2002). The covered entity and the geospatial laboratory completed a business associates' agreement for the current study. This study was approved by the investigational review boards of both organizations prior to data collection. In addition to binding contracts to protect persons and data, the National Map Accuracy established standards for TIGER files (used to geocode) of no greater than 1:100,000-scale maps (Cromley & McLafferty, 2012). This prevents the visible identification of exact locations on maps of data source.

Conclusion and Future Applications of GIS

As a requirement for National Institutes of Health-funded research, grantees must establish a data-sharing plan (United States National Library of Medicine, 2003). The expectation is that data will be made available to others that include basic research, clinical studies, surveys, or other types of research. This opens the opportunity for maximizing the use of secondary data to overcome the limitations of missing data. In addition, the Centers for Disease Control (CDC) has made a priority of leveraging geospatial data, technology, and methods to improve the health of communities (Elmore, Flanagan, Jones, & Heitgerd, 2010).

The CDC convened a panel of experts that identified six priorities and strategies to improve public health. These strategies were to strengthen surveillance infrastructure, develop geospatial categorization for community health and inequity, support GIS science and analysis, provide training, and engage nontraditional partners in GIS research (Elmore et al., 2010). As a result, the CDC has a work group evaluating surveillance data by surveying scientists who are conducting geospatial research. In addition, the CDC has developed a Geospatial Science Working Group and submitted a proposal for a national public health geospatial infrastructure. This will improve accessibility to data that will further advance the integration of GIS in disparities and inequities research.

In the current study, gaps in neighborhood poverty data were filled as demonstrated in the case exemplar; percent poverty and income were gathered from public data sources. This allowed the researchers to use House's Model of Social Inequalities in Health and Aging to identify pathways to two outcome variables, function and emotional well-being. Utilization of GIS to complete secondary data has the possibility of crossing the research to health policy chasm to promote health in frail Medicare Medicaid older adults.

Table 5.1

Variables by Dataset Source

Variables	Data Location
Race	AD-LIFE
Gender	AD-LIFE
Age	AD-LIFE
Years of education	AD-LIFE
Address	AD-LIFE
Health behaviors (physical activities, formal exercise, and number of cigarettes smoked per week)	AD-LIFE
Occupation at retirement	AD-LIFE
Percent of persons whose income in the past 12 months at or below the poverty line	American Community Survey
Occupation by median earning in the past 12 months for the civilian employed populations 16+ in one of four categories: management, business, science, and arts; service occupations; natural resources, construction, and maintenance; or production, transportation, and material moving	American Community Survey
SF12® Mental components summary score	AD-LIFE
SF12® Physical components summary score	AD-LIFE

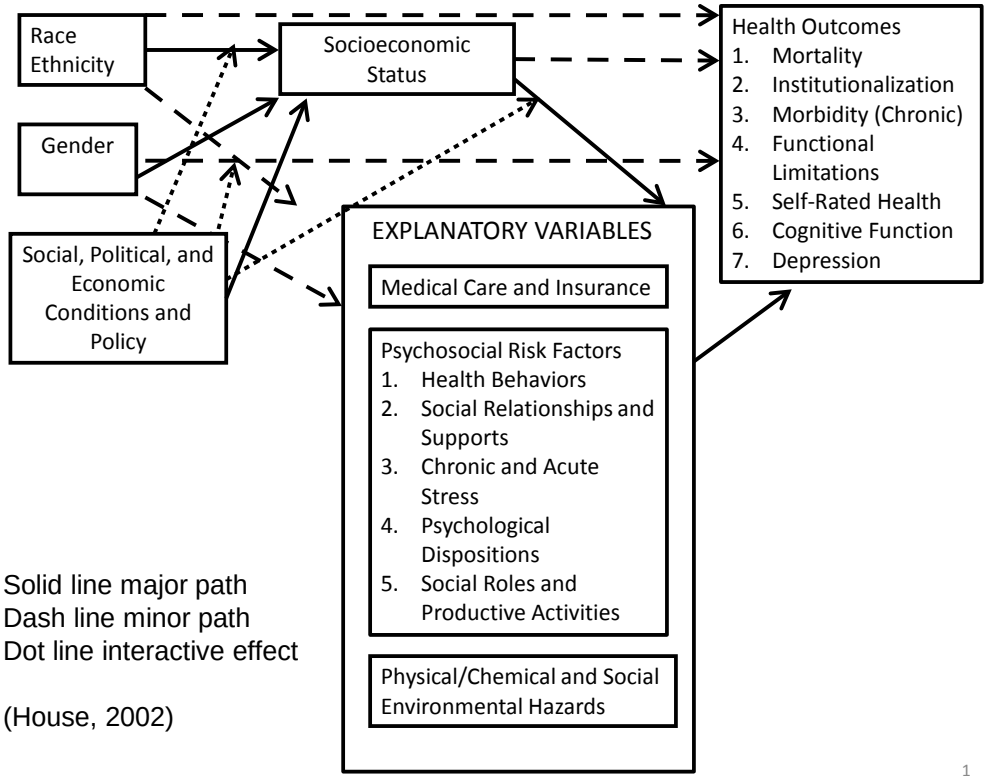


Figure 5.1 House's Model of Social Inequalities in Health and Aging

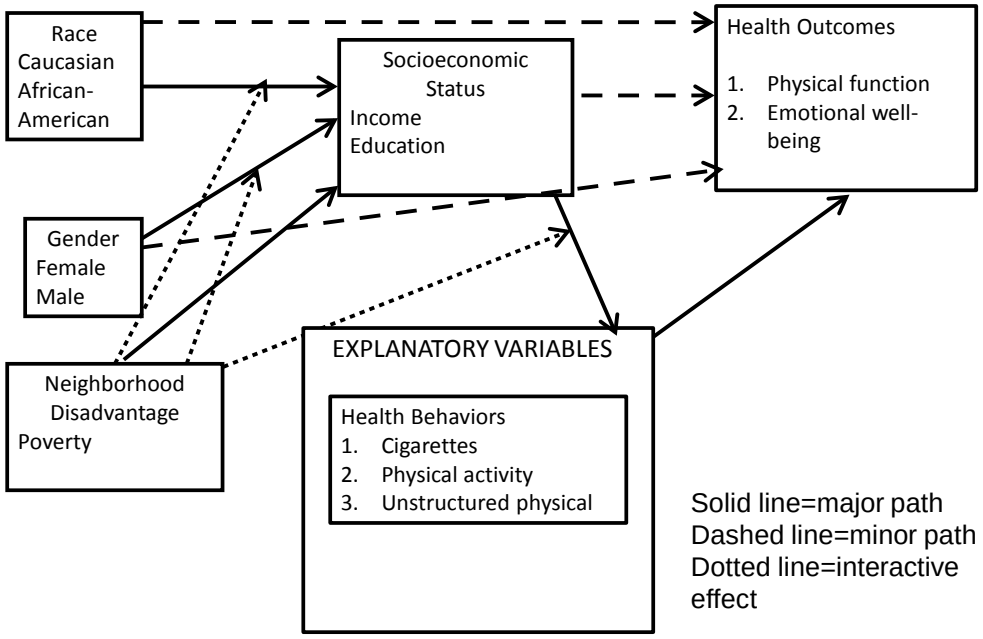


Figure 5.2 Modified House Model

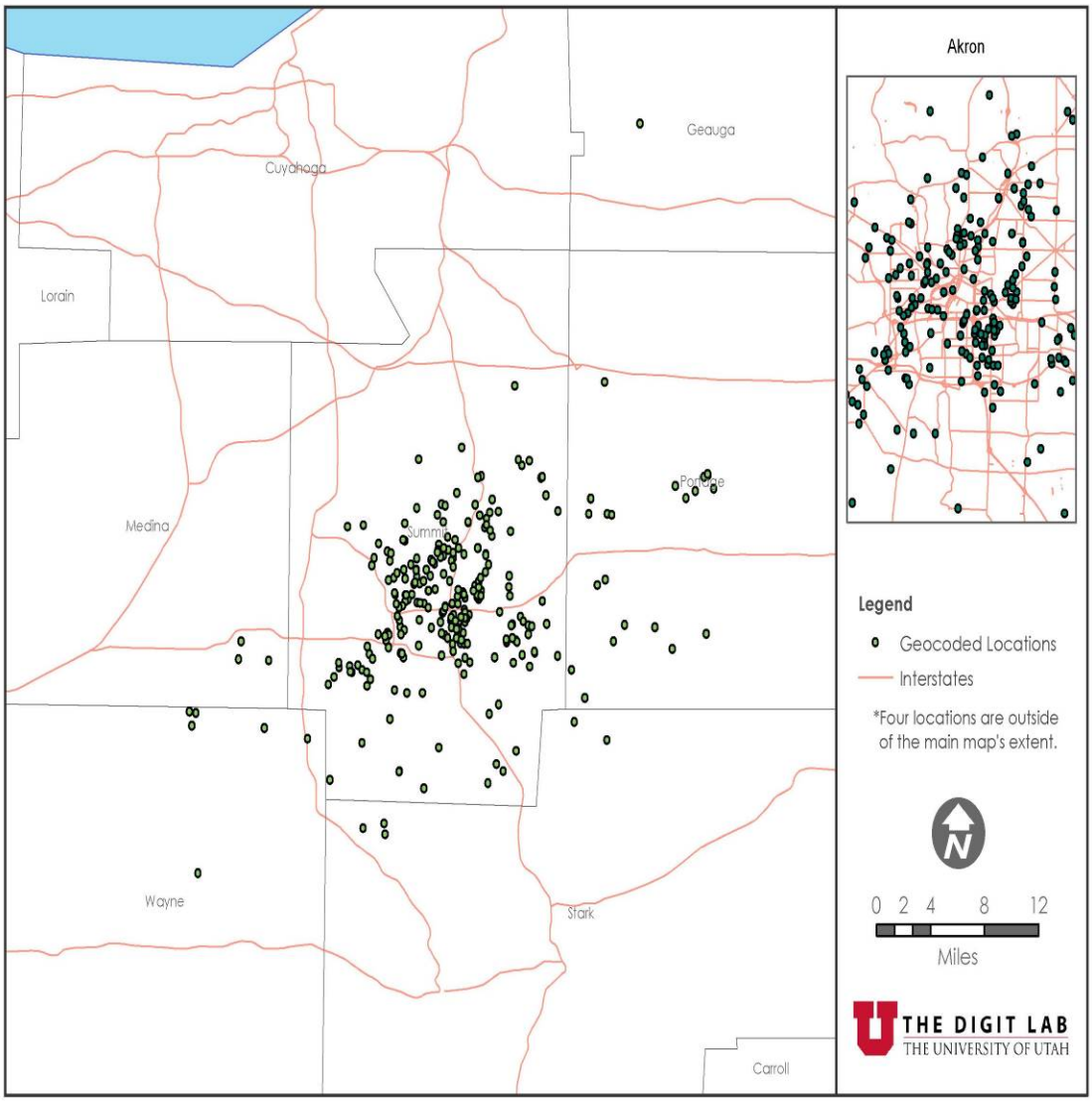


Figure 5.3 Map of geocoded cases

References

Allen, K., Hazelett, S., Jarjoura, J.,Wright, K., Fosnight, K., Kropp, K., Hua, K., & Pfister, E. (2011) The after discharge care management of low-income frail elderly (AD-LIFE) randomized trial: Theoretical framework and study design. *Population Health Management, 14*(0), 1–6. doi:10.1089/pop.2010.0016

Albrecht, J., & Ramasubramanian, L. (2004). The moving target. A geographic index of relative well-being. *Journal of Medical Systems*, *28*(4), 371–384.

American Community Survey (2008). Limitations. Retrieved from http://www.census.gov/acs/www/methodology/limitations/

American Community Survey (2006–2010). Social Explorer; U.S. Census Bureau. Summary file: Technical documentation. Retrieved from https://www.socialexplorer.com/pub/reportdata/DocBrowser.aspx?survey=ACS2010_5yr&sec=8e3c4281-bf9f-4995-ad91-83e5c77aabb3&header=True

August, K. J., & Sorkin, D. H. (2010). Racial ethnic disparities indicators of physical health status: Do they still exist throughout late life? *Journal of the American Geriatrics Society, 58*(10), 2009–2015. doi:10.111?j.152-5415.2010.03033.x

Baker, P. S., Bodner, E. V., & Allman, R. M. (2003). Measuring life-space mobility in community-dwelling older adults. *Journal of the American Geriatrics Society, 51*(11), 1610–1614.

Barnes, L. L., Wilson, R. S., Hebert, L. E., Scherr, P. A., Evans, D. A., & Mendes de Leon, C. F. (2011). Racial differences in the association of education with physical and cognitive function in older blacks and whites. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, *66*(3), 354–363. doi:10.1093/geronb/gbr016

Bennett, I. M., J. Chen, J. S. Soroui, & White, S. (2009). The contribution of health literacy to disparities in self-rated health status and preventive health behaviors in older adults. *Annals of Family Medicine* 7, no. 3 (May–June): 204–211.

Boyle, P. A., Buchman, A. S., Barnes, L. L., James, B. D. & Bennett, D. A. (2010). Association between life space and risk of mortality in advanced

age. *Journal of the American Geriatrics Society, 58*(10), 1926–1930. doi:10.1111/j.1532-5415.2010.03058.x

Butler, E. N., Ambs, A. M. H., Reedy, J., & Bowles, H.R. (2011). Identifying GIS measures of the physical activity built environment through a review of the literature. *Journal of Physical Activity and Health*, *8*(Suppl 1), S91–S97.

Cayo, M. R., & Talbot, T. O. (2003). Positional error in automated geocoding of residential addresses *International Journal of Health Geography*, *2*(10), online. doi:10.1186/1476-072X-2-10

Census 2010. United States Census 2010. Explore the form. Retrieved from http://www.census.gov/2010census/about/interactive-form.php

Centers for Medicare Medicaid CMS-1345-F (2011). Medicare program; Medicare shared savings program: Accountable care organizations. Retrieved from http://www.ofr.gov/OFRUpload/OFRData/2011-27461_PI.pdf

Choi, M., Afzal, B., & Sattler, B. (2006). Geographic information systems: A new tool for environmental health assessments. *Public Health Nurse*, *3*(5), 381–391.

Cromley, E. K., & McLafferty, S. L. (2012). *GIS and public health.* New York: The Guilford Press.

Croner, C. (2003). Public health, GIS, and the internet. *Annual Review of Public Health*, *24*, 57–82. doi:10.1146/annurev.publhealth.24.012902.140835

Curriero, F. C., Kulldorff, M., Boscoe, F. P., & Klassen, A. C. (2003). Using imputation to provide location information for nongeocoded addresses. *PLoS One. 5*(2): e8998. doi:10.1371/journal.pone.0008998

Davenhall, W. F. (2002). Protecting geocoded health data. Retrieved from http://www.esri.com/industries/health/hippa.html

Department of Health and Human Services (2002). Health Information Privacy. Retrieved from http://www.hhs.gov/ocr/privacy/

Elmore, K., Flanagan, B., Jones, N., & Heitgerd, J.,L. (2010). Leveraging geospatial data, technology, and methods for improving the health of communities: Priorities and strategies from an expert panel convened by the CDC. *Journal of Community Health*, *35*, 165–171. doi:10.1007/s10900-009-9210-4

Evenson, K. R., Sotres-Alvarez, D., Herring, A. H., Messer, L., Laraia, B. A., & Rodríguez. (2009). Assessing urban and rural neighborhood characteristics using audit and GIS data: Derivation and reliability of constructs. *International Journal of Behavioral Nutrition and Physical Activity*, *6*(44), 1–16. doi:10.1186/1479-5868-6-44

Federal Information Processing Standards Publications. (2010). General Information. Retrieved from http://www.nist.gov/itl/fipsinfo.cfm

Fremont, M. A., Bierman, A., Wickstrom, S. L., Bird, C. E., Shah, M., Escarce, J. J., Hortsman, T., & Rector, T. (2005). Use of geocoding in managed care settings to identify quality disparities. *Health Affairs*, *24*(2), 516–526. doi:10.1377/hlthahh.24.2.516

Fuller-Thompson, E., Nuru-Jeter, A., Minkler, M., & Guralnik, J. M. (2009). Black-white disparities in disability among older Americans. *Journal of Aging and Health, 21*(5), 677–698. doi:10.1177/0898264309338296

Geraghty, E. M., Balsbaugh, T., Nuovo, J. & Tandon, S. (2010). Using geographic information systems (GIS) to assess outcome disparities in patients with type 2 diabetes and hyperlipidemia. *Journal of the American Board of Family Medicine, 23*(1), 88–96. doi:10.3122/jabfm.2010.01.090149

Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2006). Examining your data. In J. F. Hair Jr., W. C. Black, B. J. Babin, R. E. Anderson, & R. L. Tatham, *Multivariate data analysis* (6th ed.). Upper Saddle River, NJ: Prentice Hall.

Herd, P., Goesling, B., & House, J. S. (2007). Socioeconomic position and health: The differential effects of education versus income on the onset versus progression of health problems. *Journal of Health and Social Behavior, 48*(3), 223–238.

House, J. S. (2002). Understanding social factors and inequalities in health: 20th century progress and 21st century prospects. *Journal of Health and Social Behavior, 43*(2), 125–142.

House, J. S., Lantz, P. M., & Herd, P. (2005). Continuity and change in the social stratification of aging and health over the life course: Evidence from a nationally representative longitudinal study from 1986 to 2001/2002

Americans' Changing Lives Study). *Journals of Gerontology, 60B*(Special Issue II), 15–26.

Hunt, K. A., Gaba, A., & Lavizzo-Mourey, R. (2005). Racial and ethnic disparities and perceptions of health: Does health plan type matter? *Health Services Research, 40*(2), 551–576.

Jones, N., Jones, S. L., & Miller, N. A. (2004). The Medicare health outcomes survey program: Overview, context, and near-term prospects. *BioMed Central, 2*(33), 1–10. doi:10.1186/1477-7525-2-33

Katz, S., Down,T. D., Cash, H. R., & Grotz, R. C. (1970). Progress in the development of the Iindex of ADL. *The Gerontologist, 10*(1), 20–30.

Kelley-Moore, J. A., & Ferraro, K. F. (2004). The black/white disability gap: Persistent inequality in later life? *Journal of Gerontology: Social Sciences*, *59*, S34–S43.

Kim, J., & Durden, E. (2007). Socioeconomic status and age trajectories of health. *Social Science & Medicine*, *65*, 2489-2502. doi:10.1016/j.socscimed.2007.07.022

Kobayashi, K. M., & Prus, S. G. (2012). Examining the gender, ethnicity, and age dimensions of the healthy immigrant effect: Factors in the development of equitable health. *International Journal for Equity in Health*, *11*(8), 1–6. Retrieved from http://www.equityhealthj.com/content/11/1/8

Krieger, N., Chen, J. T., Waterman, P. D., Rehkopf, D. H., & Subramanian, S. V. (2005). Painting a truer picture of US socioeconomic and racial/ethnic health inequalities: The public health disparities geocoding project. *American Journal of Public Health, 95*(2), 312–323.

Lampinen, P., & Heikkinen, E. (2003). Reduced mobility and physical activity as predictors of depressive symptoms among community-dwelling older adults: An eight-year follow-up study. *Aging Clinical and Experimental Research, 15*(3), 205–211.

Lawton, M. P., & Brody, E. M. (1969). Assessment of older people: Self-maintaining and instrumental activities of daily living. *The Gerontologist, 9*(3), 179–186.

Li, F., Hammer, P., Cardinal, B. L, & Vongjaturapat, N. (2009). Built environment and changes in blood pressure in middle aged and older adults.

Preventative Medicine, *48*, 237–241. doi:10.1016/j.ypmed.2009.01.005

Lied, T. R., & Haffer, S. C. (2004). Health status of dually eligible beneficiaries in managed care plans. *Health Care Financing Review, 25*(4), 59–74.

Link, B. G., & Phelan, J. (1995). Social conditions as fundamental causes of disease. *Journal of Health and Social Behavior, Extra Issue*, 80–94.

Longley, P. A., & Batty, M. (1996). *Spatial analysis: Modeling in a GIS environment.* New York: John Wiley & Sons, Inc.

Maheswaran, R., Pearson, T., Campbell, M.J., Haining, R.P., McLeod, C.W., Smeeton, N., Wolfe, C.D. (2006). A protocol for investigation of the effects of outdoor air pollution on stroke incidence, phenotypes and survival using the South London Stroke Register. *International Journal of Health Geography. 17*(5),10.

Maheswaran, R., Pearson, T., Smeeton, N. C., Beevers, S.D., Campbell, M. J., Wolfe, C. D. (2012). Outdoor air pollution and incidence of ischemic and hemorrhagic stroke: A small-area level ecological study. *Stroke, 43*(1), 22–27.

Mendes de Leon, C. F., Barnes, L. L., Bienias, J. L., Skarupski, K. A., & Evans, D. A. (2005). Racial disparities in disability: Recent evidence from self-reported and performance-based disability measures in a population-based study of older adults. *Journal of Gerontology: Social Sciences, 60B*(5), S263–S271.

Moineddin, R., Nie, J. X., Wang, L., Tracy, C. S., & Upshur, R. E. G. (2010). Measuring change in health status of older adults at the population level: The transition probability model. *BMC Health Services Research*, *10*(306). Retrieved from http://www.biomedcentral.com/1472-6963/10/306

Munro, B. H. (2005). *Statistical methods for health care research* (5th ed.). Philadelphia: Lippincott Williams & Wilkins.

National Institutes of Health (2011). *Data book. Fiscal year 2011.* Retrieved from http://report.nih.gov/nihdatabook/pdf/ndb_2011_Current_live.pdf

Ohio Department of Natural Resources (2012). GIS central archives. Retrieved from http://www.dnr.state.oh.us/tabid/15402/Default.aspx

Quon Huber, M. S., Van Egeren, L. A., Pierce, S. J., & Foster-Fisherman, P. G. (2009). GIS applications for community-based research and action:

Mapping change in a community building initiative. *Journal of Prevention and Intervention in the Community*, *37*, 5–20. doi:10.1080/10852350802498367

Popescu, I., Cram, P., & Vaughan-Sarrazin, M. S. (2011). Differences in admitting hospital characteristics for black and white Medicare beneficiaries with AMI. *Circulation*, *123*, 271–2716. doi:10.1161/CIRCULATIONAHA.11.973628

Rhodes,D., Spiro, A. 3rd, Aro,A., & Hu, H. (2003). Relationship of bone and blood lead levels to psychiatric symptoms: The normative aging study. *Journal of Occupational Environmental Medicine, 45*(11), 1144–1151.

Rose, K. M., Wood, J. L., Knowles, S., Pollitti, R. A., Whitsel, E. A., Diez Roux, A. V., Yoon, D. K., & Heis, G. (2004). Historical measures of social context in life course studies: Retrospective linkage of addresses to decennial censuses. *International Journal of Health Geographics, 3*, 27. doi:10.1186/1476-072X-3-27

Ross, C. E. (2000). Walking, exercising and smoking: Does neighborhood matter? *Social Science and Medicine, 51*(4), 265–274.

Ross, C. E., & Jang, S. J. (2000). Neighborhood disorder, fear and mistrust: The buffering role of social ties with neighbors. *American Journal of Community Psychology, 28*, 401–420.

Saelens, B. E., Sallis, J. F., Frank, L. D., Couch, S. C., Zhou, C., Colburn, T., Cain, K. L., Chapman, J., & Glanz, K. (2012). Obesogenic neighborhood environments, child and parent obesity: The Neighborhood Impact on Kids study. *American Journal of Preventative Medicine, 42*(5), e57–64.

Sarrazin, M. V., Campbell, M., & Rosenthal, G. E. (2009). Racial differences in hospital use after acute myocardial infarction: Does residential segregation play a role? *Health Affairs 28*(2), w368–378.

Schulz, A. J., Kannan, S., Dvonch, J.T., Israel, B. A., Allen III, A., James, S. A., House, J. S., & Lepkowski, J. (2005). Social and physical environments and disparities in risk for cardiovascular disease: The healthy environments partnership conceptual model. *Environmental Health Perspectives, 113*(12), 1817–1825

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

Skinner, J., Chandra, A., Staiger, D., et al. (2005). Mortality after acute myocardial infarction in hospitals that disproportionately treat black patients. *Circulation, 112*(17), 2634–2641.

Social Explorer; U.S. Census Bureau; American Community Survey. (2006–2010).*Summary File: Technical Documentation*. Retrieved from https://www.socialexplorer.com/pub/reportdata/DocBrowser.aspx?survey=ACS2010_5yr&sec=8e3c4281-bf9f-4995-ad91-83e5c77aabb3&header=True

Sullivan-Marx, E. M., Cuest, C. L., & Ratcliffe, S. J. (2008). Exercise among urban-dwelling older adults at risk for health disparities. *Research in Gerontological Nursing, 1*(1), 33–41.

Trochim, W. M. (2006). *The research methods knowledge base* (2nd ed.). Retrieved from http://www.socialresearchmethods.net/kb/>

Tucker-Seely, R. D., Subramanian, S. V., Li, Y., & Sorensen, G. (2009). Neighborhood safety, socioeconomic status and physical activity in older adults. *American Journal of Preventative Medicine, 37*(3), 207–213. doi:10.1016/j.amepre.2009.06.005

United States Census (2010). *Content determination*. Retrieved from http://www.census.gov/cac/race_ethnic_advisory_committees/docs/2006_Nov_2010_content_determination.pdf

United States Census (1991). *Survey of income and program participation. Problems with missing data.* Retrieved from http://www.census.gov/sipp/missing_problems.html

United States Census (2012). *Cartographic boundary files.* Retrieved from http://www.census.gov/geo/www/cob/tr_metadata.html

United States Department of Justice, Office of Justice Programs, National Institute of Justice (2012). *Mapping crime. Understanding hot spots.* Retrieved from https://www.ncjrs.gov/pdffiles1/nij/209393.pdf

United States National Library of Medicine (2003). National Institutes of Health. *Grant and funding extramural program. Data sharing plan requirement*. Retrieved from http://www.nlm.nih.gov/ep/datashare.html

Ware, J., Kosinski, M., & Keller, S. D. (1996). A 12-item short-form health survey: Construction of scales and preliminary tests of reliability and validity. *Medical Care, 34*(3), 220–233.

Weis, R. L., Maantay, J. A., & Fahs, M. C. (2010). Promoting active urban aging: A measurement approach to neighborhood walkability for older adults. *Cities Environment*, *3*(1), 1–22.

Wen, M., & Maloney, T. N. (2011). Latino residential isolation and the risk of obesity in Utah: The role of neighborhood socioeconomic, built-environmental, and subcultural context. *Journal of Immigrant Minority Health*, *13*, 1134–1141. doi:10.1007/s10903-011-9439-8

William, M., & Trochim, K. (n.d.). Research methods knowledge base. Retrieved from http://www.socialresearchmethods.net/kb/consthre.php

Wright, K., Hazelett, S., Jarjoura, D., & Allen, K. (2007) The AD-LIFE trial. Working to integrate medical and psychosocial care management models. *Home Health Care Nurse, 25*(5), 308–314.

Xiao, H., Gwede, C. K., Kiros, G., & Milla, K. (2007). Analysis of prostate cancer incidence using geographic information system and multilevel modeling. *Journal of the National Medical Association, 99*(3), 218–225.

Zimmer, A., & House, J. S. (2003). Education, income, and functional limitation transitions among American adults: Contrasting onset and progression. *International Journal of Epidemiology, 32*, 1089–1097. doi:10.1093/ije/dyg254

CHAPTER 6

DO FRAIL MEDICARE MEDICAID OLDER ADULT ENROLLEES DIFFER IN PHYSICAL FUNCTION AND EMOTIONAL WELL-BEING BY RACE?

Abstract

Fifty-eight percent of the Medicare Medicaid population have at least one mental cognitive condition and 44% have multiple physical impairments. The determinants of health such as race, income, and education significantly impact physical function and emotional well-being. Poor emotional well-being has been linked to physical limitations in older adults.

The purpose of the current study was to test a conceptual framework for understanding social inequities in health and aging to describe pathways that lead directly and indirectly from race to physical function and emotional well-being after controlling for age, gender, neighborhood poverty, socioeconomic status (education, income), and health behaviors among frail Medicare Medicaid older adults. Through the use of a descriptive correlational design, data from 337 frail Medicare Medicaid enrollees age 65 and older were studied in this secondary analysis of baseline data from a controlled trial of a care management intervention in a Midwestern city. Geographic Information Systems methodology was used to link subjects' baseline data to information on income and poverty from the American Community (2006–2010) to interpolate social data for the path analysis. Results indicated that the path model fit the data *($\Delta\chi^2$32.932, df 29, $\chi^{2/df}$*

1.136, TLI=.954, CFI=.976, and RMSEA (90%)=.02 (.000, .048). Creation of a path from race to physical function and emotional well-being did not improve model fit. Inequities were found with significant paths from gender to income (*β=.309, p< .001),* correlation between race and neighborhood poverty *(-.273 p < .001),* and paths from race to education *(β=.117, p< .05)*.

Not all of the variables in House's model were accessible. For instance, factors in the model that were hypothesized by House to have a major additive effect on health outcomes—such as data regarding racism, discrimination, alcohol use, source of medical care, and environmental hazards—were not available or were excluded due to lack of variance. Future studies should incorporate additional variables from House's model to describe pathways to inequities in care and health outcomes.

Introduction

Eighteen percent of the Medicare population receives both Medicare and Medicaid insurance services, accounting for 31% of the costs of Medicare (MEDPAC, 2011). Two-thirds of the nine million people insured by both Medicare and Medicaid are over the age of 65 (Cassidy, 2012). These older adults, formerly known as the *duals*, are poorer, require more assistance, and have greater rates of chronic illnesses and Alzheimer's disease than beneficiaries who receive only Medicare (Cassidy, 2012; Kronick et al., 2007). Costs of care are often compounded by co-morbid illnesses, with ambulatory and inpatient cost 43% to 51% higher for older adults with depressive symptoms and depression (Akincigil et al., 2012). Mental and physical health outcomes of the Medicare Medicaid enrollees aged 65 and older are often compared to their Medicare-only

counterparts. Unfortunately, a disproportionate number of African Americans, Hispanics, females, and individuals with less than a high school education comprise the Medicare Medicaid population as compared to Medicare-only (MEDPAC, 2011). Therefore, most extant comparisons do not adequately reflect racial inequities.

Biopsychosocial factors such as race, ethnicity, gender, and discrimination have been hypothesized to predispose those at a lower socioeconomic status (SES) to poorer health outcomes (Herd, Goesling, & House, 2007; House, 2002; Link & Phelan, 1995). The double-jeopardy theory (Biegel, 1991) proposes that age-related discrimination and minority status create a double disadvantage for African Americans as compared to Caucasians. There is a potential for a "triple" disadvantage to occur among those who are African American, low-income, and aged.

Despite changes in health policy to improve access to care for minorities, inequities in physical function persist between non-Hispanic Blacks and non-Hispanic Whites (August & Sorkin, 2010; Mendes de Leon, Barnes, Bienias et al., 2005). Race as an advantage or disadvantage to health outcomes has not been explored within a socioeconomically homogenous group for frail older-adult Medicare Medicaid enrollees. In this secondary analysis, we examined the use of House's model of inequities in health and aging to explore disparities in neighborhood poverty, income, education, and health behaviors between African American and Caucasian Medicaid Medicare enrollees that contribute to inequities in physical function and emotional well-being.

Health research focused on disparities and inequities usually involves comparisons between a socially disadvantaged group and an advantaged group; disadvantages may be racial, gender, economic, or subject of discrimination (Braveman, 2006). Both disparities and inequities refer to differences in health as a result of belonging to a socially disadvantaged group. There is a lack of consensus and clarity among researchers about these two terms. Both terms are used in this manuscript to retain the intent of cited authors. However, *inequity* is our preferred term to describe the differences by race that contribute to poor health outcomes in a disadvantaged group of frail older adult Medicare Medicaid enrollees. We chose to emphasize inequalities because it connotes that the differences that exist are unfair, avoidable, and unjust (Whitehead, 1992). In addition, we utilized a model of social inequalities in health and aging to describe the differences in health outcomes by race. The pursuit of equity is the elimination of disparities and inequities that may be achieved through change in health policy (Braveman, 2006; Whitehead, 1992). The goal of the current study was to provide substantive knowledge about the pathways that lead to inequities in order to develop interventions to improve the physical and mental health of older adult Medicare Medicaid enrollees.

Theoretical Framework

House's (2002) conceptual framework of social inequities in health and aging explains the complexities of inequities that lead to disparities in health outcomes (Figure 6.1). Using this model to guide a secondary analysis of the complex inequities experienced by Medicare Medicaid older adult enrollees

compared to Medicare only, we incorporated race, age, gender, socioeconomic status (education, occupation) and health behaviors (smoking, activity, and exercise) to explain physical function and emotional well-being.

Grounded in stress and coping theory, this model has been applied to studies of environmental, psychological, and socioeconomic status inequities that contribute to conditions such as diabetes and cardiovascular disease (House, 2002). In House's model, the effects of race, gender, and social-political and economic conditions are mediated by socioeconomic status. Explanatory variables—such as medical care, insurance, psychological risk factors, and physical, chemical, and social environmental hazards—in turn mediate the effects of demographic factors, SES, and sociopolitical and economic factors on health outcomes such as functional limitations and depression. House's conceptual framework, along with nine other models of health inequities, were recommended in the Institutes of Medicine (IOM) report on examining health inequities as a guide to examine inequities (Institutes of Medicine, 2006). These models and theories of inequities represent pathways to understanding the gaps and provide a compelling choice of researchable variables.

House and other models illustrate logical pathways to understanding inequities in health. For example, House's model has been used to summarize disparities in access to care for African Americans with systemic lupus erythematosus and social disparities by race in weight gain (Ailshire & House, 2011; Demas & Costenbader, 2009). In a study of adults aged 35 to 55, social inequity (low education) was correlated with low self-reported health (Chandola,

Ferrie, Sacker, & Marmot, 2007).

Purpose

The purpose of this secondary analysis was to utilize House's model of inequities in health and aging to explain the disparities between African American and Caucasian Medicare Medicaid enrollees that contribute to differences in physical function and emotional well-being. Essentially, the current study addressed whether race creates a double disadvantage, thereby widening the gap in health outcomes between African Americans and Caucasians in a sample of frail Medicare Medicaid older adults.

Specific Aim

To test a conceptual framework for understanding social inequities in health and aging to explore the pathways that lead to physical function and emotional well-being by race.

Research Questions

1. When income, health behaviors (smoking, formal exercise, and physical activity), age, gender, and socioeconomic status (education, income) are controlled, does race directly or indirectly impact physical function in frail Medicare Medicaid older adults?
2. When income, health behaviors (smoking, formal exercise, and physical activity), age, gender, and socioeconomic status (education, income) are controlled, does race directly or indirectly impact emotional well-being in

frail Medicare Medicaid older adults?

Review of the Literature

Six factors—race, gender, neighborhood disadvantage, income, education, and health behaviors—suggested by House's model and included in this study have been associated with inequities in physical function and mental well-being.

Inequities and Physical Function

The construct of physical function can be measured subjectively or through performance-based measures. For this study, physical function was defined as the measure of the subject's ability to perform physical activities—such as walking, bathing, dressing, climbing stairs, and lifting objects—and the perceived impact of health on engagement in these tasks (Haywood, Garratt & Fitzpatrick, 2005; Ware & Sherbourne, 1992; Wolinsky & Stump, 1996).

August and Sorkin (2010) analyzed the California Health Interview Survey of 40,631individuals over the age of 55 to determine if racial and ethnic disparities existed in physical function over time. The greatest disparity existed between Caucasians and African Americans, who reported greater difficulty in performing activities of daily living (August & Sorkin, 2010). Using data from a population-based (*N*=6,158), longitudinal study of a biracial urban sample, Mendes de Leon and associates (2005) found that older African Americans reported higher levels of disability and had lower levels on a performance-based measure of physical function than Caucasians. Differences in disability between

Caucasians and African Americans were significantly greater among women than men and tended to change slightly over time, although not in a consistent pattern.

Using a path analysis design to describe the role of disparities in the presence of co-morbidity, Louie and Ward (2011) modeled the influence of socioeconomic status and ethnic difference in disease burden on disparities in physical function in older adults. Compared with those completing high school, persons with less than 12 years of education reported greater functional difficulties on tasks such as preparing a meal, walking one-quarter mile, and stooping, crouching, or kneeling. After adjusting for disease burden as measured by self-report of medical conditions known to limit function, physical limitation did not differ by level of education. Race and functional limitations were associated with African Americans reporting worse function than Caucasians. Even after adjustment for SES, the difference remained. Findings from Louie and Ward's (2011) study supported the premise that economic factors *and* disease burden, not just disease burden alone, account for most of the racial differences in functional limitations. Overall, African Americans with greater disease burden and lower education report more functional limitations than Caucasians.

In a study of 602 community-dwelling African American older adults, the presence of major depressive symptoms increased the odds of limitations of mobility (Thorpe et al., 2011). In addition, those who had two or more medical conditions had a greater risk of limitation in mobility. Arthritis, diabetes, and heart

disease were associated with decreased mobility in women, whereas stroke was associated with decreased mobility in men.

Inequities in physical function between African Americans and Caucasians were seen in activities of daily living, disability, and education. African Americans with deficits in activities of daily living and lower education were at greatest risk for limitations in physical function.

Emotional Well-being

The presence of poor emotional well-being in the form of depression has been linked to physical limitations in older adults (Everson-Rose et al., 2005). The incidence of mental health problems varies across minority groups. In a sample of 635 Hispanic and African American older adults to asses mental health in senior housing, 26% had major depressive disorder (Robison et al., 2009).

We chose to identify the construct of emotional well-being as the absence of depression or depressive symptoms, the ability to cope, and the ability to manage relationships and emotions (U.S. Department of Health and Human Services Federal Occupational Health, 2012; Ware & Sherbourne, 1992; World Health Organization, 2011). Depressive symptoms detected in measurement of emotional well-being have been found to predict mortality among elderly adults (Blazer & Hybels, 2004). Using Cox proportional hazards modeling of data collected over 10 years, items from the Centers for Epidemiologic Studies-Depression (CES-D) that reflect a negative affect—lack of hope, lack of enjoyment, and lack of happiness—were more predictive of mortality than somatic symptoms such as and sleep problems (Blazer & Hybels,

2004).

Treatment outcomes can be impacted by emotional health in low-income elders. Low-income older adults with co-morbid anxiety in were 73% more likely to respond poorly to depression treatment and have a 1.45 times greater risk of suicidal ideations than higher-income older adults (Cohen et al., 2009).

Social and physical environment have been shown to contribute to decreased mental health, since racial minorities often live and work in environments with physical and socioeconomic risks. Other environmental stressors, such as crime and lead exposure, have been linked to psychiatric symptoms (Beach et al., 2010; Brown, 1995; Rhodes & Spiro, 2003; Wright et al., 2009).

The association of neighborhood cohesion and stressors with depression was investigated in a secondary analysis of data from a large 10-year longitudinal study. Low social cohesion, poor neighborhood aesthetics, and high crime were associated with higher mean scores for men and women on the CES-D (Mair et al., 2008). Economic conditions reflective of neighborhood poverty and individual low income increased the risk of depression in older adults. Measures of well-being may have greater predictive value for depression in older adults as compared to somatic complaints.

Racial Inequities

Both income and education contributed to cumulative disadvantage in racial minorities. In a study of 3,617 adults, Kim and Durden (2007) asserted that the cumulative disadvantage of low income and low education widened the gap

of physical impairment in older adults. In a large study of functional status in African American (*N*=16,870) compared to Caucasian (*N*=186,086) older adults, education and income were significant mediating variables that explained 90% of racial differences in functional limitations in men and 75% in women (Fuller-Thomson et al., 2009).

In the first two waves of the American's Changing Lives Survey, Jackson and colleagues (2010) determined that unhealthy behaviors had a strong direct correlation with major depression in Caucasians and an inverse relationship in African Americans. Mezuk and associates (2010) found that poor health behaviors also had a significant negative association with depression in African Americans in a study of 361 African Americans and 601 Caucasians in the Baltimore Epidemiologic Catchment Area Study (1993–2004).

Exposure to differential stress and negative life events are thought to contribute to disparities among races (Lantz et al., 2005). It has been suggested by a number of authors (or studies) that differences in the level of stress among African Americans and Caucasians may be the result of the additive stress of negative life effects such as racism and discrimination (Keyes, Barnes, & Bates, 2011; Williams, 1999; Williams & Williams-Morris, 2000). Racial inequities in education and poor health behaviors impact physical function and emotional well-being in African American older adults as compared to Caucasians.

Socioeco-Political Inequities

Increased morbidity and mortality for persons at a lower socioeconomic status (SES) has remained consistent throughout history (Institute of Medicine, 2006; Link & Phelan, 1995; Phelan, Link, & Tehranifar, 2010). Fundamental-Cause Theory attributes these differences to distinct dimensions of SES that confer health benefits—such as multiple resources, knowledge, and social capital—that have a protective effect on health (Link & Phelan, 1995; Phelan et al., 2010). Persons at a higher SES had more resources and social supports that produced a protective effect on future health (Link & Phelan, 1995; Phelan et al., 2010).

The relative impact of income versus education on health is confounded and controversial. Higher education does not necessarily confer better health benefits in minorities (Institutes of Medicine, 2006). For example, in a study of periodontitis in an older population, African Americans with higher education and income levels had a greater prevalence of periodontal disease than Caucasians with a similar SES (Borrell, Burt, Neighbors, & Taylor, 2008).

In general, African Americans have lower educational levels, lower income, and live in poorer neighborhoods (Williams & Jackson, 2005). Level of education determines the life course that leads to occupation and income, which in turn translates to improved access to care and management of chronic conditions (Herd et al., 2007; Link & Phelan, 1995). Completion of an education exposes the individual to other social networks and resources that promote self-

efficacy, and an adequate income provides resources that promote the ability to better cope with stress.

In House's conceptual framework, social policies and programs are integral to address inequities created by SES that impact health outcomes (Arno et al., 2011; Herd, Schoeni, & House, 2008). Herd and colleagues (2008) purported that these programs should have impact on individuals and communities upstream instead of downstream to increase social capital for the disadvantaged. Upstream changes are considered to be those that impact social and economic policies as opposed to downstream measures that include healthcare and behavioral change at the individual level (Herd et al., 2008).

Socioeconomic (SES) and policy inequities impact health outcomes, as persons of lower SES have worse health. Policies to improve health for persons at the lower SES level by increasing income can compensate for socioeconomic disadvantage. Through increasing the financial resources to programs to support Medicare Medicaid older adult enrollees, health outcomes can be improved. For example, in states where there was an increase of $100 per month in Social Security income, a there was a 1.8% decline in the probability of having a mobility limitation among this low-income group (Herd et al., 2008). By providing services and resources to those at the lower end of the social-economic stratum, we can increase their social capital and improve health.

Neighborhood Poverty

Economic conditions represent a major additive pathway through socioeconomic status to health outcomes in House's model. Poor economic conditions are reflective of neighborhood disadvantage that impacted depressive symptoms in older adults. The impact of the 1994–2008 recessions on older adults was evaluated in a large study by the Bureau of Labor Statistics and the Medicare Current Beneficiary Survey (McInerney & Mellor, 2012). Older adults reported worse mental health during the recession and were less likely to engage in healthier behaviors (McInerney & Mellor, 2012). In addition, neighborhood poverty has also been linked to greater depressive symptoms.

Utilizing data from the Health and Retirement Study, Wright, Ko, and Aneshensel (2011) explored the impact of neighborhood context and socioeconomic status on depressive symptoms. Neighborhood socioeconomic disadvantage was measured by the number of residents aged 25 or older without a high school degree, households receiving public assistance income, residents living below the poverty level, and residents aged 16 or older who were unemployed. As such, neighborhood socioeconomic disadvantage was related to an increase in depressive symptoms (Kubzansky et al., 2005; Wright et al., 2011).

Income has also been seen to impact perceived neighborhood safety and mobility disability among older adults. In a large longitudinal cohort study of community-dwelling adults aged 65 and older, subjects at or below the poverty level had worse perceptions of neighborhood safety and greater risk for mobility

disability (Clark et al., 2009). Economic conditions reflected in neighborhood poverty have both a psychological and physical effect on older adults. Older adults residing in areas of greater poverty reported more depressive symptoms and limited physical mobility than older adults who lived in low-poverty neighborhoods.

Gender

In House's model, gender has a major path to income and follows a path to health outcomes through income and health behaviors. In a large meta-analysis (14,213) of gender differences and physical capabilities, men performed better in measures of physical capability—grip strength, chair-rising ability, walking speed, timed get up and go, and standing balance performance (Cooper et al., 2011). Mortality associated with physical activity revealed that physical activity was inversely associated with mortality for both women and men; the relationship was even stronger for women (Brown et al., 2012). As physical activity increased, mortality from all causes decreased.

Gender differences were also noted in the prevalence of depression in older adults. In a nationally based survey from the year 2006—the Behavioral Risk Factor Surveillance Survey (BRFSS)—projections were made on depressive prevalence based on sex-specific U.S. Census national population projections for 2005 to 2050 (Heo, Murphy, Fontaine, Bruce, & Alexopoulos, 2008). Older women with depressive disorder will increase by 107.7%, from 2.6 to 5.4 million; older men with depressive disorder will increase by 125%, from 1.2 to 2.7 million. The projected prevalence of depression will be greater in women

versus men but the percentage of increase will be greater in men than women. The prevalence of depression among older adults in the Aging, Demographics, and Memory Study was slightly greater in women (498, 11.44%) than men (353, 10.19%) (Steffens, Fisher, Langa, Potter, & Plassman, 2009). The differences in physical activity and the effects of physical activity on mortality and depression between men and women support House's assertion that gender impacts health outcomes.

Age

Health outcomes are also influenced by age. The *old-old* refers to persons 85 years or older, and the *old* refers to those from 70 to 85 (Haber, 2007). Perceptions of health and health behaviors differ between the "baby boomers" and those in their 70s and older. Although age is not indicated as a factor that contributes to inequities in health outcomes in House's model (Figures 6.1 and 6.2), age was included in the current study since age could have a significant effect on health outcomes (Moineddin, Nile, Wang, Tracy, & Upshur, 2010).

In a population-based retrospective study of Ontario residents aged 65 and older, utilization of services was reviewed from January 1998 through December 2006. As persons aged, utilization increased and the probability of death increased (Moineddin et al., 2010). Prescription use was greater for women than men. In addition, those persons who were high utilizers at baseline did not decrease utilization of services over time. The increased use of services was reflective of an increase in chronic diseases over time. The worsening of

chronic conditions with age impacts self-perceived physical function and emotional well-being (Jang, Borenstein, Chiriboga, & Mortimer, 2005).

Advancing age has also been correlated with emotional well-being (Jeste et al., 2012). Conversely, the younger old age group (ages 52 to 63) has been associated with an increase in depressive symptoms (Wright et al., 2011). The variation in health perceptions by age cohort, the worsening of chronic conditions with age, and the variation in depressive symptoms by age led to our choice to control for age in the path model. These perceptions may impact the self-assessment of physical function and emotional well-being, which is why we chose to control for age in our analysis.

Health Behaviors

Older adults who engage in physical activity have lower mortality from all causes and fewer sick days from physical and mental symptoms (Brown et al., 2012; Thompson, Zack, Krahn, Andresen, & Barile, 2012). Sedentary older adults benefit from community-based exercise. In a study of the Active Start program (a community-based behavior change and fitness program), the intervention group showed a significant improvement in strength, flexibility, and balance (Yan, Wilber, Aguirre, & Trejo, 2009). Similar results were found by Toto and colleagues (2012) in a multicomponent physical activity program for community-dwelling older adults. Improvements were seen in chair sit-and-reach, arm curls, chair stand repetitions, and daily activity (Toto et al., 2012).

The association between mental health and health behaviors such as not smoking has been documented in older adults. There is a greater risk of smoking

in the presence of depression among older Health Maintenance Organization members (Green, Polen, & Brody, 2003). Second-hand exposure to smoke was hypothesized to lead to an increase in depressive symptoms as a result of lower levels of dopamine and *y*-aminobutyric acid, which are associated with mood disorders (Petty, 1995). A National Health and Nutrition Examination Survey (NHANES) cross-section of the noninstitutionalized civilian U.S. population measured the association between second-hand smoke and depression, serum cotinine, and depressive symptoms. Among those who had never smoked, second-hand exposure was positively associated with depression after adjusting for age, gender, race, ethnicity, and education (Bandiera et al., 2010).

This review of the literature summarized the variables from House's model that we used in the current study to describe predictors that lead to physical function and emotional well-being—race, gender, age, neighborhood poverty, education, income, and health behaviors (cigarettes per day, physical activity, unstructured physical activity). Table 6.1 provides a list of variables in House's model, modified model variables for this study, and measurement. Temporally ordered variables from left to right in House's model were changed to reflect the variables used in this study. Race and gender were ordered the same as in House's model.

Since this was a secondary analysis, not all of Houses' variables were accessible in the original dataset, so the primary dataset was linked to other data sources. For instance, the percent of persons in a neighborhood at or below the poverty line was used to measure the economic construct in House's model.

Although age is not indicated as a variable that contributes to inequalities in health outcomes in House's model (Refer to Figure 6.2), we decided to include age in the present study due to the heterogeneity of physical and mental health among older adults that could have a significant effect on health outcomes (Kobayashi & Prus, 2012; Moineddin et al., 2010).

Methodology

Participants

The After Discharge Care Management of Low-Income Frail Elderly (AD-LIFE) study of community-based low-income Medicare Medicaid older adults tested the effectiveness of an interdisciplinary nurse-led care-management intervention (Allen et al., 2011; Wright, Hazelett, Allen & Jarjoura, 2007). The study was funded through the Agency for Health Quality and Research (AHRQ R01 HS014539). Trial participants in the AD-LIFE study were 65 years or older, Medicare Medicaid enrollees, had one or more deficits in activities of daily living or instrumental activities of daily living, and had one or more of eight chronic medical conditions (diabetes, hypertension, chronic obstructive pulmonary disease, osteoarthritis, stroke, osteoporosis, or congestive heart failure). Participants resided in urban and rural areas of a city in the Midwest and received their health care from a large, integrated health system. Recruitment occurred during the participants' hospital stay. After discharge from acute care, participants were randomized into either a control or intervention group.

The AD-LIFE intervention included a hospital discharge phone call, in-home geriatric assessment by an advanced practice nurse (APN),

interdisciplinary team reports to a primary-care physician, and ongoing follow-up by a nurse care manager for 12 months. A registered nurse care manager collaborated with the patient and primary-care physician to accomplish the participant-defined goals. Subjects in the control group received usual postdischarge care. All data used for the current study were obtained from baseline information only. Outcomes of AD-LIFE study are pending publication.

A total of 530 participants were enrolled in the AD-LIFE study. Of those, 121 were excluded from the current study because they did not receive Medicaid. An additional 72 cases were excluded from the data analysis due to missing and/or influential cases that would significantly impact results of path analysis to meet the assumptions of a multivariate analysis (Tabachnick & Fidell, 2007). Refer to Figure 6.3 for diagram summarizing sample inclusion.

Human Subjects

After the completion of a business associates agreement between the University of Utah Digit Lab and the Joint Investigational Review Board (IRB) from the integrated health system department of research in Ohio where the data originated, the University of Utah IRB approved the current study. Since address-level data were used, the business associates agreement was completed to comply with Health Insurance Portability and Accountability Act standards, which protect subjects from covered entities such as the integrated health system (Davenhall, 2002; Department of Health and Human Services, 2002).

Measures

As mentioned in the review of literature, all of the variables from House's model could not be operationalized in this study. However, to compensate for some of the missing variables from House's model, we used Geographic Information Systems (GIS) software to link to additional from a national dataset.

Esri's ArcGIS10.0 desktop software was used to spatially link the geocoded patient addresses to the corresponding census tract with a 100% match rate. The census tract is an aggregation of census blocks containing 1200 to 8000 people (Cromley & McLafferty, 2012) and is identified by the unique Federal Information Processing Standards Publication (FIP) code assigned to each census tract (Federal Information Processing Standards Publications, 2010). Income and neighborhood poverty were linked to AD-LIFE baseline data, and American Community Survey (ACS) data were used to complete the secondary analysis.

Geocoding is the process of assigning a coordinate (such as latitude and longitude) to data based on a location (Cromley & McLafferty, 2012). In the current study, addresses were geocoded to identify latitude and longitude, which then connected the data to a location (Cromley & McLafferty, 2012). This allowed us to obtain data based on the subject's census tract assignment.

Sociopolitical-demographic Variables

Demographic Variables

Data regarding race, gender, and age were collected from each subject at the time of enrollment into the AD-LIFE trial. Participants were asked to self-

report their race using the following categories: African American, Caucasian, Hispanic, Native American, Asian American or Pacific Islander (Office of Budget Management, 1995). Gender was defined as either female or male. Age was reported in years.

Socioeconopolitical Conditions

House's model indicates that economic conditions have a major impact on socioeconomic status and moderating effect on the pathway between race, gender, and socioeconomic status (Figure 6.1). House also implies that social, political, and economic conditions and policy all contribute to socioeconomic status. Percent poverty was used to reflect neighborhood economic conditions in House's model. Data were obtained from the American Community Survey 2006–2010 and indicated the percentage of persons whose income in the past 12 months was at or below the poverty line within the participant's census tract.

Socioeconomic Status

House's model combines both education and income to reflect socioeconomic status. However, we chose to list education and income in temporal order for the path analysis, since education would come before income. Education and occupation were used to represent the construct of socioeconomic status; data for both were obtained from the AD-LIFE data set. The highest level of education was measured using the following scale: 0 = none, 1 = less than high school graduate, 2 = high school graduate (included Graduate Equivalency Degree), 3 = some college or associate's degree, 4 = bachelor's

degree, 5 = some graduate work, and 6 = graduate degree.

The AD-LIFE data did not include income information. Instead, at the time of enrollment in the AD-LIFE study, each participant indicated his or her preretirement occupation. Occupation preretirement was used as a proxy for income for our study. A person's occupation confers the amount of income he or she received, and income has been shown to impact health outcomes over the life course (Herd et al., 2007; House et al., 2005; Kim & Durden, 2007; Zimmer & House, 2003). Using geospatial information systems, income based on the participant's preretirement occupation was linked to census tracts obtained from the American Community Survey 2006–2010. We obtained the median income by occupation by income in the past 12 months from the ACS. The yearly earnings based on occupation at retirement were grouped into four categories per census tract: (1) management, business, sciences, and arts; (2) service, sales, and office; (3) natural resources, construction, and maintenance; and (4) production, transportation, and moving material. For example, a service provider may have a median income of $12,000 per year based on the income of all service providers within that census tract.

Health Behaviors Cigarettes were recorded as how many cigarettes a person smoked per day (range 0–100). Data for structured activity (walking, exercise classes, and so on) and unstructured activity (household chores, gardening, and so on) were self-reported by subjects at baseline in the AD-LIFE study and were recorded as minutes per week by the research assistant.

Outcome Variables

Physical function and emotional well-being were measured using the SF-12® (Ware, Kosinski, Turner-Bowker, & Gandeck, 2007). The SF-12® is a 12-item self-report scale that measures physical- and mental health-related quality of life. The scale is comprised of 12 items that include two component summary scores: a physical component score (PCS) and a mental component score (MCS). These component scores are comprised of eight concepts: physical functioning; role limitations due to physical health; social functioning; bodily pain; general mental health; role limitations due to emotional problems; vitality (energy and fatigue); and general health perception. Scores for PCS and MCS subscales are calculated by multiplying item scores by the specific scale weighting and summing across weighted item scores (Ware, Kosinski, & Keller, 1996).

In a study of 187 older adults living a retirement community, the SF-12® had a Cronbach alpha coefficient of .89 and test-retest reliability of .73-.86 (Resnick & Parker, 2001). The SF-12® used for the current study had a Cronbach alpha coefficient of .69, which is the recommend reliability coefficient for group-level analysis (Nunnally & Bernstein, 1994).

Mental and physical health data on each individual in the current study were linked from the mental components summary score (MSC) and physical components summary score (PSC) of the SF12® health-related quality of life within the AD-LIFE data set (Ware et al., 1996).

The SF12® mental components summary score (MCS) distinguished between groups based on psychiatric conditions that place a large burden on

mental health status. The mean was at least 10 points lower in persons with a mental health condition such as depression, anxiety, or bipolar disorder as compared to the general population (Ware et al., 2007). Reliability coefficients for the SF12® took into account the reliability of each SF12® health survey and covariance between them to report the internal consistency coefficient for age sixty-five or less for the PCS and MSC of .82 and .89, respectively (Ware et al., 2007).

Analysis

Prior to path analysis, the data were checked for influential cases to meet the assumption for a multivariate analysis (Tabachnick & Fidell, 2007). The analysis for influential cases was conducted using SPSS® Version 18.0 to determine (or estimate) the DfBeta for predictor variables. In analytic methods such as path analysis that rely heavily on interpretation of correlation coefficients, the DfBeta provides a standardized difference for each individual estimate; if DfBeta is greater than $2/\sqrt{n}$, then the observation is influential (Myers, 1990). Normality and linearity were evaluated using histograms, scatter plots, skewness -3 to 3, and kurtosis -8 to 8. No data transformations were required.

Path models were evaluated using AMOS™ 17.0 statistical software, which calculated the statistical significance of estimated path coefficients (Arbuckle, 2006) (Figure 6.4). Correlation coefficient matrices among the variables are reported in Table 6.2. Modification indices provide a list of parameters that could be added or deleted to the model to improve fit (Arbuckle,

2006). This in turn will reduce the chi square and degrees of freedom for the model.

Results

Table 6.3 provides demographic and descriptive information about participants along with the range for each variable. African Americans represented 30% (*n*=106) and Caucasians 68% (*n*=231) of the 337 participants in the current study. The majority of participants in the current study had less than a high school education (46%, *n*=115), and 9.3 (*SD*=2.8) had chronic health conditions.

We ran a path model that began with the exogenous variables in temporal order from race to the outcome variables of physical function and emotional well-being. Using AMOS 17.0, a series of seven path models were analyzed to achieve the final model. Table 6.4 provides a list of all seven models and goodness of fit indices. Modification indices provided recommendations to improve model fit (Arbuckle, 2006; Bryne, 2010; Hair, Anderson, Tatham, & Black, 1995; Hu & Bentler, 1999; Kenny, 2012). The initial model had poor-fitting indices with a $\Delta\chi^2 127.301$, *df 35*, $\chi^{2/df}$ *3.637, TLI =.096, CFI= .425*, and *RMSEA (90%)=.089 (.072, .105).* Logic, theory, and empirical (LTE) evidence were utilized to determine if the recommended modification indices were pragmatic (Kercher, 2005).

Modifications were one at a time. The first modification established a direct path from poverty to income. Next, a path was connected from gender to income. A direct path from cigarettes smoked to formal exercise was completed.

This was followed by a covariance between mental and physical health. Direct paths from age to mental health and age to physical health were added to create the final model (Table 6.4 and Figure 6.5).

The final model indicated that not all path coefficients were significant at a $p < .05$. However, fit statistics *($\Delta\chi^2$ 32.932, df 29, $\chi^{2/df}$ 1.136, TLI =.954, CFI= .976, and RMSEA (90%)=.02 (.000, .048)* suggested that the data fit the final model at a superior level with CFI and TLI above .95 (Hu & Bentler, 1999) (Table 6.4). The achievement of model fit supports the assumption that estimates of the path coefficients were correct and that this is a plausible model (Klem, 1995).

The modification indices did not recommend that a significant improvement in model fit would occur by connecting a direct path from race to physical function or emotional well-being as seen in House's model (Figure 6.1). Race did not impact physical function or mental well-being in Medicare Medicaid frail older adults when income, socioeconomic status (income, education), neighborhood conditions (poverty), and health behaviors (smoking, exercise, and physical activity) were controlled.

The effect of race on education was significant in that African Americans had less education than Caucasians. When race (Caucasian) increases by one standard deviation, education goes up by 0.117 standard deviations *($\beta = .117, p < .05$).* There was a significant correlation between race and poverty *($-.273\ p < .001$)*. African American race was associated with living in a census tract where a greater percent of persons were at or below the poverty line. As reflected in House's model, income was greater for men than women *($\beta = .309, p < .001$).* As

gender (male) goes up one standard deviation, income goes up .309 standard deviations.

Subjects that reported greater minutes of physical activity per week ($\beta = .226, p < .001$) and older age ($R^2 .145, p < .01$) had higher scores on the physical components summary score of the SF12®. Subjects who engaged in more minutes of structured physical activity such as walking ($\beta = .128, p < .05$) and physical activity like housework ($\beta = .114, p < .05$) per week and were older age $\beta = .227, p < .001$) had higher scores on the mental components summary score of the SF12®.

The results of this study did not show that inequities existed by race in physical function and emotional well-being in frail Medicare Medicaid older adults as posed in the research questions.

Discussion

This secondary analysis of baseline data from the After Discharge Care Management of Low Income Frail Elders (AD-LIFE) was focused on application of a model of social inequities in health and aging to explore disparities in physical function and emotional well-being in a sample of frail older adult Medicare Medicaid enrollees. A path analysis was used to assess the effect of multiple psychosocial and socio-demographic variables on physical function and emotional well-being. The sample included 337 older adults that participated in the AD-LIFE study 2005–2010. Significant findings included the relationship between race, poverty, and education along with the direct effects of age and activity on health outcomes.

Race

In the current study, race did not impact the primary outcomes of physical function and emotional well-being after controlling for income, education, and health behaviors. This may be related to the multiple chronic conditions, frailty, low income, and low education of this sample (Coughlin, Waidmann, & O'Malley-Watts, 2009; Green et al., 2003; Herd et al., 2007).

As hypothesized in House's model, gender impacts income, even in a low-income group, and income impacts the onset of chronic conditions (Herd et al., 2007). This finding remained consistent. The path analysis model showed that effects of race on poverty and education remained consistent with other findings as well.

African Americans were more likely to live in areas of greater poverty than Caucasians (Shultz et al., 2012; Williams, 1999). Racial segregation in the form of *redlining* (deliberate practice by lenders of steering minorities to racially segregated neighborhoods) leads to pathogenic living conditions of low income, lower education, and lesser opportunities for African Americans (Williams, 1999).

Lower education has been significantly associated with physical decline in older adults (Barnes et al., 2011). Living in high-poverty areas has also been associated with an increase in allostatic load. Persons living in high-poverty neighborhoods experienced greater allostatic load, the body's response to chronic stress that results in diseases such as hypertension (Lewis et al., 2009; McEwen, 1998; Schulz et al., 2012).

Structured and Unstructured Physical Activity

Study participants self-reported structured physical activity—such as walking, swimming, or participating in an exercise—that had a significant direct effect on physical function and emotional well-being for both African Americans and Caucasians. Emotional well-being was directly impacted by structured physical activity as well as unstructured physical activity. In our study, subjects who reported more minutes per week in physical activity and structured exercise had higher scores on the physical and mental component summary score of the SF12®.

Inactivity has been linked to increased disability and worsened quality of life in older adults (Motl & McAuley, 2010). Physical activity in community-dwelling older adults improved physical and mental health quality of life (White, Wójcicki, & McAuley, 2009). As we age, physical activity provides a protective effect against worsening functional decline (Prohaska et al., 2006).

As seen in our study, in a sample of low-income Medicare Medicaid frail older adults, persons who engaged in more activity reported better physical and mental health. Physical activity has also been identified as a moderator in the relationship between disability and depressive symptoms (Yunhwan & Kyunghye, 2008). The strength and association between disability and increased depressive symptoms decreased over time for older adults who were physically active. The combination of mental stress, low physical activity, and low income has been shown to have a cumulative effect on unhealthy and health outcomes (Krueger & Chang, 2008;). Both individual- and community-based interventions to reduce

barriers to engagement in physical activity have improved the health of older adults (Hays, Pressler, Damush, Rawl, & Clark, 2010; Robare et al., 2011; Toto et al., 2012; Yan et al., 2009).

Age

House's model did not include age as a variable that would directly or indirectly impact physical function and emotional well-being. However, the inclusion of age improved the final model fit. As a person's age increased, both the physical function and emotional well-being scores increased. The mean age of participants in our study was 74.7 *(SD=7.3*). Our findings supported the research of other studies that have found older adults to have better mental health with advancing age as compared to the young-old (Charles, 2010; Ellis, Gurgaugh & Egede, 2011; Hopman et al., 2009; Kliegel, Jäger, & Phillips, 2007). In poststroke patients, younger age—45 to 64—has been associated with lower scores on the mental components summary score of the SF-12® (Ellis et al., 2011). In a study of 2,418 older adults with multiple chronic conditions, older age was associated with better mental component summary score (Hopman et al., 2009).

Successful aging has been correlated with advanced age and fewer reports of depressive symptoms (Jeste et al., 2012). Resilience as a positive psychological trait may have contributed to the positive correlation between age and mental component summary score. Resilience through spirituality—particularly in African American older adults in the face of adversity such as poverty, poor health, and discrimination—has been hypothesized to lower rates

of depression and depressive symptoms (Chatters et al., 2008; Keyes, 2009; Rybarczyk et al., 2012).

The positive association between the physical component summary score could be explained by survivor bias, similar to what was reported by Allman et al. (2004) and Moody-Ayers, Lindquist, Sen, and Covinsky (2007). Survivorship bias refers to the logical error that could occur due to the lack of visibility of persons that did not live to an older age (Allman et al., 2004; Lee et al., 2001; Moody-Ayers et al., 2007). Adults who survive to older age are hardier than those who do not. In addition, older adults often enter Medicare Medicaid without prior medical coverage and present with complications related to untreated chronic illness and disability that increase the risk of mortality at an earlier age (Lied & Haffer, 2004; Moon & Shin, 2005; Walker et al., 2010).

Limitations

An unexpected finding was that race did not show a significant direct or indirect effect on physical function and emotional well-being as hypothesized in House's model. House's model was the theoretical basis of the current study, and we were unable to indirectly work through the relationship of race to health outcomes because all the variables in House's model were not available in the AD-LIFE data set. Therefore, we were unable to include variables such as acute and chronic stress. Perceived racial discrimination has been associated with adverse worsened hypertension, elevated diastolic blood pressure, and anxiety (Lewis, et al., 2009; Williams, 1999; Williams & Jackson, 2005; Williams & Williams-Morris, 2000). Future studies should include perceived racial

discrimination as a predictor variable that would impact health outcomes in African American older adults.

The threats to construct validity are greater in the use of secondary data (Boslaugh, 2007; Freburger & Konrad, 2002; Smith et al., 2011). The researchers would have to assume that data were collected correctly. How well data collectors were trained in data collecting and monitoring could have contributed to construct validity threat. Experimenter expectancies influence the participant's responses that may cause the participant to respond more favorably (Shadish, Cook & Campbell, 2002). Additional threats to construct validity in secondary analysis include adequate definition of the construct of interest—the tools that were used to collect the data may not measure the construct of interest (Brown & Semradek, 1992; Smith et al., 2011). For example, a depression instrument was not used at baseline in the AD-LIFE data. This limited our ability to use depression as a construct of mental well-being. We had to identify another construct of mental well-being other than depression within the AD-LIFE data.

The self-report of structured and unstructured physical activity in minutes per week was a limitation of our study, as subjects were not given a device like an accelerometer that could have more accurately recorded activity. Although self-report has been used to collect physical activity data such as in the National Health and Nutrition Examination Survey, accelerometry has been recommended to measure physical activity in older adults (Evenson, Buchner, & Morland, 2012). Additional measurement issues originated from the use of the SF-12® in a sample of low-income, low-education older adults with a high number of chronic

conditions that may have contributed to a floor effect (Shadish et al., 2002).

The average score for subjects on the PCS score was 30.2 (*SD=8.7*), which is below the 25th percentile for both age 65-74 (*M*=36.8, *SD*= 9.6) and age greater than 77 (*M=33.3, SD= 9.0*) (Ware, Kosinski, Tuner-Bowker & Gandek, 2002).

The restriction of range on key risk variables in this low-income sample may have precluded detection of racial inequities in health outcomes (Shadish, Cook, & Campbell, 2002). For example, the range of income was limited to only persons who were financially eligible for Medicaid. In addition, the mental components summary score for subjects in this study (*M= 38.15, SD= 9.71*) which was below the 25th percentile for persons aged 65 to 75 (*M= 45.15, SD= 8.76*) and (*M= 42.80, SD= 8.95*) for aged 75 and older (*M= 42.80, SD= 8.95*). The scores of participants in the current study were consistent with other studies using the SF-12® in a group of frail older adults (Hopman et al., 2009; Resnick & Nahm, 2001).

A negative correlation of the error variance was observed between the physical and mental component (*-.225, p< .001*) summary scores in the current study, which has been seen in studies where the composite summary scores were below 50 (Taft, Karlsson & Sullivan, 2001). Changes in the latest version of the SF-12v2^{TM} included modifications to the response format that addressed the issue of floor and ceiling effects to adjust for this problem (Ware et al., 2002).

The MCS and PCS scores are based on each of the eight subscales (physical functioning, role physical, bodily pain, general health, vitality, social

functioning, role emotional health, and role mental health). The summary scales may inaccurately summarize subscales profile scores (Taft et al., 2001). For example, the subscales for bodily pain and general health have a greater potential to impact PCS than the MCS. Answers to questions such as “Do you feel full of energy?” are more reflective of physical condition and stamina than of mental health (Resnick & Nahm, 2001). In addition, there are norm-based scores for specific chronic conditions, but scoring is not normed based on the number of chronic conditions.

As mentioned previously, Medicare Medicaid older adult enrollees have more chronic conditions and worse health than Medicare-only enrollees (Lied & Haffer, 2004; MEDPAC, 2011). Although the PCS is widely used in research and validated in African American older adults, modifications to traditional scoring methods may create a better tool to measure physical function and emotional well-being in Medicare Medicaid frail older adults with low education and low income (Cerin, Cresci, Janowski, & Lichtenberg, 2010; Cunningham, Hays, Burton, & Kington, 2000; Resnick & Nahm, 2001). The establishment of norm-based scoring for persons with multiple chronic conditions should also be considered in future research using the SF-12® in frail older adults.

Conclusion

Few studies have explored differences within the group of Medicare Medicaid enrollees. As we see an increase in the number of minority older adults, substantive native research is needed to understand the differences within this population in order to develop interventions that improve health (Centers for

Disease Control and Prevention, 2007; Healthy People 2020, 2012). In the current study, activity and age were key variables that had a direct relationship to physical function and emotional well-being. Since incidence of the chronic conditions is more prevalent in African Americans, Pleis and Lucas suggested emphasis on interventions at younger age to reduce disparities in late life (Pleis, & Lucas, 2009). Increasing structured and instructed physical activity to target interventions to the younger-older will improve the health of the Medicare Medicaid older adults. Future research should be directed toward strategies that promote resilience and mental health to address inequities in physical function and emotional well-being in vulnerable low-income older adults.

Table 6.1

House's Model, Modified Model, and Measurement Variables

House's Model	Modified Model	Measurement Variables
Demographic (race, ethnicity, gender)	Same plus age added	African American, Caucasian, male/female, age in years
Social, political and economic conditions and policy	Neighborhood disadvantage	Percent of persons living in poverty
Socioeconomic status	Income and education	Income based upon occupation at retirement, years of education
Explanatory Variables	Health Behaviors	Cigarettes, physical activity, unstructured physical activity
Health Outcomes	Physical Function and Emotional Well-being	Physical components summary score/mental components summary score SF12®

Table 6.2

Correlation Coefficients Between Variables

	M (*SD*)	Edc[a]	Income[b]	Cigs[c]	Physical activity[d]	Un-structure Physical activity[e]
Education[a]	1.76 (0.843)	1.000	.131*	-.007	.046	.054
Income[b]	18,924.21 (8013.23)		1.000	.043	-.002	.094
Cigarettes[c]	1.90 (5.71)			1.00	-.117*	.076
Physical[d] activity	50.30 (89.61)				1.000	.038
Unstructured[e] Physical activity	72.23 (38.26)					1.000

*p<.05

Notes: Edc[a] = Highest level of education. Inc[b] = Income
Cigs[c] = number of cigarettes smoked per day.
Physical Activity [d] = formal exercise.
Unstructured physical activity[e] = housework, gardening etc.

Table 6.3

Exogenous, Explanatory, and Endogenous Variables (*N*=337)

Variable	*M* (*SD*), *n* (%)	Range
Exogenous (Predictor)		
Age (years)	74.72 (7.3)	65-94
Gender		
Female (coded 0)	292 (86.6)	
Male (coded 1)	45 (13.4)	
Race		
African American (coded 0)	106 (30.6)	
Caucasian (coded 1)	231(68.5)	
Neighborhood poverty[a]	22.33 (14.26)	1.4-65.3
Income	37,157.32 (15,319.82)	9,983-113,542
Education[b]	*1.76 (0.843)*	1-6
Explanatory (Health Behaviors)		
Smoker		
No (coded 0)	284 (84)	
Yes (coded 1)	53 (16)	
Of smokers cigarettes[c]	12.08(9.24)	1-40
Physical activity	50.30 (89.61)	0-840
Unstructured physical activity	72.23 (38.26)	0-210
Endogenous (Outcome)		
Physical components summary	30.16 (8.72)	15.80-61.98
Mental components summary	38.15 (9.71)	12.45-59.40

Percent of persons at or below poverty per census tract (neighborhood poverty[a])Education[b] (2.00= at or below high school education), 0= none, 1= less than high school graduate, 2= high school or General Education Development diploma, 3= some college or associates degree, 5= graduate work, 6= graduate degree Cigarettes[c] = number of cigarettes per day

Table 6.4

Goodness of Model Fit Statistics of First Through Final Recursive Model

Models	χ^2	*df*	$\chi^{2/df}$	*p*	TLI	CFI	RMSEA (90%)
First	127.301	35	3.637	.000	.096	.425	.089 (.072, .105)
Second	115.240	34	3.399	.000	.181	.494	.084 (.068, .102)
Third	83.137	34	2.445	.000	.505	.694	.066 (.048, .084)
Fourth	75.567	32	2.361	.000	.533	.729	.064 (.045, .082)
Fifth	64.069	31	2.067	.000	.634	.724	.056 (.037, .076)
Sixth	40.239	30	1.341	.100	.883	.936	.032 (.000, .055)
Final	32.932	29	1.136	.280	.954	.976	.02 (.000, .048)

Table 6.5

Regression Coefficient for Direct, Indirect, and Total Effects of Variables in the Final Model

Variables	Direct	Indirect	Total
Physical function			
Race	.000	.000	.000
Gender	.000	.006	.006
Age**	.145	.000	.145
Neighborhood poverty	.000	-.004	-.004
Emotional well-being			
Race	.000	.000	.000
Gender	.000	.004	.004
Age***	.227	.000	.227
Neighborhood poverty	.000	-.002	-.002

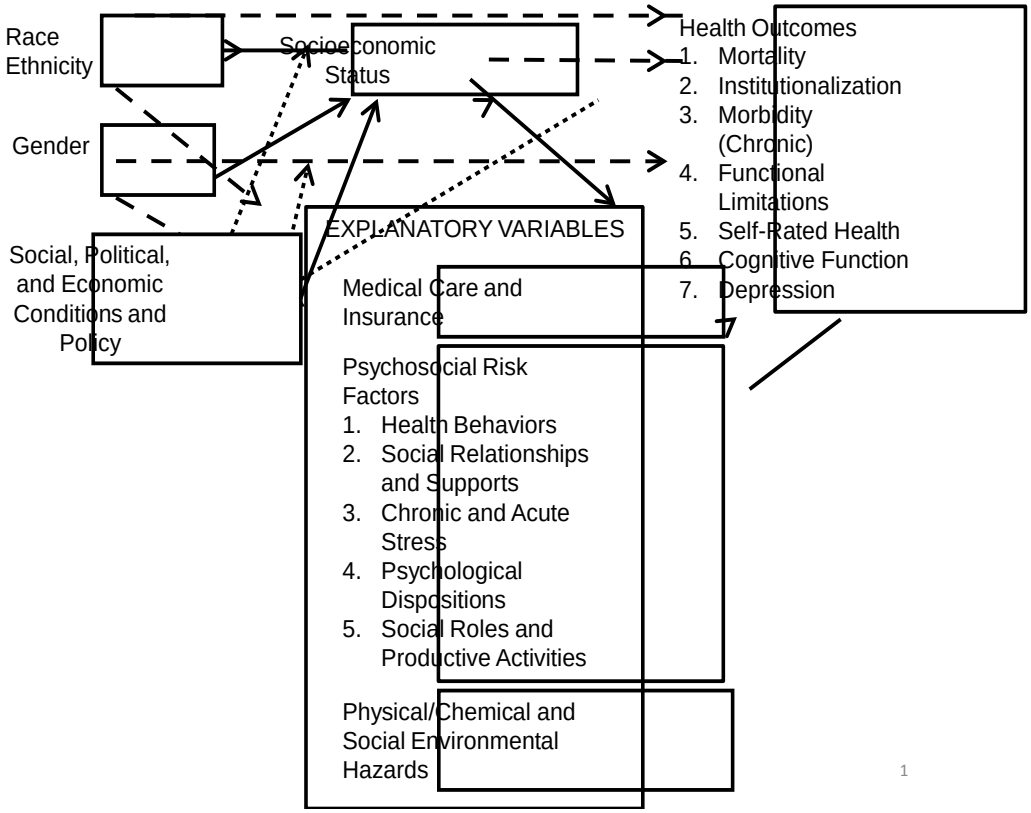
Notes: $*p < .05$; $**p < .01$; $***p < .001$. See Table 6.2 and 6.3 for definition of variable labels

Table 6.6

Standardized Regression Coefficients Estimate from Final Recursive Model

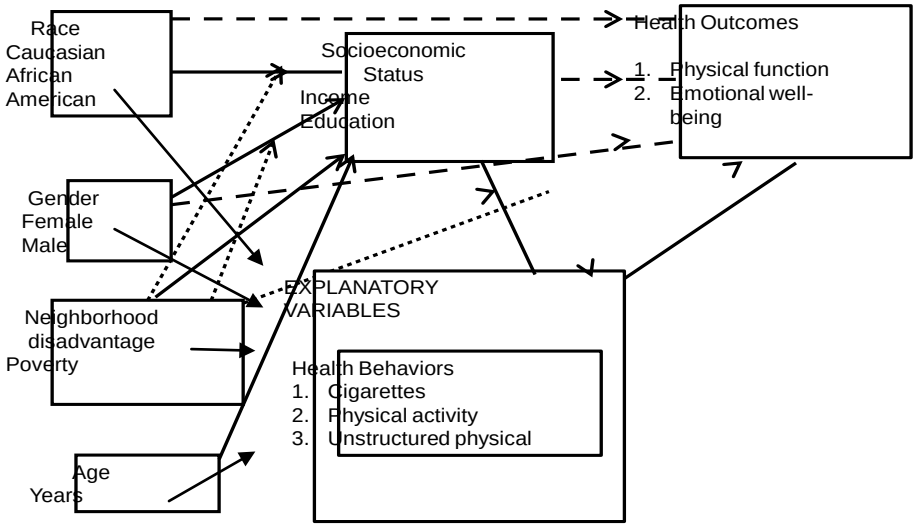
Variables	Coefficient Estimate
Physical function <--- Unstructured physical activity	.034
Physical function <--- Physical activity	.226***
Physical function <--- Cigarettes	-.020
Physical function <--- Age	.145**
Emotional well-being<--- Physical activity	.128*
Emotional well-being <--- Unstructured physical activity	.114*
Emotional well-being <--- Cigarettes	.030
Emotional well-being <--- Age	.227***
Education <--- Race	.117*
Education <--- Gender	.124*
Education <--- Age	-.083
Education <--- Neighborhood disadvantage	-.102
Income<--- Education	.064
Income <--- Neighborhood disadvantage	-.199***
Income <--- Gender	.309***
Cigarettes <--- Income	.043
Physical activity <--- Income	.003
Unstructured physical activity <--- Income	.094
Physical activity <--- Cigarettes	-.117*

Notes: *$p < .05$; **$p < .01$; ***$p < .001$. See Table 6.2 and 6.3 for definition of variable labels



Solid line=major path. Dash line=minor path. Dot line=interactive effect.

Figure 6.1 House's Model of Social Inequalities in Health and Aging (House, 2002).



Solid line=major path. Dashed line=minor path. Dotted line=interactive effect. (House, 2002)
Modified Model of Social Inequalities in Health and Aging

Figure 6.2 Modified Model of Social Inequalities in Health and Aging

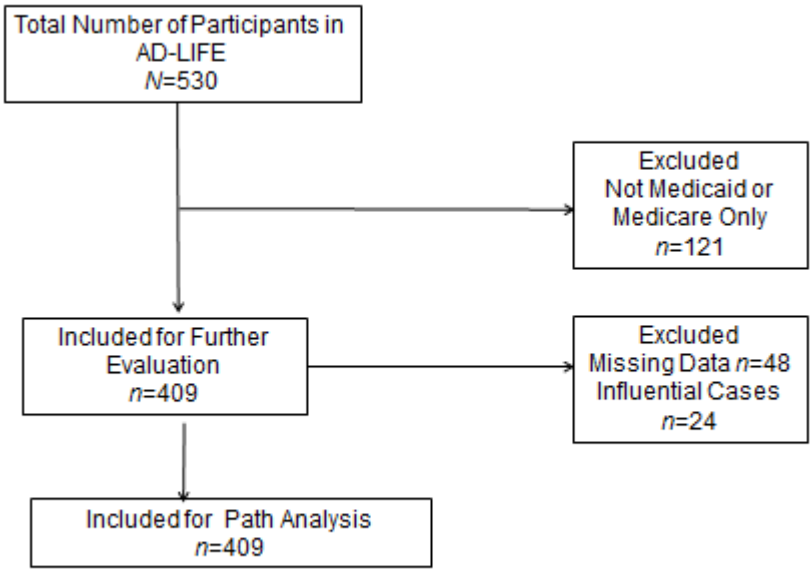


Figure 6.3 Summary of Participant Inclusion Diagram of Participants for Analysis

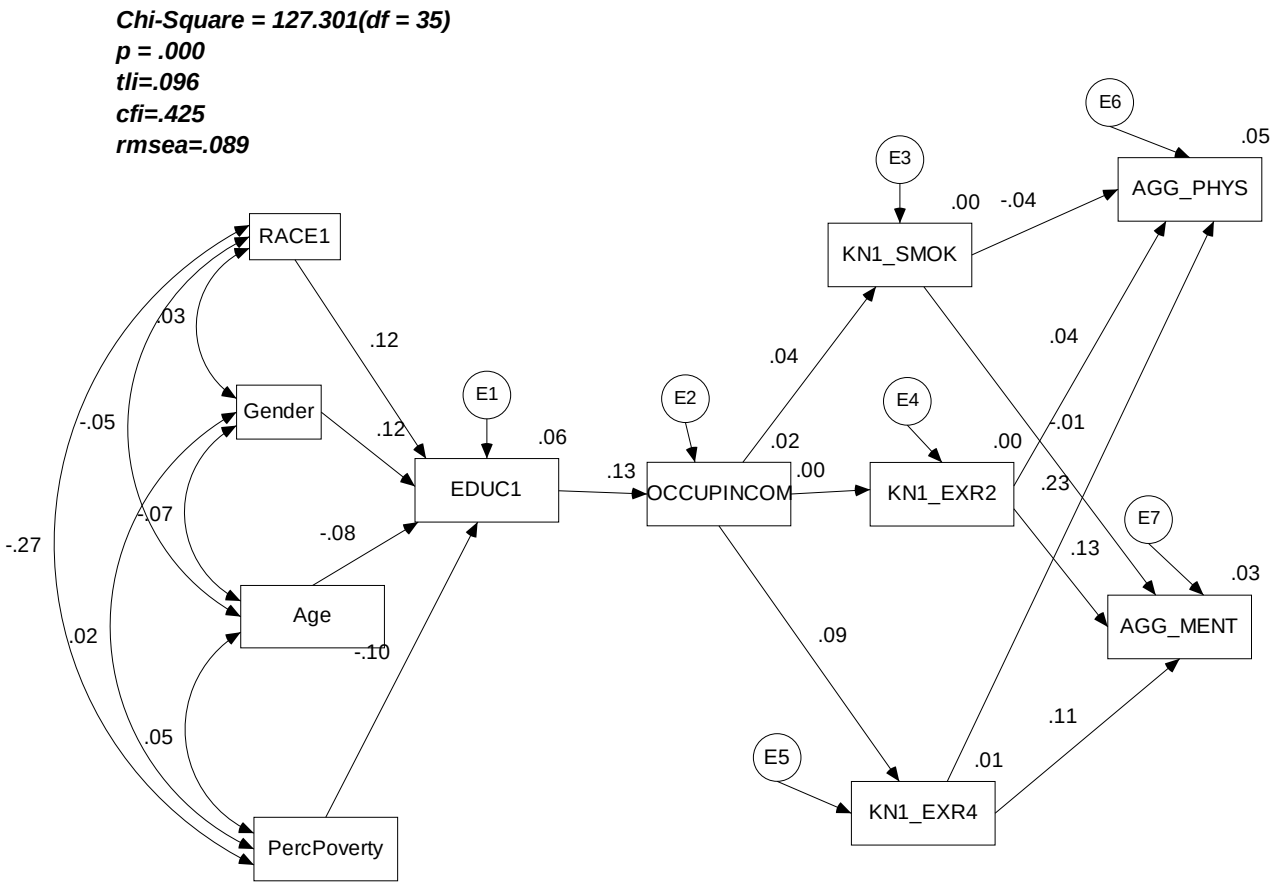


Figure 6.4 First Model

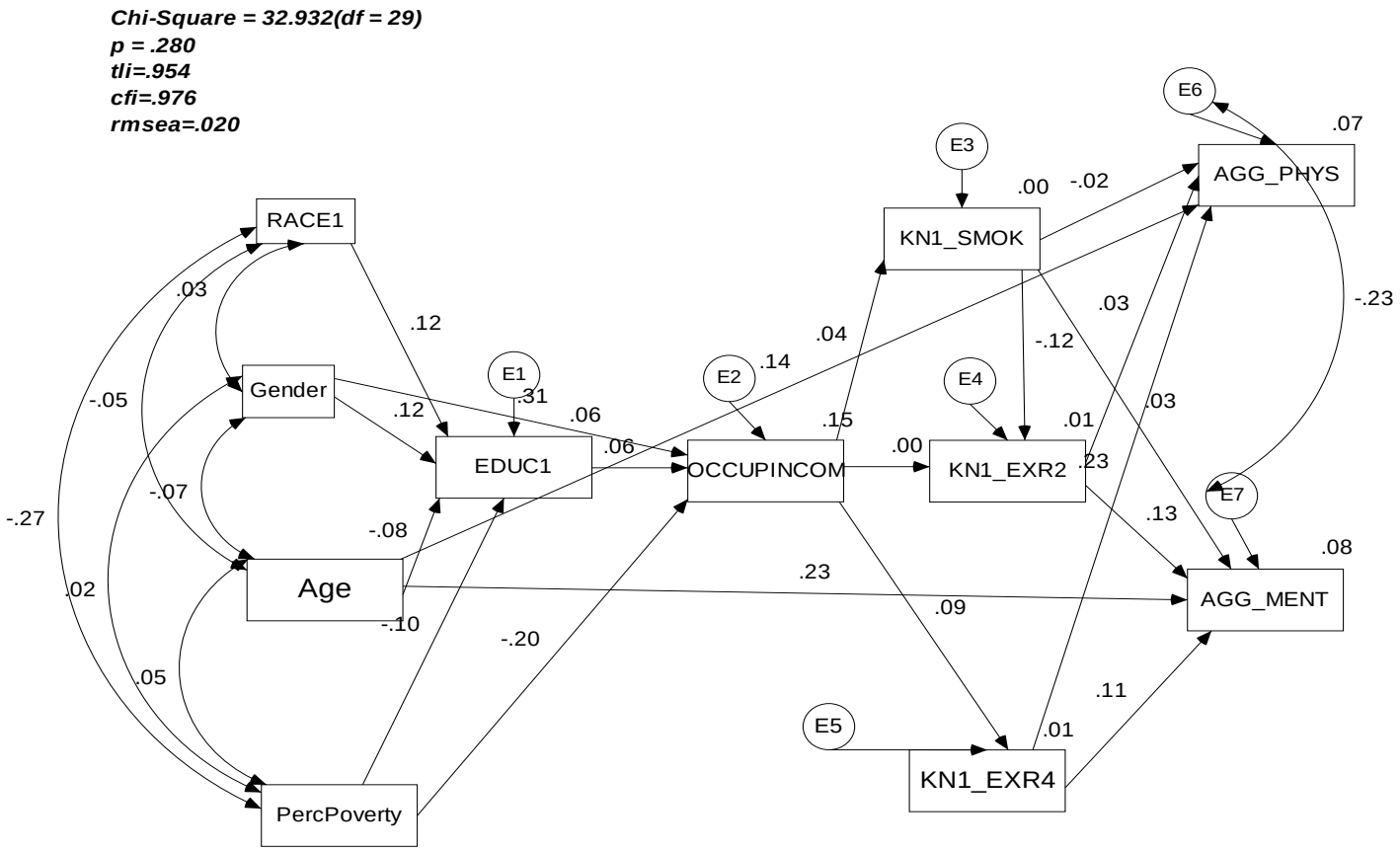


Figure 6.5 Final Model

References

Akincigil, A., Olfson, M., Siegel, M., Zurlo, K. A., Walkup, J. T., & Crystal, S. (2012). Racial and ethnic disparities in depression care in community-dwelling elderly in the United States. *American Journal of Public Health, 102*, 319–328. doi:10.2105/AJPH.2011.300349

Allen, K., Hazelett, S., Jarjoura, J.,Wright, K., Fosnight, K., Kropp, K., Hua, K., & Pfister, E. (2011) The after discharge care management of low-income frail elderly (AD-LIFE) randomized trial: Theoretical framework and study design. *Population Health Management, 14*(0), 1–6. doi:10.1089/pop.2010.0016

Allman, R. M., Baker, P. S., Maisiak, R. M., Sims, R. V., & Roseman, J. M. (2004). Racial similarities and differences in predictors of mobility change over eighteen months. *Journal of General Internal Medicine*, *19*(November 2004), 1118–1126.

Ailshire, J. A., & House, J. S. (2011). The unequal burden of weight gain: An intersectional approach to understanding social disparities in BMI trajectories from 1986 to 2001/2002. *Social Forces*, *90*, 1–27. doi:10.1093/sf/sor001

American Community Survey (2008). Limitations. Retrieved from http://www.census.gov/acs/www/methodology/limitations/

Arbuckle, J. L. (2006). *Amos 7.0 user's guide*. Chicago: SPSS®.

Arno, P. S., House, J. S., Viola, D., & Schechter, C. (2011). Social Security and mortality. The role of income support policies and population health in the United States. *Journal of Public Health Policy*, *32*, 1–17. doi:10.1057/jphp.2011.2

August, K. J., & Sorkin, D. H. (2010). Racial ethnic inequities indicators of physical health status: Do they still exist throughout late life? *Journal of the American Geriatrics Society, 58*(10), 2009–2015. doi:10.111?j.152-5415.2010.03033.x

Bandiera, F. C., Arheart, K. L, Caban-Martinez, A. J., Fleming, L. E., McCollister, K., Dietz, N. A., LeBlanc, W. G., Davila, E. P., Lewis, J. E., Serdar, B., & Lee, D. J. (2010). Secondhand smoke exposure and depressive symptoms. *Psychosomatic Medicine, 71*(1), 68–72. doi:10.1097/PSY.0b013e3181c6c8b5

Banks, K. H., Kohn-Wood, L. P., & Spencer, M. (2006). An examination of the African American experience of everyday discrimination and symptoms of psychological distress. *Community Mental Health Journal, 42*(6), 555–570.

Barnes, L. L., Wilson, R. S., Hebert, L. E., Scherr, P. A., Evans, D. A., & Mendes de Leon, C. F. (2011). Racial differences in the association of education with physical and cognitive function in older blacks and whites. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences, 66*(3), 354–363. doi:10.1093/geronb/gbr016

Beach, S. R., Schulz, R., Castle, N. G., & Rosen, J. (2010). Financial exploitation and psychological mistreatment among older adults: Differences between African Americans and non-African Americans in a population-based survey. *The Gerontologist, 50*, 744–757. doi:10.1093/geront/gnq053

Biegel, D. E., Magaziner, J., & Baum, M. (1991). Social support networks of white and black elderly people at risk for institutionalization. *Health and Social Work, 16*(4), 245–257.

Blazer, D., & Hybels, C. (2004). What symptoms of depression predict mortality in community-dwelling elders? *Journal of the American Geriatrics Society, 52*(12), 2052–2056.

Borrell, L. N., Burt, B. A., Neighbors, H. W., & Taylor, G. W. (2008). Social factors and periodontitis an older population. *American Journal of Public Health, 94*, 748–754.

Boslaugh, S. (2007). *Secondary data sources for public health.* New York: Cambridge University Press.

Braveman, P. (2006). Health disparities and health equity: Concepts and measurement. *Annual Review of Public Health Services*, *27*, 167–194. doi:10.1146/annurev.publhealth.27.021405.102103

Brown, J. S., & Semradek, J. (1992). Secondary data on health-related subjects: Major sources, uses and limitations. *Public Health Nursing, 9*(3), 162–171.

Brown, P. (1995). Race, class and environmental health. A review and systematization of the literature. *Environmental Research, 69*, 15–30.

Brown, W. J., McLaughlin, D., Leung, J., McCaul, K. A., Flicker, L., Almeida, O. P., Hankey, G. J., Lopez, D., & Dobson, A. J. (2012). Physical activity and all-cause mortality in older women and men. *British Journal of Sports Medicine*, *46*, 664–668. doi:101136/bjsports-2011-090529

Bryne, B. M. (2010). *Structural equation modeling with AMOS. Basic concepts, applications and programming.* New York: Routledge Taylor & Francis Group.

Cassidy, A. (2012). Care for dual eligibles. Efforts are afoot to improve care and lower costs for roughly 9 million people enrolled in both Medicare and Medicaid. *Health Affairs*, June 13, 2012. Retrieved from

http://healthaffairs.org/healthpolicybriefs/brief_pdfs/healthpolicybrief_70.pdf

Centers for Disease Control and Prevention and the Merck Company Foundation. (2007). *The state of aging and health in America 2007*. Retrieved from http://www.cdc.gov/aging/pdf/saha_2007.pdf

Cerin, P. A., Cresci, K., Jankowski, T. B., & Lichtenberg, P. A. (2010). Reliability and validity testing of the short-form health survey in a sample of community-dwelling African American older adults. *Journal of Nursing Measurement*, *18*(1), 49–59. doi:10.1891/1061-3749.18.1.49

Chandola, T., Ferrie, J., Sacker, A., & Marmot, M. (2007). Social inequalities in self reported health in early old age: Follow-up of prospective cohort study. *British Medical Journal, 334*, 990. doi:10.1136/bmj.39167.439792.55

Charles, T. S. (2010). Strength and vulnerability integration (SAVI): A model of emotional well-being across adulthood. *Psychological Bulletin*, *136*, 1068–1091. doi:10.1037/a0021232

Chatters, L. M., Bullard, K. K., Taylor, R. J., Toler-Woodward, A., Neighbors, H. W., & Jackson, J. S. (2008). Religious participation and DSM-IV disorders among African American older adults. *American Journal of Geriatric Psychiatry, 16*(2), 957–965. doi:10.1097/JGP.0b013e3181898081

Clark, C. R., Kawchi, I., Ryan, L., Ertel, K., Fay, M. E., & Berkman, L. F. (2009). Perceived neighborhood safety and incident mobility disability among elders: The hazards of poverty. *BMC Public Health, 9*, 1–15. doi:10.1186/1471-2458-9-162

Cohen, A., Gilman, S., Houck, P. R., Szanto, K., & Reynolds, C. F. (2009). Socioeconomic status and anxiety as predictors of antidepressant treatment response and suicidal ideation in older adults. *Social Psychiatry Psychiatric Epidemiology, 44*, 272–277.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed). Hillsdale, NJ: Lawrence Erlbaum Associates.

Cooper, R., Hardy, R., Sayer, A. A., Ben-Shlomo, Y., Birnie, K., Cooper, C., Craig, L., Deary, I. J., Demakakos, P., Gallacher, J., McNeill, G., Martin, R. M., Star, J. M., Steptoe, A., & Kuh, D. (2011). Age and gender differences in physical capability levels from mid-life onwards: The harmonisation and meta-analysis of data from eight UK cohort studies. *PLoS ONE*, *6*, 1–14. doi:10.1371/journal.pone.0027899

Coughlin, T., Waidmann, T., & O'Malley-Watts, M. (2009) *Kaiser commission on Medicaid and the uninsured. Where does the burden lie? Medicaid and Medicare spending for dual eligible beneficiaries.* Retrieved from http://www.kff.org/medicaid/upload/7895-2.pdf

Cromley, E. K., & McLafferty, S. L. (2012). *GIS and public health.* New York: The Guilford Press.

Cunningham, W. E., Hays, R. D., Burton, T. M., & Kington, R. S. (2000). Health status measurement performance and health status differences by age, ethnicity, and gender: Assessment in the medical outcomes study. *Journal of Health Care for the Poor and Underserved, 11*(1), 58–74.

Davenhall, W. F. (2002). Protecting geocoded health data. Retrieved from http://www.esri.com/industries/health/hippa.html

Demas, K. L., & Costenbader, K. H. (2009). Current opinion in rheumatology review. *Current Opinions in Rheumatology*, *21*, 102–109. doi:10.1097/BOR.0b013e328323daad

Department of Health and Human Services. Health Information Privacy. Retrieved from http://www.hhs.gov/ocr/privacy/

Ellis, C., Grubaugh, A. L., & Egede, L. E. (2011). Factors associated with SF-12 physical and mental health quality of life scores with stroke. *Journal of Cerebrovascular Disease*, *15*, 1–9. doi:10.1016/j.jstrokecerebrovasdis.2011.09.007Journal

Evenson, K. R., Buchner, D. M., & Morland, K. B. (2012). Objective measurement of physical activity and sedentary behavior among US adults aged 60 years or older. In Centers for Disease Control and Prevention. *Preventing Chronic Disease, 9*, 1–10. doi:http://dx.doi.org/10.5888/pcd9.110109

Everson-Rose, S. A., Skarupski, K. A., Bienias, J. L., Wilson, R. S., Evans, D. A., & Mendes de Leon, C. F. (2005). Do depressive symptoms predict declines in physical performance in an elderly, biracial population? *Psychosomatic Medicine, 67*, 609–615.

Federal Information Processing Standards Publications. (2010). *General information*. Retrieved from http://www.nist.gov/itl/fipsinfo.cfm

Freburger, J. K., & Konrad, T. R. (2002). The use of federal and state databases to conduct health services research related to physical and occupational therapy. *Archives Physical Medicine Rehabilitation*, *83*, 837–845. doi:10.1053/apmr.2002.32661

Fuller-Thompson, E., Nuru-Jeter, A., Minkler, M., & Guralnik, J. M., (2009). African American-Caucasian inequities in disability among older Americans. *Journal of Aging and Health, 21*(5), 677–698. doi:10.1177/0898264309338296

Green, C. A., Polen, M. R., & Brody, K. K. (2003). Depression, functional status, treatment for psychiatric problems, and the health-related practices of elderly HMO members. *American Journal of Health Promotion, 17*(4), 269–275.

Haber, D. (2007). *Health promotion and aging. Practical applications for health professionals* (4th ed.). New York: Springer Publishing Company.

Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (1995), *Multivariate data analysis* (4th ed.). Englewood Cliffs, NJ: Prentice-Hall.

Hays, L. M., Pressler, S. J., Damush, T. M., Rawl, S. M., & Clark, D. O. (2010). Exercise adoption among older, low-income women at risk for cardiovascular disease. *Public Health Nursing, 27,* 79–88. doi:10.1111/j.1525-1446.2009.00829.x

Haywood, K. L., Garratt, A. M., & Fitzpatrick, R. (2005). Quality of life in older people: A structured review of generic self-assessed health instruments. *Quality of Life Research, 14*, 1651–1668. doi:10.1007/s11136-005-1743-0

Healthy People 2020 (2012). *Older adults.* Retrieved from http://www.healthypeople.gov/2020/topicsobjectives2020/overview.aspx?topicid=31

Heo, M., Murphy, C. F., Fontaine, K. R., Bruce, M. L., & Alexopoulos, G. S. (2008). Population projection of US adults with lifetime experience of depressive disorder by age and sex from year 2005 to 2050. *International Journal of Geriatric Psychiatry, 23,* 1266–1270. doi:10.1002/gps.2061

Herd, P., Goesling, B., & House, J. S. (2007). Socioeconomic position and health: The differential effects of education versus income on the onset versus progression of health problems. *Journal of Health and Social Behavior, 48*(3), 223–238.

Herd, P., Schoeni, R., & House, J. S. (2008). Upstream solutions: Does supplemental security income program reduce disability in the elderly? *The Milbank Quarterly, 86*(1), 5–45.

Hopman, W. M., Harrision, M. B., Coo, H., Friedberg, E., Buchanan, M., & VanDenKerkhof, E. G. (2009). Associations between chronic disease, age and physical and mental health status. *Chronic Disease in Canada, 29*(2), 108–116.

House, J. S. (2002). Understanding social factors and inequalities in health: 20th century progress and 21st century prospects. *Journal of Health and Social Behavior, 43*(2), 125–142.

House, J. S., Lantz, P. M., & Herd, P. (2005). Continuity and change in the social stratification of aging and health over the life course: Evidence from a nationally representative longitudinal study from 1986 to 2001/2002 (Americans' Changing Lives Study). *Journals of Gerontology, 60B*(Special Issue II), 15–26.

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, *6*(1), 1–55.

Information Technology Processing Laboratory. (2008). *Federal information processing standards publication*. Retrieved from http://www.nist.gov/itl/fips.cfm

Institute of Medicine (2006). *Examining the health disparities research plan of the National Institutes of Health: Unfinished business*. Retrieved from http://www.nap.edu/catalog/11602.html

Jackson, J. S., & Knight, K. M. (2006). Race and self-regulatory behaviors: The role of the stress response and HPA axis in physical and mental health disparities. In L. L. Cartensen & K. W. Schaie (Eds.), *Social structure, aging, and self-regulation in the elderly* (pp. 189–207). New York: Springer.

Jackson, J. S., Knight, K. M., & Rafferty, J. A. (2010). Race and unhealthy behaviors: Chronic stress, the HPA axis, and physical and mental health disparities over the life course. *American Journal of Public Health, 100*(5), 933–939.

Jang, Y., Borenstein, A. R., Chiriboga, D. A., & Mortimer, J. A. (2005). Depressive symptoms among African American and white older adults. *Journal of Gerontology; Psychological Sciences, 60B*(6), P313–P319.

Jeste, D. V., Salva, G. N., Thompson, W. K., Vahia, I. V., Glorioso, D. K., Martin, A. S., Palmer, B. W., Rock, D., Golshan, S., Kraemer, H. S., & Depp, C. A. (2012). Association between older age and more successful aging: Critical role of resilience and depression. *American Journal of Psychiatry, 17*, 1–9. doi:10.1176/appi.ajp.2012.12030386

Kenny, D. A. (2012). *Measuring model fit.* Retrieved from http://davidakenny.net/cm/fit.htm

Kercher, K. (2005). *Advanced multivariate analysis: Path analysis.* Unpublished manuscript, Department of Nursing, Case Western Reserve University, Cleveland, Ohio.

Keyes, K. M., Barnes, D., & Bates, L. M. (2011). Stress, coping, and depression: Testing new hypothesis in prospectively studied general population sample of U.S. born Whites and Blacks. *Social Science Medicine, 72*, 650–659. doi:10.1016/j.socscimed.2010.12.005

Kim, J., & Durden, E. (2007). Socioeconomic status and age trajectories of health. *Social Science & Medicine*, *65*, 2489–2502. doi:10.1016/j.socscimed.2007.07.022

Klem, L. (1995). Path analysis. In L. G. Grimm & P. R. Yarnold (Eds.), *Understanding multivariate statistics* (pp. 65-97). Washington, DC: American Psychological Association.

Kline, R. B. (2011). *Principles and practice of structural equation modeling* (3rd ed). New York: The Guilford Press.

Kobayashi, K. M., & Prus, S. G. (2012). Examining the gender, ethnicity, and age dimensions of the healthy immigrant effect: Factors in the development of equitable health. *International Journal for Equity in Health, 11*(8), 1–6. Retrieved from http://www.equityhealthj.com/content/11/1/8

Kliegel, M., Jäger, T., & Phillips, L. H. (2007). Emotional development across adulthood: Differential age-related emotional reactivity and emotion regulation in a negative mood induction procedure. *International Journal of Aging and Human Development, 64*(3), 217–244.

Kronick, R., Bella, M., Gilmer, T. P., & Sommers, S. A. (2007). *The faces of Medicaid II: Recognizing the care needs of people with multiple chronic conditions. Center for Health Care Strategies, Inc.* Retrieved from http://www.chcs.org/publications3960/publications_show.htm?doc_id=540806

Krueger, P. M., & Change, V. W. (2008). Being poor and coping with stress: Health behaviors and the risk of death. *American Journal of Public Health, 89*, 889–896. doi:10.2105/AJPH.2007.114454

Kubzansky, L. D., Subramanian, S. V., Kawachi, I., Fay, M. E., Soobader, M., & Berkman, L. F. (2005). Neighborhood contextual influences on depressive symptoms in the elderly. *American Journal of Epidemiology*, *162*(3), 253–260. doi:10.1093/aje/kwi185

Lantz, P. M., House, J. S., Mero, R. P., & Williams, D. R. (2005). Stress, life events, and socioeconomic inequities in health: Results from the

Americans' changing lives study. *Journal of Health and Social Behavior, 46*(3), 274–288.

Lee, J. H., Tang, M., Schupf, N., Stern, Y., Jacobs, D. M., Tycko, B., & Mayeux, R. (2001). Mortality and apolipoprotein E in Hispanic, African American, and Caucasian elders. *American Journal of Medical Genetics, 103*, 121–127.

Levin, J., & Chatters, L. M. (2008). Religion, aging, and health: Historical perspectives, current trends, and future directions. *Journal of Religion, Spirituality, & Aging* , *20* (1–2), 153–172.

Lewis, T. T., Barnes, L. L., Bienais, J. L., Lackland, D. T., Evans, D. A., & Mendes de Leon, C. F. M. (2009). Perceived discrimination and blood pressure in older African American and white adults. *Journal of Gerontology A Biological Sciences, 64A*(9), 1002–1008. doi:10.1093/Gerona/glp062

Lied, T. R., & Haffer, S. C. (2004). Health status of dually eligible beneficiaries in managed care plans. *Health Care Financing Review, 25*(4), 59–74.

Link, B. G., & Phelan, J. (1995). Social conditions as fundamental causes of disease. *Journal of Health and Social Behavior, Extra Issue*, 80–94.

Louie, G. H., & Ward, M. M. (2011). Socioeconomic and ethnic differences in disease burden disparities in physical function in older adults. *American Journal of Public Health, 101*, 1322–1329. doi:10.2105/AJPH.2010.199455

Mair, C., Diez Roux, A. V., Shen, M., Shea, S., Seeman, T., Echeverria, S., & O'Meara, E. S. (2008). Cross-sectional and longitudinal associations of neighborhood cohesion and stressors with depressive symptoms in the multiethnic study of atherosclerosis. *Annals of Epidemiology, 19*, 49–57. doi:10.1016/j.annepidem.2008.10.002

McEwen, B. S. (1998). Protective and damaging effects of stress mediators. *The New England Journal of Medicine, 338*(3), 171–179.

McInerney, M., & Mellor, J. M. (2012). Recessions and seniors' health, health behaviors and healthcare use: Analysis of the Medicare Current Beneficiary Survey. *Journal of Health Economics, 31*, 744–751. doi:10.1176/appi.ajp.2012.120330386

MedPac. (2011). *A data book: Health care spending and the Medicare program*. Retrieved from http://www.medpac.gov/chapters/Jun11DataBookSec3.pdf

Mendes de Leon, C. F., Barnes, L. L., Bienias, J. L., Skarupski, K. A., & Evans, D. A. (2005). Racial disparities in disability: Recent evidence from self-reported and performance-based disability measures in a population-based study of older adults. *Journal of Gerontology: Social Sciences, 60B*(5), S263–S271.

Mezuk, B., Rafferty, J. A., Kershaw, K. N., Hudson, D., Abdou, C. M., Lee, H., Eaton, W. W., & Jackson, J. S. (2010). Reconsidering the role of social disadvantage in physical and mental health: Stressful life events, health behaviors, race and depression. *American Journal of Epidemiology, 172*(11), 1238–1249. doi:10.1093?aje/kwq283

Moineddin, R., Nile, J. X., Wang, L., Tracy, C. S., & Upshur, R. E. G. (2010). Measuring change in health status of older adults at the population level: The transition probability model. *Health Services Research, 10*, 1–6. doi:10.1186/1472-6963-10-306

Motl, R. W., & McAuley, E. (2010). Physical activity, disability, and quality of life in older adults. *Physical Medicine Rehabilitation Clinics of North America, 21*, 299–308. doi:10.1016/j.pmr.2009.12.006

Moody-Ayers, S., Lindquist, K., Sen, S., & Covinsky, K. E. (2007). Childhood social and economic well-being and health in older age. *American Journal of Epidemiology, 166*, 1059–1067. doi:10.1093/aje/kwm185

Moon, S., & Shin, J. (2005). Racial differences in health care use among Medicare only and dual eligibles. *The Journal of Health and Human Services Administration, 28*(3), 326–345.

Myers, R. (1990). *Classical and modern regression with applications* (2nd ed.). Boston: PWS KENT Publishing Company.

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

Office of Budget Management. (1995). *United States federal classification for race categories.* Retrieved from http://www.whitehouse.gov/omb/fedreg_race-ethnicity/

Petty, F. (1995). GABA and mood disorders: A brief review and hypothesis. *Journal of Affective Disorders*, *34*(4), 275–281.

Pleis, J., & Lucas, J. (2009). Summary health statistics for U.S. adults: National Health Interview Survey, 2007. *Vital and health statistics. Series 10, Data from the National Health Survey*, *240*, 1–159.

Phelan, J. C., Link, B. G., & Tehranifar, P. (2010). Social conditions as fundamental causes of health inequalities: Theory, evidence and policy implications. *Journal of Health and Social Behavior, 51*, S28–S40.

Prohaska, T., Belansky, E., Belza, B., Buchner, D., Marshall, V., McTigue, K., Satariano, W., & Wilcox, S. (2006). Physical activity, public health, and aging: Critical issues and research priorities. *Journal of Gerontology B Psychological Science Social Science, 61*(5), S267–S273.

Resnick, B., & Nahm, E. S. (2001). Reliability and validity testing of the revised 12-item short form health survey in older adults. *Journal of Nursing Measurement*, *9*, 151–160.

Resnick, B., & Parker, R. (2001). Simplified scoring and psychometrics of the revised 12-item short-form health survey. *Outcomes Management in Nursing Practice, 5*(4), 161–166.

Rhodes, D., Spiro, A. 3rd, Aro, A., & Hu, H. (2003). Relationship of bone and blood lead levels to psychiatric symptoms: The normative aging study. *Journal of Occupational Environmental Medicine, 45*(11), 1144–1151.

Robare, J. F., Bayles, C. M., Newman, A. B., Williams, K., Milas, C., Boudreau, R., McTigue, K., Albert, S. M., Taylor, C., & Kuller, L. H. (2011). The “10 keys” to healthy aging: 24-month follow-up results from an innovative community-based prevention program. *Health Education & Behavior*, *38*, 379–388. doi:10.1177/1090198110379575

Robison, J., Schensul, J. J., Coman, E., Diefenbach, G. J., Radda, K. E., Gaztambide, S., & Disch, W. B. (2009). Mental health in senior housing: Racial/ethnic patterns and correlations of major depressive disorder. *Aging and Mental Health, 13*(5), 659–673. doi:10.1080/13607860802607298

Ross, R. E., & Mirowsky, J. (2001). Neighborhood disadvantage, disorder and health. *Journal of Health and Social Behavior, 42*(3), 258–276.

Rybarczyk, B., Emery, E. E., Guequierre, L. L., Shamaskin, A., & Behel, J. (2012). The role of resilience in chronic illness and disability in older adults. *Annual Review of Gerontology and Geriatrics,* 32(1), 174–187. New York: Springer Publishing Company. Retrieved from http://dx.doi.org/10.1891/0198-8794.32.173

Schootman, M., Andersen, E. M., Wolinsky, F. D., Malmstrom, T. K., Miller, J. P., & Miller, D. K. (2007). Neighbourhood environment and the incidence of depressive symptoms among middle-aged African Americans. *Journal of*

Epidemiology Community Health, 61, 527–532. doi:10.1136/jech.2006.050088

Schulz, A.J., Kannan, S., Dvonch, J. T., Israel, B. A., Allen III, A., James, S. A., House, J. S., & Lepkowski, J. (2005). Social and physical environments and disparities in risk for cardiovascular disease: The healthy environments partnership conceptual model. *Environmental Health Perspectives*, *113*(12), 1817–1825.

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

Shultz, A. J., Mentz, G., Lachance, L., Johnson, J., Gaines, C., & Israel, B. A. (2012). Associations between socioeconomic status and allostatic load: Effects of neighborhood poverty and tests of mediating pathways. *American Journal of Public Health*, *102*, 1706–1714. doi:10.2105/AJPH.2011.300412

Smith, A. K., Ayanian, J. Z., Covinsky, K. E., Landon, B. E., McCarthy, E. P., Wee, C. C., & Steinman, M. A. (2011). Conducting high-value secondary dataset analysis: An introductory guide and resources. *Journal of General Internal Medicine, 26*, 920–929. doi:10.1007/s11606-010-1621-5

Steffens, D. C., Fisher, G. G., Langa, K. M., Potter, G. G., & Plassman, B. L. (2009). Prevalence of depression among older Americans: The aging demographics and memory study. *International Psychogeriatrics*, *21*, 879–888. doi:10.1017/S1041610209990044

Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). Boston: Pearson Education, Inc.

Taft, C., Karlsson, J., & Sullivan, M. (2001). Do SF-36 summary components scores accurately summarize subscale score? *Quality of Life Research, 10*(2001), 395–404.

Thompson, W. W., Zack, M. M., Krahn, G. L., Andresen, E. M., & Barile, J. P. (2012). Health related quality of life among older adults with and without functional limitations. *American Journal of Public Health, 102*, 496–502. doi:10.2105/AJPH.2011.300500

Thorpe, R. J., Clay, O. J., Szanton, S. L., Allaire, J. C., & Whitfield, K. E. (2011). Correlates of mobility limitation in African Americans. *Journal of Gerontology*, *66A*, 1258–1263. doi:10.1093/Gerona/glr122

Toto, P. E., Raina, K. D., Holm, M. B., Schlenk, E. A., Rubinstein, E. N., & Rogers, J.C. (2012). Outcomes of multicomponent physical activity

program for sedentary, community-dwelling older adults. *Journal of Aging and Physical Activity, 20,* 363–378.

Unruh, M. L., Newman, A. B., Larive, B., Dew, M. A., Miskulin, D. C., Greene, T., Beddhu, S., Rocco, M. V., Kusek, J. W., & Meyer, K. B. (2008). Hemodialysis Study Group. The influence of age on changes in health-related quality of life over three years in a cohort undergoing hemodialysis. *Journal of the American Geriatrics Society, 59*(9), 1608–1617. doi:10.111/j.1532-5415.2008.01849xEpub 2008 Aug 21

U.S. Department of Health and Human Services Federal Occupational Health. (August 2012). *Emotional well-being.* Retrieved from http://www.foh.hhs.gov/Calendar/august.html

Wagner, E. H., Glasgow, R. E., Davis, C., Bonomi, A. E., Provost, L., McCulloch, D., Carver, P., & Sixta, C. (2001). Quality improvement in chronic illness care: A collaborative approach. *The Joint Commission Journal on Quality Improvement*, *27*(2), 63–68.

Walker, O. K., Steers, N., Liang, L., Morales, L. S., Forge, N., Jones, L., & Brown, A. F. (2010). The vulnerability of middle-aged and older adults in a multiethnic, low-income area: Contributions of age, ethnicity, and health insurance. *Journal of the American Geriatrics Society, 58*(12), 2416–2422.

Walsh, J. L., Senn, T. E., & Carey, M. P. (2013). Longitudinal associations between health behaviors and mental health in low income adults. *Translational Behavioral Medicine*, *3*(1), 104–113. doi:10.1007/s13142-012-0189-5

Ware, J., Kosinski, M., & Keller, S. D. (1996). A 12-item short-form health survey: Construction of scales and preliminary tests of reliability and validity. *Medical Care, 34*(3), 220–233.

Ware, J. E., Jr., Kosinski, M., Turner-Bowker, D. M., & Gandek, B. (2002). *User's manual for the SF-12v2™ health survey with a supplement documenting SF-12® health survey.* Lincoln, RI: QualityMetric Incorporated.

Ware, J. E., Kosinski, M., Turner-Bowker, D. M., & Gandeck, B. (2007). *User's manual for the SF-12v2™ Health Survey with a Supplement Documenting SF-12® Health Survey.* Lincoln, RI: QualityMetric Incorporated.

Ware, F. E., & Sherbourne, C. D. (1992). The MOS 36-item conceptual framework and item selection. *Medical Care*, *30*(6), 473–483.

White, S. M., Wójcicki, T. R., & McAuley, E. (2009). Physical activity and quality of life in community dwelling older adults. *BioMed Central, 7*(10). doi:10.1186/1477-7525-7-10

Whitehead, M. (1992). *The concepts and principles of equity in health*. Retrieved from http://salud.ciee.flacso.org.ar/flacso/optativas/equity_and_health.pdf

Williams, D. R. (1999). Race, socioeconomic status, and health. The added effects of racism and discrimination. *Annals of the New York Academy of Sciences, 896*, 173–188.

Williams, D. R., & Jackson, P. B. (2005). Social sources of racial inequities in health. *Health Affairs, 24*(2), 325–335.

Williams, D. R., & Williams-Morris, R. (2000). Racism and mental health: The African American experience. *Ethnicity & Health, 5*(3/4), 243–268. doi:10.1080/135578500200009356

Wolinsky, F. D., & Stump, T. E. (1996). A measurement model of the medical outcomes study 36-item short-form health survey in a clinical sample of disadvantaged, older black and white men and women. *Medical Care, 34*(6), 537–548.

World Health Organization (2011*). Mental health. A state of well-being*. Retrieved from http://www.who.int/features/factfiles/mental_health/en/index.html

Wright, K., Hazelett, S., Jarjoura, D., & Allen, K. (2007) The AD-LIFE trial. Working to integrate medical and psychosocial care management models. *Home Health Care Nurse, 25*(5), 308–314.

Wright, R. G., Cummings, J. R., Karlamangla, A. S., & Aneshensel, C. S. (2009). Urban neighborhood context and change in depressive symptoms in late life. *Journal of Gerontology: Social Sciences, 64B*(2), 247–251.

Wright, R. G., Ko, M. J., & Aneshensel, C. S. (2011). Urban neighborhoods and depressive symptoms in late middle age. *Research on Aging, 33*, 28–50. doi:10.1177/0164027510383048

Yan, T., Wilber, K. H., Aguirre, R., & Trejo, L. (2009). Do sedentary older adults benefit from community-based exercise? Results from the active start program. *The Gerontologist*, *49*(6), 847–855. doi:10.1093/geront/gnp113

Yunhwan, L., & Kyunghye, P. (2008). Does physical activity moderate the association between depressive symptoms and disability in older adults? *International Journal of Geriatric Psychiatry, 23*, 249–256. doi:10.1002/gps.1870

Zimmer, A., & House, J. S. (2003). Education, income, and functional limitation transitions among American adults: Contrasting onset and progression. *International Journal of Epidemiology, 32*, 1089–1097. doi:10.1093/ije/dyg254

CHAPTER 7

CONCLUSION

Summary

The theoretical model that connected all three papers in this dissertation was House's Model of Social Inequalities in Health and Aging (2002). In Chapter 4, the literature synthesis indicated that prior research revealed low socioeconomic status and neighborhood poverty to be risk factors contributing to depression and depressive symptoms in African American older adults. However, a paradox exists in the literature, since the prevalence rates of depression in African Americans as compared to Caucasians were incongruent with the number of risk factors.

Chapter 5 explained the steps involved in using geographic information systems (GIS) to operationalize constructs in House's model unavailable in the primary data set to complete a secondary analysis.

The final of the three draft articles that comprise this dissertation was a path analysis conducted to test House's model in a sample of Medicare Medicaid older adult enrollees. Age, physical activity, and unstructured physical activity were shown to be significant direct paths to health outcomes. Differences in physical function and emotional well-being by race were not statistically significant.

Limitations

House's model had a greater number of variables than were used in the current study. A limitation in the current study was the use of secondary data. All of the variables needed to run the entire model were not present in the primary data set, so GIS was used to link additional data, such as neighborhood poverty and income. However, as reflected in Chapter 5, other environmental sources could not be located. In addition, an older version of the SF12® was used in the primary study, which may have contributed to floor effects (Shadish, Cook, & Campbell, 2002). A restriction of range in outcome variables would reduce the correlation between race and health outcomes thereby precluding detection of differences by race (Shadish, Cook, & Campbell, 2002). In addition, the majority of study participants scored at or below the 25th percentile on outcome variables (physical and mental components summary score) as compared to others age 65 and older. The scoring on the revised version of the SF12® was adjusted to be less sensitive to ceiling and floor effects (Ware, Kosinski, Turner-Bowker, & Gandek, 2002).

Inherent in a secondary analysis, issues of construct validity were a limitation of this study. Inadequate explication of the constructs could have occurred in the labeling of contracts from House's model (Shadish et al., 2002). Contrary to House's model, we decided to divide socioeconomic status into two variables, education and income, rather than creating a composite variable of socioeconomic status. This provided us with temporally ordered information about the relationship between race and income and education separately.

In addition, the primary study did not include a measure of depression at baseline. As a result, we had to change outcome measure of depression to emotional well-being in order to use the mental components summary score of the SF12® (Ware, Kosinski, & Keller, 1996). Monomethod bias was a threat to construct validity, as only one outcome measure was used for each of the variables in the path model (Shadish et al., 2002). Measurement of physical function and emotional well-being using both subjective and objective measures would have strengthened the design.

Contributions and Implications

The current study is one of few that evaluate group differences in frail Medicare Medicaid older adult enrollees. Although not included in House's model, age was a statistically significant factor in physical function and emotional well-being in this sample. We also know that despite multiple chronic conditions, subjects in the current study who reported more physical activity and unstructured activity had higher physical and emotional well-being scores. Results from this study could help researchers develop community-based interventions within congregate living environments to promote physical and mental health and to reduce future disability in persons newly enrolled in Medicare and Medicaid. In addition, the use of GIS was an innovative strategy that added missing data from a primary data set to a secondary analysis, providing a straightforward procedure for researchers. Clinicians can utilize this information to reinforce the benefits of physical activity, even within a group of frail older adults (Moss & Schell, 2004).

Medicare Medicaid enrollees have become an important group in the Affordable Care Act when targeting interventions for improved care. As a part of the Affordable Care Act, hospitals and care providers have developed Accountable Care Organizations (ACO). The ACO, in collaboration with the primary-care provider and patient, promote the triple aim of reducing cost, improving population health, and improving the healthcare experience (Berwick, Nolan, & Whittington, 2008; Centers for Medicare Medicaid, 2011). Similar to the current study, GIS can be used to link clinical information systems data to national datasets so that academic researchers and clinicians can collaborate to create interventions to reduce health inequities in low-income older adults.

Future Research

Although the path analysis did not reveal statistically significant differences by race in physical function and emotional well-being, the synthesis of the literature indicated that inequities remain in the recognition and treatment of depression in African American older adults. Research interventions that focus on decision support to aid providers in the identification and treatment of depression would aid both African Americans and clinicians. A decision support system that incorporates non-traditional culturally specific interventions—such as prayer and meditation—would help clinicians create patient-centered treatment recommendations for minority populations. Similar studies have used computer-based templates for chronic disease management (Bolger-Harris, Schattner, & Saunders, 2008).

Engagement in physical activity was related to higher scores on both the physical (physical function) and mental components summary (emotional well-being) scores for participants in the current study. Inequities were not noted by race in the current study. Regardless of race, findings of the study show that physical inactivity remains a problem for older adults. The prevalence of mobility disability among those aged 65 to 69 was 18.8% and 13.3% for women and men, respectively (Barnes, 2007). The statistics are even worse for Medicare Medicaid; 44% have multiple physical impairments (Jacobson, Neuman, & Damico, 2012).

One innovative strategy is to utilize a peer-to-peer model to promote mental and physical health (Casado et al., 2008; Lorig et al., 2001). For example, chronic disease self-management and diabetes self-management peer-led programs have shown significant improvements in function and reduction of depressive symptoms in older adults (Lorig et al., 2001; Lorig, Bodenheimer, Holman, & Grumbach, 2002; Lorig, Ritter, & González, 2003). Healthy Ideas is a non-peer-led model that uses care managers (social workers or nurses) to integrate depression screening and management in existing community-based programs (Casado et al., 2008).

Utilizing the best of both these models based on self-efficacy, less frail older adults could provide a brief mental and physical health promotion intervention to frail low-income older adults. A peer intervention has two advantages. Modeling is required to promote self-efficacy, and a peer who is similar to the participant will demonstrate that behavior change can be achieved

(Bandura, 1977). A peer model costs less than utilizing a health provider to deliver the intervention. While a professional would need to oversee the intervention, the professional would not need to deliver the intervention. Health behavior change to improve physical and mental health through promotion of self-efficacy can be achieved in a low-income group of frail older adults. Additional studies are needed in Medicare Medicaid older adults to incorporate genetic research in health outcomes research.

A health belief model using genomics research can help target those at risk for the adverse effects of stress on emotional well-being, effects that can worsen chronic conditions. The health belief model purports that an individual will choose to take action to change behavior if there are perceived threats, perceived susceptibility, and perceived benefits (Glanz, Lewis, & Rimer, 1997). Knowledge through genomic counseling can provide low-income older adults with information to help change behavior. For example, the perceived threat of worsening chronic illness as a result of depression may increase motivation to seek treatment. If provided with health-literate information about the impact of depression on shortening of telomeres that in turn cause aging, the benefits of treating depression can be linked to an outcome of improved health.

Patient education and counseling regarding genetics was one of the seven competencies for nurses recommended by the American Nurses Association Consensus Panel on essentials in genetics and genomics (Greco, Tinley, & Seibert, 2012). Future directions in genomic research have been targeted toward use of risk behavior counseling to promote health behaviors (Condit & Shen,

2009; Greco et al., 2012). Research will be needed to present this material to low-income, low-education older adults.

Conclusion

The pathways to inequities in physical function and emotional well-being in Medicare Medicaid older adult enrollees are complex. As we strive to conduct health services research to impact the lives of these individuals, we need to continue to test theoretical models to guide our interventions. House's Model of Social Inequalities in Health and Aging demonstrates the intricacy of multiple variables that impact health outcomes. Further exploration of these pathways will lead researchers to solutions to improve the care of vulnerable older adults.

References

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

Barnes, P. (2007). *Physical activity among adults: United States, 2000 and 2005*. Hyattsville, MD: US Department of Health and Human Services, CDC.

Berwick, D. M., Nolan, T. W., & Whittington, J. (2008). The triple aim: Care, health and cost. *Health Affairs, 27*(3), 759–769. doi:10.1377/hlthaff.27.3.759

Bolger-Harris, H., Schattner, P., & Saunders, M. (2008). Using computer based templates for chronic disease management. *Australian Family Physician*, *37*(4), 285–288.

Casado, L. B., Quijano, L. M., Stanley, M. A., Cully, J. A., Steinberg, E. H., & Wilson, N. L. (2008). Healthy Ideas: Implementation of a depression program through community-based case management. *The Gerontologist*, *48*(6), 828–838.

Centers for Medicare Medicaid CMS-1345-F (2011). Medicare program; Medicare shared savings program: Accountable care organizations. Retrieved from http://www.ofr.gov/OFRUpload/OFRData/2011-27461_PI.pdf

Condit, C. M., & Shen, L. (2009). Public understanding of risks from gene-environment interaction in common diseases: Implications for public communication*. Public Health Genomics*, *14*, 115–124. doi:10.1159/000314915

Glanz, K., Lewis, M. F., & Rimer, B. K. (1997). *Theory at a glance: A guide for health promotion practice.* National Institute of Health.

Greco, K. E., Tinley, S., & Seibert, D. (2012) *Essential genetic and genomic competencies for nurses with graduate degrees*. Silver Spring, MD: American Nurses Association and International Society of Nurses in Genetics.

House, J. S. (2002). Understanding social factors and inequalities in health: 20th century progress and 21st century prospects. *Journal of Health and Social Behavior, 43*(2), 125–142.

Jacobson, G., Neuman, T., & Damico, A. (2012). Medicare's role for dual eligible

beneficiaries. Kaiser Family Foundation Issue Brief. Retrieved from http://www.kff.org/medicare/upload/8138-02.pdf

Lorig, K. R., Ritter, P. L., Stewart, A.L., Sobel, D. S., Brown, B. W., Bandura, A., González, V. M., Laurent, D. D., & Holman, H. R. (2001). Chronic disease self-management program: 2-year health status and health care utilization outcomes. *Medical Care*, *39*(11), 1217–1223.

Lorig, K. R., Bodenheimer, T., Holman, H., & Grumbach, K. (2002). Patient self-management of chronic disease in primary care. *Journal of the American Medical Association*, *288*(19), 2469–2475.

Lorig, K. R., Ritter, P. L., & González, V. M. (2003). Hispanic chronic disease self-management: A randomized community-based outcome trial. *Nursing Research*, *52*(6), 361–369.

Moss, M. P., & Schell, M. C. (2004). GIS(c): A scientific framework and methodological tool for nursing research. *Advances in Nursing Science, 27*(2), 150–159.

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

Ware, J. E. Jr., Kosinski, M., Turner-Bowker, D. M., & Gandek, B. (2002). *User's manual for the SF-12v2™ health survey with a supplement documenting SF-12® health survey.* Lincoln, RI: QualityMetric Incorporated.

Ware, J., Kosinski, M. & Keller, S. D. (1996). A 12-item short-form health survey: Construction of scales and preliminary tests of reliability and validity. *Medical Care, 34*(3), 220–233.