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HEALTH BEHAVIORS AND FUNDAMENTAL CAUSE THEORY FACTORS INFLUENCE
THE FUTURE NEED FOR LONG-TERM CARE

by

TABITHA INGLE

Under the Direction of Erin Ruel, PhD

ABSTRACT

Can long-term care needs be predicted? Previous studies examined the relationship between lower levels of SES and the diminishing effect on a person's health and functional status. Additionally, other studies examined functional status and the relationship to a person's well-being, health, and health behaviors influence on one's life course. Few studies have attempted to predict the amount of long-term care an individual may need based on health behaviors and socioeconomic status factors and their relationship to the number of chronic illnesses diagnosed to a person. This study attempts to assess this relationship, utilizing logistic regression, with a representative sample of older U.S. black and white adults. As life expectancy continues to increase within the United States, the attempts to address our nation's care of the elderly becomes increasingly important since it is not a matter of whether one will need long-term care but when it becomes necessary.

INDEX WORDS: Long-term Care, Life Course, BMI, SES, Public Policy, Life Expectancy

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THE FUTURE NEED FOR LONG-TERM CARE

by

TABITHA INGLE

A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of

Master of Arts

in the College of Arts and Sciences

Georgia State University

2018

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Tabitha Rae Ingle
2018

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THE FUTURE NEED FOR LONG-TERM CARE

by

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1 INTRODUCTION

Many experts agree the United States is in the third stage of the epidemiologic transition, where chronic illnesses are the most prominent cause of death (Rowles & Teaster 2016). In the past century, the United States made significant policy-related and technological advances in the field of aging. These advances continue to increase life expectancy throughout the world (Chen & Thompson 2010:268; House, Kessler, & Herzog et al. 1990:383), but especially in westernized countries (Hudson & Goodwin 2013:25). Where, the oldest-old segment of the population, 80 to 85 years and up, is growing rapidly (Cox 2015:1; Crimmins and Solé-Auró 2013:1). The Center for Disease Control and Prevention estimated, in 2012, that “about half of all adults ... [in the U.S.] had at least one chronic health condition” which will cause seven out of every ten deaths (2017). This means the demographics of the population is changing rapidly, growing older, while at the same time people must contend with chronic disease more often than in the past. Accounting for the information above, it becomes apparent many people will require some type of long-term care (LTC) during their lifetime. In addition, as life expectancy continues to increase all citizens’ necessity to address the unrelenting costs and methods involved with LTC gains urgency.

Long-term care is defined as a variety of services to satisfy an individual’s “health or personal care needs,” for lengthy periods of time, (National Institute on Aging 2017) often for roughly a year (Frolik 2016:371). In general, people need LTC to negotiate ongoing health conditions, illnesses, disability, and degenerative aging issues. Often, the primary issues a person requires help for are daily personal care routines or the activities of daily living (ADLs) (Katz et al. 1963). Chen and Thompson (2010) agree that the LTC personal care services that assist an

individual with their ADLs and instrumental activities of daily living (IADLs) are integral in an older person's ability to "age in place" without moving to an institutional facility.

In the U.S., a universal LTC plan is not available to address senior citizens' chronic illnesses and their necessity for care as they approach the end stages of their life. According to Cox (2015), more than 40% of United States citizens do not have any money saved for retirement much less for medical services or LTC that may become necessary during their retirement (101). Medicare assists the aged during retirement and is an example of a universal health care plan where Part A covers hospital care; Part B takes care of doctor visits, medical equipment, and some home health care; and Part D helps with prescription drug coverage (Medicare.Gov). According to Medicare's website, various necessities are not included in Medicare coverage such as dental care, eye exams, LTC, and various other things.

In regards to thoughtful policy creation, America operates like a coach who has called a time-out to go up in the stands and watch the game, i.e. the continued graying of America, instead of planning the next plays to deal with the pressing issue of the increased life expectancy and subsequent long-term care needs. Moreover, long-term care costs are extreme for many Americans estimated to cost between \$82,000 to \$92,000 per year (Frolik 2016:373) forcing many people to eventually rely on their friends and family (Gonyea 2013:11; Shapiro, Loh, & Mitchell 2011:4). Even the cost for assisted living which enables many to delay the need for a LTC facility, often referred to as a nursing home, is extreme estimated at roughly \$45,000 a year (Genworth 2017; Nguyen 2017:3). Some people without family or friends to assist with their care may turn to Medicaid, the federal means-tested, needs-based, health plan for low-income individuals, to assist with LTC costs since it covers long-term care costs (Cox 2015:83; Frolik 2016:373). However, as mentioned above, Medicaid is only for low-income people; they "look-

back,” as it’s become known, five years into an individual’s monetary transactions to try to find asset transfers that violate the Medicaid thresholds for income and asset holdings (Medicaid.gov). Additionally, with the extreme cost of LTC facilities, many paying for their care themselves eventually qualify for Medicaid even without “spending down” or reducing assets to qualify for government assistance (Medicaid.gov; Rowles and Teaster 2016:304).

The United States is a westernized and individualistic nation focused on capitalism; often requiring citizens to take care of themselves, and the nation’s approach to LTC does not deviate from this “*pull yourself up by your bootstraps*” mentality. As mentioned prior, many people depend on family and friends to assist them with treating their chronic diseases or LTC needs. A commonly cited study by Reinhard, Feinberg, Choula, and Houser (2015) estimates the yearly value for unpaid caregiving to be roughly \$470 billion; this represents more than 35 million hours of assistance as reported by the Administration on Aging to Congress in 2015 (13). The authors of the American Association of Retired Persons (AARP) study contextualize the \$470 billion by pointing out that value is roughly equal to the world’s largest company’s yearly earnings (Walmart) and more than Medicaid’s yearly spending altogether in 2013 (Reinhard, Feinberg, Choula, and Houser 2015:3). Most of Medicaid’s funding, 70%, is spent on long-term care in nursing homes where Medicaid LTC covers up to 60% of LTC costs (Cox 2015:83). These spending percentages indicate the majority of Medicaid’s resources are already allocated towards LTC expenses for Medicaid users and those users rely primarily on Medicaid to cover their long-term care costs. With little funding available for increased LTC expenditures, it is very important to prepare for the changing demographics of future generations.

Can long-term care needs be predicted? I endeavor to answer this question and discover methods to predict an individual’s future need for LTC based on, initially, the theory from

fundamental causes and then examine health and health risk behaviors. The theory of fundamental causes (FCT) is uniquely positioned to address the LTC indicators since “medical sociologists and social epidemiologists...[have] demonstrated a substantial causal role for social conditions as causes of illness” (Link and Phelan 1995:83). This paper seeks to facilitate an understanding of the ways the FCT determinants affect the relationship between one’s need for LTC as represented by one’s functional status and their chronic illnesses. Once an association between the ADLs, chronic illnesses, and the LTC factors are established it may promote the urgency in addressing LTC needs; especially where fundamental causes influence one’s health outcomes. I conducted an analysis of the existing literature regarding LTC indicators, FCT, and the present state of society with regard to the LTC measures already in place.

The United States’ lack of a national LTC policy continues along the path of the non-plan plan, and in the future, as Baby Boomers enter the oldest-old age category we will face problems that can no longer be ignored (Spillman and Pezzin 2000). Determining one’s need for LTC is integral in planning for costs, not only for individuals and their families but also for the future exponential demand that Medicaid will shoulder as the Boomers require increasing medical assistance for their chronic illnesses. Additionally, predicting long-term care needs will prepare our society and government to better plan and address both the needs and costs of long-term care. Citizens should not feel forced to navigate their golden years focused on the loss of autonomy in caring for themselves throughout the aging process or negotiating illnesses. Often, the additional stress associated with figuring out how to pay for medical or personal care may leave a person with no other choice than to ask for the help of family or friends. In a country where one’s independence is highly valued these are not the type of challenges the U.S. should

expect our citizens to solve on their own. Instead our country should assist people with continued autonomy and dignity in their old age.

Many of the respondents in the American Changing Lives Study (ACL), aged 25 and up at the time of the first interview, in 1986, are currently approaching the category of the young old. In the present study, the data collected from the participants offer a unique opportunity to gauge the amount and types of long-term care options the modern elderly will require. Most of the participants will be categorized as senior citizens very soon, with many already meeting senior citizen status. Drawing from this nationally representative sample of Americans, logistic regression analysis was utilized to provide insight into the types of health risk behaviors and health factors already requiring LTC, especially for those with chronic health conditions or functional status challenges that enable the prediction of the demand for long-term care.

2 LITERATURE REVIEW

2.1 Fundamental Cause Theory

Fundamental Cause Theory (FCT) allows those with the means to evade disease and its associated adversities with a variety of methods (Link & Phelan 1995). Link, Phelan, Miech, and Westin (2008) define the means people use to evade disease as “SES-related resources of knowledge, money, power, prestige, and beneficial social connections” (73). These resources enable people to sidestep disease and are *fundamental* in their ability to, not only, explain health disparities regardless of the situation but to also predict them (Link & Phelan 1995). Society, disease, and methods to address disease are constantly in flux, together with the discovery of new diseases, individuals with higher levels of SES maintain the upper hand. More recently, Phelan and Link (2015) embraced a more neutral definition of FCT, stating there are “flexible resources” that are often exceptional in producing incomparable results for an outcome (314). Privileged individuals’ access to progressive information and treatments maintain gains that resource-challenged individuals cannot counter. Therefore, the disparities persist and, in some cases, continue to grow.

Link and Phelan’s FCT highlights the idea presented by the social epidemiologist, John Cassel, that “a cause can have multiple health outcomes” (1995:87). They expound the idea of ways in which social conditions perpetuate structures that connect them to “new or reemerging diseases” (Link & Phelan 1995:88). To demonstrate, Link and Phelan use the emergence of AIDS to elucidate the existing negative relationship between low SES and intravenous drug use, which already displayed poor health effects. Further connecting low SES to the risky health behavior of intravenous drug use uncovered the additional outcome of the possible increased spread of AIDS.

Similarly, an individual's SES may indicate various health outcomes for an increased BMI levels and decreased functional status. As mentioned prior, many studies found a relationship between obesity and high BMI with functional status limitations, however, SES as a fundamental cause could influence both health outcomes. An individual's SES *transportability* to different and novel illnesses and circumstances establish it as one of the fundamental causes amongst the others defined by Link and Phelan (Link & Phelan 1995; Link et al. 2008; Phelan, Link, & Tehranifar 2010). Additionally, FCT indicates health interventions that do not address inequality created by access or lack of to FCT resources will fail (Link & Phelan 1995:89).

FCT has been used as a platform and model for testing through several other studies to ensure the resources Link and Phelan identified are fundamental in causing health disparities. In a study by Link, Phelan, Miech, and Westin (2008) FCT was challenged by examining intelligence as a fundamental cause of health disparities. The datasets used for analysis in this study were the Wisconsin Longitudinal Study (WLS) and the Health and Retirement Survey (HRS) and while the WLS is not generalizable due to limitations in age, racial, and ethnic groups the analysis of the HRS allowed the researchers to exclude age and racial/ethnic interactions as showing little differences (Link et al. 2008). Link et al. (2008) preclude intelligence as a fundamental cause of health disparities while admitting it does contribute to acquiring many "SES-related resources" (87).

A study by Masters, Link, and Phelan (2014) looked specifically at education gradients by race and gender to determine if education was one of the fundamental causes of health disparities. If they could prove education differences are affected by race and gender, then that challenges education or knowledge as a fundamental cause. They used the National Health Interview Survey (NHIS) and the National Death Index (NDI) in their secondary data analysis.

The race analysis in this study was limited to non-Hispanic whites and blacks. While Masters, et al. (2014) discovered variability in the life course for disease, functional status limitations, and mortality by gender and race it did not specifically rule out SES gradients in the variations (26). Masters et al. (2014) admit race and gender are factors that influence the intergenerational effects on SES and mobility for some segments of the U.S. population (26). Therefore, it both supported and challenged the fundamental cause theory stressing the importance in the way education is raced and gendered.

Several studies discuss the idea of a “package deal” (Link et al. 2008; Masters, Link, & Phelan 2014; Phelan, Link, & Tehranifar 2010) where a person who attains a *good* job or a house in an affluent area reap certain *package deal* benefits. Benefits associated with the job or location of their home could be things such as good health benefits, parks, schools, and grocery stores which all work in tandem to produce a healthier environment for the individual. The healthier environment is not necessarily resultant from that individual’s conscious actions and decisions but comes with the *package* of the job or home. Given the synergistic effects of the *package deal*, close attention must be given to defining variables in research as fundamental.

2.1.1 Socioeconomic Status

Many studies link SES to health as a determining factor (House et al. 1994; House 2016; Link & Phelan 1995; Phelan, Link, & Tehranifar 2010); years of study in medical sociology and social epidemiology have established a strong “association between health and socioeconomic status” (Link & Phelan 1995:81). In this study, many of the variables from FCT are included in the SES variables used for analysis. The correlation between SES and functional status or health is often negatively correlated, meaning that as an individual’s SES increases the need for assistance with ADLs decreases (An & Shi 2015; Chen & Sloan 2015; d’Orsi et al. 2014; Louie

& Ward 2011; Robert & House 1996; Wilson 2001). Robert & House (1996) discovered that the relationship between SES and health is not as strong at older ages. The diminished SES and health relationship at older ages could be due to the existing social welfare programs of Social Security and Medicare. It could also be that many people who had lower levels of SES do not make it to old age.

Robert & House identified the relationships by creating age categories in ten-year increments from age 25 to 85 and above. Collapsing age gave Robert & House (1996) a more nuanced look at the change in the relationship between SES and health throughout the life course. Additionally, they took an innovative approach to SES for those in older age by including liquid assets and home ownership as “alternative” indicators of SES (Robert & House 1996). They decided to do this due to criticism directed towards an income-focused analysis of SES since those in retirement often experience a decline in income. Louie & Ward (2011) point out while education and income are often measures that make up an individual’s SES they are not interchangeable indicators of functional status limitations (1326). An & Shi (2015 and d’Orsi et al. (2014) both maintain higher levels of education and wealth are associated with less functional status limitations or impairments.

2.2 Long-Term Care Determinants

The determinants of LTC in this study are defined as FCT components, health factors, and health risk behaviors. Many experts do not deny illness may affect an individual’s social status but enough support exists to indicate social factors’ causal role in illnesses (Link & Phelan 1995). The ADLs or one’s functional status have long been used to determine an older person’s well-being (Katt, Speranza, Shore, Saenz, & Witta 2009:213) and possibly the need for long-term care (Chen & Sloan 2015:1529). A person’s diminished functional status along with any

chronic illness that a person is contending with create a situation, where LTC is in their future, it is just a matter of when it will be needed.

2.2.1 Activities of Daily Living

The ADLs and IADLs increasingly gain importance regarding the eldest members of the United States. The ADLs as defined by Katz et al. (1963) these acts are “bathing, dressing, going to the toilet, transferring, continence, and feeding” (94). Transferring refers to getting in and out of bed unassisted; while going to the toilet deals with the business of going to the bathroom and cleaning up after oneself, continence means a person can control their urination and bowels fully (Katz et al. 1963:95). When Katz et al. (1963) initially defined the ADLs, they found that an elder’s performance on a single function could be used as a proxy for a person’s entire *functional status*, as termed in the proposed study (98). Lawton and Brody (1969) expanded other ADL scales, the Langley-Porter and the Physical Self-Maintenance Scale, and named their scale the instrumental activities of daily living (IADLs) which encompass a variety of actions as required to live independently (179). Chen and Sloan’s (2015) study discovered that if U.S. obesity trends continue then the presence of ADL limitations will increase by one percent annually and that just one additional year of schooling helped to reduce ADL limitations (1529,1539).

Chen and Sloan’s ADL measure included more gross motor skills while their IADL measure contained many fine motor skilled activities; they believe that obesity may correlate more with mobility or ADLs than the fine motor type skills included in their IADL measure (2015:1531,1543). While Katt et al. (2009) contend education directly affects an older individual’s reasoning they conclude one’s ADL rating impacts thought processes more (214). In other words, one’s ADL limitations may adversely affect one’s ability to perform IADL tasks

since they often require more thought to complete. Lawton and Brody (1969) developed an IADL scale to evaluate older people “from different vantage points,” to ascertain a fuller picture of their functional status and assist in evaluating elders (183,186). Lawton and Brody’s (1969) IADL scale includes various actions required for one to live independently, such as shopping, food preparation, housekeeping, doing laundry, driving or organizing transportation on their own, handling finances, and responsibility for taking their own medications (179-181). Considering the combined information from above, it becomes apparent that ADLs may be powerful predictors of one’s functional status and one’s need for LTC. Moreover, by the time IADLs are impacted it is likely that one is already making accommodations for their ADLs or getting help with them.

While determining when an individual requires assistance with the activities of daily living, whether instrumental or not, is difficult and complex, locating help for this type of assistance is often more complicated. Additionally, many LTC users are not always older people, only 60% of people requiring assistance with ADLs are over 65 years of age (Nguyen 2017:1). It is essential to remember that all types of people may need LTC assistance with their functional status to live a full, dignified life. The unpaid caregivers providing many forms of LTC assistance are overwhelmingly women (Reinhard et al. 2015:6; Metlife 2011) and the majority are still working while also helping a friend or loved one (Cox 2015:118). A joint report by the AARP and the National Alliance for Caregiving (NAC), found that caregivers give an average of roughly 24 hours per week of care in addition to their paid jobs (2015:33). Moreover, as mentioned prior, Baby Boomers represent the next generation to require LTC assistance yet many from this generation are currently giving LTC assistance to one of their loved ones. In general, Baby Boomers prefer to stay in their homes or communities while they

age as found by Eckert, Morgan, and Swamy (2004:62). This means the new, growing older Americans group will require increased help with their ADLs and IADLs to age in place, which likely means an increase in the demand for unpaid LTC. It is important to note or remember that unpaid LTC in the U.S. already likely exceeds the entire budget for Medicaid.

There are also people called the “sandwich generation” that are taking care of their children and parents while working at the same time (Spillman and Pezzin 2000:347). The sandwich generation may also require LTC assistance for their friend or family member so that they may continue living a dignified life. The AARP and NAC estimate the average amount of time a caregiver gives to take care of a loved one at roughly five years; during this time caregivers experience diminished mental and health status (AARP and NAC Report 2015). The caregivers that help provide paid and unpaid help to those that require ADL or IADL support, lend urgency to the necessity of discovering how much LTC demand is in the United States’ future. Considering that the Baby Boomers currently providing unpaid LTC to a loved one, that they, themselves, may discover the need for assistance with their ADLs or IADLs to enable them to care for their loved one and their future self. Moreover, the caregivers that are most often caught in the “sandwich” or are providing unpaid support are of a lower SES and FCT issues may have a more pronounced effect on their health.

2.2.2 Health Behavior Factors

Various studies categorize similar concepts and variables as health factors, health behaviors, or health risk behaviors (An & Shi 2015; Chen & Sloane 2015; Devore et al. 2014; d’Orsi et al. 2014; Ferraro & Booth 1999). There are certain behaviors that some deem as riskier than others, such as drinking, smoking, or maintaining an unhealthy weight, many of these factors affect one’s health. Therefore, all variables that influence health outcomes will be

examined and categorized as health behavior factors. Several studies discovered a relationship between body mass index (BMI), which is often used as a proxy for one's obesity level (CDC 2016), and an individual's capability to perform the ADLs or their functional status (An & Shi 2015; Chen & Sloan 2015; Ferraro & Booth 1999). An & Shi (2015), and Chen & Sloan (2015) both utilize the Health and Retirement Study (HRS), a longitudinal study, to elucidate what affects a person's functional status and disability. Ferraro & Booth (1999) use data from the ACL, the same study this proposal relies upon, to examine the relationship between BMI and a person's functional illness, as they term it. An & Shi (2015) and Ferraro & Booth (1999) found BMI to be predictive of when one would begin to experience functional status limitations and was represented by a U-shaped association. A U-shaped distribution or curve indicates most participants present in the tails of the curve than at the center. To put it another way, as more people begin to experience functional status issues they will present with either high or low BMIs rather than a median BMI distribution of their participants. An example to help explain this idea, is a person who develops trouble getting around and walking may begin to gain weight due to being less active and this would place them into the upper BMI section of the distribution or curve.

Chen & Sloan (2015) directed their focus more towards what they call health behaviors (weight, smoking, and drinking) and found the most insight when investigating obesity's relationship with lower body functionality. While the aforementioned studies uncovered BMI as predictive in determining individual challenges with functional status, they all point out limitations with the data since height, weight, and functionality measures were all self-reported. When information is self-reported, it may be affected by "social desirability bias" (An & Shi 2015). Additionally, it is important to remember BMI is intended for use as a screening tool, it is

only a measure of superfluous weight (CDC 2016). An & Shi (2015) mention BMI's inability to account for unhealthy body mass and healthy (lean muscle) body mass.

Essential information to note with the medicalization of BMI, medical professionals deliver a weight-focused type of healthcare that Tylka et al. (2014) term the "weight-normative approach." This type of weight-normative healthcare follows the "primary care guidelines," where when a person's BMI reaches 30 or more the medical practitioner is supposed to counsel their patient on "weight loss interventions and nutritional advice;" even if they are not there for weight-related issues (Tomiya et al. 2016:1; Tylka et al. 2014:2). Today's common weight-normative approach models an authoritarian relationship where the doctor, as the authority, will scold the patient for their poor weight or BMI making people apprehensive about going to the doctor. This relates to functional status, as many of the studies mentioned above find, a person's BMI is highly correlated with a diminished functional status. If a person is finding it difficult to contend with their decreasing functional status along with feeling forced into a difficult conversation with a physician about their weight or BMI, they may delay going to the doctor to address their mobility issues. This same avoidance could also be present due to a person's health risk behaviors of smoking and drinking or a person may not report their real levels of usage. Once an older person's functional status begins to decline it may present a larger challenge, in the form of physical therapy or even surgery, to recover lost functionality.

A study by Devore et al. (2014) found that "extreme sleep durations," meaning too much or too little sleep hours for the aged correlate with poorer reasoning than those that sleep 7-8 hours a day (1073). Similarly, Mander, Winer, and Walker's (2017) findings show that a reduced amount or disrupted "canonical sleep" or the non-rapid eye movement (NREM) sleep which is also known as slow wave sleep is causally related to difficulty in forming new

memories for the aged (19,29). Mander, Winer, and Walker decided to examine NREM since many REM sleep issues do not occur until elders are 80 and over or experience “degenerative dementias” (2017:19). Furthermore, Mander, Winer, and Walker (2017) explain that NREM is the type of sleep where the body does most of its repair. Many studies exist that examine the effects that too much or too little sleep may have on many of the chronic health conditions included in the list given to participants of the ACL study to designate as a condition or illness they may experience (Bliwise 1993; Cappuccio et al. 2007; Cappuccio et al. 2010; Cappuccio et al. 2011; Gangwisch et al. 2006). The number of chronic health conditions (*Chronic*) is one of the main variables used to create the dependent variable of LTC for this study where other studies with results show an association with the amount of sleep one may receive; these include hypertension (Cappuccio et al. 2007; Gangwisch et al. 2006), diabetes (Cappuccio et al. 2010; Yaggi, Araujo, McKinlay 2006), lung disease (Bliwise 1993), and heart troubles (Cappuccio et al. 2011; Newman et al. 2000). Additionally, several studies connect the risk for obesity to short sleep durations, in general, less than 7 hours of sleep (Cappuccio 2008; Cizza, Skarulis, and Mignot 2005; Stranges et al. 2007). The majority of sleep research shows a risk associated with many diseases that indicate if one is sleeping less at night than they should, then their life may also be shortened (Cooke 2017). However, sleep duration is not something that is considered risky or taken as seriously by many physicians and Americans.

Several studies included health behaviors that were categorized as risky in their analysis of an individual’s diminished health or limited functional status (An & Shi 2015; Chen & Sloan 2015; d’Orsi et al. 2014). An & Shi (2015) included a dichotomous smoking variable in their analysis while the drinking variable was collapsed into two categories of “less than 5 drinks a day” or “5 or more drinks a day” (339). They found smoking as a better indicator of limited

physical mobility in specifically an individual's gross motor functioning than drinking. Chen & Sloan (2015) and d'Orsi et al. (2014) both include smoking and drinking in their examination of ADLs and disability since research indicates they are leading risk factors for many diseases. However, they uncovered a minimal relationship between the health behavior factors of smoking and heavy drinking and an increase in disability (Chen & Sloan 2015). In fact, Chen & Sloan (2015) pointed out that even when smoking and drinking decrease from higher, past levels it does little to affect disability levels. d'Orsi et al. (2014) categorized smoking as currently, formerly, or never a smoker and drinking within the last year as never, weekly to monthly, and daily (1631). Similarly, to An & Shi, d'Orsi et al. (2014) showed that smoking was a significant factor for challenges with the instrumental ADLs or IADLs.

2.2.3 Self-Rated Health

Many studies examine the value of an individual's self-rated health and the methods a person uses to make these types of assessments on themselves. A study by Attema, Brouwer, and Pinto Prades (2018) finds that people often compare themselves to others, automatically, when asked to assess their own health. An important finding of Attema et al.'s (2018) study is the finding that an older person is more likely to self-select into healthier statuses than those younger than them. Another study by Cheng, Fung, and Chan (2007) that examined the effectiveness of self-rated health finds self-rated health predicts, not only, mortality but also functional status deterioration. Various other studies agree with this relationship (Idler & Benyamini 1997; Kaplan, Strawbridge, Camacho, and Cohen 1993). Cheng et al.'s (2007) findings agree with the prior study where as people age, they see their health as better than their peers and that even as a person health declines their positive self-rated health persists.

3 HYPOTHESES

An overview of the research examined for this study support the author's inclination to create a new variable, empirically from one's number of chronic illnesses and their functional status, to investigate one's need for LTC. Based on the literature review, noting an association between health, and SES factors, their effect on aging and taking into consideration theory of fundamental causes I developed several hypotheses to test in this study.

H1 – As SES increases the probability of needing LTC will decrease.

H2 – As health risk behaviors increase, the need for LTC will increase. Specifically:

H2a – As poor sleep increases, the need for LTC will increase.

H2b – As BMI increases, the need for LTC will increase.

H2c – As alcohol consumption increases, the need for LTC will increase.

H2d – As smoking increases, the need for LTC will increase.

H3 – Controlling for health risk behaviors will attenuate, but not eliminate the association between SES and the need for LTC.

4 METHODS

I attempt to identify methods to predict LTC needs by elucidating the relationship between the LTC indicators, an individual's ADLs, and their chronic illnesses. I employed an IED or initial examination of the data to help choose the ACL study to supply the data for this study. I used secondary data analysis, including regression analysis of the ACL data to examine the factors that influence the need for LTC. I determined which variables are theoretically significant through research and the empirical literature review for this study.

Due to the longitudinal nature of the ACL and the oversampling of older adults, the sample size is consistently decreasing with each wave of interviews. Many of the variables from later waves may limit the sample size for this study. However, the ACL supplies data for analysis where those examined, in later waves, may demonstrate current LTC needs, limitations of the ADLs, or the presence of chronic illnesses. In other words, the opportunity to forecast one's necessity for LTC is not past for these individuals.

5 DATA

The data used in this research, ACL, utilizes a dataset collected by James S. House of the University of Michigan, Institute for Social Research and archived at the Inter-university Consortium for Political and Social Research (ICPSR). It “is the oldest ongoing nationally representative longitudinal study” that focuses on middle to late life years of African Americans and white Americans and covers many aspects of their lives (House 2005). The original purpose of ACL was to explore productive activities and social relationships, adaptations to life events and chronic stressors in regards to health functioning, and sociocultural influence on relationships and productiveness (House 2005). The ACL contains detailed information, specifically appealing to this study including, but not limited to, financial assets, health behaviors, health, and physical abilities. There are five waves including a variety of face-to-face surveys, telephone interviews, and proxies beginning in 1986 with the last wave taking place in 2011. The ACL gathered participant demographic data in the first wave of interviews. People over the age of 60 and African Americans were “oversampled at twice the rate of others” to produce a sample of 3,617 participants at a response rate of approximately 68-70% (House 2005). While the longitudinal nature of the ACL with the oversampling of older adults may limit the sample size for this study, it presents an incomparable data prospect since it focuses on those in the middle to late ages of the life course. The entire study population is approaching senior citizenship and many are already categorized as the young-old thus forecasting their future need for LTC is time appropriate.

Since there is constant attrition of participants due to death or incapacitation from various stages of disease, each wave of interviews has a smaller sample. Therefore, waves one and two will be utilized for this study. While there is more recent information for participants, wave one

has no missing data and wave two contains 83% of survivors and has 2,867 participants. This means that the data will not contain as much bias by attrition due to death or disease incapacitation. During the cleaning and analysis of the data, any cases with missing data were dropped for the variables of interest. Additionally, the final sample was brought back into representation using weighted variables.

Table 1.1 Constructs

Variable	Wave	Range	Manipulation
LTC (Need for)	2	0=no need, 1=needs LTC	v4832-# chronic illnesses > 4 v4926-functional status: A great deal to Quite a bit
Race	1	1=White, 2=Non-White OR 1=Black, 2=Non-Black	v2004 1=White, 2=Black, 3=American Indian, 4=Asian, or 5=Other v2005 Collapsed B(1)/N-B (2)
Gender	1	0=Male, 1=Female	v1801 recode from 1=Male, 2=Female
BMI	1	Below 18 underweight Above 30 obese	v2610-height v941-weight Apply Imperial Formula
Sleep	1	7-8 ideal amount of sleep	v942-collapse into categories and dummy variables from # hours in 24 hour period
Smoke	1	1=yes, 5=no	v943
AmtSmoke	1	Smoke 4+ a day as threshold	v944-1-95+ cigarettes per day
Drink	1	1=yes, 5=no	v946
AmtDrink	1	Drink 5+ drinks a day as threshold	v947-1-31 days drinking per month or 1-20 drinks per day
SES	1	1=Low, 2=Mid, 3=High	v2007-Education v2020-Total Income v1720-Wealth v-?? Still looking for Net Worth
SES (Theirs)	1	1=Low, 2=Low-Mid, 3=Upper-Mid, 4=High	v2064
HomeOwn	1	1=Owns, 5=Pays Rent, 8=Neither	v1714 recode 1=Own, 2=Don't Own
Age	1	Range – 63	v2000-collapse? v2002-collapsed into decade
Marriage	1	Collapse into 1=Married, 5=Not Married	v401-1=Married, 2=Separated, 3=Divorced; Marriage annulled, 4=Widowed, 5=Never married

Self-Rated Health	1	1=Excellent, 2=Very Good, 3=Good, 4=Fair, 5=Poor	v915
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5.1.1 *Dependent Variable*

Since there is not a variable that measures an individual's existing need for LTC, I created one representing one's need for LTC out of two existing variables, the number of chronic health conditions and one's functional status. It is important to use both one's functional status and their number of chronic health conditions in making the LTC need variable because they represent different aspects of health, as can be seen by their moderate correlation of .54. These variables came from wave two in 1989. The number of chronic health conditions is a count variable that ranges from zero to eight conditions and is an index where a series of questions were asked during the health module. The chronic health conditions participants were asked about were hypertension or high blood pressure, arthritis or rheumatism, lung disease, prior heart attacks or trouble, diabetes or high blood sugar, foot problem, stroke, broken or fractured bones, and cancer. An example of a question is, "Have you had a stroke?" Functional status is an ordinal level variable with five levels. The question used to create functional status was "How much are your daily activities limited in any way by your health or health-related problems?" Respondents chose from ordinal categorical responses there were coded in a Likert scale, (1) A great deal, (2) Quite a bit, (3) Some, (4) A little, and (5) Not at all.

The need for LTC is a dichotomous, dummy variable where individuals are assigned a "1" if they need LTC and a "0" if they do not need LTC, created empirically from the above two variables. First, a threshold of four chronic conditions was chosen to suggest need for long term care. Anyone with four or more chronic conditions received a "1" on LTC need. Additionally, those who answered, "1" or "2" on the functional status variable suggesting daily activities were

limited a great deal or quite a bit, were also assigned a value of “1” on the LTC needs variable. All others were scored as “0” not needed long term care at that time. If an individual is assigned a “1” for either variable then they are assigned a “1” for the final, overall LTC variable. This method to predict one’s need for LTC has not been done before and no theory exists for it. Therefore, the need for LTC variable was created empirically.

5.1.2 Independent Variables

I examined SES with variables from wave one (1986) which are *Education*, *Wealth*, *Income*, and *Home Ownership*. The question for the *Education* variable was, “What is the highest grade of school or year of college you have completed?” The answers ranged from 0-17+, and this continuous scale was collapsed into categories for individual analysis of the education component of the scale. The question for the *Wealth* variable was, “Suppose you needed money quickly, and you cashed in all of your (and your spouse's) checking and savings accounts, and any stocks and bonds, and real estate (other than your principal home). If you added up what you got, about how much would this amount to? Just give me the letter from the list.” Participants chose from seven categories and created an ordinal variable. The wealthy are not oversampled in this study. In fact, the sample demonstrates a lack of wealth or liquid assets. For the *Income* variable, participants were asked to answer, “If we include income from all these sources [prior question], and add all of your (and your spouse’s) earnings, what would your total income before taxes for the last 12 months add up to? Just give me the letter from the list on this page.” The original categories were: A. Less than 5,000 (1), B. \$5,000-9,999 (2), C. \$10,000-14,999 (3), D. \$15,000-19,999 (4), E. \$20,000-24,999 (5), F. \$25,000-29,999 (6), G. \$30,000-39,999 (7), H. \$40,000-59,999 (8), I. \$60,000-79,000 (9), and K. \$80,000+ (10) creating a continuous variable. This was further collapsed into new categories due to the low frequencies in

some of them and recoded. Both the *income* and the *wealth* variables existing categories were recoded into their midpoint for clearer analysis. The *Home Ownership* variable will come from the results from the following question, “Do you own your own home, apartment, or farm, do you pay rent, or what?” The answer categories were: (1) Owns or is buying, (5) Pays rent, (8) Neither owns nor rents, (9) NA. For this study, I created dummy indicators and the one to be used as the reference category will be “Owns or is buying.”

The *Body Mass Index (BMI)* variable was created by the ACL and I checked their variable by creating another BMI variable from two variables within the dataset both from wave one (1986), weight in pounds and height in inches. I created the new BMI variable using the Imperial formula for calculating BMI with standard measures, pounds, and inches, is $(\text{weight in pounds} * 703) / \text{height in inches}^2$. I checked their BMI variable against mine by running a correlation where I found it best to stick with their variable since there were no missing values. BMI is a ratio level variable where people with a BMI below 18 are considered underweight and above 30 are considered obese (Tomiyama et al. 2016; Tylka et al. 2014). I performed a descriptive analysis of the extreme values to elucidate outliers in either extreme category to determine if the distribution remains a normal distribution. If so, no further analysis will be necessary for the BMI variable.

Participants were asked, “How many hours of sleep do you usually get in a 24-hour period, including naps?” The interviewer was to enter the number of hours the participant supplied. This variable, *Sleep Hours* from wave one (1986), is a ratio level variable with a range of 14. These were collapsed into ranges and I created two dummy indicators, nine plus hours and under six hours to allow for better analysis of poor sleep. The optimal amount of sleep for adults,

65 years and older, is between 7-8 hours (CDC 2017), therefore the dummy indicators helped to identify poor sleep's influence on the future need for LTC.

The *Smoking* variable from wave one in 1986 is a dichotomous variable created by asking participants, "Do you smoke cigarettes now?" The participants answered (1) yes or (5) no and the variable *Smoker* was used in the analysis. If the participant answered yes then they were asked, "On the average, how many cigarettes or packs do you usually smoke a day?" This variable, *AmtSmoke*, is a continuous level variable that ranges from one per day or less to 95 or more cigarettes per day. While smoking, itself is harmful and heavy smokers are at greater risk for disease I was unable to add the *AmtSmoke* variable to the regression due to loss of participants (An & Shi 2015; Chen & Sloan 2015; d'Orsi et al. 2014). I would like to explore the relationship between the amount of smoking one does and the influence on the need for LTC in the future.

The *Drinking* variable from wave one in 1986 is a dichotomous variable created by asking participants, "Do you ever drink alcohol beverages such as beer, wine or liquor?" The participants answered (1) yes or (5) no and the variable *Drinker* was used in the analysis. If participants answer yes then they are asked, "During the last month, on how many days did you drink beer, wine, or liquor?" and "On days that you drink, how many cans of beer, glasses of wine, or drinks of liquor do you usually have?" This variable, *AmtDrink*, is a continuous level variable that ranges from zero to thirty-one for days of drinking and one to twenty for drinks per day. The variable has a threshold of five or more drinks a day to identify the participants at greater risk for disease due to a higher level of alcohol consumption (An & Shi 2015; Chen & Sloan 2015; d'Orsi et al. 2014). Similar to the *AmtSmoke* variable, I was unable to use the

AmtDrink for this study due to the low participation level for those that answered the question.

In the future, I would like to examine this variable and the effect on LTC need.

5.1.3 Controls

One of the first questions asked of respondents was, “How old are you?” The interviewer writes the age of the person. This a ratio level control, *Age* wave one (1986), and no transformations will be necessary. The higher the values, the older the participant. The original race questions in the ACL asked participants to identify their ethnicity first to align with the U.S. census methodology. However, I located a question where participants identified with race only, and the ethnicity was not considered and created the *Race* wave 1 (1986) control. The respondent was not able to “double-dip” in the race categories, for instance, selecting a Hispanic ethnicity and white race. The question was, “Are you white, black, American Indian, Asian, or another race?” The answer categories were: (1) White, (2) Black, (3) American Indian, (4) Asian, or (5) Other. I recoded this control due to low frequencies in the minority race categories. I created two new dummy indicators, (1) White or (2) Non-white where the dummy indicator “Non-White” is considered the reference group. The interviewer created the *Gender* variable by selecting whether the participant was (1) Male or (2) Female, it was not a verbal question. This *Gender* wave one (1986) control is a nominal measure and I recoded the control to (0) Male or (1) Female, and create dummy indicators. In this study, the dummy indicator “Male” was used as the reference category.

For the *Marital Status* wave one (1986) control, participants were asked to answer the question, “Are you currently married, separated, divorced, widowed or have you never been married?” The answer categories for this question were: (1) Married, (2) Separated, (3) Divorced; Marriage annulled, (4) Widowed, (5) Never married. This is a nominal measure and I

further collapsed the categories due to low frequencies; the new categories will be (1) Married and (5) Not Married. Next, I made dummy indicators and the reference dummy indicator is “Married.” Lastly, the *self-rated health* variable will come from wave one (1986) and is an ordinal variable with five categories. The question used to elicit responses from participants was, “How would you rate your health at the present time? Would you say it is excellent, very good, good, fair, or poor?” The response categories were labeled (1) Excellent, (2) Very Good, (3) Good, (4) Fair, and (5) Poor.

5.1.4 Data Analysis

I used Pearson’s r or a bivariate correlation coefficient to eliminate variables with undesirable co-linearity and ensure a correlation between the main variables. Then, I utilized logistic regression analysis. Logistic regression is appropriate for this study since the main dependent variable is a dummy variable and it is dichotomous with “1” meaning an individual needs LTC and “0” that they do not (Allison 2009:28). There are several assumptions that one’s data must meet to allow for logistic regression, the first, that the dependent variable is dichotomous has been met. The second assumption is that there are independent variables that are either continuous and, or, categorical. Finally, there should be a linear relationship between the main independent variables and the logit transformation of the dependent variable. The results of the logistic regression allow the explication of the amount of variation in the dependent variable, LTC, explained by a model that includes independent variables that support the FCT. I use this model to assess how much each independent variable contributes to the model and its significance. This helped me to determine which independent variables are most important in determining the outcome of future LTC need.

I can define which model has the most power by analyzing which model has the highest variance for the dependent variable and the goodness of fit for the models. I also used the log likelihood ratio or -2LL to assess the fit of the models to the data selected for particular models. Additionally, most independent variables play a part in determining the outcome. The variation in variables included within different models aids explicating how predictive or strong the model is for predicting the outcome. I employed a descriptive analysis of extreme values to uncover outliers and determined the effect on the distribution. The normality of the distribution was not compromised by outliers.

I began with the base logistic regression model using the constant and added the FCT variables, education, wealth, income, and home ownership. It is important to begin with these so that the improvement may be assessed as additional variables are added (Field 2013). Adding the FCT variables after the base model with the constant is also significant to determining the causal flow since, as Davis (1985) points out, “after cannot cause before...” therefore, theoretically, one should not need LTC until FCT variables begin to affect their health (11). In other words, the causality of FCT on LTC is one-way in that FCT is *fundamental* in one’s future need for LTC (Davis 1985). I added additional variables, strategically, to align with theory. I used the following equations for analysis:

$$\log(p/1-p) = \beta_0 + \beta_1(\text{SES}) \quad (1)$$

In this equation, $\log(p/1-p)$ represents the outcome which indicates whether one needs LTC or not. β_0 shall represent the intercept of the model, β_1 will represent the main variables in FCT and act as the primary equation used for the rest of the models. I added variables where theory demonstrated to be indicative of one’s increased future need for LTC to work my way up to the full equation for the health behavior factors and controls. I checked the correlation

between wealth and home ownership to make sure they were not too highly correlated, they were .311 and since this is not a strong relationship I included both in SES. β_1 SES represents education, income, wealth, and home ownership in the base model and additional models.

To determine the best *fitting* model, I regressed the primary predictor on the dependent variable and then performed a series of strategized nested regressions for specific factor's influences on the outcome. Specific models will address the hypotheses. Finally, in the last model I added the controls to the equation to determine the overall influence of the predictors on the dependent variable. Additionally, I used logistic regression to analyze the LTC variable and whether or not one's need may be predicted. SPSS predicts a probability of "1" if the value for a participant goes over .5. I examined odds ratios and paid attention to the confidence intervals to interpret whether variables added to the models impacted the odds. The odds ratio represents a change in the odds for a 1 unit increase or decrease in the independent variable on the outcome. It is important to note that the probability is different than the odds ratios, high odds do not necessarily indicate a high probability of something occurring. In interpreting the odds ratios, a positive value over one means that as FCT variables increase or are added to the equation the outcome (one's need for LTC) is more likely to occur and a negative value under one indicates the FCT variables and others that are added make the need for LTC less likely (Davis 1985; Field 2013). This directional movement of the coefficients is very important in determining the causal flow (Davis 1985). The results are "consistent" and "reinforce" the endeavor to predict one's need for LTC (Davis 1985).

6 FINDINGS

6.1.1 *Descriptive Results*

The results discussed in this section are derived primarily from Table 1. The total final sample consisted of 2,642 participants. There were 1,408 females and 1,234 males, with roughly a 1:1 female:male ratio where 53.3% females and 46.7% males. The average age of the participants was 45.83 years with a standard deviation of 15.59 years. The marital status of the sample showed a majority of the respondents were married at 70.5% and 29.5% that were unmarried. The mean BMI of the sample is 25.63, while not considered obese it is overweight and with a standard deviation of 4.71 the upper end of the BMI range would place 16% of the participants in the obese category. The majority of the sample are homeowners and get an appropriate amount of sleep with 72.2% as owners and 63.6% sleeping seven to eight hours a night. More than half of the participants are drinkers with 69.5% admitting to drinking before while only 30.5% say they currently smoke cigarettes. A clear majority of the sample participants fall into a middle category of SES with 65.4% in the lower-middle class or the upper-middle class roughly reflecting the SES of society. Most of the participants have graduated high school, 32%, with the next highest category, 24.3%, attaining some college. However, the sample does present an income on the lower side of the scale with only 11% earning more than sixty thousand dollars a year. The wealth or assets the sample have access to also lean toward the lower end of the scale with the majority, 51.6%, having access to less than ten thousand dollars of assets. While the income is on the lower side, it is not out of line with what a retiree would expect to make in the U.S., in fact, it may be higher when accounting for the oversampling of older adults in the study. Finally, the mean rating for the participant's self-rated health was 2.44 which would fall between the very good and good categories.

Table 2.1 Descriptive Statistics

Descriptive Statistics

		%(N)	M(SD)
Sex	Male	46.7 (1234)	
	Female	53.3 (1408)	
Race	White	85.1 (2248)	
	Non-White	14.9 (394)	
Age ¹			45.83 (15.59)
Marital Status	Married	70.5 (1862)	
	Not Married	29.5 (780)	
BMI			25.63 (4.71)
Smoking	Smoker	30.5 (805)	
	Non-Smoker	69.5 (1837)	
Drinking	Drinker	69.5 (1836)	
	Non-Drinker	30.5 (806)	
Sleep ²			7.62 (0.98)
SES	Lower	15.7 (414)	
	Lower-Middle	26.2 (693)	
	Upper-Middle	39.2 (1034)	
	Upper	18.9 (500)	
Education	Less Than HS	21.7 (573)	
	High School	32.0 (844)	
	Some College	24.3 (643)	
	College Grad	11.8 (311)	
	17+ Years	10.3 (271)	
Income	\$2,500	5.9 (156)	
	\$7,000	10.2 (269)	
	\$12,000	10.4 (275)	
	\$17,000	9.4 (248)	
	\$22,000	9.7 (256)	
	\$27,000	10.8 (286)	
	\$34,500	16.2 (429)	
	\$49,500	16.4 (434)	
	\$69,500	6.7 (177)	
	\$80,000+	4.3 (113)	
Wealth	>\$10K	45.8 (1211)	
	<\$10K	54.2 (1431)	
Home Ownership	Own	72.2 (1907)	
	Don't Own	27.8 (735)	
Self-rated Health ³			2.22 (1.02)
LTC ⁴			.0956 (.294)

Notes. N=2642. ¹Age years (Range = 24-96) ²Hours a night (Range = 6-9+)

³Excellent - Poor (Range = 1-5) ⁴Range = 0-1

6.1.2 Correlation Results

The results discussed in this section are shown in Table 2. The bivariate correlation results between age and education were significant with a negative correlation shown between them at ($r = -.351, p \leq .01$). Education demonstrated a weak negative correlation with BMI and sleep hours respectively $r = -.145$ and $r = -.091$ both at the $p \leq .01$ level. Total income was negatively correlated with all of the variables in Table 2 except for education, which makes sense, with a moderately strong correlation ($r = .477, p \leq .01$). Age and total income present a small negative correlation of ($r = -.242, p \leq .01$) and also make sense with the oversampling of older adults that the retirement incomes of many people are lower at older ages.

Table 3.2 Correlations

	Correlations Among Independent Variables (n=2642)				
	(1)	(2)	(3)	(4)	(5)
(1) Age	1.00				
(2) BMI	.115**	1.00			
(3) Education	-.351**	-.145**	1.00		
(4) Sleep Hours	.120**	-.044*	-.091**	1.00	
(5) Income	-.242**	-.102**	.477**	-.103**	1.00

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$.

6.1.3 Logistic Regression Results

The results presented in this section come from Table 3 which predicts LTC need by regression of the FCT, health, and health risk behavior variables. The five models shown in Table 3 are nested models with the odds ratios and confidence intervals demonstrating the need for LTC at the top and model fit statistics near the bottom. The model fit was significant beginning with Model 3 throughout the rest of the nesting regression of the models. Additionally, the -2LL decreased with each model progression, indicating a better “fitting” model each time.

The odds ratios in Model 1 are adjusted for the effects of the main variables in FCT. After accounting for effects of education, income, wealth, and home ownership there is a significant negative linear effect (odds= .892, $p \leq .001$) for education where every one year increase in education the odds of a person needing LTC decrease by 11 percent. There is also a significant negative linear effect (odds= .693, $p \leq .001$) for income where for every one category increase in income the odds of a person needing LTC decrease by 31 percent. However, wealth demonstrates a significant positive linear effect (odds= 1.119, $p \leq .05$) where the odds for needing LTC increase 12 percent as wealth increases. Model 1 begins to demonstrate mixed results regarding SES and Hypothesis 1. The hypothesis states that as SES increases, where SES is represented by education, income, wealth, and home ownership, the probability of requiring LTC will decrease. In this model wealth is the variable causing the mixed results and it could be confounded with age. As additional variables are added to the models, SES attenuates and is less significant in determining future LTC needs. The education and income results regarding SES variables align with what was expected and, therefore, H1 is supported.

In Model 2 the early life controls of race and gender are added to the equation. After accounting for effects of education, income, wealth, home ownership, race, and gender the results are almost identical to Model 1 and there are still mixed results regarding SES and Hypothesis 1 but not enough to change the support. Model 3 adds the health risk variables of smoking, drinking, and BMI to the FCT model to test specific hypotheses before adding later life controls to the regression. The effects associated with the different components of SES remain significant and do not change direction with the addition of the health risk variables, although education and income lose some of their influence on LTC. This result is expected and aligns with Hypothesis 3 which states controlling for health risk behaviors will attenuate, but not

eliminate the association between SES and the need for LTC. Whether one is a drinker shows a significant positive linear effect (odds= 1.201, $p \leq .001$) as the odds of drinkers needing future LTC as 20 percent more likely. Another positive linear effect that was significant is a person's BMI, as BMI increases one point the odds of LTC need increases 6 percent. The results for Model 3 demonstrate mixed results and partial support for Hypothesis 2. Hypotheses 2b and 2c indicate that as BMI and drinking, respectively, increase then the need for LTC will also increase. While the riskier health behaviors show support as intervening variables, the findings for smoking are neither significant nor offer any support for Hypothesis 2d. Moreover, these health behavior indicators work to weaken the influence of SES on LTC and indicate that different groups may be more likely to engage in riskier health behaviors.

Model 4 adds the additional health variables of poor sleep, either too much sleep or too little. These variables are added to the FCT model along with the prior health risk behavior variables. As with the prior model, the SES variables remain significant, with effects in the same direction, and very little change. The health variables from the last model maintain their significance, direction, and are flat. Both sleep variables had significant positive linear effects (odds= 1.656, $p \leq .01$), demonstrating for every hour one sleeps over nine hours of sleep a night the odds for the necessity of LTC in the future increase by 66 percent. Additionally, if a person does not get enough sleep, there is also a positive linear effect (odds= 1.462, $p \leq .05$) where for each hour less than six hours of sleep a night a person sleeps, the likelihood of that person needing future LTC increases by 46 percent. These results support H2a and continue to demonstrate partial support for Hypothesis 2 as an increase in the majority of health risk behaviors indicate more need for future LTC assistance. The results in Models 1-5 indicate support for Hypothesis 3 which is directly related to FCT. The SES variables, as major indicators

of FCT, maintain an association with the need for LTC. The addition of the health risk behaviors, prior to any controls, does slightly lessen the association with LTC, but they persist lending support to Hypothesis 3.

In Model 5, the later life controls are added for one's age, marital status, and self-rated health along with all the prior variables discussed. For the first time, almost all of the SES variables have lost their significance, except for income which still shows a negative linear effect. As income shows a one category increase the odds (odds= .871, $p \leq .05$) of a person needing LTC decrease by 13 percent. The self-rated health indicator and age variable act as attenuators for the SES variables in this model, with the weakest effect on income. This may indicate much of the sample in this study receives a significant amount of income either from working or in the form of a pension or social security. Additionally, the self-rated health variable contributes to the validity of the LTC variable and is highly predictive of one's mortality and morbidity. Also, making a new significant negative linear appearance is the smoking variable, where the odds (odds= .899, $p \leq .05$) of needing LTC go down when one is a smoker. These results contribute to the mixed support for Hypothesis 2 and lead to the rejection of H2d. Interestingly, the significance disappeared for poor sleep while the association with LTC lessened, leading to continued mixed results for H2a. The mixed results for sleep may indicate a self-report error where how much one sleeps is affected by other health factors, such as medication effects, and is moderated by self-rated health. Another significant variable in this model is age (odds= 1.051, $p \leq .001$), where as a person's age increases by one year the odds of needing LTC increase by 5 percent. These results make sense since as a person ages it is expected the likelihood for LTC will also increase. Self-rated health is another variable demonstrating a significant positive linear effect (odds= 2.665, $p \leq .001$) where a person is 2.67

times more likely to need LTC as indicated by their self-rated health ratings. Self-rated health demonstrates construct validity for the future need for LTC because of the high correlation between self-rated health and the need for LTC.

Table 4.3 Predicting LTC Need by regression of Fundamental Causes, Health, and Health Risk Behaviors

Predicting LTC Need by regression of Fundamental Causes, Health, and Health Risk Behaviors															
N =2642	Model 1			Model 2			Model 3			Model 4			Model 5		
	Odds Ratio	95% C.I.		Odds Ratio	95% C.I.		Odds Ratio	95% C.I.		Odds Ratio	95% C.I.		Odds Ratio	95% C.I.	
		Lower	Upper		Lower	Upper		Lower	Upper		Lower	Upper		Lower	Upper
Education	.892***	.852	.934	.891***	.851	.934	0.924***	.881	.970	0.928**	.884	.974	1.041	.983	1.102
Income	.693***	.644	.746	.694***	.644	.747	.714***	.661	.771	.719***	.666	.777	.871**	.792	.959
Wealth	1.122*	1.010	1.245	1.119*	1.007	1.244	1.120*	1.007	1.246	1.122*	1.008	1.249	.938	.829	1.061
Own	1.196	.876	1.635	1.193	.871	1.633	1.084	.786	1.494	1.093	.792	1.510	.787	.535	1.158
Race (Non-white)				.950	.660	1.366	.872	.602	1.263	.833	.573	1.210	1.042	.684	1.587
Gender (Male)				1.046	.789	1.387	.987	.740	1.317	.998	.747	1.334	.945	.679	1.313
Smoker							.960	.889	1.036	.965	.893	1.042	.899*	.822	.983
Drinker							1.201***	1.115	1.293	1.200***	1.114	1.293	1.139**	1.049	1.237
BMI							1.059***	1.032	1.087	1.059***	1.032	1.088	1.046**	1.016	1.077
9+ Hours (Sleep)										1.656**	1.129	2.431	1.053	.681	1.628
6 & Under Hrs (Sleep)										1.462*	1.056	2.024	1.167	.811	1.678
Age													1.051***	1.038	1.064
Marital Status (Married)													.868	.599	1.257
Self-Rated Health													2.665***	2.272	3.126
<i>Model Fit Statistics</i>															
-2 Log Likelihood	1439.875			1439.701			1396.368			1387.281			1107.665		
Test of Nested															
Model Fit				.174			43.333*			9.087*			279.616*		

7 DISCUSSION

The purpose of this study was to determine whether LTC needs could be predicted and explain the influence of FCT factors on a person's need for that care. As long as the United States continues without a LTC policy and relies on unpaid caregiving or the existing Medicaid system to meet the care needs of its older citizens we continue our observation of a losing game as American grays. The ACL study has proved useful in illuminating issues that modern older Americans may face for several decades. The creation of a new LTC variable from combining the variables of the number of chronic illnesses one person must contend with and their functional status, along with applying logistic regression analysis to the selected data supplied improved insight for the types of health risk behaviors and health issues that assist in predicting future LTC demand. Adding all the health behaviors and the controls to the final model, I determined the *fit* using the log likelihood and discovered Model 5 was the best fitting model. The following discussion focuses on expounding the results of this study's analysis.

The participants in this study with high SES showed their probability in the necessity for LTC decreased. In other words, as individuals' *stock* in fundamental resources increased, they were successful in reducing or delaying their future need for LTC. This finding was expected and resulted in the support of H1 which also indicates support for Fundamental Cause Theory. The ability of individuals to evade disease, chronic health conditions, or resist functional status decline support FCT and the results of this analysis demonstrate a persistent association between SES, important FCT resources, and LTC need (Link & Phelan 1995). Meanwhile, wealth was the one variable, regardless of the slightly lower wealth of this sample, that supported an increase in the probability of requiring LTC along with an increase in wealth. It is important to note, that while this sample demonstrated somewhat low wealth, they also had a high level of home

ownership with 72.2 % of the sample as home owners even though this variable did not prove significant in the regression. The results surrounding wealth could be that age is not accounted for in the models (until the end) and wealth could be picking up an age confound, since, as people age they often gain more wealth and, therefore, need more LTC. Or put differently, as people amass more wealth, they demonstrate increased longevity and, therefore, an increase in the demand for LTC since they live long enough to need that care. This idea of amassing wealth encompasses the idea of the “*package deal*” where additional wealth often means good home locations with increased access to good parks and schools (Link et al 2008; Masters, Link & Phelan 2014; Phelan, Link, & Tehranifar 2010). An individual with a secure wealth status reaps the benefit of these “*package deal*” perks extending their life allowing them to only access LTC in an oldest old age. The majority of this study’s results with SES variables exhibited that those with FCT resources had lower probabilities for needing LTC in the future. In fact, the one SES variable to remain significant throughout the nested models indicated support for FCT where one’s income indicated a lower probability for LTC, while somewhat lessened in the final model. As explicated prior, the reason behind income’s continued significance indicates much of this sample, with the average age as roughly 46 years old, still receive income. Additionally, some of the older participants likely receive some form of pension or social security making income an influential variable. A large portion of the sample may still be young enough to contribute to social security as a part of the active workforce in the United States, especially taking into consideration the standard deviation in regards to age.

The results of this study regarding the health behaviors considered as risky, for the most part, do not present any surprises. However, the smoking results do present mixed results since this variable did not become significant until the controls were added in the last model. These

results are contradictory to existing literature, however much of the existing literature analysis is for heavy smoking and drinking. I was unable to examine different levels of smoking since the smokers who could provide that information only represented 31 percent of the sample. The drinking variable was significant throughout the models and conversely the drinkers in this sample represented a majority at 70 percent of the sample. Additionally, as risky health behaviors are added with each nested model the predictive power for determining who will need LTC becomes more selective and refined. A reason for this indicates that different groups are more likely to participate in a variety of health risk behaviors. Another explanation could be that as an individual begins to engage in certain risk-taking behaviors such as smoking or drinking other health factors emerge resultant of this behavior. The health behaviors, such as smoking, drinking, and BMI work together to diminish one's ADLs or their functional status (Chen & Sloan 2015). Moreover, just as a person may be hesitant to visit a doctor when their weight is higher than recommended, they may also be tentative about reporting other risky behaviors due to a "social desirability status" (An & Shi 2015; Tylka et al. 2016).

The existing literature indicates that poor sleep has a detrimental effect on the chronic illnesses an individual contends with and may shorten their life (Bliwise 1993; Cappuccio et al 2011; Cooke 2017; Yaggi, Araujo, McKinlay 2006; Newman et al 2000). Similarly, my results indicate poor sleep is significant prior to the addition of the controls. Once the controls are added the influence of sleep on one's health is attenuated and is no longer significant. There could be several explanations for this, one of which being that how much or how little one sleeps is affected by their chronic health conditions and their functional status. They may not be able to get out of bed as much increasing their inclination to "doze off". Another reason may be the medications one takes as a result of a health condition might have sleeplessness as a side effect.

Therefore, when an individual reports their number of sleep hours there may be a self-report error where a person is reporting the number of hours they used to sleep or they desire to sleep. Also, the addition of the self-rated health may overshadow the effects of poor sleep on an individual's future need for LTC since a person is taking multiple factors into consideration, similar to health risk behaviors, before rating their health.

A surprising result or *non-result* in my analysis was the lack of significance for gender and race in all the nested models. Previous literature found associations between race and the variables used to create the LTC variable (number of chronic illnesses of an individual and functional status) where race not only could be included as fundamental in FCT (Phelan & Link 2015), but also caused minorities to lose functional status quicker (Kail, Taylor, and Rogers 2018). The primary explanation for the lack of significance for these variables was a limitation in the data. Unfortunately, the percentage of nonwhites in this sample was too low to render any important findings with roughly 15% of the sample categorized as nonwhite. Regarding the gender and previous literature showing significance in variables with respect to LTC, I chose to utilize data from only the first two waves of the longitudinal study. Perhaps, there would be more significance in gender from later waves when the differences in gendered life expectancy may present themselves. Additionally, in the earlier waves poverty may be an equalizer for race and gender where the FCT resources have more predictive power in who will require future LTC. My results certainly support this explanation.

The control, self-rated health, presented high significance and strong predictive influence over one's future necessity of LTC. Previous literature found older individuals are often more likely to rate themselves as healthier than, not only their peers, but also the condition their mobility decline would indicate for health status (Attema et al. 2018; Chang et al. 2007). This

makes the significance and positive linear effect of self-rated health interesting. Even though many older people rate themselves healthier the variable of self-rated health in this study correlates with future need for LTC. If, as people age, they were more realistic in the self-rated health selections this variable might demonstrate yet more predictive power regarding one's need for LTC.

Arguably one of the most important findings of my study is the durability of BMI's significance throughout the nested models. Previous research discovered a relationship between BMI and a person's ability to perform ADLs or their functional status (An & Shi 2016; CDC 2016; Chen & Sloan 2015; Ferraro & Booth 1999). The addition of the controls in the final model leave the probability of the future need for LTC as virtually unchanged. My results demonstrate a one point increase or decrease in BMI also increases an individual's probability for a future need of LTC by 5 percent. In other words, as an individual gains weight and increases their BMI they also increase their need for LTC and this relationship may quickly grow. An individual who presents with a slightly overweight BMI of 27, roughly two points higher than a normal BMI increases their chances of needing LTC in the future by 10 percent. The standard deviation for the mean BMI is about 5 points, which would place an individual in the obese category and increase the odds of their necessity for LTC 25 percent. The reverse would also be true for the lower levels of BMI, the minimum BMI for this sample was about 12 points and taking into account the standard deviation that would place many individuals in the underweight category of BMI at 17 points and increase their LTC odds also by 25 percent. These findings align with the U-shaped associations found in prior literature (An & Shi 2015; Ferraro & Booth 1999). Any BMI ratings outside the median distribution present cause for concern regarding LTC needs.

8 LIMITATIONS AND FUTURE DIRECTIONS

A limitation of the ACL data used for this study is the lack of racial diversity. The ACL study did oversample African Americans, but other races were not oversampled. This will not allow insight into the Latinx American and Asian American populations. These populations are increasingly important as their populations are predicted to grow significantly (Cohn & Caumont 2016). Moreover, this inability to break out African Americans from other people of color creates additional need for clarity regarding the racial influence on the need for LTC in the future. However, a recent study by Masters, Link, and Phelan (2015) examines only Black and White races, so the inclusion of a race control while not as robust as I would like, is appropriate. Especially in light of Phelan and Link's (2015) study that posits racism is a cause that is fundamental and should be included in FCT going forward to reduce racial health inequalities.

I utilized data from the first two waves of the ACL, this could be considered a limitation in my study due to the lack of looking at later waves and the age of the data. There were no variables specifically for LTC in the data. However, this is the first attempt at creating a LTC variable to assess the ACL participant's future LTC needs. Many individuals from the ACL are at an optimal age to look at their future LTC needs since they may require this type of care soon. While the ACL study is considered older data, it provides an opportunity to examine study participants approaching young, old category. Another limitation is much of the data is self-reported or *answered* by the interviewer such as the measures the ACL used to create *BMI* or *Gender*. Finally, no data exists within the ACL that accounts for the LGBTQ community. Many LGBT elders transition to the oldest-old period with no adult children or spouse to assist with their long-term care. Future analysis should also focus on a wider variety of health risk

behaviors, such as detrimental levels of smoking, poor sleep, and drinking to learn what thresholds become increasingly important to future LTC needs.

9 CONCLUSION

This study represents a unique contribution to the existing conversation regarding ways to predict demand for LTC in the future. The United States' changing demographics create an urgency to address the need for older people's long-term care as citizens simultaneously experience increased life expectancy and chronic disease occurrence. This study endeavored to emphasize the importance of an individual's health behaviors, risks associated with health, FCT factors, and SES in predicting their need for LTC as many individuals must contend with finding ways to accommodate their need for assistance as they grow older. The results of my study indicate there are certain health behaviors and FCT factors we can examine to predict an individual's need for LTC in the future. If we, as U.S. citizens, continue the conversation regarding the ways we may assist our older people in aging in their desired autonomous methods we can prevent reliance on unpaid caregiving. It is imperative that we begin to address our LTC needs immediately before the United States' demographics change in such a way to present serious problems for our aged.

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