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Feeling the Squeeze: The Association between Multigeneration Caregiving and Informal Caregivers' Health

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Feeling the Squeeze: The Association between Multigeneration Caregiving and Informal Caregivers' Health

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Virginia Commonwealth University.

by

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Dedication

This dissertation is dedicated to my brother, Donald "Disco" Yates, the most selfless caregiver I have ever known.

Acknowledgments

I could have never imagined how my life would change over the course of time it took to complete my doctorate. I have experienced the highest highs and the lowest lows in my life during this period. To say some of the events would be unimaginable is an understatement. From finding the love of my life and moving cross country to be with him, the unexpected passing of both my brother and father, the birth of my two sons, and…a global pandemic. It has been quite the adventure. I could not of accomplished this feat, or stood upright at times, without the support of my amazing team.

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I have an enormous amount of gratitude for my family. I want to thank my husband, Eric, for his undying love and encouragement to chase my dreams, my two boys, Aiden and Gavin, for giving me motivation to work towards a better future, and all my other friends and family for always believing in me (even when this process took “forever”). You are all the real rock stars!

Robert Frost once said that “the best way out is always through.” I am so grateful and elated to have made it through.

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List of Abbreviations and Symbols

AARP: American Association of Retired Persons

BRFSS: Behavioral Risk Factor and Surveillance Survey

CDC: Centers for Disease Control

DV: Dependent Variable

IV: Independent Variable

LTSS: Long-term Services and Supports

LTC: Long-term Care

MCAR: Missing Completely at Random

Abstract

Feeling the Squeeze: The Association between Multigeneration Caregiving and Informal Caregivers' Health

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A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Health-Related Sciences at Virginia Commonwealth University.

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While U.S. public policy and research has focused on the health needs of the aging population, less attention has been given to the consequences informal caregivers face caring for this generation. With the segment of the population aged 65 years or older growing rapidly, it is important to understand the factors that place informal caregivers at risk for poor health outcomes and health behaviors. Since multigeneration caregivers balance more personal, work, and caregiving demands than single-generation informal caregivers of older adults, they may be at higher risk for poor health outcomes. The aim of this study was to examine the association between multigeneration caregiving and informal caregivers' physical and psychological health and health behaviors.

This study was a retrospective, observational, pooled cross-sectional study examining the association between multigeneration caregiving and health outcomes or health behaviors of informal caregivers using secondary data from the Behavioral Risk Factor Surveillance Survey (BRFSS). Study results indicated that multigeneration caregivers experience higher rates of depression and report lower incidence of attending annual check-ups with a physician compared to single generation caregivers of

older adults. These findings are important for current legislation and policy aimed at improving LTSS for the rapidly growing population of older adults in the United States. Public health experts, policy makers, health services researchers, and others should use the results of this study to help narrow the focus of the examination of caregivers of older adults health and health behaviors.

Chapter 1: Introduction

Millions of Americans serve as informal caregivers to family members and friends every day. Informal caregivers are individuals who provide “unpaid custodial or medical care to family members or friends who have experienced a loss in independence” (Van Houtven, Voils, & Weinberger, 2011). According to a report by the U.S. Bureau of Labor Statistics, there were an average of 40.4 million people providing unpaid care for older adults (someone aged 65 years or older) in 2017-2018 in the United States (*Unpaid Eldercare in the United States--2017-2018 Summary*, 2019). On any given day, 26% of these caregivers provided unpaid care to an older adult, for an average of 3.4 hours per day. This amounts to 15.8% of the US adult population (aged 18 years or older) providing unpaid assistance to a family member or friend 65 years or older.

The number of baby boomers (i.e., those born between 1946 and 1964) reaching age 65 years or older is increasing rapidly. The number of older adults (65+ years) living in the U.S. is expected to double between 2005 and 2030 (IOM, 2013). By 2030 it is predicted that 20% of the U.S. population will be comprised of older adults. Over half (68%) of all older adults living in the U.S. live with two more chronic illnesses, while nearly all (80%) have at least one chronic illness (National Council on Aging, 2016). These older adults with chronic illness will rely on healthcare services more than any other segment of the population, and estimates suggest that nearly 70% will rely on some form of long-term care (LTC) at some point in their life (Friedman, Park, Wiemers, & Pruchno, 2017). This level of need by a rapidly growing segment of the population will not only place strain on the U.S. healthcare system to provide

LTSS for older adults but also the ability of Medicare to insure the growing population. Medicare, a national entitlement program in the U.S. provides insurance coverage to the aged (65 years or older) or disabled. In 2019, 51 Million Americans (or 15.6% of the U.S. Population) were covered under Medicare after meeting the age requirement. Due to the increased and challenging demands placed on the healthcare system and Medicare by older adults, this study focuses on informal caregivers of those aged 65 years or older.

Many older adults who need care will turn to informal caregivers due to lack of LTSS resources, lack of coverage for comprehensive LTSS coverage by Medicare, or personal preference to remain in home and receive care from loved ones. In fact, one study conducted by Thompson (2004) found that the majority of community-dwelling older adults (78%) in need of LTC turned to family or friends for care rather than formal support services (8%).

Caregiving can have both positive and negative impacts on the caregiver. Some benefits of caregiving reported by caregivers include a feeling of confidence, learning to handle difficult situations, and feelings of closeness with the care recipient (Schulz et al., 2016). In addition, one study found that 47% of individuals providing adult care found the act of caregiving very meaningful (Pew, 2018). Some negative aspects of informal caregiving are poor caregiver health and well-being. Caregiving is associated with higher rates of depression and anxiety symptoms (Belgacem et al., 2013; R Schulz & Sherwood, 2008), lower ratings of self-reported health (Soares, 2009), decreases in routine self-care (Burton et al., 2003), poor eating and exercise habits (Burton et al., 2003), higher rates of mortality (Schulz, Richard; Beach, 1999) and financial problems such as decreased wages, reduced probability of employment and increased rates of early retirement (Van Houtven, Coe, & Skira, 2013). While positive aspects of caregiving are important to understanding the whole health of the informal caregiver, the focus of this study is on the negative aspects of informal caregiving. By focusing on the negative aspects of caregiving, this study aims to determine whether a subset of caregivers is at a higher risk for poor health outcomes.

The negative effects of informal caregiving maybe compounded for members of the "sandwich generation." The sandwich generation refers to individuals caring for aging parents and children simultaneously (AARP, 2001), or those who divide their resources between work and caring for older family/friends and children (Spillman & Pezzin, 2000). In 2013 it was reported that nearly half of adults (47%) in the U.S. in their 40s and 50s self-reported having a parent aged 65 years or older while also raising a child or supporting a child financially (Parker & Patten, 2013). Therefore, nearly half of Americans 45-55 years have the potential of providing care for children and living parents simultaneously. For ease of understanding and due to the wide range of caregiving combinations found in the sandwich generation (i.e., parents and children, grandparents and children, parents and grandchildren, etc.) this study refers to members of the sandwich generation as multigeneration caregivers.

Due to competing caregiving (children and older adult) and (possible) work demands, multigeneration informal caregivers maybe at higher risk for poor health and health behaviors than single generation informal caregivers. While the health outcomes of informal caregivers have been studied extensively, there is a paucity of research the potentially high-risk subgroup of multigeneration caregivers. Existing studies of multigeneration informal caregivers report increased levels of stress and high risk for mental strain (Riley & Bowen, 2005), fewer healthy behaviors (Chassin, Macy, Seo, Presson, & Sherman, 2010), a delay in seeking medical care and reduced prescription fills, and a higher likelihood of emergency care use compared to non-caregivers (Falconi & Dow, 2014).

Study Purpose

To date there is no known study examining the association between informal caregiving and multiple measures of health and health behaviors for multigeneration caregivers compared to informal caregivers of older adults only. The objective of this study was to determine whether multigeneration caregivers experience worse health outcomes and practice more unhealthy behaviors than informal caregivers of only older adults. Research on this potentially at-risk subset of informal caregivers can help raise awareness about the needs and challenges experienced by this population and inform future long-term services and supports (LTSS) policy aimed at improving the health of informal caregivers. Keeping multigeneration caregivers in their caregiving role will help alleviate strain on the healthcare system due to an increase in older adults, help minimize LTSS costs for Medicare, and support those who want to maintain their caregiver relationship.

Research Questions

This study examined 3 research questions:

Research Question 1.

1. Do individuals who provide care to an older adult (aged 65 or older) and one or more children (aged 18 and under) report worse physical health compared to individuals who provide care only to an adult(s) aged 65 or older?

Research Question 2.

2. Do individuals who provide care to an older adult (aged 65 or older) and one or more children (aged 18 and under) report worse psychological health compared to individuals who provide care only to an adult(s) aged 65 or older?

Research Question 3.

3. Do individuals who provide care to an older adult (aged 65 or older) and one or more children (aged 18 and under) report more unhealthy behaviors compared to individuals who provide care only to an adult(s) aged 65 or older?

Theoretical Guidance

Andersen’s Behavioral Model focuses on examining the relationship between individual level predictors (predisposing, enabling and need factors) on the use of health services, health status, and health behaviors. Because this study focuses on both health behaviors (including health service use) and measures of health status (physical and psychological), Andersen’s Behavioral Model provides a logical framework to guide the analysis of the relationship between multigeneration caregiving and informal caregivers’ health outcomes.

Design and Methods

This study is a retrospective, observational, pooled cross-sectional study examining the relationship between multigeneration caregiving and health outcomes and health behaviors of informal caregivers using secondary data from the Behavioral Risk Factor Surveillance Survey (BRFSS). The BRFSS is an annual telephone survey conducted by the health departments in all 50 states, the District of Columbia, Puerto Rico, the Virgin Islands, and Guam, with the assistance of the Center for Disease Control (CDC, 2018). The BRFSS database contains health behavior data on over 400,000 adults each year, including information regarding preventable chronic diseases, injuries and infectious diseases. This study uses data from 12 states that collected data on informal caregivers from 2011 to 2013.

Chapter Summary

This chapter provided a brief summary of the purpose of the current study, theoretical framework, and study design and methodology. Chapter 2 provides a more in-depth examination of the literature on the association between informal caregiving and informal caregiver health outcomes. Multigeneration caregiving literature is emphasized when available. Lastly, this chapter discusses the theoretical framework for this study. Chapter 3 describes the study design and methods. Chapter 4 presents the study results. Chapter 5 discusses the study results and implications.

Chapter 2: Background and Theoretical Model

Introduction

While U.S. public policy and research has focused on the health needs of the aging population, less attention has been given to the consequences informal caregivers face caring for this generation. Informal caregivers are individuals who provide “unpaid custodial or medical care to family members or friends who have experienced a loss in independence” (Van Houtven et al., 2011). In order for policy makers to effectively address the needs of informal caregivers of older adults in the U.S., it is important to understand the factors that place informal caregivers at risk for poor health outcomes and health behaviors. Since multigeneration caregivers balance more personal, work, and caregiving demands than single-generation informal caregivers of older adults, they may be at higher risk for poor health outcomes.

This chapter begins with a review of existing literature on the incidence of informal caregiving and previous studies on informal caregiver health. This is followed by a description of the theoretical framework used in this study to guide the examination of the association between multigeneration caregiving and informal caregivers’ health and health behaviors, and the purpose of the current study.

Family Caregiving in the U.S.

Due to the aging baby boomer generation (i.e. those born between 1946 and 1964), the number of older adults (65+ years) living in the U.S. is expected to double between 2005 and 2030 (IOM, 2013). Over half (68%) of all older adults living in the U.S. are living with two more chronic illnesses (National Council on Aging, 2016); while nearly all (80%) have at least one chronic illness. These chronically ill older adults utilize healthcare services more than any other segment of the population (IOM), and estimates suggest that nearly 70% will rely on some form of long-term care (LTC) at some point in their life (Friedman et al., 2017).

Long-term Services and Supports (LTSS) and Informal Caregivers

Long-term services and supports (LTSS), or long-term care (LTC), can be defined as a "variety of individualized, well-coordinated services that promote the maximum possible independence for people with functional limitations and are provided over an extended period of time in accordance with a holistic approach, while maximizing their quality of life" (Shi & Singh, 2012, pg. 381). They can include paid or unpaid services, including; personal care (bathing or dressing), medication management, wound care, bill paying, transportation, or meal preparation (Richard Schulz et al., 2016). Two forms of LTSS are provided in the U.S. (informal and formal LTC). Formal support services include many varieties of care delivered in both community based LTC (i.e., home health care, adult day care, and older adult centers) and institutionalized LTC (i.e., retirement living centers, assisted living facilities, and skilled nursing facilities; Shi & Singh, 2012). Informal LTSS are not reimbursed (Shi & Singh, 2012, pg. 385) and are delivered primarily in the care recipient home.

The majority of older adults in the U.S. receive LTC from informal caregivers. At least 17.7 million individuals in the U.S. are informal caregivers of older adults (age 65 years or older) who need help due to physical, psychological or cognitive limitations (Richard Schulz et al., 2016). While, many different relationships exist between caregivers and care recipients, this study defines informal caregivers as any individual (neighbor, friend, relative, etc.) who indicates s/he provides regular care or assistance to older adults with a health problem, long-term illness or disability. In this study, the term "care recipient" refers to older adult 65 years or older receiving care from an informal caregiver. In 2009, 78% of all community-dwelling older adults in need of LTC turned to family or friends for care (Thompson, 2004). Only 8% of older adults in need of LTC in the same year utilized formal support services (Thompson). These results suggest that informal caregivers are serving as the backbone of LTSS in the U.S.

The reliance on informal caregivers to provide the bulk of LTSS in the U.S. is expected to increase with the growing aging population (Botek, 2015). However, the number of available informal caregivers is anticipated to decrease in the coming decades due to demographic trends such as increased divorce rates, delayed parenting, delayed marriage, and increased geographic dispersion. In 2010 there were more than 7 caregivers available for each person requiring care, but by 2030 this ratio is anticipated to drop to 4:1 (Redfoot, Feinberg, & Houser, 2013). And although there may be 4 potential informal caregivers per care recipient, that does not necessarily translate into four people who *will* provide informal caregiving.

Characteristics of Informal Caregivers

The typical informal caregiver in the U.S. is a 49-year-old female assisting a parent or parent-in-law, while also working a paid job (*Caregiving in the U.S.*, 2015). Informal caregivers of an adult in the U.S. have provided an average of 4 years of care, while 24% have provided 5 or more years of care (*Caregiving in the U.S.*, 2015). The typical care recipient is 69.4 years of age, and the majority (66%) are female (*Caregiving in the U.S.*, 2015). Thirty-five percent of care recipients lived with the caregiver. The most frequently reported reason the care recipient needed care was “old-age” (14%).

Informal caregivers perform a wide range of caregiving tasks. Family caregivers have traditionally provided emotional support, as well as help with household tasks and personal care for care recipients (i.e., bill paying, meal preparation, and house repairs). In addition to these tasks, many informal caregivers also provide more complex medical tasks (i.e., cleaning ventilator tubes, catheter backs, and administering IV medications. The Caregiving in the U.S. study (*Caregiving in the U.S.*, 2015) found that 46% of informal caregivers help with medications or injections, and 23% reported difficulties providing help with care recipient activities of daily living (ADLs). Outside of the home, many informal caregivers are helping the care recipient navigate a fragmented healthcare system, communicating with a range of providers in a variety of settings, and serve as surrogate decision makers (Richard Schulz et al., 2016).

In addition to providing care, informal caregivers are also working paid jobs. The study by the National Alliance for Caregiving & the AARP Public Policy Institute (2015) found that 6 out of 10 informal caregivers felt that caregiving has negatively affected their ability to do their job, 15% have taken leave of absences, and 14% have had to reduce their work hours or change jobs permanently in order to continue to provide care.

Multigeneration caregivers

Due to recent demographic trends, more and more informal caregivers are not only providing care to an older adult family member, but also raising children of their own. Delayed parenting is being called the “new norm,” with couples beginning to start families in their mid to late 30’s (Larsen, 2015). Delayed parenting paired with an increasing lifespan is leading to an increase in the prevalence of adults providing care to children and older adult family or friends simultaneously. The Bureau of Labor Statistics recently found that 22% of informal caregivers (8.7 million adults) providing care to an older family member or friend were also providing care to children under the age of 18 (United States Department of Labor & Bureau of Labor Statistics, 2017). Of these multi-generation caregivers, 32% had at least one child under the age of 6, and the remaining 69% were parents whose youngest child was between 6 and 17 (United States Department of Labor & Bureau of Labor Statistics, 2017). Results from Pew Research Center survey (2013) indicated that nearly half of adults (47%) in the U.S. in their 40s and 50s self-reported having a parent aged 65 years or older while also raising a child or supporting a child financially (Parker & Patten, 2013). Seven out of ten (70%) adults in the same age group reported that they are very (48%) or somewhat (20%) likely they will care for their aging parent(s) if they had not already (14%; Taylor et al., 2013).

These multigeneration caregivers are often called “sandwich generation” caregivers in reference to the fact that the informal caregivers are “sandwiched” between their children and the older adult(s) to whom they provide care. This phrase was first coined by social worker Dorothy Miller, who recognized the growth in this demographic group in 1981 (Larsen, 2015). Due to the wide range of caregiving combinations found in the sandwich generation (i.e., parents and children, grandparents and children, parents and grandchildren, etc.) and ease of understanding, this study refers to members of the sandwich generation as multigeneration caregivers. This study operationalizes multigeneration caregivers as those providing care to both children (18 years and younger) and older adults (65 years or older).

In addition to providing care to both children and an older adult, most multigeneration caregivers also face formal work demands. The Unpaid Eldercare in the U.S. (United States Department of Labor & Bureau of Labor Statistics, 2017) study reported that 78% of multigeneration caregivers were employed, and 63% were employed full time. A survey conducted by A Place for Mom reported that 23% of multigeneration caregivers would consider leaving their job altogether, and 31% had attempted to reduce work hours (Anderson, 2012). In comparison, only 14% of informal caregivers as a whole reported reducing their work hours to continue their caregiving role (*Caregiving in the U.S.*, 2015). This suggests that multigeneration caregivers have a more difficult time balancing work demands with competing caregiving responsibilities.

Empirical Studies on Informal Caregiving and Caregiver Outcomes

Informal caregiving research includes examples of both positive and negative impacts of caregiving on caregiver health and well-being. For example, informal caregiving has been associated with feelings of confidence, closeness with the care recipient and learning how to handle difficult situations (Richard Schulz et al., 2016).

While positive impacts of informal caregiving are important to understanding the health of the caregiver as a whole, this study focuses on the potential negative association between multigeneration caregiver membership and informal caregiver health and health behaviors. The focus is on negative consequences so the researchers can potentially identify a subset of informal caregivers at high-risk for poor health outcomes.

The literature on caregiver health has indicated that caregiving can result in poor physical and psychological health for the informal caregiver. Schulz and Sherwood (2008) reviewed the caregiving literature and summarized the physical and mental measures of informal caregiver well-being assessed in the literature (Table 1). Shulz and Sherwood (2008) noted that overall, research on caregiver well-being indicated that the informal caregiver may experience psychological distress, impaired health habits, psychiatric illness, physical illness and even death. Schulz & Eden (2016) also analyzed data from the 2011 National Health and Aging Trends Study (NHATS) and companion National Study of Caregiving (NSOC) and found that informal caregivers of older adults with 2 or more self-care needs reported emotional difficulty (45.5%), physical difficulty (28.5%), feeling exhausted at night (19.6%) and not having enough time for themselves (14.3%).

Table 1

Summary of Informal Caregiver Health Outcomes Reported in the Literature

Outcome	Type of Measure	Specific Indicators	Findings
Physical Health Effects	Global Health Measures	Self-Reported Health	Negative impact overall for all indicators; self-report measures most common with largest effect
		Chronic Conditions	
		Physical Symptoms	High-stress caregiving related to increased rates of mortality
		Medications	
		Health Service Use	
		Mortality	
Psychological Effects	Depression	Clinical Diagnosis	Most widely studied consequences of caregiving are depression and stress
		Symptom Checklists	Large negative impact overall
		Antidepressant Medication Use	
	Anxiety	Clinical Diagnosis	Findings moderated by age, socioeconomic status and informal support
		Symptom Checklists	
		Anxiolytic Medication Use	
	Stress	Burden	Older caregivers, people of low socioeconomic status and individuals with limited informal support repot worse psychological (and physical) health
Behavioral Effects	Health Behaviors	Sleep	Impaired health behaviors across domains
		Diet	
		Exercise	Strongest effect is sleep problems among dementia caregivers
		Self-Care	
		Medical Compliance	

*Adapted from Schulz & Sherwood (2008), supplement Table 1.

With the additional demands of caring for multiple generations and work responsibilities, there is concern that multigeneration caregivers are at higher risk for burnout, poor emotional and physical well-being, and lower incidence of healthy behaviors. Multigeneration caregivers are likely to spend more time providing care than single generation caregivers, and therefore could have less personal time to engage in healthy behaviors such as annual well visits, dental checkups, exercise and healthy eating. Previous researchers have found that informal caregiver's emotional and physical health is directly related to the number of intensity and quantity of caregiving provided (R Schulz & Sherwood, 2008). If multigeneration caregivers spend more hours providing care than single generation caregivers, it is likely that they will also experience poorer physical and emotional health. The specific association between caregiving and health behaviors and health outcomes of informal caregivers and multigeneration caregivers are discussed below.

Physical Health.

Informal caregivers have been reported to experience worse physical health compared to non-caregivers. Schulz & Eden (2016) reported that 20% of all informal caregivers of older adults and 39% of informal caregivers of high-need older adults reported that they experienced a high level of physical difficulty. In their examination of caregiving research over three decades, Schulz and Sherwood (2008) found that physical health was negatively associated with caregiving as measured by global health measures (i.e. worse self-reported health, more physical symptoms, increased medications, higher health service usage, and higher rates of mortality), physiologic measures (i.e. higher stress hormones, metabolic levels, lower speed of wound healing, etc.) and health behaviors (i.e. less sleep, more unhealthy diet, less exercise, higher rates of smoking, less self-care, lower preventative care and medical compliance).

One study, by Do, Cohen and Brown (2014) examined multigeneration caregivers' physical health using data from the Behavioral Risk Factor and Surveillance System, a nationally representative survey of the adult population in the U.S. The researchers examined the relationship between informal caregiving and caregiver physical health, measured by self-reported response to the question "Would you say that in general your health is: excellent, very good, good, fair or poor?" They found that informal caregivers as a whole had lower ratings of self-reported health compared to non-caregivers, and that multigeneration caregivers were at higher risk for reporting poor health compared to single generation caregivers (OR 1.11, 95% CI [1.01, 1.23]). For informal caregivers of older adults only the association between caregiving and health was non-significant. These results suggest that multigeneration caregivers are at higher risk for poor physical health outcomes compared to single generation caregivers.

Psychological Health.

Psychological effects of caregiving are the most frequently studied outcomes. These outcomes include feelings of stress or burden, symptoms of depression and anxiety, and impaired quality of life (R Schulz & Sherwood, 2008). Spillman et al. (2014) reported that 26% of caregivers of all caregivers reported substantial emotional difficulties, and 13% reported symptoms of anxiety and depression. Pinquart & Sörensen (2003) conducted a meta-analysis of 84 caregiver studies, and found that compared to non-caregivers, informal caregivers experienced more depression and stress and less self-reported well-being.

Less research has focused on the psychological impact of informal caregiving for multigeneration caregivers. One study, by Falconi & Dow (2014) in which California multigeneration caregivers reported poorer mental and emotional health compared to non-caregivers and single generation caregivers with children. In addition, multigeneration caregivers experienced more feelings of nervousness, hopelessness and depression compared to non-caregivers.

Health Behaviors.

Few studies have examined the association between caregiving and health behaviors, but there is evidence of impaired health behaviors. Self-care behaviors promote personal health and improve general well-being. Self-care behaviors include getting sufficient sleep, maintaining a healthy diet, exercising, and obtaining preventative healthcare or primary care visits. Burton et al. (2003) examined the results from the Caregiver Health Effects Study to determine the health outcomes of transitioning into and out of a caregiver role. Results indicated that individuals who transitioned into a heavy caregiving role (providing assistance with ADLs), not only experienced more depressive symptoms compared to non-caregivers and moderate caregivers, but also had increased risky health behaviors (i.e., lack of exercise, rest, or rest after illness, decreased medication adherence, issues seeing doctors for medical issues and missing physician appointments).

Hoffman, Lee & Mendez-Luck (2012) also reported on health behaviors among informal caregivers. Using data from the 2009 California Health Interview Study, the authors found that individuals providing informal care in the last year were at greater risk for negative health behaviors including, cigarette smoking and soda and fast-food consumption, even after controlling for psychological distress, demographic variables, and social resources.

While limited, past research does indicate that health behaviors maybe impaired for multigeneration caregivers specifically. Chassin et al. (2010) used data from the Indiana University Smoking Survey, a longitudinal study of the natural history of cigarette smoking. They examined the association between multigeneration caregiving and five healthy behaviors including, checking the food label for health value when shopping, using a seatbelt, choosing foods based on health value, exercising regularly and cigarette smoking. After adjusting for prior levels of health behaviors, regression analyses revealed that multigeneration caregivers participated in fewer healthy behaviors compared to non-multigeneration caregivers.

Theoretical Framework

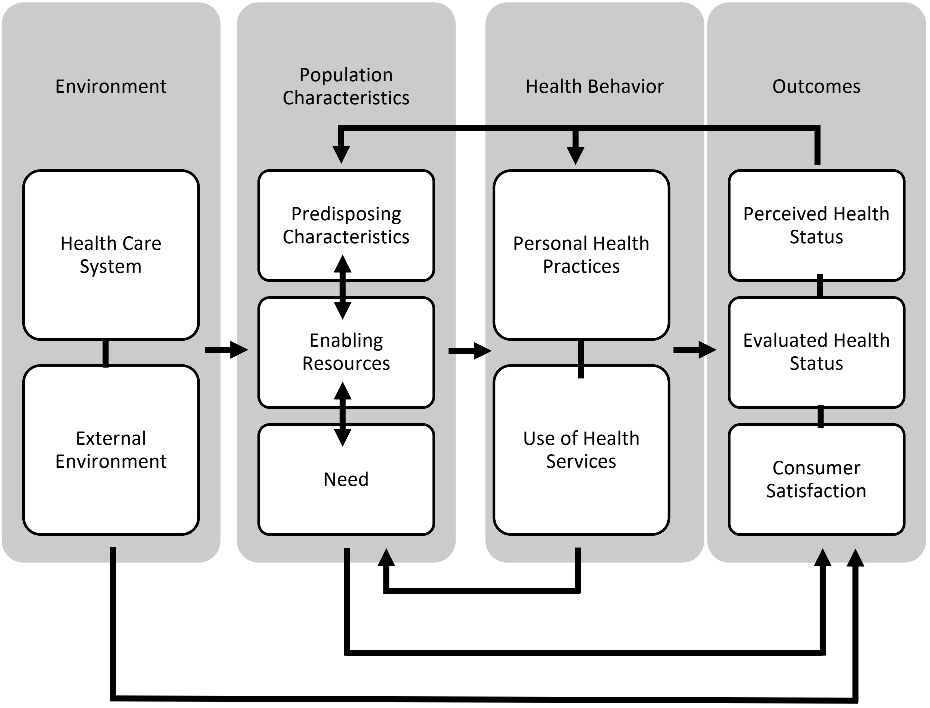
The theoretical framework utilized in this study guides the examination of the association between multigeneration caregiving and informal caregivers' health and health behaviors is Andersen's Behavioral Model of Health Services Use.

Andersen's Behavioral Model of Health Services Use.

Andersen's Behavioral Model of Health Services Use provides a lens in which to study the health outcomes and health behaviors of interest in this study. This model was originally developed in the late 1960s to understand the "how's" and "why's" of health service use, and later revised expanded to include health behaviors and health outcomes (Andersen, 1995). Figure 1 outlines the model including environmental, population, health behavior and health outcome factors.

Figure 1

Behavioral Model of Health Service Use (Adapted from Andersen, 1995).



The Behavioral Model of Health Services Use model shown in Figure 1 shows that health behaviors and health outcomes are impacted by both environment and population characteristics. Environment includes the surrounding health care system and external environment (i.e., community demographics). These relationships are not unidirectional, meaning an improvement in health behaviors could lead to improved health outcomes, and result in a change in predisposing factors. Population characteristics including predisposing, enabling and need factors, further discussed below. Since the goal of this study is to examine the association between multigeneration caregiving and informal caregivers' health outcomes and health behaviors while controlling for predisposing, enabling and need factors, this model is appropriate for framing this study.

Predisposing Factors.

Predisposing factors refer to demographic and social characteristics of the individual. Demographic variables (i.e., age and gender) are characteristics associated with the likelihood an individual will need health services. Social characteristics refer to factors that describe a person's status within a community, how healthy/unhealthy the physical environment is likely to be, and how a person is able to deal with health issues and mobilize resources to handle these issues. Social factors include level of education, occupation, ethnicity, marital status, number of children, number of residents in a home, etc. (Andersen, 1995).

Enabling Factors.

Enabling factors refer to community and personal resources that affect whether a person uses health services or not. Community enabling factors can include the presence of health personnel and facilities near an individual's place of residence or work. Personal enabling factors include income, health insurance status, regular source of care, travel times, etc. (Andersen, 1995).

Need Factors.

Need factors refer to an individual's perceived and evaluated need. Perceived need is how a person perceives his/her own health, and how this person experiences or responds to their own health condition. Evaluated need includes measures where professional judgement about individual health is established (i.e., diagnoses and prognoses for medical conditions). The Behavioral Model assumes that perceived need is related to health care-seeking behaviors and adherence to medical regimens, while evaluated need related to the type of care received by an individual in a health care setting.

Health Behaviors.

Health behaviors are behaviors that can impact individual health status. Health behaviors are influenced by the predisposing, enabling, and need factors of the individual. Examples of health behaviors include diet, exercise, consumption of alcohol, tobacco use, self-care behaviors and adherence to medical programs. The use of health services is also considered a health behavior under the Behavioral Model and an include use of hospital services, preventative medical care, and other medical services. Health behaviors influence health status in the behavioral model.

Health Outcomes.

Health outcomes include both perceived and evaluated health status (similar to Need Factors in the Behavioral Model). Health status is influenced by health behaviors and individual characteristics (predisposing, enabling and need). Perceived health includes self-report of general health status, reports of activities of daily living (ability to walk, eat, bath, dress, etc.), and disability. Evaluated health status includes measures of health based on the judgement of the medical professional based on established clinical standards. Examples of evaluated health include diagnoses and prognoses regarding medical conditions.

Andersen's Behavioral Model of Health Services Use and Past Caregiving Research.

A review of the literature shows that many studies of informal caregiver health utilize various theoretical frameworks, varying vastly across fields of study (i.e., sociology, psychology, nursing, health services research, medical, etc.), and sometimes exclude a description of the theory or framework used to guide the analysis of the study altogether. While there is not a dominating theory used in past informal caregiving research, factors from Andersen's Behavioral Model have been used. As indicated in the review below, research has included predisposing, enabling and need factors as related to both informal caregiver health outcomes and health behaviors. Since the goal of this study is to determine whether multigeneration informal caregivers experience worse health outcomes and health behaviors compared to single generation informal caregivers, Andersen's Behavioral Model provides a lens in which to study the research questions. Using this model, the current study is able to determine if multigeneration caregivers experience worse outcomes while controlling for predisposing, enabling and need factors previously found to affect informal caregiver health. Additionally, Andersen's Behavioral Model of Health Services Use also provides a sound structure for evaluating potential interventions targeting predisposing, enabling or need factors in future research.

Theoretical Framework for the Current Study.

Using Andersen's Behavioral Model of Health Services Use, this study accounts for predisposing, enabling, and need factors when evaluating the association between multigeneration caregiving and informal caregiver health outcomes and health behaviors. The specific factors used in this study have been previously associated with the physical and psychological health and health behaviors of the informal caregiver, as outlined in the literature review above. Table 2 outlines the specific model elements and factors included in the current study as related to Andersen's Behavioral Model.

Table 2

Predisposing, Enabling and Need Factors Included in the Current Study

Behavioral Model Factors	Study Factors
Predisposing	Age Gender Race Education Income Marital Status Employment Relationship to Care Recipient
Enabling	Income Insurance Coverage
Need	Care Recipient Mental Status Time Providing Informal Care
Health Behaviors	Annual Preventative Care Check-Up Exercise Smoking Binge Drinking

Predisposing Factors.

The predisposing factors included in this study are age, gender, race, education, marital status, employment and relationship to the care recipient. Predisposing factors include demographic and social characteristics associated with the likelihood an individual will need health services. The factors listed above are all associated with the likelihood an individual will need health services and are included in this study as covariates.

Enabling Factors.

The enabling factors included in this study are caregivers' insurance coverage status and income. Enabling factors in Andersen's Behavioral Model are those which affect whether a person uses health services or not. Personal enabling factors, such as insurance coverage and income, can hinder or enable an individual from seeking care. Additionally, if enabling factors are associated with an increase in healthy behaviors, health outcomes (physical and psychological) may also increase. Therefore, insurance coverage and income are included in this study as co-variates to control for their potential impact on study dependent variables (physical and psychological health and health behaviors).

Need Factors.

This study includes "need" factors that have been linked to informal caregivers' health in previous studies. The specific factors included are care recipient mental health, number of hours providing informal care per week, and the time (in months) the caregiver has provided care for the care recipient. Need measures are factors that relate to the perceived or evaluated need for care. In Andersen's Behavioral Model perceived need influences health care seeking behaviors. Therefore, in this study it is critical to include need factors as co-variates to control for the potential impact need has on the dependent variables of this study (physical health, psychological health and health behaviors).

Health Outcomes.

Physical Health.

In Andersen's Behavioral Model predisposing, enabling or need factors influence perceived health. Multigeneration caregivers may provide care for more hours, experience more financial burden, and have less self-care time, etc. These factors may decrease health behaviors or the ability to seek medical care when necessary which may result in multigeneration caregivers reporting poorer perceived health compared to single generation caregivers.

Research Question 1.

1. Do individuals who provide care to an older adult (aged 65 or older) and one or more children (aged 18 and under) report worse physical health compared to individuals who provide care only to an adult(s) aged 65 or older?

Hypothesis tested.

- H1: Multigeneration informal caregivers are more likely to report poor overall health compared to individuals who provide care only to an adult(s) aged 65 or older.

Psychological Health.

In Andersen's Behavioral Model individual predisposing, enabling or need variables influence perceived health. Multigeneration informal caregivers may experience more role conflict as they juggle caring for multiple generations and possible work demands. These factors may result in multigeneration caregivers reporting having a diagnosis of depression more often than single generation caregivers.

Research Question 2.

2. Do individuals who provide care to an older adult (aged 65 or older) and one or more children (aged 18 and under) report worse psychological health compared to individuals who provide care only to an adult(s) aged 65 or older?

Hypotheses tested.

- H2: Multigeneration caregivers are more likely to report having a diagnosis of depression compared to individuals who provide care only to an adult(s) aged 65 or older.

Health Behaviors.

In Andersen's Behavioral Model individual predisposing, enabling or need variables influence perceived health. Multigeneration caregivers may have less self-care time due to the struggle of balancing caregiving, work and personal demands which may result in multigeneration caregivers participating in healthy behaviors less often than single generation caregivers.

Research Question 3.

3. Do individuals who provide care to an older adult (aged 65 or older) and one or more children (aged 18 and under) report more unhealthy behaviors compared to individuals who provide care only to an adult(s) aged 65 or older?

Hypothesis tested:

- H3: Multigeneration caregivers will report receiving an annual check-up less often than individuals who provide care only to an adult(s) aged 65 or older.
- H4: Multigeneration caregivers will report not exercising within the last month more frequently than individuals who provide care only to an adult(s) aged 65 or older.
- H5: Multigeneration caregivers will have higher reports of smoking cigarettes than individuals who provide care only to an adult(s) aged 65 or older.
- H6: Multigeneration caregivers will be more likely to report binge drinking in the last 30 days than individuals who provide care only to an adult(s) aged 65 or older.

Study Purpose

Multigeneration caregivers provide are a growing segment of the population providing long-term care to older adults in the U.S. Existing research on informal caregivers as a whole has found that the greater the intensity or quantity of caregiving, the greater the magnitude of health effects will be for the informal caregiver (Shulz & Sherwood, 2008). However, the association between intensity or quantity of caregiving and health effects is not understood for multigeneration caregivers. Not only are multigeneration caregivers providing care for multiple generations, the majority of them are also balancing work (United States Department of Labor & Bureau of Labor Statistics, 2017), and therefore may be at higher risk for poor health outcomes and decreased health behaviors.

This study examines the association between multigeneration caregiving on informal caregiver health and is the first known study of multigeneration informal caregivers utilizing multiple dimensions of informal caregiver health (physical and psychological health) and health behaviors. Research on this potentially at-risk subset of informal caregivers, can help raise awareness about the needs and challenges experienced by this population. Entitlement programs, such as Medicare, provide the bulk of insurance coverage to older adults, but do not cover comprehensive long-term care. As the population of older adults (65 years and older) continues to grow at a rapid rate, it is essential that U.S. policy focus on ways to provide LTSS to this chronically ill aging group of individuals. Informal caregivers provide the bulk of LTSS to older adults in America. Multigeneration caregivers are a growing segment of this population and may be at higher risk for poor health outcomes. This study contributes to policy to support multigeneration caregivers by determining whether a subset of informal caregivers is at a higher risk for poor health outcomes. Maintaining the health of multigeneration caregivers will not only improve their quality of life but may keep them in their caregiving roles longer which can help alleviate the strain placed on formal LTSS and the healthcare system in the U.S. by the rapidly increasing population of older adults.

Chapter Summary

As Americans continue to age at an unprecedented rate, the need for informal caregivers will increase. Due to recent demographic trends, more and more caregivers will not only care for a loved one 65 years or older but will also likely care for their own children while balancing work demands. This generation of “sandwiched” caregivers, maybe especially vulnerable due to their complex and high-burden roles.

The aim of this study is to examine the association between multigeneration caregiving and informal caregivers’ physical and psychological health and health behaviors. This is the first known integrative study of physical and psychological well-being and health behaviors of multigeneration caregivers. Methodology for the current study is explained in Chapter 3.

Chapter 3: Methodology

Overview

This chapter presents the methodology for the current research study, beginning with the research design, data sources, population and sample, and model overview. A discussion of study variables, data collection procedures, full analytical plan and limitations of the current study follow.

Research Design

The current study is a retrospective, observational, pooled cross-sectional study examining the association between multigeneration caregiving and health outcomes or health behaviors of informal caregivers using secondary data from the Behavioral Risk Factor Surveillance Survey (BRFSS). A secondary dataset was chosen for this study, as it allows the researcher to examine a large sample of informal caregivers from multiple states, for maximum generalizability and efficient study timeframe. The unit of analysis is the individual caregiver.

Data Sources

Data obtained for this study was from the Behavioral Risk Factor Surveillance Survey (BRFSS). The BRFSS is an annual telephone survey conducted by the health departments in all 50 states, the District of Columbia, Puerto Rico, the Virgin Islands, and Guam, with the assistance of the Center for Disease Control (Center for Disease Control and Prevention, 2018). The BRFSS database contains health behavior data on over 400,000 individuals per year, including information regarding preventable chronic diseases, injuries and infectious diseases. Only one adult (18+ years of age) per household is interviewed for the survey. Each state administers a required standardized BRFSS questionnaire and has the option to include additional "modules" or sets of questions. In the standardized BRFSS questionnaire, surveyed participants are asked a range of questions regarding demographic information, general self-perceived health, physical activities, and health behaviors (see Appendix A for full BRFSS survey).

In addition to utilizing health and health behavior data from the BRFSS standardized annual survey, this study includes information collected on a state optional BRFSS Caregiver Module. The original BRFSS Caregiver Module was approved as an optional module in 2009 (Centers for Disease Control and Prevention, 2018). The survey initially contained information on the age of the care recipient, number of hours the caregiver spent providing care for the care recipient, relationship between the caregiver and care recipient, and length of time providing care (see Appendix B for full Caregiver Module Survey). Table 3 outlines the states who have utilized the optional Caregiver Module to date (Centers for Disease Control and Prevention, 2018).

Table 3

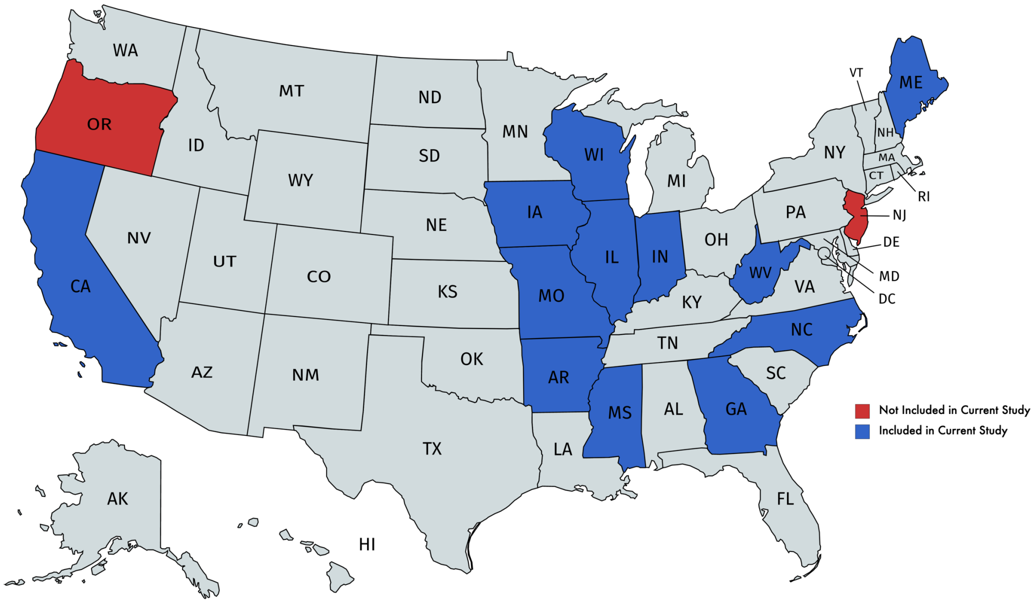
States that Fielded the Caregiver Module during the Study Period

Survey Year	**Participating States**	
	Included in Current Study	**Not Included in Current Study**
2011	North Carolina	New Jersey
2012	California Georgia Iowa Indiana Maine Mississippi Missouri West Virginia Wisconsin	Oregon
2013	Arkansas Illinois	Oregon

In 2011, the BRFSS began to include cell phones in the methodology in addition to landline numbers and modified the process for weighting. Therefore, the CDC does not recommend pre-2011 survey data be combined with data from 2011 and after for analysis. Additionally, the Caregiver Module was updated in 2015, and the number of questions dropped from 10 to 8. One of the questions dropped was “What age is the person to whom you are giving care?” Without this question, researchers in this study are unable to limit the study sample to those caring for older adults (age 65 years and older). Therefore, to maximize study sample size and comparability, this study uses the BRFSS standardized questionnaire and Caregiver Module data for years 2011-2013. Fourteen states participated in the Caregiving Module during this time frame (Table 3; Figure 2). Survey data for the BRFSS Caregiver Module is not publicly available as part of the BRFSS full dataset on the CDC website. Researchers must contact participating state’s BRFSS State Coordinator individually to request the Caregiver Module dataset.

Figure 2

States that fielded the BRFSS Caregiver Module during the study period.



Validity and Reliability of the BRFSS.

A systematic review conducted by Pierannunzi, Hu and Balluz (2013) evaluated studies examining the reliability and validity of the BRFSS versions from 2004-2011 in light of declines in survey response rate. They evaluated multiple measures included in the BRFSS in the following topic areas: 1. access to healthcare/general care, 2. immunization, preventative screening, and testing, 3. physical activity measures, 4. chronic disease, 5. mental health measures, 6. overweight and obesity measures, 7. tobacco and alcohol use measures, 8. responsible sexual behavior measures, 9. injury risk and violence. They found that overall BRFSS measures had high reliability and validity, and prevalence rates were similar to other self-reported national data. While data from this review suggest that the BRFSS data is reliable and valid, this study utilizes data from the 2011-2013 BRFSS surveys. In 2011 the BRFSS began including cell phone numbers in the surveyed population, and the weighting methodology differed from the Pierannunzi, Hu and Balluz (2013) study. Therefore, measures of reliability and validity may differ from previous reports. However, since the questions included in the BRFSS itself were relatively unchanged, and the new weighting methodology included a measure to account for differing response rates for landline or cellphone surveys it is anticipated that the data included in this study are also reliable and valid.

BRFSS Sampling.

The BRFSS includes survey data conducted from all 50 states, the District of Columbia, Puerto Rico, the Virgin Islands, and Guam, with the assistance of the Center for Disease Control (CDC; Centers for Disease Control and Prevention, 2018a). The BRFSS uses two samples: one for landline telephone participants and one for cellular telephone participants. States obtain samples of telephone numbers from the CDC.

Landline Sampling.

Household sampling was used for landline telephone numbers (Center for Disease Control and Prevention, 2018). In household sampling, the interviewer collects information on the number of adults living in the household, and then selects a participant randomly from all the eligible adults in the household. Additionally, disproportionate stratified sampling (DSS) was used to draw telephone numbers from two strata (lists) based on the density of known telephone household numbers (Center for Disease Control and Prevention, 2018). Numbers in the highest density areas are sampled at the highest rate. The ratio of sampling rate of high-density strata to medium density strata (sampling ratio) is 1:1.5.

Cellular Sampling.

For cellular telephone numbers, participants are counted as single adult households (Center for Disease Control and Prevention, 2018). The sample of cellular telephones was randomly generated from a sampling frame of confirmed cellular area code and prefix combinations. Each cellular telephone number had an equal probability of selection. Cellular telephone numbers comprised approximately 20% of states survey responses. In the case where a respondent has a cellular telephone for one state, but has relocated to another state, the state collected information on the BRFSS survey only (no optional modules). This information was transferred to the appropriate state of actual residence at the end of each data-collection period.

BRFSS Weighting for Analysis.

Weighting is used in the BRFSS to attempt to minimize bias in the sample, and ensure data are representative of the demographics (age, race and ethnicity, gender and geographic region) of the state population (each state; Centers for Disease Control and Prevention, 2018a). This study is examining a subset of the state population (informal caregivers of older adults), and the study design is cross-sectional. Therefore, weights are not be included in the study analysis.

Population and Sample

The population of interest in this study is all adult (18 years or older) informal caregivers of older adults (65 years and older) in the U.S. The sample utilized for this study consisted of data obtained from adult informal caregivers of older adults (65 years or older) who participated in the Behavioral Risk Factor Surveillance Survey (BRFSS) and optional Caregiver Module from 2011-2013. Inclusion criteria for this study were: (1) survey participants reported caring for an older adult friend or relative; (2) (Yes/No) recorded response to having a child/children currently under the age of 18 in the household; (3) had at least one response to health outcomes or health behavior questions (dependent variables).

The rationale for selecting the first study criterion was the ability to identify informal caregivers from the full BRFSS dataset. The second criterion was chosen so the researcher could identify whether an informal caregiver was a multigeneration caregiver. Multigeneration caregivers in this study are defined as any informal caregiver of an older adult who indicated that he/she had a child under the age of 18 in the household. The last criterion was established so that included study participants could be included in health outcomes or behavior analyses.

Study Sample.

The researcher for this study contacted all 14 states that administered the Caregiver Module from 2011-2013 to request their Caregiver Module data. Thirteen states shared their BRFSS data with the researcher for this study (92.9% response rate). Data was not able to be obtained from New Jersey. Each state also provided study related questions from the standardized BRFSS questionnaire to form a complete study dataset. However, Oregon only included their Caregiver Module on a State survey in both 2012 and 2013. The State survey was not part of the full CDC BRFSS dataset. Consequently, some key study variables that are collected on the full BRFSS were excluded from the study population. Oregon data was therefore eliminated from the study population. Therefore, this study included data from 12 states of the 14 states (85.8%) who participated in the BRFSS and Caregiver Module between

2011 and 2013 (Table 4). The number of surveyed participants who met study inclusion criteria in 2011, 2012 and 2013 was 542, 6,189, and 1,550, respectively. A total of 8,281 survey participants met study inclusion criteria. Individual level data for 2011-2013 is pooled across years and these 12 states. A breakdown of the BRFSS Survey Responses by State is outlined in Table 4. In these 12 states there were 61,421 BRFSS survey participants who were screened for inclusion. Inclusion required respondents to have answered yes to the question "People may provide regular care or assistance to a friend or family member who has a health problem, long-term illness, or disability. During the past month, did you provide any such care or assistance to a friend or family member?" Of the 61,421 survey participants, 20.3% indicated that they did provide care to a family member or friend in the past 30 days. Of these participants, 8,294 cared for someone aged 65 years or older (See Figure 3).

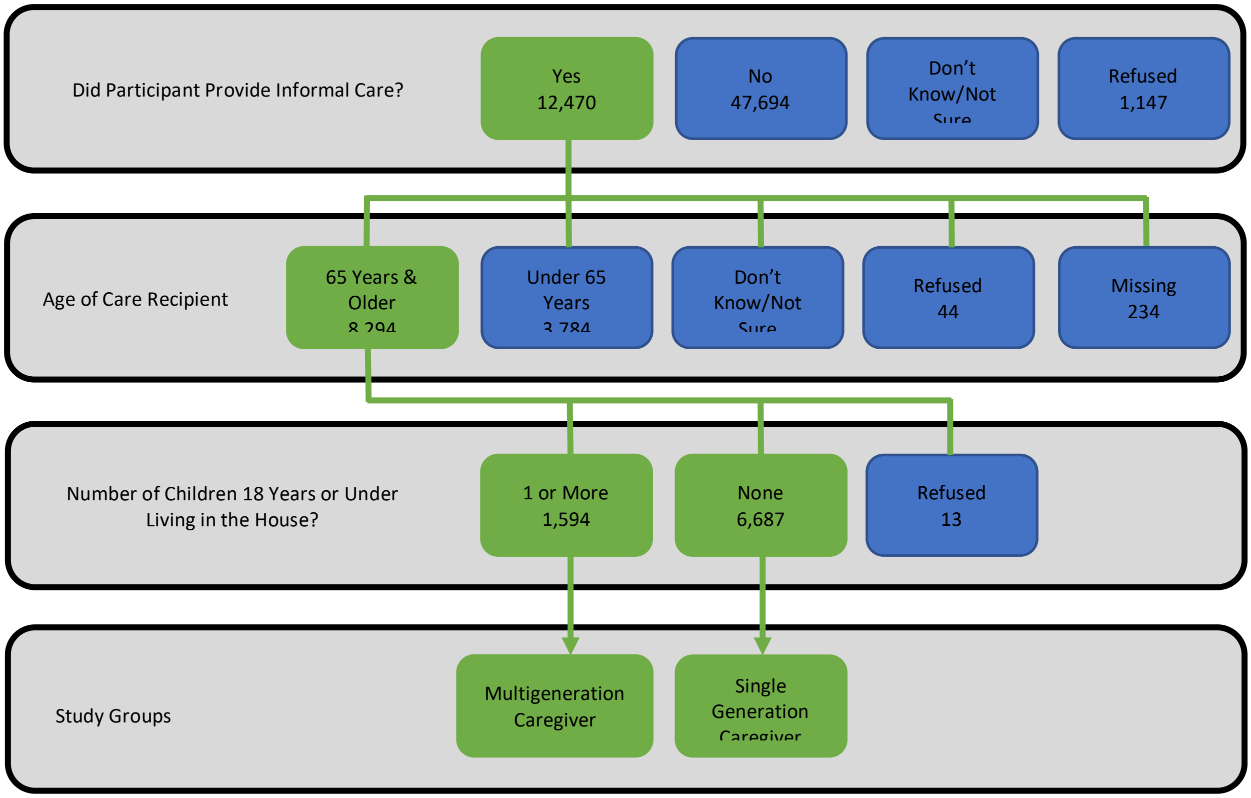
Table 4

Survey Responses for the BRFSS and Caregiver Module by State

	Single Generation Caregivers (Older Adults Only)		**Multigeneration Caregivers**		**Total**	
	N	%	N	%	N	%
Total Study Sample	**6,687**	**80.8%**	**1,594**	**19.2%**	**8,281**	**100.0%**
Arkansas	686	82.2%	149	17.8%	835	9.6%
California	323	77.6%	93	22.4%	416	4.8%
Georgia	651	82.3%	140	17.7%	791	9.1%
Illinois	564	78.9%	151	21.1%	715	8.3%
Indiana	572	79.0%	152	21.0%	724	8.4%
Iowa	344	81.7%	77	18.3%	421	4.9%
Maine	534	81.3%	123	18.7%	657	7.6%
Mississippi	837	80.9%	198	19.1%	1035	12.0%
Missouri	723	81.0%	170	19.0%	893	10.3%
North Carolina	431	79.5%	111	20.5%	542	6.3%
West Virginia	527	82.3%	113	17.7%	640	7.4%
Wisconsin	495	80.9%	117	19.1%	612	7.1%

Figure 3

Screening of Survey Participants for Inclusion in the Current Study



The study sample was stratified into single generation and multigeneration caregivers by using the response to the question asking how many children (under 18 years) were living in the household. Thirteen survey participants refused to answer this question and were excluded from the study. Single generation and multigeneration caregivers made up 80.8% and 19.2% of the study sample (8,281), respectively. A breakdown of the study population by state is included in Table 4, above. There was not a statistically significant difference in the proportion of single generation caregivers and multigeneration informal caregivers by state (p = 0.065).

Data Security

All BRFSS data were stored on an external password-protected hard drive in a safe and secure location within the primary researcher's permanent residence. All reported data is summarized, and exclude any individual level identifying data. After publication of the study results, all datasets will be destroyed.

Data Measurement

Study variables were collected from the BRFSS standardized survey and Caregiver Module conducted from 2011-2013.

Research Question 1: Physical Health

Subjective physical health was measured in the BRFSS using a self-rating of a single question, “Would you say that in general your health is…” with the option for participants to rate their health on a scale from one to five where one is excellent, two is very good, three is good, four is fair and five is poor. A dummy variable was created to code poor physical health to help with interpretability of results (1: Fair or Poor Health, 0: Good, Very Good, or Excellent Health). Responses of “Don’t Know/Not Sure” or “Refused” were excluded from analysis.

Research Question 2: Psychological Health

Psychological health was measured using one self-report measure of depression: “Has a doctor or other healthcare provider EVER told you that you had a depressive disorder (including depression, major depression, dysthymia, or minor depression)? (0=No, 1=Yes).

Research Question 3: Health Behaviors

This study examines four health behaviors: routine check-up, exercise, smoking and drinking. Annual check-up is measured by asking the participant “About how long has it been since you last visited a doctor for a routine checkup?” Answers were coded “within past year,” “within past 2 years,” “within past 5 years,” or “5 or more years ago.” A dummy variable was created to code Annual Check-Up (0: Received Annual Check-Up within the Last Year, 1: Did Not Receive Annual Checkup). Exercise was measured as a categorical “yes/no” response to the question, “during the past month, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise?" Participants were also asked how oven they smoke cigarettes (every day, some days, not at all). Smoking behaviors was codded with a dummy variable (1: Smokes some days or every day, 0: Not at all). Lastly, drinking habits were measured on a continuous scale with the question "considering all types of alcoholic beverages, how many times during the past 30 days did you have 5 or more drinks for men or 4 or more drinks for women on an occasion?" A dummy variable was created to code drinking habits into participants how reported at least one binge drinking episode in the past month (1: At least one day drinking "5 or more drinks for men or 4 more drinks for women, 0: Did not binge drink in the last 30 days).

Dependent Variables

Informal caregivers' physical health (Research Question 1), psychological health (Research Question 2) and health behaviors (Research Question 3) were used to measure the influence of multigeneration caregiving on informal caregiver outcomes. Table 5 specifies the dependent variables chosen from the BRFSS and Caregiver Module and how they relate to the conceptual model.

Covariates

State and study year variables are controlled for in order to minimize any potential association of these variables with health outcomes or health behaviors.

Independent Variables

Table 6 outlines the independent variables and covariates chosen from the BRFSS and Caregiver Module and how they relate to the conceptual model. The independent variable for this study is multigeneration caregiving status. Multigeneration caregiving status is defined in the following manner:

Table 5

Dependent Study Variables and Measurement

Research Question #	Conceptual Model Measure	Type of Variable	Measure	Question	Responses	Transformation	Data Type
1	Physical Health	Dependent	Overall Health	Would you say that in general your health is:	1: Excellent, 2: Very Good, 3: Good, 4: Fair, 5: Poor, 7: Don't Know/Not Sure 9: Refused	0: Good Health (1-3), 1: Poor Health (4-5), Excluded (7, 9)	Categorical
2	Psychological Health	Dependent	Depression	(Ever told) you that you have a depressive disorder, including depression, major depression, dysthymia, or minor depression?	1: Yes, 2: No, 7: Don't Know/Not Sure, 9: Refused	1: Yes, 0: No, Excluded (7,9)	Categorical
3	Health Behaviors	Dependent	Annual Check-Up	About how long has it been since you last visited a doctor for a routine checkup? [A routine checkup is a general physical exam, not an exam for a specific injury, illness, or condition.	1: Within past year, 2: Within past 2 years, 3: Within past 5 years, 4: 5 or more years ago, 7: Don't Know/Not Sure, 8: Never, 9: Refused	0: Received Annual Check-Up (1), 1: Did Not Receive Annual Check-Up (2, 3, 4, 8), Excluded (7, 9)	Categorical
			Exercise	During the past month, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise?	1: Yes, 2: No, 7: Don't Know/Not Sure, 9: Refused	0: Exercises, 1: Does Not Exercise, Excluded (7, 9)	Categorical
			Smoking	Do you now smoke cigarettes every day, some days, or not at all?	1: Every Day, 2: Some Days, 3: Not at All, 7: Don't Know/Not Sure, 9: Refused	1: Smokes (1, 2), 0: Does Not Smoke (3), Excluded (7, 9)	Categorical
			Drinking	Considering all types of alcoholic beverages, how many times during the past 30 days did you have 5 or more drinks for men or 4 or more drinks for women on an occasion?	#1-76 times, 77: Don't Know/Not Sure, 88: None, 99: Refused	1: Binge Drinking (1-76), 0: Did Not Binge Drink (88), Excluded (77, 99)	Categorical

Table 6

Independent Variables and Covariates

Conceptual Model Measure	Type of Variable	Measure	Question	Responses	Transformation	Data Type
Population Characteristic	Independent Variable	Caregiver Status (Older adult)	People may provide regular care or assistance to a friend or family member who has a health problem, long-term illness, or disability. During the past month, did you provide any such care or assistance to a friend or family member?	1: Yes, 2: No, 7: Don't Know/Not Sure, 9: Refused	Excluded (0,7,9)	Categorical
			What age is the person to whom you are giving care?	Age in years [0-115], 777: Don't know / Not sure, 999: Refused	Excluded (<65,777,999)	Continuous
		Multigeneration Caregiver Status	How many children less than 18 years of age live in your household?	1-87 # of Children, 88: None, 99 Refused	88=Single Generation CG, 1-87=Multi Generation CG, Excluded (99)	Categorical
Predisposing Characteristics	Covariates	Age	What is your Age?	Continuous, 9: Refused	18-24, 25-34, 35-44, 45-54, 55-64, 65-74, 75+, Exclude (9)	Categorical
		Gender	Indicate sex of respondent	1: Male, 2: Female		Categorical
		Race	Calculated Variable: Preferred Race Category Derived from two other race variables included in BRFSS.	1: White, 2: Black or African American, 3: Asian, 4: Native Hawaiian or other Pacific Islander, 5: American Indian or Alaska Native, 6: Other, 7: No Preferred Race, 8 Multiracial but preferred race not asked, 77 Don't Know/Not Sure, 99: Refused	1: White, 2: Black or African American, 3: Other Race or No Preferred Race (3, 4, 5, 7), 8: Multiracial but preferred race not asked, Excluded (77, 99)	Categorical
		Education	What is the highest grade or year of school you completed?	1: Never attended school or only kindergarten, 2: Grades 1-8, 3: Grades 9-11, 4: Grade 12 or GED, 5: College 1-3 years, 6: College 4 or >, 9: Refused	Excluded (9)	Categorical
		Income	Is your annual household income from all sources:	1: < 10k, 2: < 15k, 3: < 20k,m4: < 25k, 5: < 35k, 6: <50k, 7: <75k, 8: 75k or more, 77: Don't Know/Not Sure, 99: Refused	Excluded (77, 99)	Categorical

Table 6

Continued.

		Marital Status	Are you: (marital status)	1: Married, 2: Divorced, 3: Widowed, 4: Separated, 5: Never Married, 6: A member of an unmarried couple, 9: Refused	Excluded (9)	Categorical
		Employment	Are you currently…?	1: Employed for Wages, 2: Self-Employed, 3: Out of Work for 1 Year or More, 4: Out of Work for Less than 1 Year, 5: A Homemaker, 6: A Student, 7: Retired, 8: Unable to Work, 9: Refused	Excluded (9)	Categorical
		Relationship to Care Recipient	What is his/her relationship to you? For example, is he/she your (mother/daughter or father/son)?	01: Parent, 02: Parent-in-law, 03: Child, 04: Spouse, 05: Sibling, 06: Grandparent, 07: Grandchild, 08: Other Relative, 09: Non-relative		Categorical
Enabling Factors	Covariate	Insurance Coverage	Do you have any kind of health care coverage, including health insurance, prepaid plans such as HMOs, or government plans such as Medicare, or Indian Health Service?	1: Yes, 2: No, 7: Don't Know/Not Sure, 9: Refused	Excluded (7,9)	Categorical
Need Factors	Covariates	Care Recipient Mental Status	During the past year, has the person you care for experienced changes in thinking or remembering?	1: Yes, 2: No, 7: Don't Know/Not Sure, 9: Refused	Excluded (7, 9)	Categorical
		# Hours Providing Care	In an average week, how many hours do you provide care for	_ _ _ Hours per week, 777: Don't know / Not sure, 999: Refused	Excluded (777, 999, hours >168)	Continuous
		Time Providing Care	For how long have you provided care for	1 _ _Days, 2 _ _Weeks,3 _ _Months, 4 _ _Years, 777: Don't know / Not sure, 999: Refused	1= <1 Year, 2= <2 Years, 3= <5 Years, 4= <10 Years, 5= <20 Years, 6= 20+ Years, Excluded (777, 999)	Categorical
		Age of Care Recipient	What age is the person to whom you are giving care?	Age in years [0-115], 777: Don't know / Not sure, 999: Refused	Age in Years [65-115], Excluded (<65,777,999)	Continuous

1. Informal caregivers are defined as individuals who answered “yes” to the question “People may provide regular care or assistance to a friend or family member who has a health problem, long-term illness, or disability. During the past month, did you provide any such care or assistance to a friend or family member?” **AND** reported the age of the care recipient was 65 years or older.
2. Multigeneration caregivers are defined by the criteria above, and by indicating they have 1 or more children under the age of 18 living in the household. Single generation caregivers answer indicated they had no children under the age of 18 living in the household.

Predisposing, Enabling, and Need Variables.

Demographic variables controlled for in this study are predisposing, enabling and need factors associated with higher risk for adverse outcomes in caregiving research (Richard Schulz et al., 2016, pg. 329). Definitions of the predisposing, enabling and need variables are outlined in Table 6.

Missing Data

Missing data is handled using listwise deletion, where each case is eliminated if it has missing data for any variable included in the analysis. An assumption of using listwise deletion is that the variables included in the study are missing completely at random. To determine if values were missing completely at random (MCAR), Missing Value Analysis was conducted prior to analyzing the study research questions. This test is designed to identify patterns of missing values in the dataset (Tabachnik & Fidell, 2013). For variables with more than 5% missing data, a t test was conducted to see if missingness among one variable was related to any of the other study variables (α 0.05). Little’s MCAR test was non-significant ($p = 0.289$) indicating study variables were MCAR. Therefore, listwise deletion is an appropriate method for handling missing values in this study.

Data Analysis

This research study has three main research questions. Each analysis in this study has the same independent and control variables and differing dependent variables. Data is pooled across study years and states. However, state and study year control variables are included in study analyses in order to minimize any potential relationship between these variables and study dependent variables.

All data analyses were performed using IBM Statistical Package for the Social Sciences (SPSS) version 26.

Descriptive Analysis.

Caregiver and care recipient demographics are summarized using means and standard deviations, or raw counts and percentages for continuous and categorical variables, respectively.

Inferential Statistics.

Each dependent variable and the corresponding inferential analysis are outlined in Table 7.

Table 7

Statistical Analysis by Research Question and Dependent Variable

Research Question Dependent Variable	Dependent Variable	Measurement	Statistical Analysis
RQ1: Physical Health	DV1: Overall Health	Categorical	Binary Logistic Regression
RQ 2: Psychological Health	DV2: Depression	Categorical	Binary Logistic Regression
RQ3: Health Behaviors	DV3: Annual Check-Up	Categorical	Binary Logistic Regression
	DV4: Exercise	Categorical	Binary Logistic Regression
	DV5: Smoking	Categorical	Binary Logistic Regression
	DV6: Drinking	Categorical	Binary Logistic Regression

Binary Logistic Regression.

Binary logistic regression is utilized to test whether caregiver status is associated with physical health (DV 1), psychological health (DV 2) or health behaviors (DV 3-6), individually. This test was utilized to predict the dependent variable by a linear combination of the IV and CVs for Research Questions 1, 2 and 3. Binary logistic regression is appropriate statistical method to test this relationship, as the dependent variables are dichotomous, there was one IV (caregiver status), and a number of covariates (listed in Tables 5 & 6). For this study, logistic regression allows us to model the probability of having poor physical or psychological health or engaging in specific health behaviors for multigeneration caregivers compared to single generation informal caregivers.

Statistical Assumptions for Logistic Regression.

There are no statistical assumptions concerning the distributions of the predictor variables for logistic regression (Tabachnik & Fidell, 2013). Predictor variables do not have to meet criteria of normality, linearity or equal variance.

Logistic Regression Assumption: Cell Frequencies

Cross tabulations were performed for the categorical predictor variables and the dependent variables (physical health, psychological health, health behaviors) to ensure that no more than 20% of the cells had frequencies less than 5 (Tabachnick, Barbara G.; Fidell, 2013). Three variables were transformed for analysis. Education level had only 4 observations total in the reference category “never attended school or only kindergarten”. Therefore, it was collapsed with “Grades 1-8” to form the category “8th Grade or Less”. Race had more than 20% of the cells containing missing data when cross-tabbed with the dependent variables depression (25.0%), exercise status (25.0%), smoking status (21.5%), and binge drinking (31.3%). Therefore, variables containing less than 5% of the data were collapsed into one category “Other Minority or No Preferred Race”. This resulted in 4 categories for race: 1. White, 2. Black or African American, 3. Other Minority or No Preferred Race, 4. Multiracial but

Preferred Race Not Asked. Caregiver relationship had more than 20% of the cells containing missing data when cross-tabbed with smoking status (22.2%) and binge drinking (22.2%). The two categories with less than 5% of all values of caregiver relationship (Child and Grandchild) were collapsed with "Other Relative". These variable transformations resulted in no more than 20% of cells having frequencies less than 5.

Logistic Regression Assumption: Multicollinearity Among Predictor Variables

The research questions in this study are all evaluated using logistic regression. One assumption of this analysis is that the predictor variables are not highly correlated with one another or that there is the absence of multicollinearity. The analytic models for each research question in this study includes caregiving status, predisposing, enabling and need factors of both the caregiver and care recipient. When using multiple predictor variables there is the risk that some of the factors may be highly correlated with one another.

To test whether the multicollinearity assumption was met, relationships among predictor variables were tested using collinearity statistic VIF. All predictor variables had a VIF < 5 indicating low correlation among predictor variables. Therefore, all predictor variables remained in the analysis.

However, when estimating the logistic regressions, there was an error due to redundancies among variables, and the models continued to eliminate year due to multicollinearity. Because caregiver states were only included in one study year, these two variables have high multicollinearity. This relationship was tested using chi square analysis. Chi square analysis revealed that the relationship between state and interview year was significant, $p < 0.001$. Therefore, interview year was dropped from the logistic regression analyses due to multicollinearity with the predictor variable state.

Sample Size and Power.

The six hypotheses in this study are tested using binary logistic regression. The regression model tests whether the independent variable (Informal Caregiver Status: Single Generation vs Multiple

Generation) predicts the dependent variables (1: Overall Health, 2: Depression, 3: Annual Check-Up, 4: Exercise, 5: Smoking, 6: Drinking).

Sample size and power analysis was calculated for each hypothesis using G*Power 3.1. All calculations assumed a statistical standard α of 0.05 and power of 0.95 (Tabachnik & Fidell, 2013). As the hypotheses for this study are directional in nature, the sample size and power analysis were set to a one tail logistic regression. R^2 was set to 0.25 (R=0.50) as the covariates in this study are expected to have a moderate association with the dependent variables (physical health, psychological health and health behaviors). In the study sample, 19.2% are multigeneration caregivers and 80.8% are single generation informal caregivers. Therefore, X parm π was set to 0.192 as it refers to the proportion of cases who are multigeneration caregivers.

In order to calculate the sample size and power for the study, the researchers also needed to define a meaningful effect size for this study. The proportion of single generation informal caregivers who experienced the outcome of interest (poor self-reported health, self-reported depression, no annual check-up, no exercise, smoking, binge drinking) is outlined in (Table 8). The hypotheses in this study postulate that multigeneration caregivers will experience worse physical and psychological outcomes and report more unhealthy behaviors. Therefore, sample size and power analyses were calculated to detect a difference of 5% in the proportion of multigeneration caregivers reporting poor health outcomes and health behaviors. Results from all Sample Size and Power Analyses are outlined in Table 8. Based on the assumptions above the sample size needed to detect a 5% difference in the proportion of informal caregivers experiencing poor health outcomes or reporting unhealthy behaviors with an α of 0.05 and power of 0.950 ranged from 1,031 to 1,380. This study exceeds these sample size requirements with a total sample size of 8,281.

Table 8

Sample Size Calculations

Outcome of Interest	Proportion of Single Generation Informal Caregivers-Study Data	Proportion of Multigeneration Caregivers – Proportion Estimate	Sample Size
Poor Health	0.20	0.25	1,063
Depression	0.22	0.27	1,126
No Annual Check-Up	0.20	0.25	1,063
Does Not Exercise	0.24	0.29	1,178
Smokes	0.34	0.39	1,380
Binge Drinking	0.19	0.24	1,031

Institutional Review Board (IRB) Submission

The Institutional Review Board (IRB) at Virginia Commonwealth University exempted this study from review.

Limitations

The main limitation of this study is that it contains data from only 12 states. While the sample is fairly large, the limited number of sampled states prevents the researchers from generalizing these results to the entire population of single and multigeneration caregivers in the U.S.

Another limitation is the use of the retrospective pooled cross-sectional study design. All data was collected from 2011-2013. The demographic characteristics of the sampled population as well as health outcomes and behaviors may have changed since data collection. Additionally, because the study is cross-sectional in nature, all data was collected at one moment in time and claiming certainty in the directionality of the results is not possible.

Additionally, the BRFSS and Caregiver Module data contains self-reported measures. Self-reported data from these sources is not verified, and some of the measures used are sensitive in nature (i.e., self-reported binge drinking and diagnosis of depression) which can result in underreporting of the condition by survey respondents. However, Pierannunzi, Hu and Balluz's (2013) review of BRFSS survey responses (including mental health measures and smoking and drinking measures) found that the majority of these measures were highly reliable and valid.

Finally, the BRFSS and Caregiver Module data contain information on a wide range of informal caregivers. However, some subgroups of caregivers are not represented in the dataset (i.e., informal caregivers who are also residents of nursing homes or group homes) as they are excluded from the BRFSS survey, and any respondent who is unable to respond to the survey due to physical or psychological problems is excluded from the survey. Therefore, the generalizability of the current study does not apply to older adult informal caregivers living in assisted living environments or those with psychological or physical limitations which would prevent them from being able to complete a telephonic survey.

Chapter Summary

This chapter described the observational, cross-sectional, retrospective research design and quantitative data analyses for this research study. Details about the secondary dataset, sampling, variable measurement and analyses were explained, as well as potential limitations of the study. Results from study analyses are described in the following chapter.

Chapter 4: Results

Overview

This chapter contains the results of the data analysis outlined in Chapter 3. Descriptive statistics for the independent and dependent variables are discussed. A discussion of the results for each research question follows.

Descriptive Analysis

In this study, the majority of caregivers of older adults were female (68.7%), aged 55 years or more (26.9%), employed (47.5%), caring for a parent (42.0%), provided an average of 21 hours of care per week, and have provided care for at least 2 years (59.7%). Additionally, 19.2% of older adult caregivers were multigeneration caregivers (also caring for at least one child under the age of 18). These results match with recent estimates published in 2020, that found that the majority of caregivers of adults were female (61%), average age of 49.4 years, employed (61%), caring for a parent or parent-in-law (50%), for an average of 24 hours per week, and 29% have been providing care for at least 5 years (*Caregiving in the U.S.*, 2020). Table 9 presents caregiver and care recipient demographics by caregiver status (single or multigeneration).

Table 9

Caregiver and Care Recipient Demographics

	Single Generation Caregivers		Multigeneration Caregivers		Overall		p-value
	N	**%**	**N**	**%**	**N**	**%**	
Total	**6,687**	**80.8%**	**1,594**	**19.2%**	**8,281**	**100%**	
Caregiver Age (Years)	**6,634**	**100.0%**	**1,588**	**100.0%**	**8,222**	**100.0%**	**<0.001**
18-24	99	1.5%	56	3.5%	155	1.9%	
25-34	135	2.0%	221	13.9%	356	4.3%	
35-44	234	3.5%	498	31.4%	732	8.9%	
45-54	1,230	18.5%	585	36.8%	1,815	22.1%	
55-64	2,227	33.6%	171	10.8%	2,398	29.2%	
65-74	1,693	25.5%	48	3.0%	1,741	21.2%	
75+	1,016	15.3%	9	0.6%	1,025	12.5%	
Caregiver Gender	**6,687**	**100.0%**	**1,594**	**100.0%**	**8,281**	**100.0%**	**0.039**
Male	2,129	31.8%	465	29.2%	2,594	31.3%	
Care Recipient Gender	**6,656**	**100.0%**	**1,587**	**100.0%**	**8,243**	**100.0%**	
Male	2,048	30.8%	534	33.6%	2,582	31.3%	
Education Level	**6,682**	**100.0%**	**1,594**	**100.0%**	**8,276**	**100.0%**	**<0.001**
8th Grade or Less	111	1.7%	17	1.1%	128	1.5%	
Grades 9-11	304	4.5%	84	5.3%	388	4.7%	
Grade 12 or GED	2,107	31.5%	391	24.5%	2,498	30.2%	
College 1-3 Years	1,905	28.5%	466	29.2%	2,371	28.6%	
College 4 or More Years (College Graduate)	2,255	33.7%	636	39.9%	2,891	34.9%	
Employment Status	**6,675**	**100.0%**	**1,590**	**100.0%**	**8,265**	**100.0%**	**<0.001**
Employed for Wages	2,261	33.9%	944	59.4%	3,205	38.8%	
Self-Employed	570	8.5%	147	9.2%	717	8.7%	
Out of Work for 1 Year or More	194	2.9%	74	4.7%	268	3.2%	
Out of Work for Less than 1 Year	121	1.8%	54	3.4%	175	2.1%	
A Homemaker	432	6.5%	163	10.3%	595	7.2%	
A Student	57	0.9%	45	2.8%	102	1.2%	
Retired	2,547	38.2%	76	4.8%	2,623	31.7%	
Unable to Work	493	7.4%	87	5.5%	580	7.0%	
Income Level	**5,864**	**100.0%**	**1,481**	**100.0%**	**7,345**	**100.0%**	**<0.001**
<$10k	237	4.0%	64	4.3%	301	4.1%	
<$15k	326	5.6%	80	5.4%	406	5.5%	
<$20k	472	8.0%	111	7.5%	593	7.9%	
<$25k	652	11.1%	114	7.7%	766	10.4%	
<$35k	758	12.9%	143	9.7%	901	12.3%	
<$50k	1,042	17.8%	193	13.0%	1,235	16.8%	
<$75k	1,020	17.4%	256	17.3%	1,276	17.4%	
$75k or More	1,357	23.1%	520	35.1%	1,877	25.6%	
Insurance	**6,676**	**100.0%**	**1,589**	**100.0%**	**8,265**	**100.0%**	**<0.001**
Yes	6,068	90.9%	1,309	82.4%	7,377	89.3%	

Table 9

Continued.

	Single Generation Caregivers		Multigeneration Caregivers		Total		
	N	%	N	%	N	%	p-value
Marital Status	**6,673**	**100.0%**	**1,592**	**100.0%**	**8,265**	**100.0%**	**<0.001**
Married	3,897	58.4%	1,092	68.6%	4,989	60.4%	
Divorced	993	14.9%	215	13.5%	1,208	14.6%	
Widowed	865	13.0%	44	2.8%	909	11.0%	
Separated	116	1.7%	32	2.0%	148	1.8%	
Never Married	698	10.3%	170	10.7%	859	10.4%	
A Member of An Unmarried Couple	113	1.7%	39	2.4%	152	1.8%	
Caregiver Race	**6,639**	**100.0%**	**1,584**	**100.0%**	**8,223**	**100.0%**	**<0.001**
White	5,208	78.4%	1,153	72.8%	6,361	77.4%	
Black or African American	626	9.4%	222	14.0%	848	10.3%	
Other Minority or No Preferred Race	134	2.0%	67	4.2%	201	2.4%	
Multiracial but preferred Race Not Asked	671	10.1%	142	9.0%	813	9.9%	
Care Recipient Changes in Thinking or Remembering	**6,446**	**100.0%**	**1,555**	**100.0%**	**8,001**	**100.0%**	**0.890**
Yes	4,058	63.0%	976	62.8%	5,034	62.9%	
Relationship of Caregiver to Older Adult Care Recipient	**6,639**	**100.0%**	**1,586**	**100.0%**	**8,225**	**100.0%**	**<0.001**
Parent	2,707	40.8%	744	46.9%	3,451	42.0%	
Parent In-Law	620	9.3%	211	13.3%	831	10.1%	
Spouse	919	13.8%	30	1.9%	949	11.5%	
Sibling	398	6.0%	18	1.1%	416	5.1%	
Grandparent	251	3.8%	321	20.2%	572	7.0%	
Other relative	521	7.8%	126	7.9%	647	7.9%	
Non-relative	1,223	18.4%	136	8.6%	1,359	16.5%	
Length of Time Providing Care for Older Adult (Years)	**6,359**	**100.0%**	**1,537**	**100.0%**	**7,896**	**100.0%**	**<0.001**
<1	1,621	25.5%	508	33.1%	2,129	27.0%	
1 - <2	855	13.4%	201	13.1%	1,056	13.4%	
2 - <5	1,831	28.8%	396	25.8%	2,227	28.2%	
5 - <10	1,125	17.7%	251	16.3%	1,376	17.4%	
10 - <20	670	10.5%	141	9.2%	811	10.3%	
20+	257	4.0%	40	2.6%	297	3.8%	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	
Avg. Older Adult Care Recipient Age	81.65	8.35	78.62	8.37	81.07	8.44	<0.001
Avg. Hours Providing Care per Week for Older Adult	21.82	38.07	16.71	30.53	20.79	36.73	<0.001

Descriptive statistics for all dependent variables stratified by caregiving status are listed in Table 10. Overall, approximately 1 in 5 caregivers experienced poor health (19.2%), depression(22.4%), and binge drinking(20.6%). Additionally, 22.8% of caregivers reported not receiving an annual check-up in the previous year and 23.3% reported not exercising in the last month. Over one-third of caregivers reported that they currently smoke (37.5%).

Table 10

Dependent Variable Descriptive Statistics

	Single Generation Caregiver		**Multigeneration Caregiver**		**Total**		**Total**
	N	**%**	**N**	**%**	**N**	**%**	**p-value**
General Health	**6,674**	**100.0%**	**1,591**	**100.0%**	**8,265**	**100.0%**	**<0.001**
Good	5,323	79.8%	1,354	85.1%	6,677	80.8%	
Poor	1,351	20.2%	237	14.9%	1,588	19.2%	
Depression Diagnosis	**6,660**	**100.0%**	**1,591**	**100.0%**	**8,251**	**100.0%**	**0.001**
No	5,217	78.3%	1,185	74.5%	6,402	77.6%	
Yes	1,443	21.7%	406	25.5%	1,849	22.4%	
Annual Check-Up	**6,646**	**100.0%**	**1,581**	**100.0%**	**8,277**	**100.0%**	**<0.001**
Yes	5,311	79.9%	1,042	65.9%	6,353	77.2%	
No	1,335	20.1%	539	34.1%	1,874	22.8%	
Exercise Last 30 Days	**6,680**	**100.0%**	**1,592**	**100.0%**	**8,272**	**100.0%**	**<0.001**
Yes	5,061	75.8%	1,287	80.8%	6,348	76.7%	
No	1,619	24.2%	305	19.2%	1,924	23.3%	
Smoking Last 30 Days	**3,036**	**100.0%**	**710**	**100.0%**	**3,746**	**100.0%**	**<0.001**
No	2,003	66.0%	340	47.9%	2,343	62.5%	
Yes	1,033	34.0%	370	52.1%	1,403	37.5%	
Binge Drinking Last 30 Days	**2,925**	**100.0%**	**788**	**100.0%**	**3,713**	**100.0%**	**<0.001**
No	2,375	81.2%	572	72.6%	2,947	79.4%	
Yes	550	18.8%	216	27.4%	766	20.6%	

Inferential Statistics

Bivariate Analysis.

Table 10 outlines the bivariate analysis of caregiving status and study dependent variables. Multigeneration caregivers were more likely to have a diagnosis of depression (X^2 (1, N = 8,265) = , p = 0.001). A quarter (25.5%) of multigeneration caregivers self-reported a history of depression, compared to only 21.7% of single generation caregivers. Multigeneration caregivers were also more likely to smoke (X^2 (1, N = 3,746) = , p < 0.001) and binge drink (X^2 (1, N = 3,713) = , p < 0.001) compared to single generation caregivers. Over half (52.1%) of multigeneration caregivers smoke compared to only 34.0% of single generation caregivers. Binge drinking was reported among 27.4% of multigeneration caregivers, and only 18.8% of single generation caregivers. Lastly, significantly fewer multigeneration caregivers reported receiving an annual check-up (65.9%) than single generation caregivers (79.9%; X^2 (1, N = 8,277) = , p < 0.001).

Conversely, single generation caregivers were more likely to report poor health (20.2% vs 14.9%) and were less likely to exercise (75.8% vs. 80.8%; p <0.001) compared to multigeneration caregivers. These findings suggest that multigeneration caregivers maybe at higher risk for depression, smoking, binge drinking and missing an annual check-up, while single generation caregivers are at higher risk for poor health and exercising less often.

Logistic Regression

Research Question 1.

A binary logistic regression was used to determine whether caregiver self-reported health responses could be predicted by caregiver status (single generation or multigeneration caregiver) and a set of covariates (predisposing, enabling and need factors outlined in Chapter 3). There were 2,079 cases with missing values that were excluded from analysis using listwise deletion. After deletion of these cases, 6,202 survey participants' data were included in the logistic regression analysis (4,894 single generation caregivers, 1,308 multigeneration caregivers) or 74.9% of the study sample. This exceeded the study sample needed to adequately power the analysis of this research question.

A test of the full model with caregiving status and the study covariates against a constant-only model was statistically significant, χ^2 (60, *N* =6,202) = 1172.517, *p* < 0.001. Results indicate that the predictors significantly distinguished between poor and good self-reported health. A test of goodness of fit was performed using the Hosmer-Lemeshow statistic and was found to be non-significant (*p* = 0.097) indicating a good fitting model.

Table 11 shows regression coefficients, Wald statistics, and odds ratios for each of the predictor variables. Caregiving status was not a significant predictor of poor self-reported health (Wald = 0.008, *df* = 1, *p* = 0.929). Therefore, hypothesis 1, multigeneration informal caregivers are more likely to report poor overall health compared to individuals who provide care only to an adult(s) aged 65 or older was not supported.

According to the Wald criterion, poor health was also significantly predicted by caregiver gender (Wald = 16.979, *df* = 1, *p* < 0.001), caregiver race (Wald = 16.936, *df* = 3, *p* = 0.001), caregiver education level (Wald = 66.535, *df* = 4, *p* < 0.001), caregiver employment status (Wald = 266.495, *df* = 7, *p* < 0.001), caregiver income level (Wald = 99.923, *df* = 7, *p* < 0.001), care recipient age (Wald 8.285, *df* = 1, *p* = 0.004), change in care recipient thinking (Wald = 7.939, *df* = 1, *p* = 0.005), hours providing care per week (Wald = 7.226, *df* = 1, *p* = 0.007), length of time providing care (Wald = 12.290, *df* = 5, *p* = 0.031) and caregiver state (Wald = 20.001, *df* = 11, p = 0.045). Conversely, caregiver age, insurance coverage, marital status, and relationship of the caregiver to the care recipient were not significant predictors of general health (p > 0.05).

The odds ratios indicated that poor general health was less likely to be reported by female caregivers (OR = 0.709) compared to male caregivers. The odds of reporting poor self-reported general health decreased by approximately 30% for female caregivers compared to males. Compared to white

Table 11

Variables in the Final Model of General Health Predictors

Variables	Reference Group	B	(SE)	Wald	*df*	p	Odds Ratio
Caregiver Status	**Single Generation Caregiver**	**-0.010**	**0.116**	**0.008**	**1**	**0.929**	
Age	**18-24 Years**			**7.373**	**6**	**0.288**	
Gender	**Male**	**-0.343**	**0.083**	**16.979**	**1**	**<0.001***	**0.709**
Race	**White**			**16.936**	**3**	**0.001***	
Black or African American		0.294	0.125	5.552	1	0.018*	1.342
Other Race or No Preferred Race		0.752	0.218	11.910	1	0.001*	2.112
Multiracial but Preferred Race Not Asked		-0.650	0.751	0.748	1	0.387	
Education Level	**8th Grade or Less**			**66.535**	**4**	**<0.001***	
Grades 9-11		-0.955	0.303	9.945	1	0.002*	0.385
Grade 12 or GED		-1.386	0.275	25.403	1	<0.001*	0.250
College 1-3 Years		-1.580	0.278	32.248	1	<0.001*	0.206
College 4 or More (College Graduate)		-1.907	0.284	45.014	1	<0.001*	0.149
Employment Status	**Employed for Wages**			**266.495**	**7**	**<0.001***	
Self-Employed		-0.097	0.161	0.359	1	0.549	
Out of Work for 1 Year or More		0.772	0.185	17.456	1	<0.001*	2.164
Out of Work for Less than 1 Year		0.232	0.245	0.895	1	0.344	
A Homemaker		0.350	0.168	4.344	1	0.037*	1.419
A Student		0.278	0.392	0.501	1	0.479	
Retired		0.413	0.124	11.093	1	0.001*	1.512
Unable to Work		2.198	0.140	245.930	1	<0.001*	9.010
Insurance Coverage	**Yes**	**-0.017**	**0.123**	**0.019**	**1**	**0.890**	
Income Level	**<$10k**			**99.923**	**7**	**<0.001***	
<$15k		0.055	0.202	0.075	1	0.784	
<$20k		0.163	0.188	0.751	1	0.386	
<$25k		-0.215	0.188	1.296	1	0.255	
<$35k		-0.253	0.190	1.775	1	0.183	
<$50k		-0.681	0.194	12.312	1	<0.001*	0.506
<$75k		-0.772	0.205	14.260	1	<0.001*	0.462
$75k or More		-1.439	0.221	42.288	1	<0.001*	0.237
Marital Status	**Married**			**10.755**	**5**	**0.056**	
Care Recipient Age	**-**	**-0.015**	**0.005**	**8.285**	**1**	**0.004***	**0.985**
Relationship of Care Recipient to Caregiver	**Parent**			**11.848**	**6**	**0.065**	
Care Recipient Changes in Thinking or Remembering	**No**	**0.227**	**0.081**	**7.939**	**1**	**0.005***	**1.255**
Hours per Week Providing Care	**-**	**0.003**	**0.001**	**7.226**	**1**	**0.007***	**1.003**
How Long Provided Care	**<1 Year**			**12.290**	**5**	**0.031***	
<2 Years		0.043	0.127	0.115	1	0.735	
<5 Years		0.158	0.103	2.329	1	0.127	
<10 Years		0.168	0.117	2.057	1	0.152	
<20 Years		-0.215	0.145	2.193	1	0.139	
20+ Years		0.389	0.199	3.817	1	0.051	
State	**Arkansas**			**20.001**	**11**	**0.045***	
California		-1.344	0.765	3.082	1	0.079	
Georgia		-0.969	0.753	1.655	1	0.198	
Illinois		-0.836	0.753	1.233	1	0.267	
Indiana		-0.591	0.752	0.616	1	0.432	
Iowa		-0.964	0.764	1.594	1	0.207	
Maine		-1.036	0.755	1.881	1	0.170	
Mississippi		-0.812	0.751	1.169	1	0.280	
Missouri		-0.708	0.751	0.891	1	0.345	
North Carolina		-0.888	0.762	1.361	1	0.243	
West Virginia		-0.774	0.753	1.057	1	0.304	
Wisconsin		-1.049	0.756	1.921	1	0.166	
Constant		1.505	0.982	2.352	1	0.125	

*Significant at a p<=0.05

caregivers, odds ratios indicated that Black or African American caregivers (OR = 1.342) and caregivers who identified as “other race or no preferred race” (OR = 2.112) had higher odds of reporting poor general health. When explored further, the coefficients for the statistically significant variable of education were all significant (Table 11). The odds ratios for education category indicate that compared to caregivers with an 8th grade education or less, caregivers with higher levels of education have lower odds for poor general health. For employment status, the odds of reporting poor general health were higher for caregivers who stated they were out of work for 1 year or more (OR = 2.164), a homemaker (OR = 1.419), retired (OR = 1.512) or unable to work (OR = 9.010) compared to caregivers employed for wages. Odds ratios also indicated that compared to caregivers making less than $10k annually, the odds of reporting poor general health were lower for caregivers who made more than $35k. The odds ratio for care recipient age was 0.985, indicating that for every 1 unit increase in age of the care recipient, the odds of reporting poor general health was decreased by 1.5% for caregivers. Changes in the care recipient’s thinking or remembering in the last year was a significant predictor of poor self-reported health (OR = 1.255), with caregivers who reported a change in thinking in the care recipient in the last year having a 25.5% increase in the odds of reporting poor general health. The odds of reporting poor general health were also increased for every one unit increase in the hours the caregiver spent providing care to the care recipient (OR = 1.003). While the length of time the caregiver has provided care to the care recipient and caregiver state were statistically significant predictors of poor self-reported general health, the individual coefficients for the variables were not significant compared to the reference groups.

Research Question 2.

A binary logistic regression was used to determine whether caregiver self-reported depression could be predicted by caregiver status (single generation or multigeneration caregiver) and a set of covariates (predisposing, enabling and need factors outlined in Chapter 3). There were 2,086 cases with missing values on the study variables that were excluded from analysis using listwise deletion. After deletion of these cases, 6,195 survey participants' data were included in regression analysis (4,887 single generation caregivers, 1,308 multigeneration caregivers) or 74.8% of the study sample. This exceeded the study sample needed to adequately power the analysis of this research question.

A test of the full model with caregiving status and the study covariates against a constant-only model was statistically significant, χ^2 (60, *N* =6,195) = 724.914, $p < 0.001$, indicating that the predictors significantly distinguished between caregivers who did or did not self-report a depression diagnosis. A test of goodness of fit was performed using the Hosmer-Lemeshow statistic and was found to be non-significant ($p = 0.438$) indicating a good fitting model.

Table 12 shows regression coefficients, Wald statistics, and odds ratios for each of the predictor variables. According to the Wald criterion, caregiving status was a significant predictor of depression, (Wald = 4.583, *df* = 1, $p = 0.032$). The odds ratio of 1.223 means that the odds of reporting a depression diagnosis increased by 22.3% for multigeneration caregivers compared to single generation caregivers. Therefore, the second hypothesis that multigeneration caregivers are more likely to report having a diagnosis of depression compared to individuals who provide care only to an adult(s) aged 65 or older was supported.

In addition to caregiving status, caregiver age (Wald = 65.309, *df* = 6, $p < 0.001$), caregiver gender (Wald = 30.012, *df* = 1, $p < 0.001$), caregiver race (Wald = 36.671, *df* = 3, $p < 0.001$), caregiver employment status (Wald = 165.867, *df* = 7, $p < 0.001$), caregiver income level (Wald = 62.058, *df* = 7, $p < 0.001$), caregiver marital status (Wald = 16.395, *df* = 5, $p = 0.006$), and change in care recipient thinking (Wald = 46.735, *df* = 1, $p < 0.001$) were all significant predictors of self-reported depression. Conversely, caregiver education level, caregiver insurance coverage, care recipient age, relationship of the caregiver to the care recipient, hours per week providing care to the care recipient, length of time providing care, and caregiver state were not significant predictors of poor self-reported general health ($p > 0.05$).

Table 12

Variables in the Final Model of Depression Predictors

Variables	Categorical Reference Group	B	(SE)	Wald	*df*	p	Odds Ratio
Caregiver Status	**Single Generation Caregiver**	**0.201**	**0.094**	**4.583**	**1**	**0.032***	**1.223**
Age	**18-24 Years**			**65.309**	**6**	**<0.001***	
26-34 Years		0.266	0.307	0.748	1	0.387	
35-44 Years		0.387	0.308	1.577	1	0.209	
45-54 Years		0.448	0.309	2.103	1	0.147	
55-64 Years		0.271	0.317	0.728	1	0.394	
65-74 Years		-0.316	0.333	0.903	1	0.342	
75+ Years		-0.980	0.358	7.476	1	0.006*	0.375
Gender	**Male**	**0.415**	**0.076**	**30.012**	**1**	**<0.001***	**1.512**
Race	**White**			**36.671**	**3**	**<0.001***	
Black or African American		-0.721	0.124	33.919	1	<0.001*	0.486
Other Race or No Preferred Race		-0.054	0.213	0.064	1	0.800	
Multiracial but Preferred Race Not Asked		-1.360	0.775	3.077	1	0.079	
Education Level	**Never Attended School or Only Kindergarten**			**7.198**	**4**	**0.126**	
Employment Status	**Employed for Wages**			**165.867**	**7**	**<0.001***	
Self-Employed		-0.104	0.129	0.649	1	0.420	
Out of Work for 1 Year or More		0.623	0.168	13.811	1	<0.001*	1.864
Out of Work for Less than 1 Year		0.457	0.203	5.063	1	0.024*	1.579
A Homemaker		-0.117	0.149	0.619	1	0.431	
A Student		-0.596	0.36	2.734	1	0.098	
Retired		0.334	0.108	9.512	1	0.002*	1.396
Unable to Work		1.544	0.13	140.933	1	<0.001*	4.684
Insurance Coverage	**Yes**	**-0.050**	**0.111**	**0.204**	**1**	**0.651**	
Income Level	**<$10k**			**62.058**	**7**	**<0.001***	
<$15k		-0.203	0.193	1.107	1	0.293	
<$20k		-0.025	0.178	0.019	1	0.889	
<$25k		-0.334	0.179	3.487	1	0.062	
<$35k		-0.409	0.178	5.244	1	0.022*	0.665
<$50k		-0.555	0.178	9.743	1	0.002*	0.574
<$75k		-0.669	0.184	13.175	1	<0.001*	0.512
$75k or More		-1.100	0.191	33.100	1	<0.001*	0.333
Marital Status	**Married**			**16.395**	**5**	**0.006***	
Divorced		0.274	0.099	7.691	1	0.006*	1.315
Widowed		0.163	0.128	1.617	1	0.204	
Separated		0.404	0.238	2.896	1	0.089	
Never Married		0.150	0.124	1.475	1	0.225	
A Member of An Unmarried Couple		0.630	0.204	9.525	1	0.002*	1.878
Care Recipient Age	**-**	**-0.006**	**0.005**	**1.826**	**1**	**0.177**	
Relationship of Care Recipient to Caregiver	**Parent**			**10.460**	**6**	**0.107**	
Care Recipient Changes in Thinking or Remembering	**No**	**0.492**	**0.072**	**46.735**	**1**	**<0.001***	**1.636**
Hours per Week Providing Care	**-**	**0.001**	**0.001**	**0.398**	**1**	**0.528**	
How Long Provided Care	**<1 Year**			**5.004**	**5**	**0.415**	
State	**Arkansas**			**18.514**	**11**	**0.070**	
Constant		0.720	0.943	0.582	1	0.446	

*Significant at a p<=0.05

When explored further, caregivers who were aged 75 years or older had lower odds (OR = 0.375) of reporting a depression diagnosis compared to caregivers aged 18-24 years. Female caregivers also had higher odds of reporting a depression diagnosis (OR = 1.512) compared to male caregivers. For caregiver race, caregivers who were Black or African American had lower odds of reporting a depression diagnosis compared to white caregivers. Compared to caregivers who were employed for wages, odds of reporting a depression diagnosis were higher for caregivers who were out of work for 1 year or more (OR = 1.864), out of work for less than 1 year (OR = 1.579), retired (OR = 1.396) or unable to work (OR = 4.684). Further analysis of caregiver income level revealed that the odds of reporting a depression diagnosis were significantly lower for caregivers making more than $25k per year were at compared to caregivers making less than $10k annually. Divorced caregivers (OR = 1.315) and caregivers who indicated they are a member of an unmarried couple (OR = 1.878) had higher odds of reporting depression compared to married caregivers. Lastly, caregivers who cared for a care recipient who experienced a change in thinking or remembering in the last year had a 63.6% increase in the odds of reporting a depression diagnosis (OR = 1.636).

Research Question 3.

Annual Check-Up.

A binary logistic regression was used to determine whether having an annual check-up by a clinician could be predicted by caregiver status (single generation or multigeneration caregiver) controlling for a set of covariates (predisposing, enabling and need factors outlined in Chapter 3). A total of 6,188 cases were included in the analysis, after 2,093 cases were deleted due to missing data. There were 4,888 single generation caregivers and 1,300 multigeneration caregivers, a total of 74.7% of the study population. This exceeded the study population needed to adequately power the analysis of this research question.

A test of the full model with caregiving status and the study covariates against a constant-only model was statistically significant, χ^2 (60, *N* =6,188) = 737.779, *p* < 0.001. Results indicate that the predictors significantly distinguished between those that did or did not receive an annual check-up by a clinician. A test of goodness of fit was performed using the Hosmer-Lemeshow statistic and was found to be non-significant (*p* = 0.142) indicating a good model.

Table 13 shows regression coefficients, Wald statistics, and odds ratios for each of the predictor variables. Caregiving status was a significant predictor of receiving an annual check-up (Wald = 6.088, *df* = 1, *p* = 0.014). Odds ratios (OR = 1.246) indicating multigeneration caregivers had higher odds of not receiving an annual check-up in the previous year compared to single generation caregivers. Based on this finding, hypothesis 3 (multigeneration caregivers will report receiving an annual check-up less often than individuals who provide care only to an adult(s) aged 65 or older) was supported.

In addition to caregiving status, caregiver age (Wald = 31.814, *df* = 6, *p* < 0.001), caregiver race (Wald = 30.622, *df* = 3, *p* < 0.001), caregiver employment status (Wald = 42.088, *df* = 7, *p* < 0.001), caregiver insurance coverage (Wald = 173.645, *df* = 1, *p* < 0.001), caregiver marital status (Wald = 17.039, *df* = 5, *p* = 0.004), hours per week providing care (Wald = 9.984, *df* = 1, *p* = 0.002), and caregiver state (Wald = 39.720, *df* = 11, *p* < 0.001) were significant predictors not receiving an annual check-up. Conversely, caregiver gender, caregiver education level, caregiver income, care recipient age, relationship of care recipient to caregiver, care recipient change in thinking or remembering and length of time providing care were not significant predictors of not having an annual check-up (*p* > 0.05).

Further analysis showed that the odds of not receiving (missing) an annual check-up were lower for caregivers aged 65-74 years (OR = 0.534) or 75+ years (OR = 0.461) compared to caregivers 18-24 years. Odds ratios also indicated that Black or African American caregivers were less likely to miss an annual check-up compared to white caregivers. For employment status, odds ratios revealed that the

Table 13

Variables in the Final Model of Annual Check-Up Predictors

Variables	Categorical Reference Group	B	(SE)	Wald	*df*	p	Odds Ratio
Caregiver Status	**Single Generation Caregiver**	**0.220**	**0.089**	**6.088**	**1**	**0.014**	**1.246**
Age	**18-24 Years**			**31.814**	**6**	**<0.001***	
26-34 Years		0.106	0.263	0.161	1	0.689	
35-44 Years		0.273	0.266	1.051	1	0.305	
45-54 Years		0.021	0.269	0.006	1	0.939	
55-64 Years		-0.167	0.277	0.363	1	0.547	
65-74 Years		-0.628	0.297	4.475	1	0.034*	0.534
75+ Years		-0.775	0.327	5.627	1	0.018*	0.461
Gender	**Male**	**-0.077**	**0.072**	**1.134**	**1**	**0.287**	
Race	**White**			**30.622**	**3**	**<0.001***	
Black or African American		-0.686	0.125	30.025	1	<0.001*	0.504
Other Race or No Preferred Race		-0.034	0.201	0.028	1	0.868	
Multiracial but Preferred Race Not Asked		0.558	0.832	0.449	1	0.503	
Education Level	**Never Attended School or Only Kindergarten**			**4.129**	**4**	**0.389**	
Employment Status	**Employed for Wages**			**42.088**	**7**	**<0.001***	
Self-Employed		0.167	0.112	2.245	1	0.134	
Out of Work for 1 Year or More		-0.174	0.174	1.004	1	0.316	
Out of Work for Less than 1 Year		-0.279	0.210	1.771	1	0.183	
A Homemaker		-0.259	0.145	3.201	1	0.074	
A Student		-0.073	0.293	0.061	1	0.805	
Retired		-0.319	0.113	7.943	1	0.005*	0.727
Unable to Work		-0.862	0.160	29.151	1	<0.001*	0.422
Insurance Coverage	**Yes**	**1.360**	**0.103**	**173.645**	**1**	**<0.001***	**3.898**
Income Level	**<$10k**			**13.326**	**7**	**0.065**	
Marital Status	**Married**			**17.039**	**5**	**0.004***	
Divorced		0.234	0.099	5.585	1	0.018*	1.263
Widowed		-0.325	0.146	4.953	1	0.026*	0.722
Separated		0.009	0.251	0.001	1	0.971	
Never Married		0.232	0.012	3.787	1	0.052	
A Member of An Unmarried Couple		-0.001	0.215	0.000	11	0.996	
Care Recipient Age	**-**	**0.003**	**0.005**	**0.390**	**1**	**0.532**	
Relationship of Care Recipient to Caregiver	**Parent**			**9.360**	**6**	**0.154**	
Care Recipient Changes in Thinking or Remembering	**No**	**0.107**	**0.069**	**2.372**	**1**	**0.124**	
Hours per Week Providing Care	**-**	**0.003**	**0.001**	**9.984**	**1**	**0.002***	**1.003**
How Long Provided Care	**<1 Year**			**5.675**	**5**	**0.339**	
State	**Arkansas**			**39.720**	**11**	**<0.001***	
California		0.703	0.836	0.707	1	0.400	
Georgia		0.138	0.833	0.028	1	0.868	
Illinois		0.603	0.832	0.525	1	0.469	
Indiana		0.432	0.833	0.269	1	0.604	
Iowa		0.559	0.837	0.446	1	0.504	
Maine		0.169	0.834	0.041	1	0.840	
Mississippi		0.326	0.832	0.153	1	0.696	
Missouri		0.418	0.831	0.252	1	0.615	
North Carolina		0.105	0.839	0.016	1	0.900	
West Virginia		-0.086	0.835	0.011	1	0.918	
Wisconsin	-	0.208	0.834	0.062	1	0.803	
Constant		-1.425	0.992	2.063	1	0.151	

*Significant at a p<=0.05

odds of not receiving an annual check-up were lower for caregivers who were retired (OR = 0.727) or unable to work (OR = 0.422) compared to caregivers employed for wages. Caregivers who did not have insurance had much higher odds of not receiving an annual check-up (OR = 3.898) compared to caregivers with insurance. Divorced caregivers had higher odds (OR = 1.263) of missing an annual check-up while widowed caregivers (OR = 0.722) had lower odds of not receiving an annual check-up compared to married caregivers. Lastly, while caregiver state was a statistically significant predictor of not receiving an annual check-up, the individual coefficients for the variable were not significant compared to the reference group, Arkansas.

Exercise.

A binary logistic regression was used to determine whether exercising could be predicted by caregiver status (single generation or multigeneration caregiver) controlling for a set of covariates (predisposing, enabling and need factors outlined in Chapter 3). There were 2,077 cases with missing values on the study variables that were excluded from analysis using listwise deletion. After deletion of these cases, 6,204 survey participants' data were included in regression analysis (4,897 single generation caregivers, 1,307 multigeneration caregivers) or 74.9% of the study population. This exceeded the study population needed to adequately power the analysis of this research question.

A test of the full model with caregiving status and the study covariates against a constant-only model was statistically significant, χ^2 (60, N =6,204) = 524.395, $p < 0.001$. Results indicate that the predictors significantly distinguished between those who did or did not participate in exercise. A test of goodness of fit was performed using the Hosmer-Lemeshow statistic and was found to be non-significant (p = 0.206) indicating a good model.

Table 14 shows regression coefficients, Wald statistics, and odds ratios for each of the predictor variables. According to the Wald criterion, caregiving status was not a significant predictor of exercise status (Wald = 0.692, df = 1, p = 0.405). Hypothesis 4, multigeneration caregivers will report not

Table 14

Variables in the Final Model of Exercise Predictors

Variables	Categorical Reference Group	B	(SE)	Wald	*df*	p	Odds Ratio
Caregiver Status	**Single Generation Caregiver**	**0.082**	**0.098**	**0.692**	**1**	**0.405**	
Age	**18-24 Years**			**10.814**	**6**	**0.094**	
Gender	**Male**	**0.076**	**0.073**	**1.082**	**1**	**0.298**	
Race	**White**			**1.461**	**3**	**0.691**	
Education Level	**8th Grade or Less**			**74.919**	**4**	**<0.001***	
Grades 9-11		0.028	0.278	0.010	1	0.920	
Grade 12 or GED		-0.277	0.253	1.201	1	0.273	
College 1-3 Years		-0.629	0.256	6.045	1	0.014*	0.533
College 4 or More (College Graduate)		-0.956	0.260	13.531	1	<0.001*	0.384
Employment Status	**Employed for Wages**			**43.938**	**7**	**<0.001***	
Self-Employed		-0.103	0.128	0.655	1	0.418	
Out of Work for 1 Year or More		-0.111	0.184	0.366	1	0.545	
Out of Work for Less than 1 Year		-0.151	0.226	0.447	1	0.504	
A Homemaker		-0.209	0.145	2.081	1	0.149	
A Student		-0.586	0.428	1.869	1	0.172	
Retired		-0.190	0.105	3.245	1	0.072	
Unable to Work		0.654	0.128	25.967	1	<0.001*	1.922
Insurance Coverage	**Yes**	**0.206**	**0.110**	**3.495**	**1**	**0.062**	
Income Level	**<$10k**			**33.462**	**7**	**<0.001***	
<$15k		0.256	0.191	1.793	1	0.181	
<$20k		0.167	0.181	0.851	1	0.356	
<$25k		0.115	0.179	0.411	1	0.522	
<$35k		0.036	0.180	0.040	1	0.841	
<$50k		-0.162	0.181	0.794	1	0.373	
<$75k		-0.136	0.188	0.519	1	0.471	
$75k or More		-0.517	0.196	6.940	1	0.008*	0.596
Marital Status	**Married**			**5.879**	**5**	**0.318**	
Care Recipient Age	**-**	**0.003**	**0.005**	**0.505**	**1**	**0.477**	
Relationship of Care Recipient to Caregiver	**Parent**			**31.019**	**6**	**<0.001***	
Parent-In-Law		-0.254	0.121	4.380	1	0.036*	0.776
Spouse		0.292	0.142	4.202	1	0.040	1.338
Sibling		0.194	0.163	1.431	1	0.232	
Grandparent		-0.450	0.182	6.106	1	0.013	0.638
Other Relative		-0.411	0.136	9.144	1	0.002*	0.663
Non-Relative		-0.226	0.107	4.481	1	0.034*	0.798
Care Recipient Changes in Thinking or Remembering	**No**	**-0.043**	**0.068**	**0.392**	**1**	**0.531**	
Hours per Week Providing Care	**-**	**0.002**	**0.001**	**3.777**	**1**	**0.052**	
How Long Provided Care	**<1 Year**			**3.326**	**5**	**0.650**	
State	**Arkansas**			**27.268**	**11**	**0.004**	
California		-0.521	0.762	0.468	1	0.494	
Georgia		-0.123	0.754	0.030	1	0.861	
Illinois		-0.080	0.754	0.011	1	0.916	
Indiana		0.032	0.754	0.002	1	0.966	
Iowa		-0.091	0.760	0.014	1	0.905	
Maine		-0.293	0.756	0.150	1	0.699	
Mississippi		0.013	0.753	0.000	1	0.986	
Missouri		-0.314	0.753	0.174	1	0.676	
North Carolina		0.095	0.759	0.016	1	0.900	
West Virginia		-0.094	0.755	0.016	1	0.901	
Wisconsin		-0.502	0.758	0.438	1	0.508	
Constant		-1.103	0.934	1.394	1	0.238	

*Significant at a p<=0.05

exercising within the last month more frequently than individuals who provide care only to an adult(s) aged 65 or older was not supported. Caregiver education level (Wald = 74.919, $df = 4$, $p < 0.001$), caregiver employment status (Wald = 43.938, $df = 7$, $p < 0.001$), caregiver income level (Wald = 33.462, $df = 7$, $p < 0.001$), relationship of care recipient to caregiver (Wald = 31.019, $df = 1$, $p < 0.001$), and caregiver state (Wald = 27.268, $df = 11$, $p = 0.004$) were significant predictors of exercise status among caregivers. Conversely, caregiver age, caregiver gender, caregiver race, caregiver insurance coverage, caregiver marital status, care recipient age, care recipient change in thinking or remembering, hours providing care per week and length of time providing care were not significant predictors in the model.

Specifically, odds ratio indicated that caregivers who had 1-3 years of college education (OR = 0.533) or 4 or more years of college education (OR = 0.384) had lower risk to not exercise compared to caregivers with an 8th grade level of education or less. The odds of not exercising were 92.2% higher for caregivers who were unable to work compared to caregivers employed for wages. For caregiver employment status, the odds of not exercising were lower for caregivers making $75k or more compared to caregivers making less than $10k annually. Relationship of the care recipient to the caregiver was also a significant predictor of likelihood to exercise in the last 30 days. When the care recipient was a parent-in-law (OR = 0.776), grandparent (OR = 0.638), other relative (OR = 0.663) or non-relative (OR = 0.798) the odds of not exercising were lower than caregivers caring for their parent. Alternatively, the odds of not exercising were 33.8% higher for caregivers caring for their spouse compared to caregivers caring for their parents. Lastly, while caregiver state was a statistically significant predictor of exercise status, the individual coefficients for the variable were not significant compared to the reference group, Arkansas.

Smoking.

A binary logistic regression was used to determine whether smoking status could be predicted by caregiver status (single generation or multigeneration caregiver) controlling for a set of covariates (predisposing, enabling and need factors outlined in Chapter 3). There were 2,842 cases included in the analysis, after 5,439 cases were deleted using listwise deletion. There were 2,239 single generation caregivers and 603 multigeneration caregivers or 34.3% of the study population included in the study. This exceeded the study population needed to adequately power the analysis of this research question.

A test of the full model with caregiving status and the study covariates against a constant-only model was statistically significant, χ^2 (60, N =2,842) = 689.500, $p < 0.001$. Results indicate that the predictors significantly distinguished between those who report smoking or not. A test of goodness of fit was performed using the Hosmer-Lemeshow statistic and was found to be non-significant ($p = 0.956$) indicating a good model.

Table 15 shows regression coefficients, Wald statistics, and odds ratios for each of the predictor variables. According to the Wald criterion, caregiving status was not a significant predictor of smoking status (Wald = 2.197, *df* = 1, $p = 0.138$). Therefore, hypothesis 5 (multigeneration caregivers will have higher reports of smoking cigarettes than individuals who provide care only to an adult(s) aged 65 or older) was not supported. However, the predictor variables caregiver age (Wald = 94.974, *df* = 6, $p <$ 0.001), caregiver education level (Wald = 26.839, *df* = 4, $p < 0.001$), caregiver employment status (Wald = 14.901, *df* = 7, $p = 0.037$), health insurance coverage (Wald = 6.472, *df* = 1, $p = 0.011$), caregiver income level (Wald = 42.056, *df* = 7, $p < 0.001$), caregiver marital status (Wald = 24.674, *df* = 5, $p <$ 0.001), and care recipient age (Wald = 4.214, *df* = 1, $p = 0.040$) were significant predictors of smoking status. Conversely, caregiver gender, caregiver race, relationship of care recipient to caregiver, care recipient change in thinking or remembering, hours per week providing care, length of time providing care and caregiver state were not significant predictors in the model ($p > 0.05$).

Further analysis showed that compared to caregivers aged 18-24 years, the odds of smoking were higher for caregivers 26-34 years (OR = 3.116) and 35-44 years (OR = 2.646) but lower for

Table 15

Variables in the Final Model of Smoking Predictors

Variables	Categorical Reference Group	B	(SE)	Wald	*df*	p	Odds Ratio
Caregiver Status	**Single Generation Caregiver**	**-0.188**	**0.127**	**2.197**	**1**	**0.138**	
Age	**18-24 Years**			**94.974**	**6**	**<0.001***	
26-34 Years		1.136	0.460	6.107	1	0.013*	3.116
35-44 Years		0.973	0.458	4.511	1	0.034*	2.646
45-54 Years		0.537	0.459	1.369	1	0.242	
55-64 Years		0.027	0.467	0.003	1	0.954	
65-74 Years		-0.851	0.490	3.014	1	0.083	
75+ Years		-1.669	0.531	9.895	1	0.002*	0.188
Gender	**Male**	**-0.010**	**0.097**	**0.010**	**1**	**0.921**	
Race	**White**			**3.126**	**3**	**0.373**	
Education Level	**8th Grade or Less**			**26.839**	**4**	**<0.001***	
Grades 9-11		-0.032	0.412	0.006	1	0.938	
Grade 12 or GED		0.073	0.384	0.036	1	0.849	
College 1-3 Years		-0.058	0.386	0.022	1	0.881	
College 4 or More (College Graduate)		-0.555	0.392	2.004	1	0.157	
Employment Status	**Employed for Wages**			**14.901**	**7**	**0.037***	
Self-Employed		-0.275	0.172	2.567	1	0.109	
Out of Work for 1 Year or More		-0.362	0.224	2.602	1	0.107	
Out of Work for Less than 1 Year		0.199	0.291	0.467	1	0.494	
A Homemaker		-0.030	0.196	0.023	1	0.879	
A Student		-1.361	0.485	7.883	1	0.005*	0.256
Retired		-0.235	0.150	2.455	1	0.117	
Unable to Work		0.003	0.172	0.000	1	0.984	
Insurance Coverage	**Yes**	**0.375**	**0.147**	**6.472**	**1**	**0.011***	**1.455**
Income Level	**<$10k**			**42.056**	**7**	**<0.001***	
<$15k		0.263	0.261	1.018	1	0.313	
<$20k		-0.271	0.239	1.281	1	0.258	
<$25k		-0.387	0.242	2.546	1	0.110	
<$35k		-0.536	0.241	4.959	1	0.026*	0.585
<$50k		-0.663	0.241	7.577	1	0.006*	0.515
<$75k		-1.034	0.254	16.580	1	<0.001*	0.356
$75k or More		-1.002	0.256	15.292	1	<0.001*	0.367
Marital Status	**Married**			**24.674**	**5**	**<0.001***	
Divorced		0.617	0.130	22.523	1	<0.001*	1.853
Widowed		0.418	0.183	5.221	1	0.022	1.519
Separated		0.226	0.303	0.558	1	0.455	
Never Married		0.350	0.172	4.155	1	0.042	1.420
A Member of An Unmarried Couple		0.506	0.261	3.756	1	0.053	
Care Recipient Age	**-**	**-0.013**	**0.006**	**4.214**	**1**	**0.040***	**0.987**
Relationship of Care Recipient to Caregiver	**Parent**			**5.542**	**6**	**0.487**	
Care Recipient Changes in Thinking or Remembering	**No**	**0.131**	**0.096**	**1.852**	**1**	**0.174**	
Hours per Week Providing Care	**-**	**0.001**	**0.001**	**1.288**	**1**	**0.256**	
How Long Provided Care	**<1 Year**			**5.078**	**5**	**0.406**	
State	**Arkansas**			**16.539**	**11**	**0.122**	
Constant		0.876	1.206	0.528	1	0.468	

*Significant at a p<=0.05

caregivers 75+ years of age (OR = 0.188). While caregiver education level was a statistically significant predictor of smoking status, the individual coefficients for the variable were not significant compared to the reference group, 8th grade education or less. Caregivers who were students had lower odds (OR = 0.256) of smoking than caregivers who were employed for wages. Caregivers who did not have insurance coverage had higher odds (OR = 1.455) of smoking than caregivers with insurance coverage. Caregivers making $25k or more annually all had lower odds of smoking than caregivers making less than $10k per year. Marital status was also a significant predictor of smoking, with caregivers who were divorced (OR = 1.855), widowed (OR = 1.511), or never married (OR = 1.415) having higher odds of reporting smoking than married caregivers. Lastly, for every one unit increase in care recipient age, the odds of smoking decreased by 1.3 (OR = 0.987).

Binge Drinking.

A binary logistic regression was used to determine whether self-reported binge drinking could be predicted by caregiver status (single generation or multigeneration caregiver) controlling for a set of covariates (predisposing, enabling and need factors outlined in Chapter 3). After deletion of 5,353 missing cases there were 2,928 cases included in the analysis (33.8%) of the population. There were 2,268 single generation caregivers and 660 multigeneration caregivers included in the analysis. This exceeded the study population needed to adequately power the analysis of this research question.

A test of the full model with caregiving status and the study covariates against a constant-only model was statistically significant, χ^2 (60, N =2,928) = 352.376, $p < 0.001$. Results indicate that the predictors significantly distinguished between those who did or did not self-report binge drinking in the last 30 days. A test of goodness of fit was performed using the Hosmer-Lemeshow statistic and was found to be non-significant ($p = 0.157$) indicating a good model.

Table 16 shows regression coefficients, Wald statistics, and odds ratios for each of the predictor variables. According to the Wald criterion, caregiving status was not a significant predictor of binge

Table 16

Variables in the Final Model of Binge Drinking Predictors

Variables	Categorical Reference Group	B	(SE)	Wald	*df*	p	Odds Ratio
Caregiver Status	**Single Generation Caregiver**	0.056	0.131	0.182	1	0.670	
Age	**18-24 Years**			49.370	6	<0.001*	
26-34 Years		-0.497	0.356	1.950	1	0.163	
35-44 Years		-0.563	0.371	2.302	1	0.129	
45-54 Years		-0.908	0.375	5.850	1	0.016*	0.403
55-64 Years		-1.278	0.392	10.634	1	0.001*	0.279
65-74 Years		-1.970	0.430	21.016	1	<0.001*	0.139
75+ Years		-3.107	0.529	34.522	1	<0.001*	0.045
Gender	**Male**	**-0.623**	**0.103**	**36.542**	**1**	**<0.001***	**0.536**
Race	**White**			**0.716**	**3**	**0.870**	
Education Level	**8th Grade or Less**			**21.141**	**4**	**<0.001***	
Grades 9-11		-0.547	0.618	0.783	1	0.376	
Grade 12 or GED		-0.715	0.563	1.61	1	0.204	
College 1-3 Years		-1.010	0.564	3.2	1	0.074	
College 4 or More (College Graduate)		-1.254	0.567	4.892	1	0.027*	0.285
Employment Status	**Employed for Wages**			**2.187**	**7**	**0.949**	
Insurance Coverage	**Yes**	**0.241**	**0.172**	**1.981**	**1**	**0.159**	
Income Level	**<$10k**			**14.080**	**7**	**0.050***	
<$15k		-0.846	0.362	5.462	1	0.019*	0.429
<$20k		-0.517	0.323	2.564	1	0.109	
<$25k		-0.995	0.326	9.327	1	0.002*	0.370
<$35k		-0.773	0.319	5.851	1	0.016*	0.462
<$50k		-0.995	0.307	10.482	1	0.001*	0.370
<$75k		-1.005	0.310	10.491	1	0.001*	0.366
$75k or More		-0.965	0.313	9.494	1	0.002*	0.381
Marital Status	**Married**			**3.822**	**5**	**0.575**	
Care Recipient Age	**-**	**0.003**	**0.007**	**0.126**	**1**	**0.723**	
Relationship of Care Recipient to Caregiver	**Parent**			**15.538**	**6**	**0.016***	
Parent-In-Law		0.003	0.151	0.000	1	0.983	
Spouse		0.606	0.292	4.304	1	0.038	1.834
Sibling		0.094	0.332	0.081	1	0.777	
Grandparent		0.109	0.212	0.263	1	0.608	
Other Relative		-0.394	0.219	3.232	1	0.072	
Non-Relative		-0.370	0.171	4.687	1	0.03*	0.690
Care Recipient Changes in Thinking or Remembering	**No**	**0.209**	**0.106**	**3.900**	**1**	**0.048***	**1.232**
Hours per Week Providing Care	**-**	**-0.005**	**0.002**	**6.946**	**1**	**0.008***	**0.995**
How Long Provided Care	**<1 Year**			**2.926**	**5**	**0.711**	
State	**Arkansas**			**40.253**	**11**	**<0.001***	
California		20.322	21671.791	0.000	1	0.999	
Georgia		20.515	21671.791	0.000	1	0.999	
Illinois		20.884	21671.791	0.000	1	0.999	
Indiana		20.477	21671.791	0.000	1	0.999	
Iowa		21.063	21671.791	0.000	1	0.999	
Maine		20.487	21671.791	0.000	1	0.999	
Mississippi		20.619	21671.791	0.000	1	0.999	
Missouri		20.670	21671.791	0.000	1	0.999	
North Carolina		20.304	21671.791	0.000	1	0.999	
West Virginia		20.545	21671.791	0.000	1	0.999	
Wisconsin		21.335	21671.791	0.000	1	0.999	
Constant		-18.795	21671.791	0.000	1	0.999	

*Significant at a p<=0.05

drinking (Wald = 0.182, $df = 1$, $p = 0.670$). These results do not support hypothesis 6, multigeneration caregivers will be more likely to report binge drinking in the last 30 days than individuals who provide care only to an adult(s) aged 65 or older. However, caregiver age (Wald = 49.370, $df = 6$, $p < 0.001$), gender (Wald = 36.542, $df = 1$, $p < 0.001$), education level (Wald = 21.141, $df = 4$, $p < 0.001$), income level (Wald = 14.080, $df = 7$, $p = 0.050$), relationship of care recipient to caregiver (Wald = 15.538, $df = 6$, $p = 0.016$), care recipient changes in thinking or remembering (Wald = 0.048, $df = 1$, $p = 0.048$), hours per week providing care (Wald = 6.946, $df = 1$, $p = 0.008$), and caregiver state (Wald = 40.253, $df = 11$, $p < 0.001$) were significant predictors of binge drinking. Conversely, caregiver race, caregiver employment status, caregiver insurance coverage, care recipient age, and length of time providing care were not significant predictors in the model ($p > 0.05$).

Further analysis showed that all groups of caregivers aged 45 years and older had lower odds of binge drinking compared to caregivers aged 18-24 years. Female caregivers were less likely to report binge drinking than male caregivers (OR = 0.536). Odds of binge drinking were also lower for caregivers with 4 or more years of college (0.285) compared to caregivers with an 8th grade education or less (OR = 0.285). Income was a significant predictor of binge drinking, with caregivers making an annual income of \$10-14k (OR = 0.429), \$20-24k (OR = 0.370), \$25-34k (OR = 0.462), \$35-49k (OR = 0.370), \$50-74k (OR = 0.366), or \$75k or more (OR = 0.381) having lower odds of binge drinking than caregivers making <\$10k per year. Caregivers who took care of their spouse had odds 83.4% higher for binge drinking compared to caregivers caring for their parent (OR = 1.834). Odds for binge decreased by 0.5% for every one unit increase in hours providing care per week (OR = 0.995). Lastly, while caregiver state was a statistically significant predictor of binge drinking, the individual coefficients for the variable were not significant compared to the reference group, Arkansas.

Chapter Summary

This chapter reviewed the results of this research study. Overall, there is mixed support for the study hypotheses. Caregiver status was a significant predictor of psychological health and annual check-ups with multigeneration caregivers more likely to report a depression diagnosis and less likely to get an annual check-up compared to single generation caregivers. However, caregiver status (single generation or multigeneration) was not significantly a significant predictor of caregiver's self-reported physical health, exercise, smoking status or binge drinking after controlling for predisposing, enabling or need factors. A discussion of these results follows in Chapter 5.

Chapter 5: Discussion

Introduction

This chapter summarizes the major findings of this study, the conclusions drawn from the results presented in Chapter 4, and the implications for caregivers of older adults. Limitations and recommendations for future research follow.

Summary of the Study

The purpose of this study was to determine whether informal, multigeneration caregivers experience worse health outcomes and practice more unhealthy behaviors than informal caregivers of only older adults. Three research questions guided this study:

- **Research Question 1:** Do individuals who provide care to an older adult (aged 65 or older) and one or more children (aged 18 and under) report worse physical health compared to individuals who provide care only to an adult(s) aged 65 or older?
- **Research Question 2:** Do individuals who provide care to an older adult (aged 65 or older) and one or more children (aged 18 and under) report worse psychological health compared to individuals who provide care only to an adult(s) aged 65 or older?
- **Research Question 3:** Do individuals who provide care to an older adult (aged 65 or older) and one or more children (aged 18 and under) report more unhealthy behaviors compared to individuals who provide care only to an adult(s) aged 65 or older?

Andersen's Behavioral Model guided the analysis, which was conducted using the CDC's Behavioral Risk Factor Surveillance System (BRFSS) survey data from 2011-2013. Data from 12 states was included in this study, as they completed an optional Caregiver Module during the study timeframe.

Results of Hypotheses Testing.

The six study hypotheses and the hypotheses testing results are presented in Table 17. After controlling for enabling, predisposing, and need factors, two of the six hypotheses were supported and four were not. Multigeneration caregivers were more likely to report a depression diagnosis and less likely to get an annual check-up compared to single generation caregivers. Caregiver status (single generation or multigeneration) was not a significant predictor of caregiver's self-reported physical health, exercise, smoking status or binge drinking after controlling for predisposing, enabling and need factors of the caregiver and care recipient.

Discussion of Findings

Research Question 1.

Physical Health.

Study results indicated that caregiving status (multigeneration vs. single generation) was not a significant predictor of self-reported general health after controlling for predisposing, enabling and need factors of the caregiver and care recipient. Therefore, hypothesis 1 was rejected. However, it is important to note that 19.2% of caregivers of older adults in this study reported poor self-reported health. These findings align with recent studies showing that caregivers of adults report being in fair or poor health 21% of the time (*Caregiving in the U.S.*, 2020). In comparison, estimates of fair/poor health in the general U.S. population were only 12% in 2018 (*Caregiving in the U.S.*, 2020). This level of poor self-reported health among caregivers of older adults compared to the general population requires attention, as caregiving maybe intensifying normal declines in health due to age.

Table 17

Summary of Hypotheses and Study Results

Research Question		Hypothesis	Result	Result Summary
1	H1	Multigeneration informal caregivers are more likely to report poor overall health compared to individuals who provide care only to an adult(s) aged 65 or older	Rejected	There were no differences in self-reported health between multigeneration and single generation caregivers.
2	H2	Multigeneration caregivers are more likely to report having a diagnosis of depression compared to individuals who provide care only to an adult(s) aged 65 or older	Supported	Multigeneration caregivers were more likely to report a diagnosis of depression compared to single generation caregivers.
3	H3	Multigeneration caregivers will report receiving an annual check-up less often than individuals who provide care only to an adult(s) aged 65 or older	Supported	Multigeneration caregivers were less likely to receive an annual checkup compared to single generation caregivers.
3	H4	Multigeneration caregivers will report not exercising within the last month more frequently than individuals who provide care only to an adult(s) aged 65 or older	Rejected	There were no differences in self-reported exercise between multigeneration and single generation caregivers.
3	H5	Multigeneration caregivers will have higher reports of smoking cigarettes than individuals who provide care only to an adult(s) aged 65 or older	Rejected	There were no differences in self-reported smoking between multigeneration and single generation caregivers.
3	H6	Multigeneration caregivers will be more likely to report binge drinking in the last 30 days than individuals who provide care only to an adult(s) aged 65 or older	Rejected	There were no differences in self-reported binge drinking between multigeneration and single generation caregivers.

Gender.

In this study, male caregivers had higher odds of poor self-reported general health compared to female caregivers. Previous literature is mixed on this topic with some studies finding no gender differences in caregiver health, while others report that female caregivers experience worse subjective well-being and physical health compared to male caregivers (Pinquart & Sorensen, 2006; Vitaliano, Zhang, & Scanlan, 2003). However, as the meta-analysis by Pinquart and Sorensen points out, the gender differences in health may also result from higher stressors (i.e., caregiving hours, burden) faced by female caregivers compared to male caregivers. This study found that gender was a significant predictor of caregiver self-reported physical health after controlling for some stressors faced by the caregiver (i.e., employment status, insurance coverage, caregiving hours, length of time providing care, etc.). This study also found that male caregiver of older adults, not females, were more likely to report poor physical health. This finding is unexpected and stresses the importance of evaluating the impact of various caregiver and care recipient characteristics on caregiver health, in relation to each other. While simple bivariate findings, such as impact of gender on caregiver physical health, are important to start the conversation on caregiver health, a broader understanding of the impact in relation to other factors in the environment is more telling.

Race.

Caregivers of older adults who identified as Black or African American and other minority/no preferred race had higher odds of reporting poor health as a result of caregiving compared to white caregivers (study reference group). This aligns with recent findings that white caregivers rated themselves as excellent or very good health more often (45%) compared to African American (34%) or Hispanic caregivers (35%). The fact that race was a significant predictor of health, even after controlling for predictors such as education, employment status, insurance coverage and income is a significant finding in this study. Minority caregivers of older adults, as a whole, experienced worse physical health compared to white caregivers. Future healthcare policy should consider these sociodemographic differences when developing culturally appropriate avenues for supporting the health of caregivers.

Education.

Caregivers of older adults who had higher than an 8th grade education had lower odds of reporting poor general health compared to caregivers with an 8th grade education or less. As years of education increased the odds of reporting poor physical health declined. This is similar to recent reports that caregivers of adults who had a high school diploma or less reported their health to be less than very good 57% of the time in 2019 (*Caregiving in the U.S.*, 2020). Considering the majority of caregivers in this study were over the age of 55, there may not be a lot that policy can do to influence the impact of caregiver education on physical health. However, future research should focus on potential avenues for supporting caregivers who are still in pursuit of education (whether that be a high school diploma, GED, or higher education), and to see if policy aimed at supporting caregiver employment and income (discussed below) may offset the impact of education on caregiver health.

Employment and Income.

This study had similar findings with caregiver employment and income significantly predicting poor physical health of the caregiver. Informal caregivers of older adults who were out of work for 1 year or more, homemakers, retired, or unable were all had higher odds of reporting poor self-reported general health compared to caregivers employed for wages. Income was also a significant predictor of caregiver health, with caregivers of older adults who made $35k or more having lower odds of reporting poor health compared to caregivers who made less than $10k.

This finding is troubling, as financial impacts of caregiving are not uncommon. A recent report found that of caregivers who care for a care recipient 50 years or older, nearly one in five (17%) experienced a high degree of financial strain as a result of providing care, while 36% overall experienced at least a moderate amount of financial strain (*Caregiving in the U.S.*, 2015). Additionally, the findings that lower income caregivers are at higher risk for poor health, is especially important considering a recent report which found that 6 in 10 caregivers reported having at least 1 impact or change to their employment, including going in late/leaving early (53%), reducing work hours (15%), taking a leave of absence (14%), turning down a promotion (7%), etc., which all can negatively impact caregiver income (*Caregiving in the U.S.*, 2020). The finding that both employment and income, which are directly correlated, highlights the importance of creating policy changes to help keep caregivers employed, and potentially help supplement their income based on their caregiving responsibilities (i.e., policies to offer paid leave, flexible work hours, supplemental pay for caregiving responsibilities, etc.). These support systems would not only help minimize the financial impacts to the caregiver, but also has the potential to improve caregiver physical health.

Care Recipient Changes in Thinking or Remembering.

Caregivers of older adults who reported a change in mental status of the care recipient in the previous 12 months had higher odds 20.3% higher for reporting poor health compared to caregivers who cared for someone who did not experience changes in thinking or remembering. This is similar to a report that found that 32% of caregivers of care recipients 50 years or older who had Alzheimer's or dementia reported that their health had suffered as a result of providing care (*Dementia Caregiving in the U.S.*, 2017). The fact that 1 in 5 caregivers of care recipients who experienced a change in thinking or remembering reported poor health is alarming, but not a new finding in the literature. There is extensive literature on caregiver health for patients with Alzheimer's or dementia, as this is typically a highly demanding and stressful caregiving situation with both high physical and emotional demands on the caregiver. Policy aimed at improving the health of caregivers, should make sure to target this high-risk group of caregivers.

Research Question 2.

Psychological Health.

Results from this study supported hypothesis 2, that multigeneration caregivers of older adults would experience higher rates of depression compared to single generation caregivers after controlling for predisposing, enabling and need factors. More specifically, multigeneration caregivers had higher odds of indicating that a doctor had previously diagnosed them with depression compared to single generation caregivers. Multigeneration caregivers reported depression 25.5% of the time, while single generation caregivers reported depression 21.7% of the time (overall, 22.4%). This indicates that the stressors of acting as a multigeneration caregiver, may result in higher rates of depression compared to single generation caregivers of older adults. This supports previous findings from studies such as Falconi & Dow (2014), which found that multigeneration caregivers experienced more feelings of nervousness, hopelessness and depression compared to non-caregivers.

It is also important to point out, a little more than 1 in 5 of all caregivers of older adults in this study (22.8%) reported having a diagnosis of depression. A recent report by Richard Schulz et al. (2016) found that between 13% and 22.3% of caregivers reported clinically meaningful levels of depression, with those in the highest group caring for caregivers of care recipients with dementia. The rate of 22.8% of all caregivers in this study reporting a history of depression is at the high end of previously reported ranges. This could be due to differences in the operational definition of depression in the various studies. While the reports of depression outlined in Schulz et al. included measures of current depressive symptoms or meeting diagnostic criteria for depression, this study included a self-report measure of *ever* having depression. This means that the caregivers in this study do not necessarily have depression now, and it could have overestimated the impact of caregiving on rates of depression, since it included the entire history of having depression. Future studies examining the impact of caregiving should include measures of current depressive symptoms when evaluating whether caregiving status (multigeneration vs. single generation) or caregiving in general impacts psychological health.

In addition to caregiving status, multiple predisposing enabling and need factors were predictive of depression among caregivers. These predictive factors included caregiver age, caregiver gender, caregiver race, caregiver employment status, caregiver income level, caregiver marital status, and care recipient changes in thinking or remembering.

Age.

An interesting finding in this study was that caregivers of older adults who were aged 75 years or more were much less likely to report a depression diagnosis (OR = 0.375) compared to caregivers 18-24 years of age. Previous literature is mixed on this finding. For caregivers with care recipients with dementia, some researchers report that lower age is associated with lower rates of depressive symptoms (opposite to this study; Covinsky et al., 2003) while other researchers did not find a significant difference in depressive symptoms based on caregiver age (Gallicchio, Siddiqi, Langenberg, & Baumgarten, 2002). A difference between previous studies and this study, is the caregiver age groups. Covinsky et al. grouped all caregivers less than 65 years of age into one group, and Gallicchio et al. grouped all caregivers less than 50 into one group. The wider range of caregiver age groups in this study (i.e., 18-24, 25-35, 35-44, etc.) may have been able to be more sensitive to differences in the data. Additionally, the findings that age was a significant predictor of depression in this study was significant in a logistic regression model, with other caregiver and care recipient demographics variability accounted for, and therefore is a strong enough finding to warrant future research.

Gender.

Overall, female caregivers had higher odds of reporting a diagnosis of depression compared to male caregivers of older adults. This difference is interesting, especially in light of previously discussed study results that found that females were less likely to report poor physical health compared to males.

It seems that the impact of caregiving on the health of the caregiver may appear in different measures of health for male and female caregivers. While males are more likely to report poor physical health, females are more likely to report a history of depression. This highlights the importance of including multiple measures of health when evaluating the impact of caregiving on caregiver health. It also shows that policy aimed at improving the health of the caregiver should be inclusive of both psychological and physical measures of health, and target interventions aimed at improving these to the right subgroup of caregivers.

Race.

Similar to previous studies, this study found that Black or African American caregivers of older adults reported a history of depression less often than white caregivers. A meta-analysis conducted by Pinquart and Sorensen (2005) found that African Americans reported lower levels of burden depression than white caregivers. In this study, African American caregivers reported having a history of depression 18.7% of the time, white caregivers reported having a history of depression 22.3% of the time. Another study by Covinsky (2003) also found that African American caregivers had the lowest rates of depression. The differences in depression rates in African American caregivers compared to white caregivers maybe due to differences in responding to stressors of caregivers, cultural differences in expectations about elders, or if it is a result of cultural differences which may impact the reporting of or seeking treatment for depression. Due to the significant differences in rates of reporting depression among white and African American caregivers, future policy on LTSS and caregiver health should make sure to evaluate culturally appropriate interventions measurements of both physical and psychological health.

Employment Status & Income Level.

Similar to the findings about physical health, both employment status and income level were significant predictors of depression for caregivers of older adults in this study. In this study, patients making $25k or more had lower reported rates of depression than caregivers making $10k or less annually. Additionally, caregivers who were out of work for less than 1 year, out of work for more than one year, retired or unable to work all reported higher rates of depression than caregivers who were employed for wages. A report in 2015 of caregivers of older adults in the U.S. found that 60% of caregivers experienced having to make work accommodations (including cutting work hours or taking a leave of absence) to help care for their loved one (*Caregiving in the U.S.*, 2015). Reducing hours or taking a leave of absence can decrease income of the caregiver. A recent study found that lower levels of income are associated with depression in caregivers of patients with dementia (Covinsky et al., 2003). These findings support the need for employment and income support for informal caregivers. Caregivers of older adults in this study experienced higher rates of depression and lower ratings of physical health when they were in lower income groups or were not employed for wages. Policy should focus efforts on initiatives aimed at supplementing the income of informal caregivers and maintaining employment of the caregiver, these can include paid time off, supplemental income for caregiving responsibilities, job protection, etc.

Marital Status.

This study found that married caregivers of older adults had lower reported rates of depression compared to those who were in an unmarried couple or divorced. Existing literature on the relationship between marital status and caregiver depression is sparse. However, one study by Covinsky et al. (2003) did report that for caregivers of patients with dementia, caregiver marital status was not a significant predictor of depression. While the findings in this study are contradictory to this past study, depression in this study was defined as “ever having a diagnosis” of depression. Since a depression diagnosis could have been in the past, rates could have been overestimated in this study. However, the odds ratios reported in this study for marital status and depression were strong. It could be that being married provides support for caregiving duties both mentally and objectively, and therefore serves as a protectant against depression, or it could not be related to depression. Future studies should include both more objective measures of current depression symptoms and diagnosis and also further evaluate the impact of caregiver marital status on depression.

Research Question 3.

Health Behaviors.

Annual Check-Up.

Study results indicated that multigeneration caregivers of older adults were less likely to receive an annual check-up compared to single generation caregivers, supporting hypothesis 3. While single generation caregivers reported receiving an annual check-up 79.9% of the time, only 65.9% of multigeneration caregivers received an annual check-up. This could be attributed to the fact that multigeneration caregivers are juggling more caregiving and personal responsibilities and may have less time to dedicate to self-care, such as annual check-ups. However, these annual visits play a critical role in supporting the health of caregivers. Having an annual physical allows for early identification of potential health issues and helps with management of chronic health conditions. Data from the CDC indicate 79.3% of all caregivers who completed the BRFSS from 2015 to 2017 aged 45 years or older reported having an annual check-up in the past year ("Caregiving for Family and Friends - A Public Health Issue," 2019). This aligns with the findings of this study that 79.9% of single generation caregivers report receiving an annual check-up. It also supports the finding that multigeneration caregivers have an increased risk of not receiving an annual check-up, as only 65.9% of multigeneration caregivers reported receiving an annual check-up in this study. The findings suggest that any policy targeting improved primary care among caregivers should include specific goals of engaging multigeneration caregivers who are more likely to not have an annual exam.

In addition to caregiving status, multiple predisposing, enabling and need factors were significant predictors of having an annual check-up in the study population. Age, race, employment status, insurance coverage, income level, and marital status predicted whether caregivers received an annual check-up in the previous 12 months.

Age.

Age was a significant predictor of receiving an annual check-up, with caregivers aged 65-74 and 75+ years more likely to receive an annual check-up than caregivers aged 18-24 years (reference group). The finding that older caregivers are more likely to receive an annual check-up maybe due to a variety of factors. First, as caregivers age, they are a more likely to be living with a chronic condition or dealing with other health issues themselves. Secondly, by providing care for a care recipient aged 65 or older, caregivers aged 65 and older may relate more to the health of the caregiver they are providing care for, and therefore attend more annual check-ups. Lastly, as individuals reach the age of 65 or older they gain access to Medicare, and have the coverage needed to access care. Insurance was a predictor of receiving an annual check-up in this study and supports the supposition that Medicare coverage may improve the odds of receiving an annual check-up for older adult caregivers.

Race.

In this study, Black or African American caregivers of older adults were more likely to receive an annual check-up compared to white caregivers. Similarly, data on caregivers aged 45 years or older in 2015-2017 found that more Black/African American caregivers (85.0%) reported receiving a routine check-up compared to white caregivers (78.2%). This finding is interesting in contrast to the results from this study on physical health, that Black/African American caregivers were 34.2% more likely to report poor general health than white caregivers. Higher annual check-up use among this minority group maybe due to higher levels of poor general health in this population. This finding highlights the importance of using multiple measures of health and health behavior in future studies examining caregiver health. While the finding that Black/African American caregivers attend more annual check-ups could indicate they are in better health than other caregiving groups, this study showed they actually had lower levels of self-rated general health.

Employment Status and Insurance Coverage.

Employment status was a significant predictor of receiving an annual check-up with caregivers who were retired or unable to work more likely to receive an annual check-up than caregivers employed for wages. This is an interesting finding, as insurance coverage (also a significant predictor of receiving an annual check-up) is often tied to employment in the U.S. In fact, in this study caregivers who did not have insurance coverage had much higher odds of nor receiving an annual check-up compared to caregivers with insurance coverage. One may assume that caregivers who were employed for wages, and more likely to have insurance, would be more likely to receive an annual check-up. However, that was not the case in this study. It could be that the caregivers in this study who were retired or unable to work were in worse physical health and were in more relative need for check-ups with their physician. That supposition is supported by study results which showed that caregivers who were retired (OR = 1.512) or unable to work (OR = 9.010) were also more likely to report poor physical health compared to caregivers employed for wages. These findings again highlight the need for comprehensive analysis of both caregiver health and health behaviors. Interventions aimed at improving preventative care, might not be the right intervention for caregivers who are retired or unable to work because they still report poor general health. Or it could be that they need more intensive preventative care interventions to improve general health. Future studies should look at this interaction in more depth and with more objective measures of health care utilization and physical health.

Exercise.

Study results did not support hypothesis 4, that multigeneration caregivers would exercise less than single generation caregivers of older adults. These findings support previous findings from (Chassin et al., 2010) which found that multigeneration caregivers did not exercise less often than single generation caregivers. However, the Chassin et al. (2010) study did find that non-caregivers were 45% more likely to exercise two or more times per week than multigeneration caregivers. Therefore, while not in the scope of this study, it could be that caregivers of older adults in general maybe at higher risk for not exercising compared to non-caregivers. The finding that nearly a quarter of all caregivers overall (23.3%) did not exercise at least one time in the past month, shows that caregivers maybe stretched for time, and may find it difficult to make time to care for themselves.

While caregiving status was not a predictor of participation in exercise, other predisposing, enabling and need factors were significant predictors. Education level, employment status, income, relationship of care recipient to caregiver, and all significantly predicted participation in exercise among caregivers.

Education Level.

Caregivers who had an 8th grade education or less were more likely to *not* exercise than caregivers who had at least 1 year of college education. Another study of health behaviors of caregivers, found that only 26.9% of caregivers with less than a bachelor's degree worked out two or more times a week while 50.2% of caregivers with a bachelors or higher worked at least two times a week (Chassin et al., 2010). These findings suggest that caregivers with lower levels of education exercise less frequently than caregivers with higher education. These differences are above those accounted for by employment status and income and suggests that there is some factor associated with education that impacts caregiver health behaviors.

Employment Status.

Caregivers who were unable to work had higher odds of *not* exercising than caregivers who were employed for wages. Literature on the impact of caregiving on exercise is limited. However, a study by Chassin et al. (2010) also found that caregivers who worked less than 20 hours per week (41.1%) and those who worked >20 hours per week (37.2%) worked out at least two times a week or more similar rates. This is interesting, in that caregivers who are juggling work, personal and caregiving demands are more likely to exercise than caregivers with only personal and caregiving demands. This finding is significant even after controlling for the hours of care provided per week and the length of time providing care to the care recipient. With education having a significant impact on multiple measures of health in this study, future studies should evaluate the interaction of this factor with other covariates to understand the relationship between caregiving and exercise.

Income.

Caregivers of older adults who made $75k or more were more likely to exercise than caregivers making $10k or less. This differences in rates of exercise are startling, especially considering the measure in this study counts "exercise" as working out at least one time in a month span. This means that a little over 30% of caregivers making $10k or less did not exercise once in the last month. With exercise having clear ties to health, this finding warrants additional research to understand the impact of income on caregiver exercise.

Relationship of Care Recipient to Caregiver.

Caregivers who cared for a parent were more likely to *not* exercise, than caregivers caring for a parent-in-law, grandparent, other relative, or non-relatively. Conversely, caregivers who cared for a spouse were more likely to *not* exercise compared to caregivers caring for a parent. Literature on the exercise patterns of caregivers of older adults including the evaluation of the relationship of the caregiver to the care recipient is limited. With the rates of not exercising ranging from 16.7% to 35.7% based on the relationship of the caregiver to the care recipient, it is evident that relationship may impact caregiver exercise. Future research should investigate this relationship or at least include the relationship as a covariate when evaluating the impact of caregiving on caregiver exercise.

Smoking.

Caregiving status was not a significant predictor of smoking status, thus hypothesis 5 was rejected. However, 37.5% of all caregivers of older adults reported they currently smoke (52.1% of multigeneration caregivers and 34.0% of single generation caregivers). This aligns with a study done by Salgado-Garcia et al. (2015) which reported that 39% of caregivers of care recipients with Alzheimer's reported smoking. While the population of care recipients differed from this study, the rates of smoking are both higher than the national estimates in 2019 of 10.3% (34 Million Americans) for smoking in the general U.S. population (Centers for Disease Control and Prevention, 2021). The high rate of smoking found among both single generation and multigeneration caregivers should be a focus of future policy aimed at improving the health of caregivers in the U.S. Smoking is the leading cause of preventable disease, disability and death in the U.S., estimates suggest that over 16 million people are living with at least one disease caused by smoking (Centers for Disease Control and Prevention, 2021). With caregivers in this study reporting rates of smoking over 2 and a half times (264%) that of the general population, it is clear that they are at a higher risk of contracting disease related to smoking compared to the general population.

Another important note in the study findings, is that over half (54.8%) of caregiver survey respondents did not answer the question on their current smoking status. Survey respondents who did answer this question could differ from caregivers who did not respond to the question. Additionally, the potentially sensitive nature of this question could result in under reporting of smoking status. Future studies should examine other more objective measures of smoking status to determine whether multigeneration caregivers are at a higher risk for this health behavior.

Predisposing, enabling and need variables predictive of smoking status were age, employment status, insurance coverage, income level, marital status. Previous research on caregiver health behaviors is more limited in scope. However, a discussion of study findings in relation to existing findings follows.

Employment Status and Income.

Results from this study indicate that caregivers of older adults who are students have lower odds of smoking compared to caregivers employed for wages. Smokers have been reported to more likely to be employed full-time than non-smokers (Salgado-Garcia et al., 2015; Williams, Lewis-Jack, Johnson, & Adams-Campbell, 2001). Interestingly, as income level increased, the odds of smoking also decreased. These findings suggest an interaction between employment and income exists, in that as caregivers make more income, they are less likely to smoke.

Insurance Coverage.

This study found that caregivers of older adults without insurance coverage had higher odds of smoking than caregivers with insurance. More specifically, caregivers without insurance reported smoking 64.9% of the time, compared to only 33.4% of caregivers with insurance. This rate of smoking in caregivers without insurance is extremely high, as estimates in 2019 were that only 10.3% of the general population in the U.S. smokes (Centers for Disease Control and Prevention, 2021). Previous research on smoking cessation in the general public, has also found that insurance status is correlated with smoking status. One study found that individuals who gained private insurance were more likely to stop smoking than individuals who remained uninsured (Brown & Wei, 2018). Additionally, discussions with a healthcare provider about quitting smoking was not associated with smoking cessation, indicating the impact of private insurance on smoking behavior may be moderated by other mechanisms than direct physician access (Brown & Wei, 2018). Based on these findings, it is extremely important that insurance status is included in future research surrounding smoking status among informal caregivers.

Marital Status.

Caregivers of older adults who were divorced, widowed or never married were more likely to report smoking that married caregivers. Similar results were reported by, Chassin et al. (2010), who found that married caregivers reported smoking an average of 2.6 cigarettes per day, while non-married caregivers smoked 5.3 cigarettes per day. This could suggest that being married helps protect against some poor health behaviors in informal caregivers.

Binge Drinking.

Multigeneration caregivers were not at a higher risk to report binge drinking in the past 30-days compared to single generation caregivers of older adults, and therefore hypothesis 6 was rejected. Similar to smoking status, the majority of respondents did not complete this question. Only 49.4% of multigeneration caregivers, and 43.7 % of single generation caregivers responded to this question (total of 44.8%). Self-reported binge drinking is a potentially sensitive self-reported data point. It could be that the caregivers who did respond to this question are fundamentally different in health behaviors compared to the caregivers that did not complete this question, or that the sensitive nature of the question could have resulted in some untruthful responses. Therefore, the finding that caregiving status did not significantly predict binge drinking behavior should be interpreted with caution.

While caregiving status was not a significant predictor of binge drinking, 1 in 5 caregivers in this study reported binge drinking in the last month. Overall the rate of binge drinking was 20.6%, higher than the reported rate of binge drinking for caregivers (11.4%) and caregivers for care recipients with dementia (8.2%) in a study by Gottschalk, Konig, & Brettschneider (2020). Therefore, caregivers of older adults maybe at a higher risk for binge drinking compared to informal caregivers as a whole. This maybe because caregivers of older adults are using binge drinking as a way to help cope with the stress from caregiving. Binge drinking is a cause for concern among caregivers, as this can impact their own health and the health of the care recipient. The caregiver can be too impaired to provide care to the care recipient. Past research has also linked caregiver alcohol use to elder abuse (Cooney & Howared, 1995). Future studies should reexamine whether caregiving status impacts binge drinking, as this is a health behavior that can lead to health issues in caregivers, putting them and the care recipient at higher risk for poor health.

Additional predisposing, enabling and need factors predictive of binge drinking in this study were age, gender, education level, income level, relationship of care recipient to caregiver, and care recipient changes in thinking or remembering.

Age.

Caregivers aged 45 years or older were less likely to report binge drinking compared to caregivers aged 18-24 years. The higher odds of binge drinking among young adults in this study is concerning, as binge drinking early in life may have long-term effects on the health and wellness of an individual. A study examining binge drinking in the U.S. using BRFSS data from 2015 found similar results, with individuals aged 18-24 years and 25-35 years binge drinking more often than individuals aged 35 and older (Kanny, Naimi, Liu, Lu, & Brewer, 2018). With the findings of this study matching the trends found in the general population, future analysis examining binge drinking among caregivers of older adults should also include age as a covariate, as it is significantly related to binge drinking behavior.

Gender.

Gender was also a significant predictor of binge drinking with male caregivers being more likely to participate in binge drinking in the past 30 days compared to female caregivers of older adults. The pattern of men binge drinking more often than women, is similar to a study that found in the U.S., men had about twice prevalence of binge drinking (22.2%) compared to women (12.1%) (Kanny et al., 2018). This supports the supposition that caregivers of older adults are at a higher risk for binge drinking compared to non-caregivers, and also highlights the importance of included gender in analysis of binge drinking among caregivers.

Education Level and Income Level.

Caregivers of older adults with 4 or more years of college education (college graduate) had lower odds of binge drinking compared to caregivers with an 8th grade education or less. Caregivers making $10k had higher odds of binge drinking than caregivers in almost all other income groups (with the exception of caregivers making $15-19k annually). The findings that caregivers of older adults reported binge drinking more often when they had lower levels of education and lower levels of income contrasts with the 2015 study results of U.S. adults which found binge drinking was more common for adults making $75k and for adults with a college education (Kanny et al., 2018). While the findings of this study do not match that of the adults surveyed for the BRFSS in 2015, they do highlight that binge drinking patterns do differ among individuals with different levels of education or income. The literature on binge drinking among caregivers of older adults is extremely limited in nature. Future studies should include these covariates that have been previously found to relate to binge drinking behavior in adults in the U.S. to gain a more thorough understanding of the factors impacting binge drinking in caregivers of older adults.

Relationship of Care Recipient to Caregiver.

Compared to caregivers caring for a parent, caregivers caring for a spouse had higher odds and caregivers caring for a non-relative had lower odds to report binge drinking. Alternatively, a recent study found that caregivers who cared for a parent/parent-in-law, child/grandchild, or other relative were more likely to binge drink than caregivers caring for their spouse (Gottschalk et al., 2020). The contradictory findings of direction of the relationship between caregiver relationship and binge drinking and the Gottschalk et al. (2020) study is interesting. It could be that the difference in findings is due to a difference in the age of the care recipient. While the Gottschalk et al. (2020) study included all caregivers (regardless of care recipient age) this study focused on caregivers of older adults. Therefore, the differences in findings could be a result of sampling. In order to understand which caregivers of older adults are at risk for binge drinking, future studies should include the relationship of the caregiver to the care recipient.

Care Recipient Changes in Thinking or Remembering.

Caregivers of older adults who cared for a care recipient with a change in thinking or remembering (an indicator of potential dementia) had higher odds of binge drinking compared to caregivers who cared for someone who did not experience this change. This finding is in conflict with other findings that showed that rates of binge drinking were lower (8.2%) for caregivers of patients with dementia compared to other caregivers (11.4%; Gottschalk et al., 2020). The difference in findings could be because the study by Gottschalk et al. (2020) included all individuals who cared for someone in the past 30 days regardless of the care recipient age. In this study, only caregivers of older adults were included in the analysis. The higher rates of binge drinking found in this study compared to the Gottschalk et al. (2020) study could indicate that caregivers of older adults are at a higher risk for binge drinking compared to caregivers as a whole. Future studies should include additional comparison groups (i.e., caregivers of care recipients <65 years) to determine whether caregivers of older adults are at a higher risk for poor health behaviors.

Summary of Findings

This study found that multigeneration caregivers are at a higher risk for higher rates of depression and less self-care in the form of annual check-ups after controlling for predisposing, enabling and need factors of the caregiver and care recipient. This supports the hypothesis that multigeneration caregivers are at higher risk for poor psychological health and at risk for poor health behaviors. While caregiver status (single vs. multigeneration) was not a significant predictor for 4 of the 6 dependent variables, bivariate analysis showed that multigeneration caregivers had higher self-reported rates of depression, smoking and binge drinking. They were also less likely to receive an annual check-up. So, while caregiving status was not a predictor of these health outcomes and health behaviors when controlling for caregiver and care recipient characteristics, it could be that these factors are what inherently describe a multigeneration caregiver. Descriptive analysis in this study found that compared to single generation caregivers, multigeneration caregivers were younger, had higher levels of education, more likely to be employed for wages, making $75k or more, married and caring for a parent or grandparent. This paints the picture of a young adult with children and a family, juggling work demands and caregiving responsibilities. The competing demand for caregiver time can place additional burden on the multigeneration caregivers and may place them at higher risk for poor health outcomes.

In support of this, multiple predisposing, enabling and need factors previously linked to poor informal caregiver health were also significant predictors of poor health and health outcomes in this study. Gender was a significant predictor of physical health and psychological health, with males reporting poor general health and binge more often than female caregivers. Conversely, female caregivers were more likely to report poor psychological health, as measured by having a history of depression. Education, employment and income were consistent predictors of health outcomes in this study with caregivers who had higher education, higher income and employed having better health overall compared to caregivers with lower levels of income, education and those caregivers not employed for wages. Race was also related to multiple measures of health, including physical health and psychological health. While African Americans were more likely to report poor physical health, they were less likely to report a history of depression compared to white caregivers. The finding that race is a significant predictor even after controlling for other predisposing, enabling and need factors highlights the importance of developing culturally appropriate avenues for supporting caregiver health.

It is important that research on caregiver health examine caregiver outcomes not in isolation, but in relation to a host of caregiver and care recipient characteristics. Understanding how these factors impact different measures of caregiver health, are crucial to developing effective targeted interventions implementing successful policy changes. For example, in this study African American caregivers were more likely to receive an annual check-up than white caregivers. This may suggest that they have better health outcomes than white caregivers. However, African American caregivers were more likely to report poor general health than white caregivers. If policy makers were to look at this finding of poor health among African American caregivers in isolation, they may focus on efforts to improve preventative check-ups among this population. While this may have some benefit, this study suggests that higher rates of annual check-ups do not necessarily equate to better general health. There is an interaction among predictor and and different measures of health outcomes that needs to be considered when developing policy. These findings are important for current legislation and policy aimed at improving LTSS for the rapidly growing population of older adults in the United States. Public health experts, policy makers, health services researchers, and others should use the results of this study to help narrow the focus of the examination of caregivers of older adults health and health behaviors.

Another interesting finding in this study are the factors that were not consistently found to be predictors of caregiver health. Caregiver age, care recipient relationship to the caregiver, length of time providing care, and care recipient age have been previously linked to informal caregiver health but were not found to be strong predictors of caregiver health in this study. This could be because this study focused on a subset of informal caregivers who care for older adults specifically, and also examined these predictors in a logistic regression model. The logistic regression model looks at odds ratios in the presence of other predictive variables. It could be that while these factors have been found to be related to caregiver health in the past, this was in isolation and the predictor variables in this study are accounting for some of the variance in the data.

The results of this study indicate multigeneration caregivers are at higher risk for poor health outcomes compared to single generation caregivers. Caregivers who are in poor health, may become unavailable to care for others. Without the population of informal caregivers available to care for older adults in the United States, the health care and LTSS systems will face incredible strain in caring for the aging population. By supporting caregivers in their role, not only would the health and well-being of the caregiver improve, but also the health of the care recipient. Not including provisions for supporting the health of the multigeneration caregiver in future LTSS policy will inevitably lead to a secondary health crisis where caregivers experience poor health outcomes at the expense of caring for their loved ones. It is essential that policy is developed to support caregiver health, with emphasis on culturally appropriate interventions and supports. Potential supports, mentioned in the discussion of findings above, include supplemental pay, additional paid time off, flexible work hours, expanded respite care, education assistance, and paid home care, etc.

Caregiving During a Pandemic

COVID-19, a virus that disproportionately affects older adults, may result in an even higher demand for long term care to be provided by informal caregivers in the United States. Skilled nursing facilities (SNFs) are a potential alternative to informal caregiving. However, mortality rates related to COVID-19 have been concentrated in SNFs ("State Data and Policy Actions to Address Coronavirus," 2020). In fact, the first outbreak of COVID-19 in the United States occurred at a nursing home in Kirkland, Washington. By October 2020, 40% of COVID-19 related deaths occurred in long-term care facilities in the 47 states reporting long-term care COVID-19 data ("State Data and Policy Actions to Address Coronavirus," 2020). With COVID-19 having more sever effects on older adults and individuals with comorbidities, it is possible that older adults will choose to avoid SNFs and rely more on family members for their care. One study, published by Barnett et al. (2020) found that in three metropolitan areas (Cleveland, Detroit and New York City) SNF weekly admissions and patient census declined from March to May 2020 compared to the same week the previous year. While lower admissions and census can be tied to a decrease in elective procedures due to COVID-19 precautions, it is possible that a decrease in admissions can also be tied to patient choice to remain at home instead of going to a potentially risky environment at SNFs.

A Health Affairs blog published by Werner & Van Houtven, (2020) outlined the case for providing post-acute care at home. Providing care for COVID-19 patients in skilled nursing facilities can be extremely dangerous for the vulnerable patients at these facilities. These researchers suggest that an alternative to SNF provided post-acute care is providing intensive home-based rehabilitation in the patient home, and formally incorporating informal caregivers into the care team. In this model, informal caregivers would provide assistance with activities of daily living and oversee the patient rehabilitation with the support of a remote health care team. While implementing this model would require some payer reform (including expansion of home health care definitions and potential payment to informal caregivers), it does support that the future of medicine could include providing more intensive post-acute care for older adults in the patient home.

These studies show that the demand for informal caregivers of older adults may increase dramatically in the near future due to COVID-19. Care recipients want to receive care in the home and are seeking care in more formal settings less often due to the risk of contracting COVID-19. This means that care that once would have been provided by formal healthcare workers will be shifted to informal caregivers. With this immediate increase in demand for informal caregivers, it is even more important to consider the health of the caregiver when implementing these models of care. It is important to understand that these informal caregivers are already juggling their own personal and work demands, and caregiving is an added responsibility that can result in poor health outcomes for the caregiver.

Limitations

Although this study contributes to the growing literature on caregiver health, specifically for multigeneration caregivers, results should be interpreted with caution due to some limitations within the study. First, this study utilizes a pooled cross-sectional design, and directionality of the results regarding the association of multigeneration caregiving and health outcomes or health behaviors is not possible. Additionally, all data was collected from 2011-2013. The demographic characteristics of the sampled population as well as health outcomes and behaviors may have changed since data collection. Second, this study only contains data from only 12 states. The limited number of sampled states prevents the researchers from generalizing these results to the entire population of single and multigeneration caregivers in the U.S. However, study sample demographics were similar to recently published results on the characteristics of caregivers in the U.S., as described in Chapter 4 (*Caregiving in the U.S.*, 2020). Therefore, there is some confidence that the results of this study are generalizable to caregivers in the U.S.

Furthermore, the BRFSS and Caregiver Module data contains self-reported measures. Self-reported data is subjective in nature and may not match more objective measures of health and health behaviors. This may be of particular concern for questions more sensitive in nature (i.e., self-reported binge drinking, smoking and diagnosis of depression) which can result in underreporting or non-response of the condition by survey respondents. Two of the health behaviors examined in this study were smoking status and whether the survey participant had at least one episode of binge drinking in the last month. These questions are sensitive in nature and resulted in a large percentage of missing data (54.8% smoking, 55.2% binge drinking). Additionally, the question on depression asked if the caregiver had ever been diagnosis with depression. This means the temporal relationship between depression and caregiving responsibilities cannot be inferred. Rates of depression in this study may have been over estimated due to this open timeframe inherent in the question. Results of this analysis should be interpreted with caution due to the large amount of missing data, and potential for biased results. Due to the potential for these health behaviors and a diagnosis of depression to have a significant impact on caregiver health, future studies should examine more objective measures of smoking, binge drinking and depression in this vulnerable population.

Finally, the BRFSS and Caregiver Module data contain information on a wide range of informal caregivers. However, some subgroups of caregivers are not represented in the dataset (i.e., residents of nursing homes, group homes) as they are excluded from the BRFSS survey, and any respondent who is unable to respond to the survey due to physical or psychological problems is excluded from the survey.

Therefore, the generalizability of the current study does not apply to older adult informal caregivers living in assisted living environments or those with psychological or physical limitations which would prevent them from being able to complete a telephonic survey.

Recommendations for Future Research

This study was limited in the measures of health and health behaviors included in this study, as it only pulled data on questions asked in the BRFSS and Caregiver Module from 2011 – 2013. Other important measures of caregiver health and health behaviors exist that were not included in the BRFSS (or were not asked for the subset of participants who completed the Caregiver Module) that warrant additional research.

Caregiving status has previously been shown to impact levels of anxiety (Richard Schulz & Martire, 2004) . This study included caregivers of older adults who were found to be at a higher risk for ever having a depression diagnosis. However, anxiety could not be included in the analysis as it was not asked in conjunction with the Caregiver Module. Future studies should include more objective measures of depression (mentioned above) and anxiety, as is important to understand multiple measures of psychological health when evaluating the health of caregivers of older adults.

Another interesting health behavior that warrants future research is opioid use among caregivers of older adults. Opioid use is an epidemic in the United States, with 70,630 people dying from drug overdose in 2019, and 10.1 million misusing prescription opioids in the past year ("What is the U.S. Opiod Epidemic?," 2021). Additionally, 80% of older adults with prescribed pain medication reported theft by family members or others who use it for themselves or to sell (Trull, 2019). With caregivers having direct access to care recipient medication, it is important to note any potential for this group of caregivers to be at higher risk for opioid use and abuse.

Lasty, future studies on multigeneration caregiver health utilizing path analysis or longitudinal data may be interesting to understand how caregiver characteristics may impact health over time. Path analysis allows for the analysis of more complicated models than typical regression models. Researchers can examine a hypothesized chain of relationships among independent variables and how they impact the dependent variable. In relation to this study, path analysis may provide insight into whether caregiving status impacts caregiver health and health behavior through the predisposing, enabling and need factors outlined in this study. Longitudinal data sets may provide additional insight into how caregiver and care recipient characteristics impact caregiver health over time.

Conclusion

This study revealed that multigeneration caregivers experience higher rates of depression and report lower incidence of attending annual check-ups with a physician. This negative impact on multigeneration caregivers' psychological health and health behavior was above what could be explained by study covariates. Additionally, this study confirmed past research that predisposing enabling and need factors of both the caregiver and care recipient differentially impact informal caregivers of older adults physical and psychological health and health behaviors.

Informal caregivers are the backbone of long-term care for older adults in the United States. With the rapidly increasing population of older adults in the United States, and the renewed focus on providing post-acute care at home it is essential that informal caregivers receive the support they need so their own health does not decline as a result of providing care to this vulnerable population. Strain of poor health of caregivers can endanger the functioning of LTSS systems in the United States, as they serve as the main source of long-term care for aging adults in America. The results of this study suggest multigeneration caregivers are at a higher risk for depression and participate in fewer health behaviors, specifically attending annual check-ups with their physician. Future policy and health interventions should be developed to support the overall health of this growing population of at-risk caregivers.

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Appendix A

2011 – 2013 BRFSS Surveys

2011 BRFSS Questionnaire: https://www.cdc.gov/brfss/questionnaires/pdf-ques/2011brfss.pdf

2012 BRFSS Questionnaire: https://www.cdc.gov/brfss/questionnaires/pdf-ques/2012_BRFSS.pdf

2013 BRFSS Questionnaire: https://www.cdc.gov/brfss/questionnaires/pdf-ques/2013-BRFSS_English.pdf

Appendix B

BRFSS Caregiver Survey

BRFSS Caregiver module
2009

1. People may provide regular care or assistance to a friend or family member who has a health problem, long-term illness, or disability. During the past month, did you provide any such care or assistance to a friend or family member?

1 Yes
2 No
7 Don't know / Not sure
9 Refused

CATI note: If Core13.1 = 1 (Yes), continue. Otherwise, go to next module.

2. What age is the person to whom you are giving care?

INTERVIEWER NOTE: If more than one person, ask "What is the age of the person to whom you are giving the most care?"

_ _ _ Code age in years [0-115]
777 Don't know / Not sure
999 Refused

The remainder of these questions will be about the person to whom you are giving the most care.

3. Is this person male or female?

1 Male
2 Female
9 Refused

4. What is his/her relationship to you? For example is he/she your (mother/daughter or father/son)?

Do not read:
01 Parent
02 Parent-in-law
03 Child
04 Spouse
05 Sibling
06 Grandparent
07 Grandchild
08 Other Relative
09 Non-relative

77 Don't know / Not sure
99 Refused

5. For how long have you provided care for [CATI: code from Q4].
If Q4 = 77 (Don't know/not sure) or 99 (Refused); say "that person."

NOTE: Code using respondent's unit of time.

1 _ _ Days
2 _ _ Weeks
3 _ _ Months
4 _ _ Years
777 Don't know / Not sure
999 Refused

6. What has a doctor said is the major health problem, long-term illness, or disability that the person you care for has? [Check only one condition].

Do not read:

Physical Health Condition/Disease

01 Arthritis/Rheumatism
02 Asthma
03 Cancer
04 Diabetes
05 Heart Disease
06 Hypertension/High Blood Pressure
07 Lung Disease/Emphysema
08 Osteoporosis
09 Parkinson's Disease
10 Stroke Disability
11 Eye/Vision Problem (blindness)
12 Hearing Problems (deafness)
13 Multiple Sclerosis (MS)
14 Spinal Cord Injury
15 Traumatic Brain Injury (TBI)

Learning/Cognition

16 Alzheimer's Disease or Dementia
17 Attention-Deficit Hyperactivity Disorder (ADHD)
18 Learning Disabilities (LD) Developmental Disability
19 Cerebral Palsy (CP)
20 Down's Syndrome
21 Other developmental disability (e.g., spinal bifida, muscular dystrophy, fragile X)

Mental Health

22 Anxiety
23 Depression
24 Other

77 Don't know / Not sure
99 Refused

7. In which of the following areas does the person you care for most need your help?

Please read:
01 Taking care of himself/herself, such as eating, dressing, or bathing
02 Taking care of his/her residence or personal living spaces, such as cleaning, managing money, or preparing meals
03 Communicating with others
04 Learning or remembering
05 Seeing or hearing
06 Moving around within the home
07 Transportation outside of the home
08 Getting along with people
09 Relieving/decreasing anxiety or depression

Do not read:
77 Don't know / Not sure
99 Refused

8. In an average week, how many hours do you provide care for [CATI: code from Q4]. If Q4 = 77 (Don't know/not sure) or 99 (Refused); say "that person" because of his/her health problem, long-term illness, or disability?

Note: Round up to the next whole number of hours.

Do not read:
_ _ _ Hours per week
777 Don't know / Not sure
999 Refused

9. I am going to read a list of difficulties you may have faced as a caregiver. Please indicate which one of the following is the greatest difficulty you have faced as a caregiver.

Please read:
01 Creates a financial burden
02 Doesn't leave enough time for yourself
03 Doesn't leave enough time for your family
04 Interferes with your work
05 Creates stress
06 Creates or aggravates health problems

07 Affects family relationships
08 Other difficulty
88 No difficulty

Do not read:
77 Don't know / Not sure
99 Refused

10. During the past year, has the person you care for experienced changes in thinking or remembering?

Read only if necessary: "Had more difficulty remembering people, places, or things, or understanding or making decisions as easily as they once did."

1 Yes
2 No
7 Don't know / Not sure
9 Refused

Vita

Christine Lynn Patterson was born on May 5, 1985, in Chula Vista, California. She graduated from El Dorado High School, El Dorado, Kansas in 2003. She received her Bachelor of Science in Psychology from Emporia State University, Emporia, Kansas in 2007. Ms. Patterson went on to receive her Master of Arts in Experimental Psychology, focusing on Behavioral Neuroscience, from the University of South Carolina, Columbia, SC in 2010. She subsequently worked for the University of Kansas School of Medicine-Wichita from 2010-2012, where she assisted resident physicians in both surgery and anesthesiology with their research projects. Throughout her doctoral studies she worked at Virginia Commonwealth University Health System, where she currently works as a Business Intelligence Analyst for Care Coordination and Continuum Integration, focusing on the evaluation of patient care across the continuum of care.