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**ASSOCIATIONS BETWEEN HOUSING INSECURITY AND HEALTH IN MIDLIFE
WITH MODERATION BY SOCIAL SUPPORT**

A Thesis in

Human Development and Family Studies and Demography

by

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ABSTRACT

Housing insecurity—or limited and/or unreliable access to quality housing—is a powerful chronic stressor that can adversely affect individual health and well-being. This study extends prior research by investigating the effects of housing insecurity on the mental as well as physical health of aging adults using the Midlife in the United States study (MIDUS; $N = 2,532$; M age = 63.42; 57% women; 16% black). Participants reported on experiences of anxiety/depression in the past year, self-rated mental health, self-rated physical health, and number of chronic health conditions experienced in the last year. Participants also reported experiences of housing insecurity since the 2008 recession (e.g., homelessness, threatened with foreclosure or eviction, missed rent payment). Higher levels of housing insecurity were experienced by younger participants and black participants. Results showed that, even when controlling for prior health, housing insecurity was associated with significantly higher odds of experiencing anxiety/depression, poorer self-reported mental and physical health, and chronic health conditions. Neighborhood support items were assessed as moderators; and, while these support measures themselves seemed to be predictive of lower odds of adverse health outcomes, when interacted with housing insecurity they increased odds of experiencing the health outcomes of interest. Therefore, more research needs to be done on the role that the nature of community/neighborhood interactions may have on health. The results of the analysis suggest that experiences of insecure housing leave midlife and aging adults vulnerable to compromised mental and physical health. This research adds to the body of literature on housing by creating a more comprehensive and inclusive measure of housing insecurity experiences, as well as contributing a life course perspective to how housing insecurity can impact health. This research has implications for policy addressing housing insecurity issues as a public health concern, especially in the aftermath of the 2008 recession and current economic and housing crisis caused

by the COVID-19 pandemic. Future research should further examine differences in the association of housing insecurity experiences on health by racial groups, and also examine neighborhood safety and quality in conjunction with housing issues to ascertain the impact of safe housing and location on health in midlife adults.

Table of Contents

	Page
ACKNOWLEDGEMENTS	vii
I. INTRODUCTION	1
Housing Insecurity: Definition and Preliminary Research	2
Theoretical Framework	5
Health Outcomes: Physical and Mental Health	6
Housing Insecurity and Health	8
Social Support and Physical and Mental Health	11
Covariates	13
The Present Study, Research Questions, and Hypotheses	17
II. METHOD	18
Sampling and Methods	18
Measures	20
Analysis Plan	24
III. RESULTS	25
Descriptive Results	25
Housing Insecurity and Physical and Mental Health	27
Predictive and Moderating Effects of Social Support	28
Covariates	30
IV. DISCUSSION	32
Strengths and Limitations	38
Conclusions and Implications	39
Future Research Directions	41

REFERENCES	44
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APPENDICES

A. Results Tables	66
-------------------------	----

B. Figures.....	76
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Introduction

On any given night in the United States, it is estimated that there are over 550,000 people experiencing homelessness, representing a homelessness rate of about 17 people for every 10,000 people in the general population (The United States Department of Housing and Urban Development, 2017). Gromis and Desmond (2019) indicate that, on average, 3.6 million eviction cases are filed annually in the United States (U.S.), resulting in roughly 1.5 million eviction judgments per year. While a lack of housing is an issue many Americans have faced for decades, certain economic, public health, and political events often lead to increased rates of homelessness, eviction, and housing insecurity issues, bringing these challenges to the forefront of national attention.

The recession of 2008 was one of these events that contributed significantly to increases in housing issues. The recession was accompanied by a nation-wide housing crisis, which saw unemployment rise substantially (peaking at between 9.5-10 percent), and as a result, many individuals and families faced housing insecurity, and were unable to afford their homes or rent (Sard, 2009). In the aftermath of the 2008 recession, it was estimated that 900,000 to 1.1 million families with children in the United States could be categorized as being in deep poverty, and therefore at risk of experiencing housing uncertainty and homelessness (Sard, 2009). As a result of rising unemployment and general economic instability, homeless shelters saw rises up to 40 percent in certain parts of the country in the immediate aftermath of the 2008 recession (Sard, 2009).

Given its growing prevalence, there has been increasing interest and research on investigating the effects of a lack of or uncertainty of housing (i.e., housing insecurity) on health outcomes (Cox, Wenzel, & Rice, 2016). Much of this research has typically relied on single-item

measures of housing insecurity (typically, eviction or homelessness) rather than a more comprehensive approach to capture housing insecurity (incorporating less extreme but potentially important forms of housing insecurity) and its effects on health outcomes (Desmond & Kimbro, 2015; Desmond & Shollenberger, 2015; Fowler, Gladden, Vagi, Barnes, & Frazier, 2015). Further, earlier research has focused on how housing insecurity can be a potent stressor with deleterious effects for physical and psychological health and well-being of children, adolescents, and young adults (Cutts et al., 2011; Blevins, 2018). Comparatively little prior work has incorporated a developmental perspective to consider the impacts of housing insecurity on health across the life course, particularly for middle-age and older adults. Accordingly, this study aims to contribute to the scientific literature through the use of a more comprehensive characterization of housing insecurity, including evictions, failure to make rent payments, and having to move in with friends/family to save money. In addition, this research investigates the effects of housing insecurity on the physical and mental health of adults in their midlife and beyond to test how the health effects of housing insecurity vary across the adult life course. This study will also investigate the moderating role of community social support in the relationship between housing insecurity and health.

Housing Insecurity: Definition and Preliminary Research

There has been research into various types of insecurity of basic needs that may impact people's lives, livelihoods, and health; including food and water insecurity, and job insecurity (Burgard, Brand, & House, 2009; Kim & Knesebeck, 2015; Bethancourt et al., 2020). Barrett (2010) defines food security as "a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life". Food insecurity encompasses

more than just current nutritional status, capturing as well vulnerability to future disruptions in access to adequate and appropriate food. Kim and Knesebeck (2015) acknowledge that “unemployment [has] repetitively found to be associated with mental disorders and depression”, but extend their definition of job insecurity to include “the sole anticipation of joblessness (i.e., perceived job insecurity) that detracts (mental) health similarly to its actual experience, as it describes a prelude to an unemployment state that is highlighted by the ongoing exposition to an uncertain future”. These concepts of insecurity incorporate the idea of uncertainty of access. Thus, based on these characterizations of food and job insecurity, these definitions could similarly be translated to a more comprehensive definition and operationalization of housing insecurity. Housing insecurity similarly should not merely measure whether an individual currently has access to housing/shelter—but also whether they are vulnerable (i.e., for financial reasons, missed mortgage/rent payment, etc.) to their current housing situation being disrupted or no longer being able to afford their current housing situation. Thus, in this paper “insecurity” is conceptualized and operationalized as vulnerability and uncertainty related to one’s present and future situation.

Cox et al. (2016) define housing insecurity as: “Limited or uncertain availability of stable, safe, adequate, and affordable housing and neighborhoods; limited or uncertain access to stable, safe, adequate, and affordable housing and neighborhoods; or the inability to acquire stable, safe, adequate, and affordable housing and neighborhoods in socially acceptable ways”. Routhier (2018) similarly advocates for “measuring housing insecurity as an index of multiple variables within four identified dimensions: unaffordability, poor conditions, overcrowding, and forced moves”, and reports that “housing insecurity is widespread among U.S. renters, but varies greatly in severity and type”. While some aspects of housing insecurity have been

investigated, many of these studies focus only on specific emergent markers of housing insecurity (typically eviction and homelessness), rather than assessing housing insecurity from a more complete, nuanced perspective that includes a broader range of experiences in the realm of housing (Cox et al., 2016; Desmond, 2016; Fowler, Gladden, Vagi, Barnes, & Frazier, 2015). This is in contrast to an extensive body of literature on more holistic and complete measures for food and job insecurity (Barrett, 2010; Burgard, Brand, & House, 2009). There is also still little academic consensus on how to define housing insecurity and what experiences might comprise it. This study offers an assessment of housing insecurity that captures the multitude of housing insecurity experiences people face, and in doing so, contributes to the discussion on creating a widely accepted measure of this construct that may be used by future researchers.

Interest in better defining and researching housing insecurity was spurred by the prevalence and impacts of homelessness and other similar living insecurities after the 2008 recession, which left many Americans vulnerable to experiences such as eviction and foreclosure. This previous housing insecurity research has focused primarily on African Americans and ethnic minorities, as they already tend to experience higher levels of socioeconomic and health inequalities compared to whites (Ong, Williams, Nwizu, & Gruenewald, 2017; Egede & Walker, 2020). Additionally, African Americans experience disproportionately higher rates of various markers of housing insecurity, including evictions and homelessness (Blevins, 2018; Logie, Jenkinson, Earnshaw, Tharao, & Loutfy, 2016). Matthew Desmond's (2016) book Evicted: Poverty and Profit in the American City chronicles the adverse consequences and circumstances of white and predominantly African American individuals and families facing eviction in Milwaukee, Wisconsin; this book inspired the current study to adopt

broader measures of housing insecurity and examine the consequences of housing insecurity on health markers.

Theoretical Framework

Decades of research have examined the topic of chronic stress and the pathways by which these stressors may impact various facets of health and well-being. A foundational article on this subject, by Pearlin, Menaghan, Lieberman, and Mullan (1981), provides insight into this framework and line of research. Pearlin et al. (1981) define stress as “a response of the organism to conditions that, either consciously or un- consciously, are experienced as noxious”. They describe the varying sources of stress, including life events and life strains and discuss that “life events can function to bring into focus the unfavorable implications of life problems, and it is the new meaning of old problems that creates distress. Life events, from this perspective, lead to stress by adversely altering the meaning of persistent life strains... life events may [also] create new strains or intensify preexisting strains and it is these new or intensified strains, in turn, that eventuate in stress” (Pearlin et al., 1981). Life events can also result in changes in one’s self concept, and, as a result, a diminished sense of self (Pearlin et al., 1981). This kind of stress can manifest itself in both the psyche as well as the body, disrupting homeostasis and impacting the functioning and regulation of many parts of an organism’s system (psychological, immunological, cardiovascular, etc.) (Pearlin et al., 1981; Logan & Barksdale, 2008). Thus, the results of such chronic stressors can be changes in health and well-being. While mediating/moderating pathways such as coping skills and social support may buffer the negative impacts of stressors on health, there is still a critical direct pathway between stressors and health outcomes (Pearlin et al., 1981).

Pearlin et al. (1981) use the chronic stress framework to illustrate the potential pathways by which disruptive life events, such as job insecurity, can impact health. For example, losing one's job may lead to loss of income, creating further economic strain on an individual/family unit, which can potentially impact self-esteem and relationships functioning, and thus result in depression; and other studies have also corroborated these pathways between chronic stress and depressive symptoms (McGonagle & Kessler, 1990). Similarly, on the physical health side, stress and trauma can impact regulation of the hypothalamic-pituitary-adrenal (HPA) axis, causing release of stress hormones, resulting in inflammation of the body, and impacting the functioning of various physiological systems, thus resulting in poorer physical health and chronic conditions (Piazza, Almeida, Dimitreva, & Klein, 2010; Logan & Barksdale, 2008). Similarly to the role of job insecurity in the Pearlin (1981) model, this study will examine housing insecurity as an event which may act as chronic stressor, contributing to adverse health through pathways of economic strain, self-esteem and coping, and bodily inflammation, which can result in changes to physical and mental/emotional health and well-being. This thesis will also investigate the potential role of social support (particularly neighborhood/community support) as a moderator of the housing insecurity-health relationship.

Health Outcomes: Physical and Mental Health

This study will examine markers of physical and mental health as outcomes of interest in order to provide a well-rounded perspective of overall health. Within each of these categories, this study will examine two indicators indicative of well-being. For physical health, the analysis will utilize number of chronic health conditions and self-rated physical health as outcomes. And finally, for emotional (or mental) health, this study will examine anxiety/depression reports and self-reported mental health as outcomes of interest.

The benefit of using a variety of measures as health outcomes can provide a better understanding of how housing insecurity, along with other demographic/behavioral factors, may affect various aspects of well-being. For physical health, this study utilizes a more “objective” measure of health (number of chronic health conditions), as well as a more “subjective” measure (self-rated physical health). Number of chronic conditions is a useful measure, because it can provide a more “objective” sense of health based in an actual diagnosis. Comorbidity of chronic health conditions increase risk of mortality, and can predict earlier mortality for those in midlife (although in older age, this association becomes less clear) (Fillenbaum, Pieper, Cohen, Cornoni-Huntley, & Guralnik, 2000; Lee, Go, Lindquist, Bertenthal, & Covinsky, 2008). However, it is critical to remember that there is no perfect measure of health, because historical, racial, and economic contexts will always influence the appropriateness of every measure. Because the sample will incorporate diversity in terms of race and socioeconomic status, it is important to recognize that there are often disparities in access to healthcare and diagnostic testing for individuals and populations of lower socioeconomic status, or those who belong to a racial minority group (Burgard & Chen, 2014). Additionally, individuals of certain socioeconomic or racial groups often face a bias in treatment or diagnosis, even if they are able to access healthcare; and thus, certain conditions may be underdiagnosed or underreported for these groups (Burgard & Chen, 2014). While self-reported health similarly faces issues related to individuals tending to rate themselves based on the context of the community around them or cultural expectations of health (and therefore the self-report data is not “standardized” across groups), self-report measures were included as outcomes because they can help to balance out issues with underdiagnoses of chronic conditions (Burgard & Chen, 2014). Additionally, self-rated physical health, while it may have variability related to contextual factors discussed above,

has been found to be a somewhat accurate predictor of actual physical health. An analysis by Bunda and Busseri (2019) found that “longitudinal modeling revealed that subjective perceptions of declining SRH [self-rated health] predicted actual declines in physical health over time”.

In 1943, Abraham Maslow proposed the psychological theory that became widely known as Maslow’s hierarchy of needs (Maslow, 1948). This hierarchy ranges from physiological needs, safety needs, belongingness and love needs, esteem needs, to self-actualization (Maslow, 1948). The theory posits that each stage of needs cannot be met until the previous stage has been fulfilled (Maslow, 1948). This study focuses on the first stage of physiological needs, which includes food, water, sleep, and shelter; and which sets the foundation for the following four stages. For mental health, this study will use self-reported mental health (similarly to the previously discussed self-reported physical health measure) as well as a measure indicating whether participants have experienced anxiety/depression within the past 12 months. Experiencing mental health issues such as anxiety and depression has been found to be “associated with significant impairment of health-related quality of life”; and is a serious public health issue (Das-Munshi et al., 2008). While both these measures are imperfect due to concerns about reporting and diagnosis (and there is some literature that particularly discusses certain cultural groups being less likely to report mental health issues due to cultural stigma), combining the two measures will allow for a more holistic understanding of the impacts of housing insecurity on mental health (Burgard & Chen, 2014).

Housing Insecurity and Health

Previous literature on food and water insecurity validates that these basic physiological needs are essential in predicting health (Barrett, 2010; Stuff et al., 2004; Bethancourt et al.,

2020). Stuff et al. (2004) found that “adults in food-insecure households were significantly more likely to rate their health as poor/fair and scored significantly lower on physical and mental health scales”. Experiencing other forms of economic insecurity, such as job insecurity, also contributes to negative health: according to a study by Ferrie, Shipley, Stansfeld, and Marmot (2002), job insecurity has negative impacts on self-rated health and mental health; and these issues increase with continuous exposure to the chronic stressor of job instability. Additionally, experiencing adverse economic events during and after the 2008 recession has been shown to be associated with “long-lasting and transdiagnostic declines in mental health”; and these relationships were particularly strong for those from minority and marginalized sociodemographic groups (Forbes & Kreuger, 2019). Forbes and Kreuger suggest that these results indicate “the need for additional support for people who suffer marked losses during recessions and for those without a strong safety net”. These experiences can make people feel as though they are losing “locus of control”, and contribute to feelings of stress and helplessness which then negatively impact health (Zhang & Jang, 2017).

While measures of food, water, and job insecurity have been widely studied, there is a growing, even if limited, body of literature regarding the concept of housing insecurity as impacting health outcomes. In particular, certain lived experiences, such as the stress and trauma caused by housing insecurity, can “get under the skin” and become biologically embedded, which then can (a) impact regulation of the hypothalamic-pituitary-adrenal (HPA) axis, (b) contribute to inflammation in the body, and (c) affect health outcomes (Piazza et al., 2010). More broadly, there is evidence that housing insecurity can act as a chronic stressor which impacts health.

Why might housing insecurity contribute to adverse health outcomes? Housing insecurity is a significant stressor which can “get under the skin” to impact biological processes. Stress can lead to wear and tear on the body, elevate allostatic load, contribute to dysregulation of the hypothalamic-pituitary-adrenal (HPA) axis, and thus lead to high levels of inflammation within the body, which may in turn increase the likelihood of disease risk and adverse physical/mental health outcomes; and so, chronic and acute stressors can have long lasting health effects through inflammatory pathways (Logan & Barksdale, 2008; Martínez & González-Juanatay, 2009). Housing insecurity may be an acute or a long-term stressor, and it is important to understand the health consequences associated with these experiences as housing insecurity continues to be a more salient issue after the 2008 recession, and as rent and housing prices climb (Jones & Grigsby-Toussaint, 2020).

There is a growing body of literature to suggest that the experience of housing insecurity may be associated with negative physical and mental health outcomes. Desmond and Kimbro (2015) found that mothers who had previously been evicted experienced more material hardship, depression, parenting stress, and reported poorer health for themselves as well as their children; compared to mothers who had not been evicted. Stahre, Vaneenwyk, Siegel, and Njai (2015) found that housing insecure participants were twice more likely to self-report poor health than housing secure participants. Fowler et al. (2015) found that housing loss due to eviction or foreclosure is a significant event which can lead to mental health crises, and increased suicide rates. Novick et al. (2020) found that housing insecurity was associated with increased risk for adverse kidney outcomes (a chronic health condition). Thus, it is clear housing insecurity can have negative implications for various aspects/facets of health.

A large portion of literature on housing insecurity and health focuses on the wellbeing of younger children and adolescents, and the associations between experiences of housing insecurity and its potential impact on poor health, low weight, and developmental risks/setbacks (Cutts et al., 2011; Blevins, 2018). This study aims to provide an assessment of the impact of housing insecurity on the health of older/aging adults. By doing so, this study will contribute to a life course understanding of how housing insecurity experiences can shape health across age groups. Another benefit of this study is the use of longitudinal data, which will help to better estimate the impact of housing insecurity experiences after the 2008 recession on recent health outcomes, while controlling for health outcomes of participants in a prior wave.

Social Support and Physical and Mental Health

Midlife is a point often characterized by social roles and relationships. Igarashi et al. (2012) describe the experiences of midlife adults as providing intergenerational support, and highlights how economic conditions (i.e., a fear that children will not be able to obtain a good-paying job or buy a house, and generally face more barriers to financial stability and independence) can impact the role of midlife adults in the lives of their children as well as aging parents. At midlife, adults tend to be responsible for providing for and supporting multiple people, which can exacerbate the stress caused by issues such as economic or housing insecurity (Lachman, Teshale, & Agrigoroaei, 2014; Infurna, Gerstorf, & Lachman, 2020). Additionally, midlife is a time when many adults have been in, or currently are in, domestic partnerships. The social, emotional, and financial support afforded by marital unions can have a positive impact on health (including self-rated) (Weeks, 2014).

Previous research has indicated that engagement within one's community can act as a predictor of health. For instance, high levels of social capital and ties with one's community has

been shown to be associated with better message recall regarding health issues; essentially, increased engagement with community seems to be associated with higher proactive strategy as well as awareness regarding to potential diseases/illnesses (Viswanath, Steele, & Finnegan, 2006). In addition, having positive views of others can contribute to psychological benefits (Poulin, 2014; Borgonovi, 2008). A study by Robinette, Charles, Mogle, and Almeida (2013) using MIDUS daily diary data found that “higher perceived neighborhood cohesion predicts fewer self-reported daily stressors, higher positive affect, lower negative affect, and fewer physical health symptoms”. So, higher levels of trust and cohesion with neighbors seems to be associated with more positive health outcomes. In contrast, however, social isolation has been shown to be associated with increased odds of experiencing coronary heart disease as well as mortality (Heffner, Waring, Roberts, Eaton, & Gramling, 2011). Cichy et al. (2013) found that, for African Americans experiencing chronic stress, receiving social support was actually more beneficial and protective against negative outcomes than it was for other racial groups. Friedman and Ryff’s (2012) findings indicated that, for older adults who had high comorbidity (simultaneously experiencing two or more diseases or medical conditions), those who had higher levels of purposeful and positive engagement and social relationships with others had lower levels of certain inflammatory biomarkers; while adults with comorbidity but low purposeful connections did not see lower inflammatory levels. Sin and Almeida (2018) also stress the importance of daily positive events, which may include neighbor/community interactions. This paper will examine community/neighbor support as a potential moderator of the relationship between housing insecurity and physical/mental health outcomes, and assess whether higher levels of support/engagement with neighbors may buffer the relationship between housing insecurity and adverse health.

Covariates

In this study, covariates represent demographic and behavioral factors which may influence physical and mental health outcomes. They are used in the models as predictors of health, and also act as controls to estimate the association between housing insecurity and health outcomes even when accounting for sociodemographic and behavioral factors.

Race/Ethnicity and Socioeconomic Status

Exposure: A study by Njai, Siegel, Yin, and Liao (2017) across fifteen states in the United States (US) found that “the prevalence of [housing] security was highest among whites, lower among blacks, and lowest among Hispanics. The prevalence of [housing] security was highest among persons with ≥ 4 years of college education, lower among persons with a high school education and < 4 years of college, and lowest among persons with less than a high school education. For each racial/ethnic group, the prevalence of [housing] security was highest among persons with ≥ 4 years of college and lowest among persons with less than a high school education”. This indicates that prevalence of housing security varies across race/ethnic group as well as socioeconomic status (SES); with minority groups experiencing higher housing insecurity, as well as those with lower levels of education.

Vulnerability: Research has pointed to the idea of racial/ethnic health disparities occurring due to discrimination and stress getting “under the skin” and biologically imbedded, thus disrupting biological processes; with individuals within minority and marginalized racial populations trending to be especially affected by these processes (Williams, 1999). The compounding effects of everyday discrimination or unfair treatment can contribute to multisystem biological dysregulation, and thus various physiological and emotional health consequences (Ong, Williams, Nwizu, & Gruenewald, 2017; Allen, Watkins, Mezuk, Chatters,

& Johnson-Lawrence, 2020). These resulting health disparities (i.e., higher rates of cardiovascular disease, obesity, diabetes, and preterm births) particularly impact black and Hispanic populations, even after controlling for socioeconomic status in statistical models (Williams, 1999).

As the income gap in the United States is currently increasing, it is also crucial to understand how inequality and differences in socioeconomic status can impact health (Adler & Ostrove, 1999). Socioeconomic status (SES) is a construct that is normally measured using education, income, occupation, or a composite of these measures, as a proxy (Winkleby, Jatulis, Frank, & Fortmann, 1992). SES has been shown to be a quite accurate gauge of various social/environmental factors as well, including standard of living, access to education and economic opportunities, and proximity to crime; and prior research has shown that lower SES is associated with more stress, whereas higher SES is associated with lower chronic stressors and is protective against adverse health (i.e., mental health issues, coronary heart/cardiovascular disease, inflammatory immune disorders, and poor health behaviors) (Winkleby et al., 1992; Baum, Garofalo, & Yali, 1999; Adler & Ostrove, 1999; Baum & Grunberg, 1991; Owen, Poulton, Hay, Mohamed-Ali, & Steptoe, 2003). Further studies have also indicated that education may be protective against adverse health outcomes (also known as the education-health gradient) (Mirowsky & Ross, 2017).

Gender

Gender is also a construct that can impact and play a role in stress and health. Although women overall have longer life-expectancy as compared with men, women also have heavy disadvantages regarding morbidity (a concept called the “female-male health-survival paradox”; Baum & Grunberg, 1991; Mayor, 2015). In spite of women generally having longer lifespans

(especially in developed countries), in almost every area in the world, across all age groups, women actually experience higher rates of physical and mental illness as compared to men; and 90% of the most common illnesses are more widespread among women than men (Mayor, 2015). There are several pathways related to societal roles that may help explain these gender health disparities. Societal gender roles can account for some of the gender differences in stress. For example, women tend to have responsibilities and onus of being a primary caretaker, rather than men. Family caretaking can act as a stressor that can negatively affect mental and physical health; and because women more frequently engage in these roles and activities, the burden of caregiving disproportionately impacts them, leaving women more susceptible to the negative health effects associated with caretaking (this is also particularly relevant in midlife, when women may be caring for children as well as aging parents at the same time) (Mayor, 2015; Igarashi, Hooker, Coehlo, & Manoogian, 2013).

Age

Midlife is characterized by many changes in health. For women, these changes may include menopause and difficulty conceiving children. For both men and women, with age comes increased susceptibility to more chronic health conditions, including blood pressure, cardiovascular disease, lower mobility, and functional/cognitive declines (as well as conditions such as Alzheimer's and dementia) (Whitbourne, 2001). A study by Stone, Schwartz, Broderick, and Deaton (2010) found that rumination and "worry was elevated through middle age and then declined". This indicates that, although physical and functional health may decline from midlife to old age, this life course trajectory may not hold true for mental health outcomes. Some research has indicated that, while midlife is full of work and family demands and stressors, in older age fewer of these demands may exist (individuals may likely be retired, not be active

caretakers, etc.); thus, emotional well-being may stabilize in older age (Whitbourne, 2001). I expect to see that as individuals in the sample age, they report poorer physical health; but may actually report higher quality of emotional health.

Substance Use

Exposure: Gleib and Weinstein (2019) examined the role of drug and alcohol abuse in midlife (using the MIDUS dataset) in response to economic insecurity. They found that subjective measures of economic distress predicted drug abuse, and is associated with “the increase in drug abuse at ages 50+” (Gleib & Weinstein, 2019). Lachaud et al. (2020) found that alcohol/substance use disorder(s) were more likely to occur in participants who experienced persistent housing and food insecurity (two concepts that are highly correlated). Thus, it is likely that those who experience housing insecurity may likely also struggle with substance use issues, although this may be a somewhat bidirectional relationship. Substance use may also be tied to the circumstantial stress of housing insecurity, and used as a maladaptive coping mechanism—which may further exacerbate health issues.

Vulnerability: Schulte and Hser (2013) describe substance use as “often initiated in adolescence, but it is during adulthood that prevalence rates for SUDs [substance use disorders] peak; and while substance involvement is less common among older adults, the risk for health complications associated with use increases”. Alcohol, tobacco, marijuana, and, increasingly, prescription medications are all often implicated in SUDs (Schulte & Hser, 2013). In older adulthood, substance use disorders are more likely to cause/lead to medical emergency injuries such as damaging falls than in adolescence or earlier adulthood. “Cigarette smoking in particular has been linked to 90 percent of all cases of lung cancer and accounts for approximately one-third of all cancer deaths” (Schulte & Hser, 2013). “Several substances (e.g.,

alcohol, tobacco, heroin, prescription stimulants, methamphetamine) have been linked to increased risk for cardiovascular problems and heart disease”; and substance use can also increase risk of infectious diseases in adulthood (Schulte & Hser, 2013). “Adults diagnosed with an SUD and comorbid mental health disorder are at increased risk for poor health, social dysfunction, incarceration, poverty, and homelessness” (Schulte & Hser, 2013). SUDs are often associated with anxiety and mood disorders, as well as functional and cognitive decline in older adulthood (Schulte & Hser, 2013). Thus, substance use issues (a risky health behavior) can be a substantial predictor of physiological and psychological health outcomes in midlife to older adulthood.

The Present Study, Research Questions, and Hypotheses:

In sum, while there is some literature on the housing insecurity and adult health outcomes, there is emerging research that examines multiple facets of housing insecurity as they impact the health of midlife/older adults. In addition to comparing the effects of housing insecurity on physical and mental health, this study will also examine how these relationships differ by race, socioeconomic status, marital status, age, gender, and substance use behaviors; and whether community/familial social support may play a buffering role in these relationships. The study sample population comes from Midlife in the United States (MIDUS), a national longitudinal study of a health and wellbeing of adults in the United States.

The present study will focus primarily on three research questions: (1) Do experiences of housing insecurity predict physical and mental health? I hypothesize that people who have experienced housing insecurity will have poorer physical and mental health. (2) Does housing insecurity disproportionately impact the health of African Americans (AAs)? AAs already experience heightened levels of socioeconomic and health inequalities compared to whites

(Egede & Walker, 2020). Based on this, I hypothesize that there will be a difference in prevalence of housing insecurity among AAs compared to whites, as well as worse health outcomes for AAs experiencing housing insecurity as compared to whites. (3) Do sources of social support (i.e., community support) act as a buffer in the relationship between housing insecurity and health outcomes? I hypothesize higher levels of social support will act as a protective factor and mitigate the positive relationship between housing insecurity and adverse health outcomes.

This work will advance research in this field in four ways. (1) It will create a more comprehensive and holistic approach to housing insecurity. This perspective will add to the current discussions of how to capture more nuanced experiences of housing insecurity, as well as broaden understanding and theories of health disparities. (2) This study will focus on the impacts of housing insecurity among a midlife and aging population, which will contribute to an understanding of how housing insecurity may shape health across the life course. (3) This study will combine measures of physical markers of health and mental health conditions in order to understand how stressors such as housing insecurity can get under the skin to impact various facets of health. (4) The longitudinal nature of this study will allow the investigation of how housing insecurity can contribute to changes in health over time; as well as allow a further understanding of how societal, political, and economic contexts might impact health.

Method

Sampling and Methods

This study will use data from Midlife in the United States, a National Longitudinal Study of Health and Well-Being (MIDUS) to assess the effects of housing insecurity on health outcomes and health disparities. The MIDUS study began in 1995, and recruited a nationally

representative sample of U.S. adults between ages 25 to 75 (Radler, 2014). Since the start of MIDUS data collection, there have been several waves that have followed up on participants (Radler, 2014). Specifically, the analysis will use data from the second and third waves of MIDUS, collected in 2004-2006 (MIDUS 2), and 2013-2015 (MIDUS 3), respectively (n=2532; 15.92% AA). The sample includes survey measures of health from the original MIDUS sample, as well as the Milwaukee African American (AA) oversample (MIDUS 2 Milwaukee was collected between 2005-2006; MIDUS 3 Milwaukee was collected between 2016-2017). The original MIDUS sample and the Milwaukee datasets will be combined for the analysis. Data collection for these waves consisted of baseline assessments (e.g., phone interview and extensive self-administered questionnaire), with additional questions in selected areas (e.g., economic recession experiences for MIDUS 3).

There were several criteria specified for selecting the final sample to address the research aim. In particular, participants were selected who had complete data on age; race; gender; education; marital status; substance behaviors; and the health outcomes in question. The study also did not include individuals who answered “Don’t Know”, “Refused”, or “Inappropriate” to any of the above items. This exclusion ensured a cleaner sample and analysis.

Housing insecurity will be used as the main predictor/independent variable in this study. The health outcomes will include prevalence of chronic physical conditions (i.e., cardiovascular disease, cancer, and diabetes) and self-rated physical health; and mental health conditions (anxiety and depression) as well as self-rated mental health. The social support measures to be used as moderators of housing insecurity effects will be based on self-reports (collected on an ordinal scale) of trust in neighbors, amount of contact with neighbors, and amount/frequency of conversations with neighbors. Each social support measure will be assessed as a potential

moderator in the housing insecurity-health relationship. These measures are described in further detail below

Measures

Descriptive statistics and bivariate correlations for study constructs are displayed in Tables 1, 2, and 3. Housing insecurity, race, educational level, age, gender, marital status, and substance use were predictor variables; physical (chronic conditions and self-reported health) and mental (anxiety/depression and self-reported health) health were all outcomes of interest. The moderator variables include community social support.

Housing insecurity.

During MIDUS 3, respondents were asked whether or not they had experienced the following in the aftermath of the 2008 recession: (1) moved in with family/friends to save money; (2) experienced homelessness since last interview; (3) missed a mortgage or rent payment; (4) threatened with foreclosure/eviction; (5) lost home to foreclosure; and (6) lost home to something other than foreclosure. For the analysis, the study develops a comprehensive measure of intensity of housing insecurity by adding up the number of “yes” responses to the aforementioned six questions. In the resulting index, zero represents experiencing no housing insecurity, and six represents experiencing all dimensions of housing insecurity. The mean of housing insecurity experience in the sample was 0.26, with a standard deviation (sd) of 0.75, with scores ranging from 0-5.

Within the individual experiences of housing insecurity, the most common manifestation of housing insecurity was missing a rent or mortgage payment, with 8.29% of participants indicating that they had experienced this in the aftermath of the 2008 recession. The least common form of housing insecurity was losing one’s home to something other than foreclosure,

with only 2.33% of participants reporting this. Overall, 14.26% of the sample reported experiencing at least one form of housing insecurity post 2008. A specific breakdown of each housing insecurity construct by sociodemographic factors can be found in Table 2.

Physical health.

Self-rated physical health

This item asks participants to rate their physical health, between 1 (excellent), 2 (very good), 3 (good), 4 (fair), or 5 (poor) (Meyer, Cifuentes, & Warren, 2011; Monden, 2010; Warren-Findlow, Laditka, Thompson, & Laditka, 2013; Zhang & Jang, 2017). For this analysis, this measure was dichotomized, such that participants who reported poor/fair health were denoted a score of “1”; while participants who reported good, very good, and excellent health were denoted as “0”. This measure in MIDUS 3 (18.36% reported poor/fair physical health) will be one of the outcome variables of interest, and the analysis will control for the self-rated physical health response of participants from the prior MIDUS 2 survey (12.24% reported poor/fair physical health).

Chronic conditions

In MIDUS 3 Project 1 (survey), participants indicate the number of chronic conditions they have experienced within the past 12 months (mean=3.32, sd=3.11, range=0-20) (Bunda & Busseri, 2019; Kessler, Mickelson, Barber, & Wang, 2001; Piazza, Charles, & Almeida, 2007; Barger, 2006). Examples of conditions include “asthma, bronchitis or emphysema, diabetes or high blood sugar, ulcer, migraine headaches, and thyroid disease” (Piazza et al., 2007). Participants also reported number of chronic conditions in MIDUS 2 Project 1 (mean=2.36, sd=2.37, range=0-30), which will be used as a predictor to better isolate the impact of housing insecurity on changes in chronic conditions in wave 3.

Mental health.

Self-rated mental health

This item asks participants to rate and evaluate their mental/emotional health, between 1 (excellent), 2 (very good), 3 (good), 4 (fair), or 5 (poor) (Jang, Yoon, Chiriboga, Molinari, & Powers, 2014). For this analysis, this measure was dichotomized, such that participants who reported poor/fair health were denoted a score of “1”; while participants who reported good, very good, and excellent health were denoted as “0”. This measure in MIDUS 3 (10.23% of participants reported poor/fair mental health) will be one of the outcome variables of interest, and the analysis will control for the self-rated mental health response from MIDUS 2 (6.48% reported poor/fair mental health).

Anxiety/Depression

This item asks participants whether, in the past 12 months, they have experienced or been treated for anxiety, depression, or some other emotional disorder (Lee, 2020; McWilliams, Goodwin, & Cox, 2004). This may include participants experiencing symptoms such as panic attacks, low energy or interest in activities, symptoms of bipolar disorder, etc. (Lee, 2020; McWilliams, Goodwin, & Cox, 2004). Participants responded to this question in a binary—yes or no (logistic regression will be used for this outcome). Participants’ responses to this item in wave 3 (21.01% yes) will be an outcome of interest in the regression models, while the analysis will control for responses to this item in wave 2 (17.69% yes) by implementing wave 2 anxiety/depression as a predictor in the models.

Social Support.

This study will use MIDUS 3 measures of support received from neighbors in hours per month (mean=3.32, sd=17.85, range=0-744); frequency of contact with neighbors (this

construct was reverse-coded for the analysis, such that 1=never or hardly ever, 2=less than once a month, 3=1-3 times a month, 4=about once a week, 5=several times a week, and 6=almost every day; mean=4.93, sd=1.32, range=1-6); and frequency of conversations with neighbors (coded such that 1=never or hardly ever, 2=less than once a month, 3=1-3 times a month, 4=about once a week, 5=several times a week, and 6=almost every day; mean=2.95, sd=1.61, range=1-6) as moderators to understand how social support influences and interacts with the housing insecurity-health outcomes relationship (Greenfield & Reyes, 2014; Shaw, 2005). I predict that higher levels of neighborhood support will buffer the impact of housing insecurity on adverse/negative health outcomes.

Covariates.

Race. Participants indicated their racial/ethnic background in the MIDUS 3 study as either White, Black and/or African American, Native American or Alaska Native Aleutian Islander/Eskimo, Asian, Native Hawaiian or Pacific Islander, or Other. Participants will be categorized by white and black for the regression analysis, with black acting as the reference group. 84.08% of the sample is white, and 15.92% is black.

Gender. In order to account for demographic variability, the regression models in this study included gender as a covariate. In Wave 3, participants indicate their gender as either male or female. The gender of the participant was coded using a dummy variable indicating male gender (1), with the female gender (0) serving as the base category. 42.69% of the sample is male, and 57.31% is female.

Highest Education. To account for demographic variability, the models in this study also included participants' highest educational level as a covariate (which was used to represent socioeconomic status). Participants' highest educational level was assessed in Wave 3 by asking

the participants via survey to indicate their highest educational attainment, ranging from “No school/some grade school” to “PH.D., ED.D., MD, DDS, LLB, LLD, JD, or other professional degree”. Responses to this question were then compiled into two discrete variables—“high school or less” (reference group) or “some college or more” educational attainment. 30.69% of participants fell in the “high school or less category”, and 69.31% of participants fell into the “some college or more” category.

Age. This study used age reported in MIDUS 3, and then mean-centered it for the regression analysis. Mean=62.42, sd=10.94, range=39-94.

Marital Status. In the MIDUS 3 survey, participants reported their current marital status. Options were: married, separated, divorced, widowed, or never married. For the analysis, participants were into two categories: married and non-married (reference group). 61.85% of the sample was married, and 38.15% of the sample was not married at the time of MIDUS 3.

Substance use behaviors. In MIDUS 3, participants indicated whether they have experienced or been treated for alcohol or drug problems in the past 12 months—yes or no (reference group). 1.74% of the sample indicated experiencing substance use issues within the past year.

Analysis Plan

All statistical analyses will be conducted using R. The analytical strategy will consist of a series of regression analyses, including logistic (binary) and Poisson regression, to assess the association of housing insecurity experiences on health outcomes, while also controlling for demographic and behavioral health factors as predictors/covariates. For the analyses, predictors (housing insecurity, age, and neighbor support, contact, and conversation) were mean-centered, and dummy coding (0=reference group, 1) was used for the demographic covariates to create

reference groups for the regression. For these regressions, MIDUS 3 predictors and outcomes will be used, while controlling for health in MIDUS 2 in the second regression model. This will allow for a better estimation of the effects of housing insecurity on health outcomes. To test the buffering or exacerbating moderation effects of social support on the housing insecurity-health links, interaction terms will be created between housing insecurity experiences and social support, which will be added into the regression models. All predictors and moderators were mean-centered for the analysis. For the regression models, Model 1 will examine the association of housing insecurity and demographic and behavioral covariates on MIDUS 3 health outcomes. Model 2 will add MIDUS 2 corresponding health as a predictor for MIDUS 3 health outcomes. And Model 3-5 will add social support interactions (neighbor support, neighbor contact, and neighbor conversation) into the model to assess how neighborhood/community support influence the relationship between housing insecurity and the health outcomes in question.

Results

Descriptive Results

The first set of analyses describe the items and sum of the housing insecurity scale. This study examined whether certain sociodemographic group factors predicted housing insecurity. This is illustrated in bar graph form in Figure 1. Participants within the sample were subset into three age categories: young (age 45 or younger), middle (between 46-65), and old (66+). “Young” participants had a mean of 0.30 housing insecurity experiences (sd=0.72, range=0-3); “middle” participants had a mean of 0.36 housing insecurity experiences (sd=0.88, range=0-5); and “old” participants had a mean of 0.14 housing insecurity experiences (sd=0.51, range=0-4). Age was significantly associated with mean levels of housing insecurity in adults. Subjects who were "young" age reported the middle level of housing insecurity (M = 0.30), those who were

"middle" age had highest level of housing insecurity ($M = 0.36$), and finally those who were "old" age showed the lowest level of housing insecurity ($M = 0.14$). A one-way ANOVA demonstrated that these differences were statistically significant, $F(2,529)=27.1$, $p<.001$, $\eta^2=.021$, $MSE=0.55$.

Descriptive analyses also examined whether race was associated with housing insecurity. To do so, all participants within the sample were subset into black and white. Whites had a mean of 0.18 housing insecurity experiences ($sd=0.61$, $range=0-5$); whereas blacks had a mean of 0.72 housing insecurity experiences ($sd=1.15$, $range=0-5$). A t-test illustrated that these mean differences were significant between the white and black groups, with blacks significantly more likely to experience higher housing insecurity than whites ($t=9.17$, $df=444.9$, $p<.001$). These descriptive results can be seen in Figure 2.

To assess more descriptive statistics, the sample was subset into two groups: those who experienced no housing insecurity post 2008; and those who reported experiencing one or more forms of housing insecurity. Then, mean differences between these two groups were looked at for each of the four health outcomes.

As indicated in Figure 3, mean differences in number of chronic conditions in MIDUS 3 between the no housing insecurity and housing insecurity groups were examined. The "no housing insecurity" group experienced a mean of 3.18 chronic conditions ($sd=2.99$, $range=0-20$); whereas the "housing insecurity" group experienced a mean of 4.19 chronic conditions ($sd=3.62$, $range=0-19$). A t-test indicated that the mean differences between these two groups were significant, with those in the "housing insecurity" group significantly likely to experience more chronic conditions relative to the "no housing insecurity" group ($t=5.067$, $df=445.47$, $p<.001$). As indicated in Figure 4, percent differences in self-rated "poor/fair" physical health

between the no housing insecurity and housing insecurity groups in MIDUS 3 were examined. 15.34% of the “no housing insecurity” group experienced poor/fair physical health; whereas 36.57% of the “housing insecurity” group reported experiencing poor/fair physical health. A t-test indicated that the differences between these two groups were significant; with the “housing insecurity” group significantly more likely to experience poor/fair physical health compared to the “no housing insecurity” group ($t=8.00$, $df=429.36$, $p<.001$).

As indicated in Figure 5, percentage differences in self-rated “poor/fair” mental health between the no housing insecurity and housing insecurity groups in MIDUS 3 were examined. 7.65% of the “no housing insecurity” group reported experiencing poor/fair mental health; whereas 25.76% of the “housing insecurity” group reported poor/fair mental health. A t-test indicated that the differences between these two groups were significant; with the “housing insecurity” group significantly likely to experience poor/fair mental health compared to the “no housing insecurity” group ($t=7.63$, $df=405.2$, $p<.001$). Finally, as indicated in Figure 6, differences in anxiety/depression between the no housing insecurity and housing insecurity groups in MIDUS 3 were examined. 19.02% of the “no housing insecurity” group reported experiencing anxiety/depression; whereas 32.96% of the “housing insecurity” group experienced anxiety/depression. A t-test indicated that the percentage differences between these two groups were significant; with the “housing insecurity” group experiencing more anxiety/depression compared to the “no housing insecurity” group ($t=5.33$, $df=447.09$, $p<.001$).

Housing Insecurity and Physical and Mental Health

The regression results can be found in the corresponding Tables 4-7 in the appendix. Binary logistic regression was used to estimate the relationship between housing insecurity and self-rated physical health, self-rated mental health, and anxiety/depression (given each of these

outcomes were coded dichotomously). Poisson regression was used to estimate the association between housing insecurity and number of chronic conditions (a count variable).

For all four health outcomes (number of chronic conditions [Table 4], self-rated physical health [Table 5], self-rated mental health [Table 6], and anxiety/depression [Table 7]), higher experiences of housing insecurity were associated with significantly higher odds of experiencing these adverse health outcomes. Even when controlling for health outcomes in MIDUS 2, there was still a significant association between housing insecurity experiences and each health outcome in MIDUS 3. Model 2 in each regression table illustrates this association.

For number of chronic conditions, Model 2 in Table 4 indicates that each one unit increase in housing insecurity experience (or as housing insecurity experiences increases by one) was associated with 10% higher odds of experiencing an additional chronic condition (OR=1.10; $p<.001$). Each one unit increase in housing insecurity (or reporting an additional housing insecurity experience) was also associated with significantly increased odds (56%) of reporting poor/fair self-rated physical health, as can be observed from Model 2 in Table 5 (OR=1.56; $p<.001$). For each additional housing insecurity experience, we expect a 65% increase in the odds of reporting poor/fair mental health, as per Table 6 (OR=1.65, $p<.001$). And finally, housing insecurity increasing by one is significantly associated with a 22% greater chance/risk of experiencing symptoms of anxiety/depression in Table 7 (OR=1.22, $p<.01$).

Predictive and Moderating Effects of Social Support on the Link between Housing Insecurity and Physical and Mental Health

In Model 3 through 5 of the regression analyses, main effects and interaction terms between neighbor support and housing insecurity were added. Using a threshold of $\alpha=.05$, the analyses found that hours of neighbor/community support received in a month was not

predictive of health outcomes across the board. However, frequency of contact and conversation with neighbors was somewhat predictive of health.

For number of chronic conditions, self-reported physical health, self-reported mental health, and anxiety/depression, neighbor contact was significantly predictive of lower odds of experiencing these outcomes. As neighbor contact increased by 1 unit (i.e., from “never or hardly ever” (1) to “less than once a month” (2); or “less than once a month” (2) to “1-3 times a month” (3); and so on) there is a corresponding 3% decrease in odds of reporting an additional chronic condition, as can be seen in Model 4 in Table 4 (OR=0.97, $p<.001$). As neighbor contact increases by 1 unit, there is a 9% decrease in odds of reporting poor/fair physical health (OR=0.91, $p<.05$; Model 4 Table 5). As neighbor contact increases by 1 unit, there is a 13% decrease in the odds of reporting poor/fair mental health (OR=0.87, $p<.01$). And, as neighbor contact increases by 1 unit, there is a 10% decrease in odds of experiencing anxiety/depression in the last 12 months (OR=0.90, $p<.01$).

Similarly, for number of chronic conditions and anxiety/depression, conversation with neighbors was also significantly predictive of lower odds of these conditions. When conversation with neighbors increased by 1 unit (i.e., from “never or hardly ever” (1) to “less than once a month” (2); or “less than once a month” (2) to “1-3 times a month” (3); and so on), there is a 2% decrease in odds of experiencing an additional chronic condition (OR=0.98, $p<.001$). When conversation with neighbors increases by 1 unit, there is a corresponding 9% decrease in odds of experiencing anxiety/depression (OR=0.91, $p<.01$).

However, when these neighborhood variables were interacted with housing insecurity, a different story was told. For chronic conditions, self-rated mental health, and anxiety/depression, the interaction between neighbor contact/conversation with housing

insecurity was actually associated with higher/elevated odds of these health outcomes. However, the only significant interaction between neighbor interactions and housing insecurity was that of neighbor contact * housing insecurity on self-reported mental health (OR=1.11, $p<.05$). Essentially, this indicates that as housing insecurity experiences increase, higher levels of contact with neighbors is associated with higher odds of experiencing/reporting worse (poor/fair) self-rated mental health (see Figure 7).

Covariates

Race and Physical and Mental Health

In Model 1, being white was associated with significantly lower odds of chronic conditions, self-reported physical health, and self-reported mental health; while for anxiety/depression, being white was actually associated with significantly higher odds of experiencing anxiety/depression compared to blacks (OR=1.43, $p<.05$).

When adding health in MIDUS 2 as a control within Model 2, the effect of race on MIDUS 3 health seemed to fade out. Race was only significantly associated with self-rated physical health (OR=0.66, $p<.01$). This result indicates that, compared to blacks, whites had a 34 percent lower chance/odds of reporting poor/fair physical health.

Education Level and Physical and Mental Health

In Model 1, education was significantly associated with lower odds of all four health outcomes (which is in line with literature that generally posits education as being protective against adverse health). When MIDUS 2 health was added as a control in Model 2, education remained significantly predictive of chronic conditions, self-reported physical health, and self-reported mental health; such that higher levels of education (some college or more) was significantly associated with lower odds of these conditions compared to reference group

participants who had only completed high school or less. In Model 2, some college or more education was associated with 9% lower odds of experiencing an additional chronic condition compared to the reference group (OR=0.91, $p<.001$). In Model 2, some college or more education was also associated with a 49% decline in odds of reporting poor/fair physical health (OR=0.51, $p<.001$). In Table 6 Model 2, some college or more education was also associated with 37% lower odds of reporting poor/fair physical health compared to the high school or less group (OR=0.63, $p<.01$).

Gender and Physical and Mental Health

For chronic conditions and anxiety/depression, men had significantly lower odds of these outcomes compared to women, even when MIDUS 2 health was added to the models. In Model 2, males had 17% lower odds of experiencing additional chronic conditions compared to women (OR=0.83, $p<.001$); and males also had a 39% lower chance of experiencing anxiety/depression compared to females (OR=0.61, $p<.001$).

Age and Physical and Mental Health

When controlling for the prior wave of health in regression model 2, results showed that age was significantly associated with chronic conditions, and self-rated physical and mental health. If age increases by a year, we expect a 1% increase in the risk of an additional chronic condition (OR=1.01, $p<.001$). For self-reported physical health, a one year increase in age was significantly predictive of 1 percent higher odds of reporting poor/fair health (OR=1.01, $p<.05$). Conversely, as age increases by a year, there is a corresponding 2% decrease in odds of reporting poor/fair mental health (OR=0.98, $p<.05$).

Marital Status and Physical and Mental Health

After controlling for MIDUS 2 health in Model 2, marital status was found to be associated with significantly lower odds (31% lower odds) of poor/fair self-reported mental health compared to those in the sample who were unmarried (OR=0.69; $p<.05$).

Substance Use and Physical and Mental Health

Even after controlling for MIDUS 2 health in Model 2, substance use issues were found to be significantly associated with higher odds of worse chronic conditions, self-rated mental health, and anxiety/depression compared to those who did not have substance use issues. These corresponding odds ratios can be found in the regression tables below. Compared to those who did not report substance issues, those who had substance issues in the past year had a 72% elevated risk of experiencing an additional chronic condition (OR=1.72, $p<.001$); a 318% increased risk of reporting poor/fair mental health (OR=3.18, $p<.01$); and a 664% increased risk of reporting anxiety/depression (OR=6.64, $p<.001$).

MIDUS 2 Health and MIDUS 3 Physical and Mental Health Outcomes

As can be seen in Model 2 of each of the below regression tables, MIDUS 2 health was significantly predictive of MIDUS 3 outcomes across every health variable of interest. However, despite controlling for MIDUS 2 health, housing insecurity was found to be significantly predictive of all four health outcomes, which validates the hypothesis that higher housing insecurity experiences predicts adverse health.

Discussion

The results highlight the potential impact of housing insecurity, along with various other neighborhood and demographic factors, on both physical as well as mental health. The descriptive results indicated that, in terms of prevalence of housing insecurity, this differed significantly by age group as well as by race. These findings are not altogether surprising, based

on prior literature. Miller, Tancredi, Kaiser, and Tseng (2020) conducted a study that found “food insecurity rates were highest in late- (37.5%) and early- (36.0%) midlife, relative to younger (33.7%) and older (20.2%) age groups”. Based on the construct of housing insecurity being closely linked to food insecurity, it is not surprising that housing insecurity follows a similar prevalence pattern. It is also conceivable that, while those in earlier adulthood may still be able to have housing support from parents (such as living with parents due to the longer period of emerging adulthood and lower rates of complete financial independence due to economic pressures), midlife adults are at a stage where they may be expected to provide for their own adult children, as well as aging parents; and thus the housing burden is highest during that time of life (Arnett, 2000; Igarashi, Hooker, Coehlo, & Manoogian, 2013). Older adults may also have access to living with their adult children, or governmental housing aid. In the 1949 National Housing Act, a goal was written that every American family would have access to “a decent home and a suitable living environment”; and since that time, various programs and policies have been implemented to improve and subsidize housing costs for low-income elderly people (Pynoos, 2018). However, policy and interest around this goal has waxed and waned across time. Many scholars have raised concern about how to provide safe and affordable housing for America’s growing aging population, and have turned to examples from other countries, such as Japan, with a large aging population who are tackling similar issues and taking steps towards increasing elderly housing policy (Lawler, 2001; Lee, 2010).

Additionally, it was not surprising to note that housing insecurity experiences significantly varied by race. Lee and Evans (2020) found that African Americans face disproportionate rates of eviction and forced movement compared to whites. Thus, it is likely this pattern may hold for other forms of housing insecurity, including missing a rent/mortgage

payment, etc. It is also the case that African Americans tend to have lower socioeconomic status overall compared to whites (in large part due to historic oppression and marginalization, and thus lack of economic opportunity; Sautter, Thomas, Dupre, & George, 2012). Thus, African Americans may be more at-risk of losing housing for financial reasons.

Housing insecurity was found to be significantly associated with higher odds of experiencing each health outcome of interest. While there has been some literature regarding housing insecurity and mental health, this study indicates that housing insecurity is significantly associated with increased odds of experiencing adverse physical health, as well (Forbes & Kreuger, 2019). Focusing specifically on the physical health results, the odds ratios in Tables 4-5 below allow the comparison of housing insecurity on physical health against age on physical health. For example, for number of chronic conditions, as age increases by one year, there is an associated 1% increase in odds of experiencing an additional chronic condition (OR=1.01, $p<.001$). Experiencing an additional housing event is associated with a 10% increase in risk of another chronic condition (OR=1.10, $p<.001$). Therefore, it can be interpreted that experiencing an additional housing insecurity event is comparable to aging 10 years in terms of impact on number of chronic conditions. Looking at self-reported physical health, while an increase in age only corresponds to a 1% increase in odds of reporting poor/fair physical health (OR=1.01, $p<.05$); an increase in housing insecurity experiences is associated with a 56% increase in risk of rating health as poor/fair (OR=1.56, $p<.001$). Again, this illustrates the extent to which housing insecurity can impact physical health, when compared to aging. This indicates that housing insecurity is an important factor to consider when considering and treating health. It also implies that community or governmental action taken to support individuals and families at

risk of housing insecurity experiences, such as eviction or foreclosure, may actually confer health benefits.

In terms of neighbor/community social support, the regression results indicated that hours of support received in a month was not significantly predictive of health; nor did it interact significantly with housing insecurity. However, frequency of neighbor contact and conversations were interesting as they indicated that, on their own, higher levels of neighbor contact and conversation were actually protective—and predictive of lower odds of adverse health. But, when interacted with housing insecurity, this pattern changed; such that, as housing insecurity experiences increased, higher levels of neighbor contact/conversation actually were associated with poorer/worse health outcomes compared to those who received lower neighbor contact/conversation. This may indicate that, as individuals face increasing housing insecurity experiences, the nature of contact and conversation with neighbors may change and become less positive and more negative or contentious in nature (i.e., negotiating a lease agreement or contesting an eviction or rent payment with one's landlord; or asking neighbors for financial or material support); and thus, as housing insecurity increases, more frequency of negative interactions may result in poorer health. It is also possible that those who are housing insecure are more likely to seek out interactions and conversations/support from the community—and thus a selection effect may be in play.

Some of the covariates also posed interesting results in the regressions. For example, the fact that whites overall had lower odds of experiencing adverse health (except for anxiety/depression), was unsurprising, given that blacks tend to experience worse health overall than whites (Orsi, Margellos-Anast, & Whitman, 2010). The association between race and anxiety/depression was interesting, in that whites were more likely to report experiencing these

symptoms; it is possible that there are cultural factors that might influence blacks to underreport anxiety/depression, or that blacks are being diagnosed and treated with anxiety/depression at lower rates than whites due to less accessible care, or bias in treatment (Mays, Jones, Delany-Brumsey, Coles, & Cochran, 2017; Alang, 2019; Neighbors, Jackson, Bowman, & Gurin, 1983). However, the fact that adding MIDUS 2 health into the models nullified significant associations between race and health for the other outcomes indicates that racial differences in health in MIDUS 3 can generally be explained by participants' previous health reports.

The regression results indicated that higher education seemed to be somewhat protective against adverse health. This is in line with prior research on the "education-health gradient"; which indicates that, in general, higher levels of educational attainment tend to correlate with various positive health outcomes (Conti, Heckman, & Urzua, 2010; Schnittker, 2004; Zhang, Chen, McCubbin, McCubbin, & Foley (2011)). The fact that anxiety/depression was exempt from this pattern is intriguing, and indicates that education may not as be predictive of mental health symptoms compared to physical health symptoms. It is possible that the type of jobs/careers associated with high education might be heavily dependent on mental labor, which may be a source of stress; as well as increased peer or social pressure to live a certain lifestyle or provide for family. The regression results for gender on health are in line with the male-female health paradox; wherein, although women tend to live longer, they are also more vulnerable to negative physical health and emotional health experiences compared to men (Baum & Grunberg, 1991; Mayor, 2015). Prior research has also indicated that, due to societal pressure around masculinity and emotionality, men are less likely to report experiencing anxiety/depression, and also less likely to seek treatment for emotional health concerns (Sigmon et al., 2015).

Regarding the association between age and health, the regression results are consistent with prior literature, which indicates that chronic physical conditions and functional challenges may increase with age, but emotional health tends to be more consistent/stable and can even improve with age and experience (Whitbourne, 2001; Stone et al., 2010). The models also indicated that marital status might be more protective against perceptions of mental health, and boost positive mental health; as compared to physical health outcomes. This fits with prior literature, which indicates marriage as conferring emotional benefits; and generally improves physical well-being through providing a sense of stability and social support; but the impact of marriage might be more significant in predicting mental rather than physical health (Koball, Moiduddin, Henderson, Goesling, & Besculides, 2010). Finally, substance use issues significantly predicted higher risk of adverse health, which is consistent with prior literature which indicates that health behaviors such as substance use can be predictive of worse health overall (physical, mental/emotional, and functional; Schulte & Hser, 2013). Due to the high positive and significant associations between substance behaviors and health outcomes found in these models, it is possible that substance use is a mediating factor/pathway between housing insecurity and health, and thus future research should examine the possible potential role of health behaviors in the relationship between insecurity and health.

It is possible that there are mediating pathways or other confounding factors these models did not control for, which could be impacting the association between housing insecurity and health outcomes of interest. For example, general stress related to the aftermath of the recession, including unemployment and general economic insecurity, could potentially partially account for the relationship between housing insecurity and health; and previous research has shown that being exposed to or having experienced a recession-related event (i.e., job loss, pay

cut, etc.) was associated with higher allostatic load and worse mental health for participants (Patel, 2019; Forbes & Kreuger, 2019). Therefore, future research will need to examine other facets of the recession (such as losing one's job due to the recession) to better determine and "untangle" the impact of housing insecurity specifically as a construct impacting health.

Strengths and Limitations

A strength of using the MIDUS dataset is the ability to control for various demographic and health behavior factors, including race, gender, marital status, education, age, and substance use. In addition, the longitudinal nature of the study allowed the assessment of the impact of housing insecurity on MIDUS 3 health while controlling for corresponding MIDUS 2 health as a covariate/predictor. MIDUS in general has information on various biomarkers such as C-reactive protein or IL-6, and specific depression/anxiety diagnoses (all of which are provided in the MIDUS dataset), which can be used to better understand the biological impacts of housing insecurity in a future study. There is a possibility when using self-rated health, although it has been found overall to be a fairly accurate indicator of health, that participants who are more sensitive to and likely to perceive discrimination will also be more likely to report worse health; thus, the association could be a selectivity effect. This is why using other health measures besides self-reports could be beneficial in future studies.

Limitations of the analysis include issues with self-reports of health in terms of accuracy of these reports. Self-report data can vary based on personal bias/cultural or contextual factors that impact reporting certain types of health outcomes. Minority or low SES populations may have less access to healthcare and thus conditions may not be accurately diagnosed (underreported). Another major issue with this sample is that it does not provide time-sensitive information on when housing insecurity was experienced, or how many times different housing

insecurity items might have been experienced, which limits the ability to capture the full scope of housing insecurity.

Conclusions and Implications

In sum, this study provided support for the earlier stated research questions and hypotheses. (1) Do experiences of housing insecurity predict physical and mental health? The analysis found that people who have experienced more housing insecurity have increased risk of poorer physical and mental health for every MIDUS 3 outcome, even when controlling for corresponding health in MIDUS 2. (2) Does housing insecurity disproportionately impact African Americans (AAs)? This study found that African Americans experience significantly higher levels of housing insecurity compared to whites; and that African Americans were less likely to experience each health outcome, with the exception of anxiety/depression. (3) Do sources of social support (i.e., community support) act as a buffer in the relationship between housing insecurity and health outcomes? Neighbor contact/conversations seem to be protective against adverse health; but, when interacting with housing insecurity, higher levels of neighbor contact and conversation predict worse health. This result was not what had been hypothesized earlier; I had predicted that, when interacting with housing insecurity, higher neighbor support would buffer the positive relationship between housing insecurity and health. There are various potential reasons for this result. This may be because the nature of this neighbor contact/conversation may be negative rather than positive for housing insecure participants, compared to non-housing insecure participants. Thus, when those without housing insecurity interact with neighbors, this social support is a positive and a protective factor against poor health. However, the nature of interactions is more negative and stressful for the housing insecure participants, and thus higher interaction corresponds with poorer health for this group.

This research project is particularly timely because of housing insecurity issues in the face of the current COVID-19 pandemic. The current novel coronavirus (COVID-19) pandemic is thrusting the country into new economic challenges that mirror the impacts and negative effects of the 2008 recession. The global health crisis onset by the COVID-19 pandemic has led to various economic repercussions: the U.S. “unemployment rate peaked at an unprecedented level, not seen since data collection started in 1948, in April 2020 (14.8%) before declining to a still elevated level in December (6.7%)” (Falk, Carter, Nicchitta, Nyhof, & Romero, 2021). Even as the national unemployment rate has dropped, in-person service industries continue to suffer (for example, the leisure and hospitality industry currently has an unemployment rate of 16.7%) (Falk et al., 2021). Part-time workers, workers without a college degree, women, and racial/ethnic minorities continue to be most vulnerable to unemployment due to the pandemic (Falk et al., 2021). It is likely that Americans will continue to face housing insecurity at increasing rates as more people become unemployed, a problem exacerbated by the continuing increase in rent prices over the past decade (Egede & Walker, 2020; Rogers & Power, 2020). While the United States (U.S.) government has issued moratoriums on evictions due to the pandemic, once these moratoriums expire, an estimated 40 million Americans could be facing homelessness (Egede & Walker, 2020).

Particularly in the face of the COVID-19 pandemic, and associated economic repercussions, it is likely that Americans will continue to face housing insecurity at increasing rates as more people become unemployed, a problem exacerbated by the continuing increase in rent prices (Egede & Walker, 2020). The scale developed in this study will provide a foundation for future research in the field of housing insecurity, which will likely be extended in the COVID-19 era. The formulation of effective interventions and countermeasures to reduce

housing insecurity effects on health outcomes, therefore, becomes critical. This research has far-reaching policy implications for policy makers, activists, and the population at large. The results derived from this analysis can be leveraged by various stakeholders to address housing insecurity as a public health issue. For example, this research can inform such actions, including providing insights into factors to consider in housing insecurity relief and stimulus packages as well as broad social and familial recommendations for physical and mental well-being in the face of insecurity challenges. This research is also very timely because of its focus on the middle-aged and elderly, a population group whose share in the US population has been rapidly rising and is forecast to continue rising for the next decade (Case, Deaton, & Stone, 2020). Results from this analysis can be used to identify the needs of adults and families facing housing insecurity, and create financial supports or develop social programs to assist them, which can ultimately help preserve their health and well-being.

Future Research Directions

According to Leopold, Cunningham, Posey, and Manuel (2016) and Cox et al. (2016), there is a need to consider issues such as neighborhood safety, neighborhood quality/cleanliness, and access to transportation as issues that go hand in hand with the concept of housing insecurity. Therefore, future research should examine housing insecurity issues, such as eviction, moving in with family/friends, and missing rent payments in conjunction with the quality and safety of the areas in which participants live, to assess housing issues within a spatial context. Future research will also examine and control for other recession events that could possibly be predicting health outcomes, including unemployment and financial insecurity.

Future directions for this line of research include use of functional health and biomarker information from MIDUS to assess biological impacts of post-recession housing insecurity on

individuals, as well as how housing insecurity may influence ability to perform basic and functional activities and tasks of daily living. Future research will also investigate the predictive role of housing insecurity experiences on various health behaviors, such as alcohol and drug/substance use, and how these behaviors in turn act as a mediating pathway in predicting physical, biological, functional, and mental health. Future analyses using this data will also intend to stratify the sample by race to better assess the differential impacts housing insecurity may have on health outcomes for black versus white participants. In following manuscripts, I will also include family as potential source of social support as a moderator, and investigate whether familial support acts as a significant predictor or interacts significantly with housing insecurity to predict health; and whether the nature of familial support influences health differently than neighbor/community support (which was relatively insignificant as a moderator). To better link housing insecurity issues to a life course perspective, it could be useful to assess whether participants who experience housing insecurity in midlife have certain characteristics in common related to childhood or adolescent adverse experiences (as this has been found to be the case for food insecurity; an accumulation of ACEs (adverse childhood experiences) is associated with increased odds of experiencing food insecurity in adulthood; Testa & Jackson, 2020). The pathways by which childhood experiences as well as historical time contributes to housing insecurity and health indicates the need to cohort analyses or longitudinal analyses on data to assess what factors predict the association between housing insecurity and health across time, and across age groups.

Research conducted for this study has also highlighted how interconnected and intertwined housing insecurity is with insecurity of other basic needs. Thus, it is essential to examine housing insecurity in conjunction with insecurity of food and water to better understand

how these constructs overlap to determine health; and thus what measures should be taken at community and policy levels to support and assist individuals and families who are facing these issues. And finally, I hope to use MIDUS to compare and contrast impacts of the 2008 Recession versus the COVID-19 pandemic on housing insecurity and health in midlife, once the MIDUS study collects data on the pandemic. This will help researchers understand how certain economic and historical contexts can exacerbate the issues of housing insecurity and impact health; as well as how other factors relevant to each time period may also contribute to health disparities (such as the prominent racial disparities surrounding COVID-19 infections and vaccinations, as well as social isolation due to mandated quarantines and safety protocol).

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APPENDIX A**TABLES**

Table 1. Descriptives ($N = 2532$)

Variable	<i>n</i>	%	<i>mean</i>	<i>sd</i>	<i>range</i>
Gender					
Male	1081	42.69			
Female	1451	57.31			
Age (W3)			63.42	10.94	39-94
Race					
White	2129	84.08			
Black	403	15.92			
Highest educational level (W3)					
High school or less	777	30.69			
Some college or more	1755	69.31			
Marital status (W3)					
Married	1566	61.85			
Not married	966	38.15			
Substance use (W3)					
Yes	44	1.74			
No	2488	98.26			
Self-rated physical health (W2)					
Poor/Fair	310	12.24			
Good+	2222	87.76			
Self-rated physical health (W3)					
Poor/Fair	465	18.36			
Good+	2067	81.64			
Chronic conditions (W2)			2.36	2.37	0-30
Chronic conditions (W3)			3.32	3.11	0-20
Self-rated mental health (W2)					
Poor/Fair	164	6.48			
Good+	2368	93.52			
Self-rated mental health (W3)					
Poor/Fair	259	10.23			
Good+	2273	89.77			

Variable					
	<i>n</i>	%	<i>mean</i>	<i>sd</i>	<i>range</i>
Anxiety/depression (W2)					
Yes	448	17.69			
No	2084	82.31			
Anxiety/depression (W3)					
Yes	532	21.01			
No	2000	78.99			
Housing insecurity (W3)			0.26	0.75	0-5
Yes	361	14.26			
No	2171	85.74			
Homeless (W3)					
Yes	25	0.99			
No	2507	99.01			
Eviction/foreclosure (W3)					
Yes	163	6.44			
No	2369	93.56			
Lost home foreclosure (W3)					
Yes	66	2.61			
No	2466	97.39			
Lost home not foreclosure (W3)					
Yes	59	2.33			
No	2473	97.67			
Missed rent/mortgage (W3)					
Yes	210	8.29			
No	2322	91.71			
Moved in to save (W3)					
Yes	143	5.65			
No	2389	94.35			
Neighbor support (W3)			3.32	17.85	0-744
Neighbor contact (W3)			4.93	1.32	1-6
Neighbor conversation (W3)			2.95	1.61	1-6

Table 2. Descriptives of Housing Insecurity Items

	Race		Gender		Education		Marital status	
	White N %	Black N %	Male N %	Female N %	HS or less N %	Some college or more N %	Married N %	Not married N %
Missed rent/mortgage	115 5.4%	95 23.6%	82 7.6%	128 8.8%	82 10.6%	128 7.3%	83 5.3%	127 13.1%
Moved in with friends/family	82 3.9%	61 15.1%	52 4.8%	91 6.3%	60 7.7%	83 4.7%	40 2.6%	103 10.7%
Threatened foreclosure/eviction	86 4.0%	77 19.1%	66 6.1%	97 6.7%	62 8.0%	101 5.8%	59 3.8%	104 10.8%
Lost home foreclosure	37 1.7%	29 7.2%	29 2.7%	37 2.5%	28 3.6%	38 2.2%	33 2.1%	33 3.4%
Lost home not foreclosure	44 2.1%	15 3.7%	15 1.4%	44 3.0%	21 2.7%	38 2.2%	18 1.1%	41 4.2%
Experienced homeless	13 0.6%	12 3.0%	11 1.0%	14 1.0%	14 1.8%	11 0.6%	6 0.4%	19 2.0%
Housing insecurity	214 10.1%	147 36.5%	141 13.0%	220 15.2%	138 17.8%	223 12.7%	133 8.5%	228 23.6%

Table 3. Descriptive statistics and correlations of study variables

	Race	Gender	Education	Age	Marital	Substance	Chronic (W2)	Chronic (W3)	Physical (W2)
1. Race									
2. Gender	.06***								
3. Education	.12***	.08***							
4. Age	.08***	.03	-.10***						
5. Marital	.31***	.20***	.08***	-.07***					
6. Substance	-.06***	.05*	-.04	-.04*	-.05*				
7. Chronic (W2)	-.11***	-.17***	-.13***	.14***	-.12***	.01			
8. Chronic (W3)	-.12***	-.16***	-.14***	.12***	-.12***	.10***	.58***		
9. Physical (W2)	-.22***	-.04*	-.15***	-.01	-.13***	.03	.36***	.31***	
10. Physical (W3)	-.20***	-.06***	-.19***	.02	-.13***	.04	.34***	.36***	.44***
11. Mental (W2)	-.13***	-.09***	-.10***	-.06***	-.11***	.06***	.27***	.27***	.38***
12. Mental (W3)	-.14***	-.04*	-.11***	-.09***	-.12***	.10***	.25***	.29***	.25***
13. Anxiety (W2)	0.00	-.17***	-.06***	-.09***	-.11***	.06***	.48***	.29***	.19***
14. Anxiety (W3)	-.02	-.15***	-.06***	-.06***	-.10***	.13***	.31***	.44***	.16***
15. Neighbor Support	-.01	-.03	-.04*	-.02	.02	-.01	-.01	.01	.01
16. Neighbor Contact	.02	.07***	.03	.07***	.03	-.02	-.08***	-.08***	-.10***
17. Neighbor Converse	.06***	.04	-.02	.17***	0.00	-.01	-.02	-.04*	-.07***
18. Home Insecurity	-.26***	-.03	-.07***	-.18***	-.19***	.05***	.12***	.14***	.11***

Note. *p < .05. **p < .01. ***p < .001.

	Physical (W3)	Mental (W2)	Mental (W3)	Anxiety (W2)	Anxiety (W3)	Neighbor Support	Neighbor Contact	Neighbor Converse	Home Insecurity
1. Race									
2. Gender									
3. Education									
4. Age									
5. Marital									
6. Substance									
7. Chronic (W2)									
8. Chronic (W3)									
9. Physical (W2)									
10. Physical (W3)									
11. Mental (W2)	.24***								
12. Mental (W3)	.40***	.31***							
13. Anxiety (W2)	.15***	.34***	.23***						
14. Anxiety (W3)	.20***	.25***	.32***	.45***					
15. Neighbor Support	.01	-.01	-.01	.04	.03				
16. Neighbor Contact	-.08***	-.09***	-.08***	-.07***	-.08***	.02			
17. Neighbor Converse	-.05*	-.05*	-.04*	-.04	-.07***	.02	.55***		
18. Home Insecurity	.20***	.10***	.23***	.12***	.12***	0.00	-.03	-.06***	

Note. *p < .05. **p < .01. ***p < .001.

Table 4. Poisson regression models of chronic health conditions, Midlife in the United States (n=2,532)

	Model 1		Model 2		Model 3		Model 4		Model 5	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Housing Insecurity (HI)	1.15***	1.12-1.18	1.10***	1.07-1.13	1.10***	1.07-1.13	1.10***	1.07-1.13	1.10***	1.07-1.13
Neighbor support * HI					1.00†	0.99-1.00				
Neighbor contact * HI							1.01†	1.00-1.03		
Neighbor converse * HI									1.01†	1.00-1.03
Neighborhood Support										
Neighbor support					1.00	1.00-1.00				
Neighbor contact							0.97***	0.95-0.98		
Neighbor converse									0.98***	0.96-0.99
Sex (Ref=Female)										
Male	0.74***	0.71-0.77	0.83***	0.79-0.87	0.83***	0.79-0.87	0.83***	0.80-0.87	0.83***	0.79-0.87
Age	1.01***	1.01-1.01	1.01***	1.01-1.01	1.01***	1.01-1.01	1.01***	1.01-1.01	1.01***	1.01-1.01
Race/ethnicity (Ref=Black)										
White	0.86***	0.81-0.91	0.95	0.90-1.01	0.96	0.90-1.01	0.96	0.90-1.02	0.96	0.90-1.02
Education (Ref=HS or less)										
Some college or more	0.84***	0.80-0.87	0.91***	0.87-0.95	0.91***	0.87-0.96	0.91***	0.87-0.95	0.91***	0.87-0.95
Marital Status (Ref=Not married)										
Married	0.97	0.93-1.02	1.00	0.96-1.05	1.00	0.95-1.05	1.00	0.96-1.05	1.00	0.95-1.05
Health Behaviors (Ref=No substance abuse)										
Substance abuse last 12 months	1.75***	1.54-1.98	1.72***	1.51-1.95	1.72***	1.51-1.94	1.70***	1.49-1.93	1.72***	1.51-1.95
MIDUS 2 Health										
Chronic conditions last 12 months			1.13***	1.12-1.13	1.13***	1.12-1.13	1.13***	1.12-1.13	1.13***	1.12-1.13

Significance level: † p ≤ 0.10, * p ≤ 0.05, ** p ≤ 0.01, *** p ≤ 0.001

Model 1 R²=.093; Model 2 R²=.269; Model 3 R²=.269; Model 4 R²=.271; Model 5 R²=.271

Table 5. Logistic regression models of self-reported physical health, Midlife in the United States (n=2,532)

	Model 1		Model 2		Model 3		Model 4		Model 5	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Housing Insecurity (HI)	1.53***	1.35-1.73	1.56***	1.37-1.79	1.56***	1.37-1.79	1.56***	1.37-1.79	1.56***	1.36-1.79
Neighbor support * HI					1.00	0.99-1.02				
Neighbor contact * HI							1.06	0.97-1.16		
Neighbor converse * HI									1.00	0.93-1.08
Neighborhood Support										
Neighbor support					1.00	0.99-1.01				
Neighbor contact							0.91*	0.84-0.99		
Neighbor converse									0.96	0.89-1.03
Sex (Ref=Female)										
Male	0.85	0.68-1.07	0.87	0.68-1.10	0.87	0.68-1.11	0.88	0.69-1.12	0.87	0.68-1.11
Age	1.01*	1.00-1.02	1.01*	1.00-1.02	1.01*	1.00-1.02	1.01*	1.00-1.03	1.01*	1.00-1.03
Race/ethnicity (Ref=Black)										
White	0.47***	0.36-0.61	0.66**	0.49-0.89	0.66**	0.49-0.89	0.66**	0.49-0.89	0.66**	0.49-0.89
Education (Ref=HS or less)										
Some college or more	0.44***	0.35-0.54	0.51***	0.40-0.64	0.51***	0.40-0.64	0.50***	0.40-0.64	0.50***	0.40-0.64
Marital Status (Ref=Not married)										
Married	0.79*	0.62-0.99	0.85	0.67-1.10	0.86	0.67-1.10	0.85	0.66-1.10	0.85	0.66-1.10
Health Behaviors (Ref=No substance abuse)										
Substance abuse last 12 months	1.41	0.67-2.81	1.32	0.58-2.82	1.33	0.59-2.83	1.26	0.55-2.72	1.32	0.58-2.82
MIDUS 2 Health (Ref=SRH Good+)										
SRH Poor/Fair			10.45***	7.92-13.83	10.45***	7.93-13.84	10.15***	7.69-13.45	10.33***	7.83-13.68

Significance level: † $p \leq 0.10$, * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$ Model 1 $R^2=.087$; Model 2 $R^2=.205$; Model 3 $R^2=.205$; Model 4 $R^2=.207$; Model 5 $R^2=.205$

Table 6. Logistic regression models of self-reported mental health, Midlife in the United States (n=2,532)

	Model 1		Model 2		Model 3		Model 4		Model 5	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Housing Insecurity (HI)	1.62***	1.42-1.85	1.65***	1.43-1.89	1.65***	1.43-1.89	1.65***	1.43-1.90	1.65***	1.43-1.90
Neighbor support * HI					1.01	0.99-1.02				
Neighbor contact * HI							1.11*	1.01-1.22		
Neighbor converse * HI									1.02	0.94-1.10
Neighborhood Support										
Neighbor support					0.99	0.97-1.01				
Neighbor contact							0.87**	0.79-0.96		
Neighbor converse									0.97	0.89-1.06
Sex (Ref=Female)										
Male	0.84	0.63-1.11	0.97	0.72-1.31	0.98	0.72-1.31	0.99	0.74-1.34	0.98	0.72-1.32
Age	0.98**	0.97-0.99	0.98*	0.97-1.00	0.98*	0.97-1.00	0.99*	0.97-1.00	0.99*	0.97-1.00
Race/ethnicity (Ref=Black)										
White	0.71*	0.51-1.00	0.83	0.58-1.19	0.82	0.58-1.17	0.84	0.59-1.20	0.83	0.58-1.18
Education (Ref=HS or less)										
Some college or more	0.55***	0.42-0.73	0.63**	0.47-0.84	0.62**	0.47-0.84	0.62**	0.47-0.84	0.63**	0.47-0.84
Marital Status (Ref=Not married)										
Married	0.63**	0.47-0.85	0.69*	0.51-0.93	0.69*	0.51-0.94	0.68*	0.50-0.92	0.69*	0.51-0.93
Health Behaviors (Ref=No substance abuse)										
Substance abuse last 12 months	3.69***	1.80-7.24	3.18**	1.48-6.53	3.18**	1.48-6.51	3.09**	1.41-6.42	3.19**	1.48-6.56
MIDUS 2 Health (Ref=SRH Good+)										
SRH Poor/Fair			7.63***	5.27-11.04	7.64***	5.27-11.05	7.28***	5.01-10.55	7.60***	5.24-10.99

Significance level: † p ≤ 0.10, * p ≤ 0.05, ** p ≤ 0.01, *** p ≤ 0.001

Model 1 R²=.095; Model 2 R²=.158; Model 3 R²=.159; Model 4 R²=.164; Model 5 R²=.158

Table 7. Logistic regression models of anxiety/depression, Midlife in the United States (n=2,532)

	Model 1		Model 2		Model 3		Model 4		Model 5	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Housing Insecurity (HI)	1.33***	1.18-1.50	1.22**	1.06-1.40	1.22**	1.06-1.40	1.22**	1.06-1.40	1.23**	1.07-1.41
Neighbor support * HI					1.00	0.98-1.01				
Neighbor contact * HI							1.05	0.96-1.15		
Neighbor converse * HI									1.06	0.98-1.14
Neighborhood Support										
Neighbor support					1.00	1.00-1.01				
Neighbor contact							0.90**	0.83-0.97		
Neighbor converse									0.91**	0.85-0.98
Sex (Ref=Female)										
Male	0.47***	0.38-0.58	0.61***	0.48-0.78	0.61***	0.48-0.78	0.62***	0.49-0.79	0.62***	0.49-0.79
Age	0.99*	0.98-1.00	1.00	0.99-1.01	1.00	0.99-1.01	1.00	0.99-1.01	1.00	0.99-1.01
Race/ethnicity (Ref=Black)										
White	1.43*	1.07-1.92	1.16	0.85-1.61	1.17	0.85-1.62	1.18	0.86-1.63	1.18	0.86-1.64
Education (Ref=HS or less)										
Some college or more	0.79*	0.64-0.98	0.87	0.69-1.10	0.87	0.69-1.11	0.87	0.69-1.11	0.86	0.68-1.10
Marital Status (Ref=Not married)										
Married	0.71**	0.57-0.88	0.83	0.65-1.05	0.82	0.65-1.04	0.82	0.65-1.04	0.82	0.65-1.04
Health Behaviors (Ref=No substance abuse)										
Substance abuse last 12 months	6.83***	3.65-13.14	6.64***	3.33-13.42	6.65***	3.33-13.44	6.62***	3.30-13.44	6.84***	3.42-13.88
MIDUS 2 Health (Ref=No Anxiety/depression)										
Anxiety/depression last 12 months			9.03***	7.13-11.46	9.00***	7.11-11.43	8.95***	7.06-11.36	9.03***	7.13-11.48

Significance level: † $p \leq 0.10$, * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$ Model 1 $R^2=.056$; Model 2 $R^2=.187$; Model 3 $R^2=.187$; Model 4 $R^2=.190$; Model 5 $R^2=.190$

APPENDIX B**FIGURES**

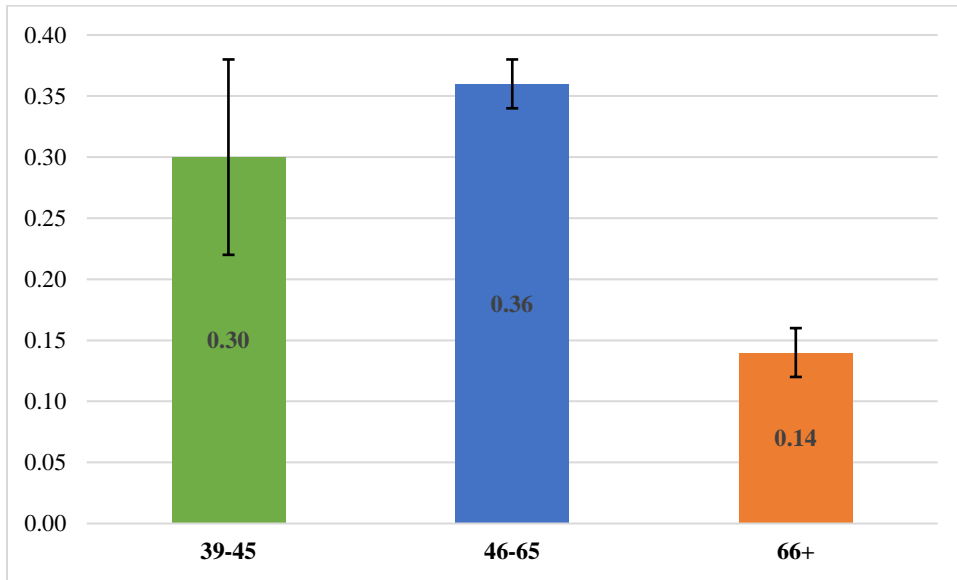
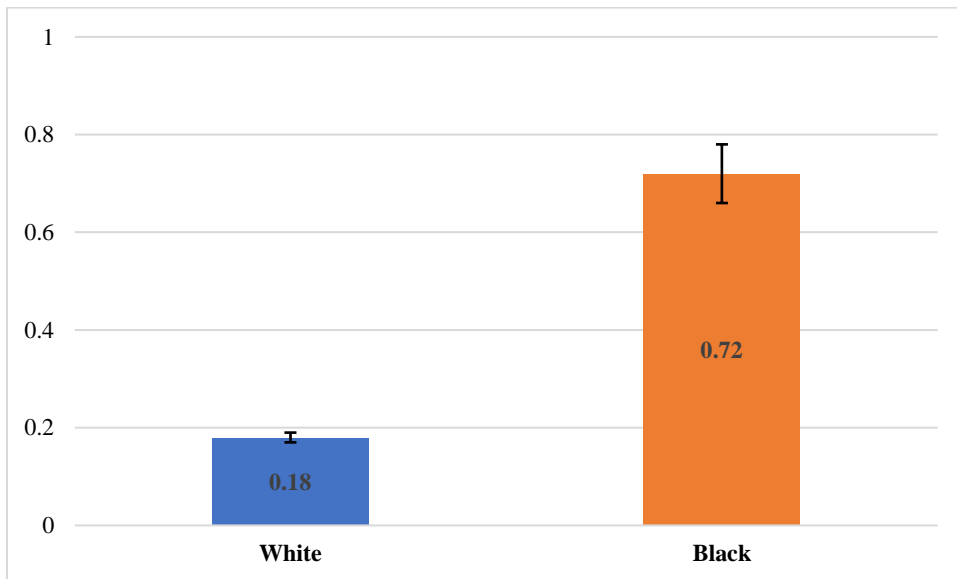
Figure 1. Means and Standard Errors of Housing Insecurity by Age Group**Figure 2.** Means and Standard Errors of Housing Insecurity by Race

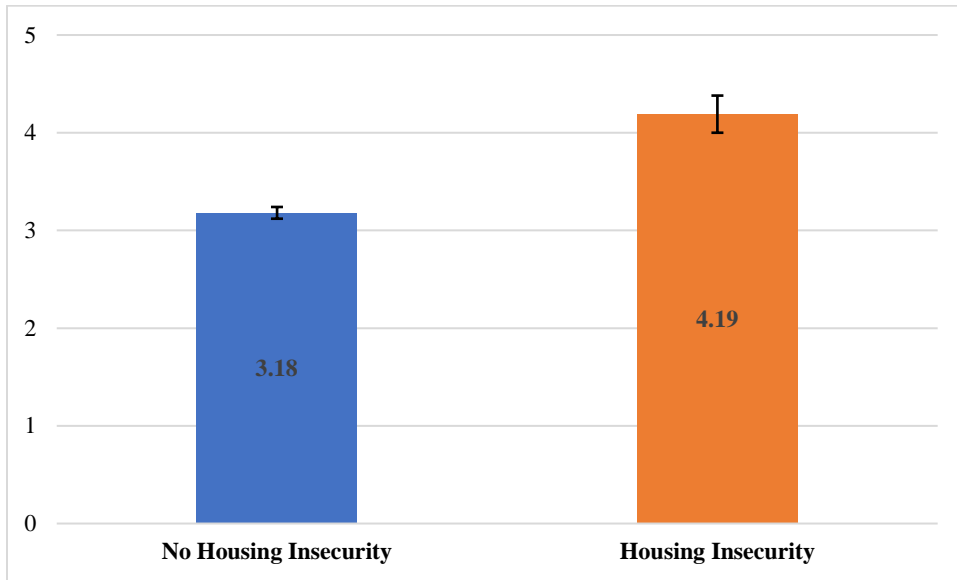
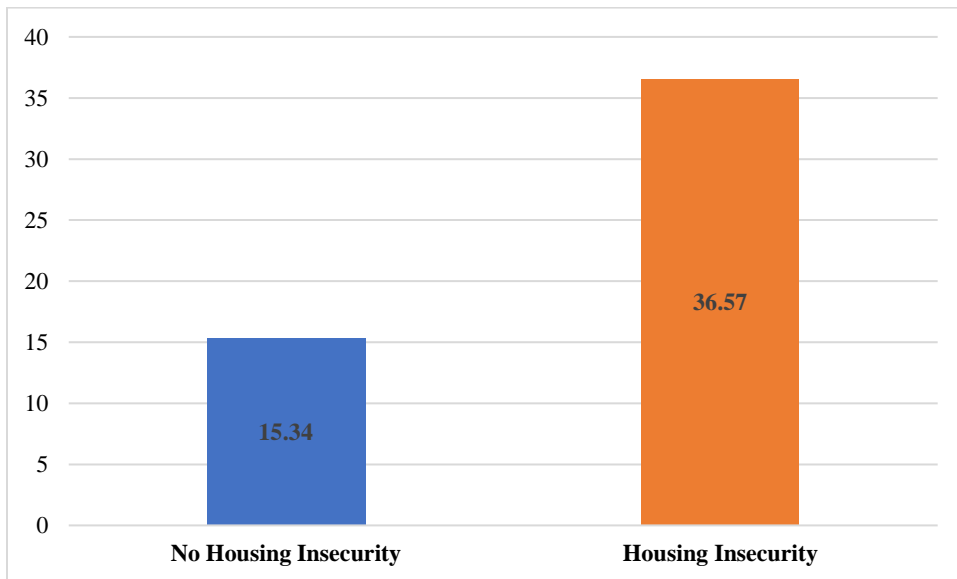
Figure 3. Mean Number of Chronic Conditions**Figure 4.** Percent Reporting Poor/Fair Physical Health

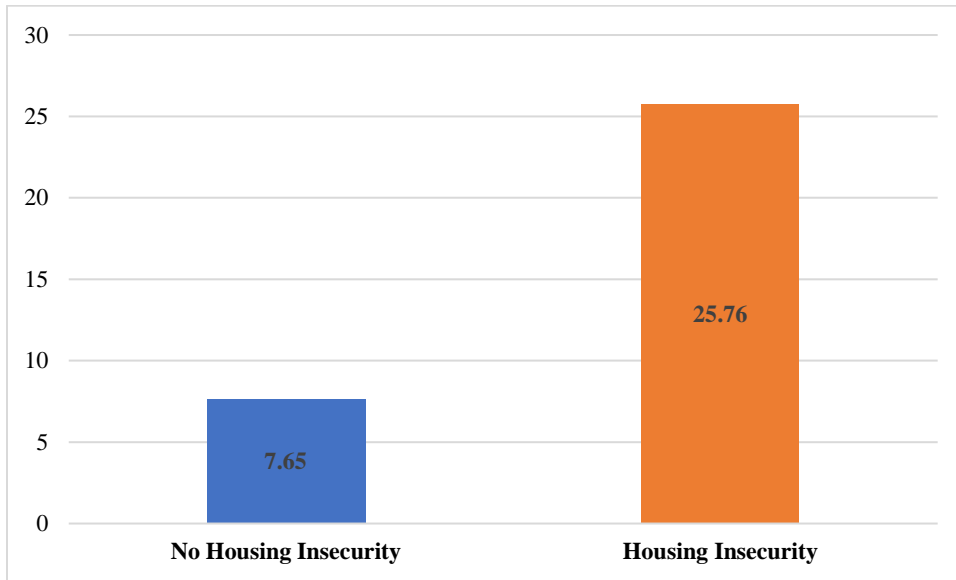
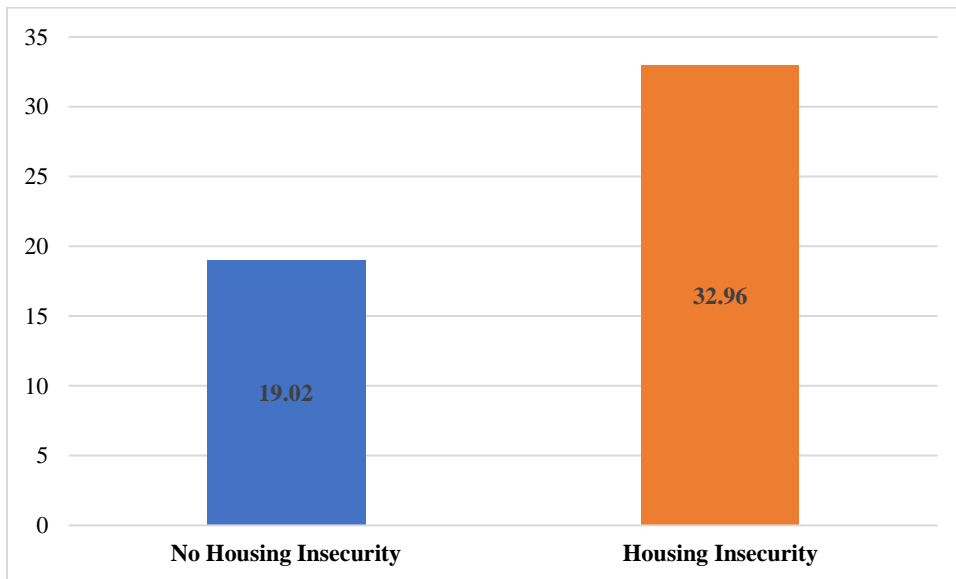
Figure 5. Percent Reporting Poor/Fair Mental Health**Figure 6.** Percent Reporting Anxiety/Depression

Figure 7. The Association Between Housing Insecurity and Self-Rated Mental Health: Moderation by Neighbor Contact

