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The urban neighborhood, depressive symptoms, and age: stress and psychosocial resources

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The Urban Neighborhood, Depressive Symptoms, and Age:

Stress and Psychosocial Resources

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Master of Science in Public Health

by

Frederick A. Harig

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ABSTRACT OF THE THESIS

The Urban Neighborhood, Depressive Symptoms, and Age:

Stress and Psychosocial Resources

by

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Master of Science in Public Health

University of California, Los Angeles, 2012

Professor Carol S. Aneshensel, Chair

Existing research shows that residents exposed to neighborhood socioeconomic disadvantage (NSD) have a relatively high risk of some types of mental illness. This study investigated whether this pattern is present for depressive symptoms among persons in late-middle age to extreme old age, and if so why. Investigated factors include: stressors (neighborhood physical disorder and financial strain) and psychosocial resources (mastery, social support, and religious service attendance). Age differences were examined.

NSD was positively associated with depressive symptoms net of individual-level demographic characteristics used to control for selection. Exposure to stressors partially explained the association while psychosocial resources suppressed it. A significant, curvilinear cross-level interaction with age was found: NSD is positively associated with symptoms among those under 64, but has little effect among persons 65 to 74 year, and is negative at older ages. The mental health disparity for depressive symptoms in disadvantaged neighborhoods is partially due to greater exposure to stressors and fewer resources to counteract this exposure. The counter-intuitive inverse association among the oldest adults warrants further investigation.

The thesis of Frederick A. Harig is approved.

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CHAPTER I

Background

Introduction

Stress process theory links social stratification to health disparities and therefore provides a cogent framework for studying the mental health effects of living in stratified neighborhoods. Furthermore, residents over 50 years in age are especially vulnerable to the effects of the socially disadvantaged neighborhood. From late-middle adulthood through advanced-old age, depression is the most frequent cause of emotional distress. It is associated with an increased risk of co-morbidity and mortality, and it impedes recuperation from myocardial infarction (Blazer, Hughes, & George, 1987). During this period of the life course, there is a gradual increase in vulnerability and susceptibility to illness, and depressive symptoms reach its highest level for the oldest adults (Mirowksy & Ross, 1992). Social causation may explain some of the occurrence of depressive disorders for persons over 50 years in age through exposure to new stressors and diminishing protective psychosocial resources (Aneshensel, 2009). This study examines how neighborhood conditions influence depressive symptoms in this population through differential exposure to stress and differential access to psychosocial resources.

Depressive disorders are common and associated with age, but are not well understood. One in four people in the United States experience a depressive disorder during their lifetime (Kessler et al., 2005); but vulnerability to this debilitating illness is not universal. Recent empiricism has shifted vulnerability from the historical medical model approach of intrapersonal psychological mechanisms towards the social environment. Social inequalities stratify exposure to stress phenomenologies and access to psychosocial resources; consequently, psychological distress and depressive disparities are disproportionately distributed across sociodemographic

subgroups (Aneshensel, 2009; Pearlin, 1989). The individual-level social correlates associated with depressive disorders are well known. In contrast, there is considerable ambiguity about the role of neighborhood-level social inequality. Neighborhood-level socioeconomic disadvantage contributes to an environment with an increase in chronic and stressful life events and a decrease in psychosocial resources (Aneshensel & Sucoff, 1996; Galea et al., 2007; Hill et al., 2005; Robert, 1998; Ross, 2000; Ross & Mirowsky, 2008; Schieman & Meersman, 2004; Silver et al., 2002). The social context of the neighborhood environment may partially explain depressive disparities for residents over 50 years in age.

This study investigates whether social inequalities, measured by neighborhood-level socioeconomic disadvantage, and mental health disparities, measured by depressive symptoms, are associated among persons in late-middle adulthood through advanced-old age, and if so what factors help to explain this association. This study's focal relationship is the independent variable of neighborhood socioeconomic disadvantage and the dependent variable of depressive symptoms. This focal relationship is examined through individual-level differences in stress exposure and access to psychosocial resources.

This chapter begins with a discussion of depressive disorder symptomology, prevalence, and etiology. Then, in regards to the multidimensionality of mental wellbeing, categorical measurement of depressive symptoms is discussed along with its implications for whether age has a linear relationship with depressive symptoms.

This is followed by a discussion of the social etiology of depressive symptoms as demonstrated through the distribution of depressive disorders across social groups. Next, these distributions are explained by reference to variability of exposure to social stressors and access to psychosocial resources. This is followed by a review of the theoretical, conceptual, and methodological issues of studying neighborhood-level effects on mental health. The chapter ends with the presentation of an application of a neighborhood stress process framework,

including a discussion of the key concepts of the independent, dependent, control, and intervening variables.

Background

Depressive Disorders

Unlike transient feeling of sadness, the most common mood disorder of Major Depressive Disorder (MDD) severely impacts the individual's quality of life. An MDD episode includes these major components: depressed mood or lack of interest in one's usual activities, feelings of guilt and worthlessness, feelings of helplessness and hopelessness, psychomotor retardation, loss of appetite, and sleep disturbance (American Psychiatric Association, 2000). More common in older adults is a depression syndrome without sadness (Gallo et al., 1997); and a depletion syndrome marked by withdrawal, apathy, and lack of vigor (Adams, 2001; Blazer, 2003; Newman, 1989; Newman et al., 1991). Another concern for older adults is that late-onset depressive disorder frequently includes psychomotor retardation (Lockwood et al., 2002). The National Comorbidity Survey reports that those with MDD report a mean of 35.2 days per year of not being able to carry out normal daily activities (Kessler et al., 2005). For older adults, these debilitating symptoms restrict quality of life and affect their overall health.

From late-middle adulthood through advanced old age, MDD contributes to higher utilization of health care services, impedes recuperation, and increases risk for comorbidity and mortality. Depressive symptoms are associated with increased medical service costs and outpatient services (Fischer et al., 2003; Unutzer et al., 1997). MDD, with a 25 percent co-occurrence, impedes recuperation from a myocardial infarction (Carney & Freedland, 2003; Romanelli et al., 2002). Depressive symptoms increase the risk for comorbidity in brain cell atrophy, Alzheimer and cardiovascular diseases, and bone density, as well as weight loss (Alexopoulos et al., 1993; Morley & Kraenzle, 1994; Lyles, 2001; McEwan, 2003). MDD increases mortality risk by 4.31 fold—even after controlling for physical health problems (Leaf et

al., 1989). Recent nursing home admittees with MDD have an increased risk for mortality during their first year (American Psychiatric Association, 2000). The distressing symptoms of MDD increase allostatic load and over time lead to excessive physiological wear and tear, impaired immunity and healing; this contributes to an early death (McEwan, 2003).

Describing mental wellbeing as being free of a diagnosed depressive disorder may hide the psychological distress experienced by older adults. During their lifetime 20.8 percent of all adults will experience a mood disorder and 16.6 percent of older adults will experience Major Depressive Disorder (Kessler et al., 2003). Kessler and colleagues report that adults over 65 have the lowest risk of MDD (Kessler et al., 2003); which Blazer confirms with the low 0.8 percent prevalence (Blazer et al., 1987). The physiology of older adults, as well as cohort variability, contributes to differences missed by researchers who categorize all older adults as one group. There is a curvilinear relationship between age and depressive symptoms, where the highest depressive symptoms are found among those over eighty years in age (Ferraro & Rinaldo, in press). Older adults experience an increase in low-grade depressive symptoms, which is accompanied by a lower prevalence of high-grade depressive disorders (Ferraro & Rinaldo, in press). Psychiatric disorders are dynamic and experienced as gradations of symptoms—there is no black and white boundary, some symptoms are dropped while others are gained. Mirowsky and Ross (1989) argue that evaluating psychiatric conditions as binary diagnoses contributes to a loss of valuable information, and is a weak measurement of understanding the multidimensionality of mental health (Mirowsky & Ross, 1989). On the other hand, depressive disorders, measured as continuous symptoms, reveal the pervasiveness of psychological distress (Horwitz, 1999). Beekman and colleagues found in a review of 34 community-based studies that for persons over 55 years in age, MDD was rare at 1.8 percent; but for all clinically relevant depressive symptoms, the average prevalence was 13.3%

(Beekman et al., 1999). The categorical diagnosis of depressive symptoms, therefore, masks much of the psychological distress experienced by older adults.

A single broad categorization of old age overlooks the differences between cohorts in that category, while a continuous measure misses the nuanced social experience of aging if only linear effects are examined. To large extent, neighborhood studies group adults over 65 into a single category (Berke et al., 2007), or use a continuous age variable (Hybels et al., 2006; Ostir et al., 2003; Schieman & Meersman, 2004), despite known differences in aging physiologies, cohort historical experiences, and social rankings (Lynch & Smith, 2005; NIH, 2007). Advanced aging is considered the innate physiological source of some diseases. However, most gerontologists are skeptical that age is an independent variable, believing it meaningless and mediated by social processes and cultural attitudes (Laws, 1995; Macnicol, 2006). Persons with a healthy lifestyle, low stress, and access to resources will mature with a modest, subtle, and steady decline in health. These persons, after reaching 80 years of age, will then experience a precipitous drop in physiological health. This biological aging process is sped up or slowed down considerably by individual diet, sedentary behavior, and social influence, including socioeconomic status.

Ageism is the systematic stereotyping and discrimination against people because of their age (Butler, 1975); consequently, social ranking creates age variation in stress exposure and access to personal and social resources. Specifically, life course position determines employment status, social roles like spouse or grandparent, and health care access. Older adults are more likely than young to middle-aged adults to experience social roles that limit personal control, lower social position, and reduce access to resources, all of which contribute to increased susceptibility to disease (Mirowsky & Ross, 1992).

Beside age stratification, cohorts have unique social histories with known differences in education, economic, and lifestyles. Importantly, they have different urban living experiences: in

1920, 51.2% of the population lived in urban neighborhoods, compared to 64.0% in 1950, and 73.7% in 1980 (US Census, 1995). Achievements varied for those benefiting from the post–World War II economic boom and educational benefits from the Servicemen's Readjustment Act of 1944, as well as housing opportunities through the Veterans Housing Act of 1970. For persons over 50 years in age, their unique life course position, societal expectations, as well as cohort histories, necessitates an examination of cohorts that considers social factors as well as biological processes.

Social Etiology

The etiology of psychiatric disorders is sometimes mistakenly attributed to an entirely biological cause. However, not everyone has the same susceptibility to depressive disorders. The medical field has yet to identify the biological causes of most psychiatric disorders including depressive disorders (Kessler, 2002; Klerman, 1989 cited in Aneshensel & Phelan, 1999). A common fallacy is that physiology, genetics, or hormones are the sole cause of depressive disorders (Cockerham, 1996; Aneshensel & Phelan, 1999). Psychiatrists explain the source of depressive disorders through a medical model, where diseases manifest through physiological mechanisms (Bruce, 1999). Depressive disorders may have a physiological impact, but the differential distribution of depression across social groups suggests that social causation is also responsible (Aneshensel, 2009). Higher rates of depressive disorders are found among women, Whites, less educated, impoverished, unemployed, and divorced/separated persons (Kessler et al., 1994; Kessler et al., 2003; Ross, 2000; Simon, 2002; Williams, 1996; Williams & Jackson, 2005). Considerable evidence suggests that depressive disorders parallel societal resources, in that both are neither randomly nor uniformly distributed through society (Aneshensel, 2009; Kawachi & Berkman, 2001).

The distribution of mental health disparities are correlated with social inequalities. The ascribed status indicators of age, gender, race, and ethnicity are associated with inequitable achievement in education, employment, and income (Ferraro & Rinaldo, in press; Williams, 1996). Furthermore, not all achievements provide the same employment opportunities; a given level of education may not reveal the same degree of preparation, skills, and social standing between gender, race, and ethnic groups (Williams, 2001). Achievement inequalities are seen in the U.S. poverty rate, which at 13.5% overall, is more common among women (14.8%), African Americans (25.1%), Hispanics (21.9%), those without a high school diploma (24.2%), and the unemployed (28.3%) (U.S. Census Bureau, 2010). Persons who are socially disadvantaged experience differential exposure to stressors and the likelihood of negative social comparisons (Mcleod & Nonnemaker, 1999). Between 23 and 50 percent of depressive symptoms is explained by sociodemographic-related differential exposure to stress (Turner et al., 1995). Depressive disparities occur at least in part because of this differential exposure to stress, so that those of disadvantaged social status experience elevated rates of psychological distress (Aneshensel, 2009).

Stress process theory explains how social structures contribute to individual-level depressive disparities. In 1981, Pearlin and colleagues (1981) proposed a stress process model to explain depression through the unequal distribution of stress through psychosocial structures. This empirically supported theory substantiates that inequality in social resources leads to a differential exposure to stressors and access to resources, which determine differential health and social outcomes (Pearlin, 1989; Wheaton, 2010). The social construct dimensions include sociodemographic characteristics (e.g., female), macro structures (e.g., the economy), sociodemographic histories (e.g., a member of a historically discriminated group), and life history (e.g., age cohort). The stress phenomenologies dimensions include life events (e.g., family member death), chronic strains (e.g., financial strain), and ambient environmental

stressors (e.g., neighborhood crime) among others. The psychosocial resource dimensions include social (e.g., being a member of a cohesive group) and personal resources (e.g., the coping mechanism of mastery), for example. The outcomes dimensions include individual-level physical (e.g., allostatic load) and mental health (e.g., depressive disorders). Other outcomes affected by stress and mental health are role transitions (e.g., divorce) and achievement inequalities (e.g., college education). Stress process theory demonstrates how the lopsided exposure to stressors and the inequitable distribution of resources, results in the socially disadvantaged having disproportionate levels of psychological distress. However, the effect of the social context of the neighborhood environment on individual psychological distress is less well known.

Neighborhoods and Depression

Stratification at the Neighborhood-Level

Neighborhood inequality is increasing and, at the same time, for older adults, residential mobility is shrinking (Massey & Denton, 1993; Massey et al., 2003; South & Crowder, 1997). Our society is a large community composed of hierarchal units, where one of the lower units is an urban neighborhood (Sampson et al., 2002). The neighborhood shapes access to education, employment and economic opportunities, as well as social relationships and social capital (Diez-Roux, 2003; Massey, 2000; Mays et al., 2007; Williams, 2001). Stratification manifests in disadvantaged neighborhoods as the stressful conditions of poverty and negative comparisons; segregated groups as well as individual social isolation; prejudice and stigma; and constrained educational and employment opportunities (Mcleod & Nonnemaker, 1999). Massey and Denton (1993) demonstrate that in the last decades of the 20th century, U.S. neighborhoods showed an increase in the concentration of affluence (21%) and poverty (20%), an inequality projected to continue (Massey, 1996). Socioeconomic status determines residential mobility (Massey &

Fischer, 2000); education and marriage facilitate mobility to affluent neighborhoods, while older adults and public assistance recipients are less able to leave impoverished and distressed neighborhoods (South & Crowder, 1997). As I noted above, disadvantaged neighborhoods are becoming more impoverished with older residents less likely to leave and unable to avoid this deleterious environment.

Neighborhoods and Depressive Symptoms

Older adults living in socially disadvantaged neighborhoods are exhibiting signs of heightened psychological distress. A long-standing body of research supports the association between the deleterious neighborhood environment and negative health outcomes. In 1939 Faris and Dunham were early pioneers in the study of the ecological influences of community disorganization and mental health outcomes. In 1996 Aneshensel and Sucoff were among the first to examine neighborhood-level socioeconomic disadvantage and depressive symptoms, as well as other mental health outcomes. Recent large representative studies have found that older adults living in socially disadvantaged neighborhoods have a higher risk for depressive symptoms than those in advantaged neighborhoods (Echeverria et al., 2008; Hybels et al., 2006; La Gory & Fitzpatrick, 1992; Kubzansky et al., 2005; Muramatsu, 2003; Walters et al., 2004) although there are exceptions (Aneshensel et al., 2007). Few studies examine those in late-middle age, but one that focused on this group found a similar relationship between depressive symptoms and neighborhood disadvantage that was most pronounced for persons who are themselves personally disadvantaged (Wight, Ko, & Aneshensel, 2009). Depressive symptoms increase for older adults residing in disadvantage neighborhoods and experiencing high levels of stressors: being disabled, self-rated poor health, chronic medical condition, social isolation, and neighborhood disorder, (Kawachi et al., 1999; Kubzansky et al., 2005; Ostir et al., 2003; Scheiman et al., 2005; Wight et al., 2008). Depressive symptoms decrease for older

adults residing in disadvantage neighborhoods with high access to psychosocial resources: cohabitation, living in neighborhoods dense with older adults, mastery, social support, social ties, and social cohesion (Berke et al., 2007; Kawachi & Berkman, 2001; Kubzansky et al., 2005; La Gory & Fitzpatrick, 1992; Scheiman et al., 2005). Depressive symptoms increase for older adults residing in disadvantage neighborhoods within the following individual-level sociodemographic groups: gender (female), country of origin (Mexico), with education (low), income (low), and marital status (divorced or separated) (Aneshensel et al., 2007; Berke et al., 2007; Hybels et al., 2006; Kubzansky et al., 2005; Ostir et al., 2003; Schieman & Meersman, 2004).

Depressive symptoms are relatively high in socially disadvantaged neighborhoods, but this pattern could be the result of aggregated individual-level disadvantage. The compositional hypothesis asserts that neighborhood-level differences are the result of aggregated individual-level characteristics. There is an established association between individual-level socioeconomic status and depressive symptoms. There is the possibility that socially disadvantaged individuals self-select into impoverished neighborhoods or are unable to leave. The compositional hypothesis states that differences in neighborhood-level health disparities are due to either (a) endogeneity where observed associations are due to the composition of individuals living in the neighborhood, rather than (b) exogeneity where observed associations are due to the contextual quality of the neighborhood (Ross & Mirowsky, 2008). Analysis that includes controls for individual-level sociodemographic disadvantage can reduce the possibility that differences are compositional, and support the inference that the disadvantaged neighborhood is distressing and affects mental health outcomes.

Neighborhoods and Stress Process Theory

Pearlin's stress process theory explains depressive symptoms, in part, through the unequal distribution of stress within the social environment (Pearlin et al., 1981). The neighborhood is one environment in which social processes account for individual-level experiences of stressors and accesses resources (Pearlin, 1989). The neighborhood context has status homophily with individuals sharing similar life history, macro structures, and comparable economic conditions. In brief, the stress process theory conceptually explains the pathway in which neighborhood-level disadvantage, through differential exposure to stressors and access to resources, explains depressive symptoms.

Stress process theory has informed the development of conceptual frameworks, which explain the relationship between neighborhood disadvantage and depressive symptoms among persons over 50 years in age. With a stress process framework, Schieman (2005) reported that for persons over 65 years in age, the social context of the disadvantaged neighborhood explains the variability of social resources (support), which decreased with age, and increased with marriage and widowhood. In another study, Schieman and Meersman (2004) found that the variability in depressive symptoms was determined, in part, by stressors (neighborhood disorder and role strain) and resources (mastery), and was moderated by individual-level sociodemographic status (sex and education). This study found no significant association between age and depressive symptoms, perhaps owing to the examination of age as a continuous variable in a linear form. Both previously mentioned studies had limited generalizability: Neighborhoods were represented by one small metropolitan area that had limited sociodemographic diversity. In addition, it is difficult to generalize to urban neighborhoods because the sample was composed of inconsistent population densities: rural, suburban, and urban. Further inferential difficulties were introduced by not using multilevel modeling, the preferred method of analysis when individuals are nested within neighborhoods.

Aneshensel and colleagues (2007) found that the impact of structural disadvantage across neighborhoods was largely due to individual-level social status, which explained most of the variability of depressive symptoms among a sample of older persons (70+). They found depressive symptoms were higher among certain sociodemographic groups: female; less education; lower income and wealth; widowed, separated, or divorced; Catholic or Jewish. This study found that the composition of individual-level disadvantage explained variation in depressive symptoms across neighborhoods with little to no contextual neighborhood effect. This sample, including only those over 70 years of age, was not representative of all persons from late-middle adulthood through advanced-old age. Age, as a continuous variable, had a significant negative relationship with depressive symptoms, when individual-level health variables were controlled. However this cohort may not be representative of the life histories of all adults from late-middle age to extreme old age. Among cohorts over 70 years of age, besides dissimilar physiologies, these cohorts have different historical experiences, income inter-quartile ranges, and number of children (National Institute on Aging, 2007).

However, a study with a broad age range of older adults (50 years and older) found contextual neighborhood effects after controlling for individual-level sociodemographic composition (Beard et al., 2009). Beard and colleagues (2009) in a longitudinal study found a positive association between depressive symptoms and New York City's poor neighborhoods. They investigated stressors (major life events), psychosocial resources (social support and personality traits), and individual-level socioeconomic status (age, education, income, marital status, and race). This study had no significant findings between age and depressive symptoms, although only linear effects were examined. This study had limited generalizability, because the sample included only New York City neighborhoods.

A multilevel study informed by stress process theory with a representative sample of residents of urban neighborhoods from across the United States is necessary to assess the

disadvantage neighborhood contextual effects among those over 50 years of age. What follows next is a review of additional sociological theories that may also explain the influence of the psychosocial environment, as well as the achieved statuses, associated with health outcomes.

Neighborhoods and Ecological and Social Capital Theories

Ecological theory models the pathways in which the disadvantaged neighborhood influences health outcomes. Ecological theory is composed of five psychosocial subsystems, each uniquely influencing behavior: micro, meso, exo, macro, and chrono (Bronfenbrenner, 1994). The two systems most relevant to neighborhood studies are the micro and meso. The micro, or individual- and interpersonal-level, includes the interactions within one's immediate environment. Moreover, this is where relationships that influence important health outcomes are formed. This level includes social participation and social support, known mediators of the disadvantage social status and mental illness relationship. The meso, or intermediate level including the neighborhood-level, is a collection of micro systems that includes the built environment. This environmental social context includes community networks and resources (e.g. educational services), neighborhood physical condition, residential stability, and commuting distance. These factors are all associated with mental illness (Aneshensel et al., 2007; Galea et al., 2005). Ecological theory informed Wheaton and Clark's (2003) examination of childhood neighborhood experience and long-term mental health outcomes. They found a compound effect, in that disadvantage occurs at both the neighborhood-level (meso) and the family-level (micro). They also found neighborhood-level effects when controlling for both individual-level and family-level socioeconomic status.

Another important theory explaining the focal relationship is social capital theory. This theory explains health outcomes through a pathway of social network resources that are associated with both individual-level and neighborhood-level socioeconomic status. Social

capital is theorized to influence present socioeconomic status and health through various factors. These factors include differential access to intergenerational wealth through opportunities and information (Loury, 1977); intentional reproduced inequity and social exchange (Bourdieu, 1986); and social organization norms and trust (Putnam, 1995). An important premise of social capital theory is that ascribed social status (age, gender, and race/ethnicity) may directly influence achieved social status (employment, marital status, and wealth). The social capital theory concept of social organization is empirically associated with mental wellbeing (Fratiglioni et al., 2000; Kawachi & Berkman, 2001; Kim, 2008; Oxman et al., 1992; Schieman & Meersman, 2004). Carpiano (2006) proposed a conceptual social capital framework to examine health outcomes in disadvantaged neighborhoods. Carpiano's framework presented social capital as having four dimensions: social support, neighborhood organization/participation, informal social control, and social leverage. This framework examined how neighborhood socioeconomic characteristics were antecedents to social cohesion, social capital, and health status. Carpiano's (2007) application of this conceptual framework found no significant associations among elements; consequently, social capital may not be a paradigm for explaining the pathways of neighborhood-level socioeconomic disadvantage and individual-level health outcomes. Nevertheless, other studies have productively used social capital.

Both ecological and social capital are alternate sociological theories that specify neighborhood social processes and individual-level health outcomes. As the preceding discussion suggests, these two theories have strengths and weaknesses in examining the neighborhood psychosocial environment and health outcomes. The stress process model was chosen for this study because it has broad empirical support, focuses on mental illness, and accommodates theoretical concepts from both the ecological and social capital theories.

Methodological Issues Studying Neighborhood Effects on Depression

Biases can be introduced into this study through individual-level socioeconomic indicators and cross-level inferences. Diez-Roux (2004) states that individual-level variables may meditate, confound, or simultaneously do both on neighborhood-level effects. Individual-level biases are controlled through the adjustment of individual-level sociodemographic characteristics associated with depression (Diez-Roux, 2001). The compositional hypothesis asserts that spuriousness from social downward-drifting individuals explains the focal relationship association. If the focal relationship association remains after controlling for possible individual-level confounders, then there is more confidence in neighborhood contextual effects (Aneshensel, 2002, pg. 72).

Additional bias is avoided through individual-level controls for cross-level or residual confounding (Diez-Roux & Mair, 2010; Kim & Kawachi, 2006). Cross-level inferential biases are reduced by subjective confirmation that the socially disadvantage neighborhood is more stressful. This bias is avoided by conceptually matching the aggregated neighborhood-level concept of social disorder and economic hardship with individual-level self-reports of neighborhood disorder and financially strain (Kim & Kawachi, 2006). This subjective confirmation avoids sociologistic and psychologistic fallacies by examining relevant causal mechanisms at both the individual and neighborhood-level (Diez-Roux, 1998). The sociologistic fallacy occurs when drawing inferences regarding the causes of variability across groups without consideration of relevant individual-level factors. The psychologistic or individualistic fallacy occurs when drawing inferences regarding the causes of variability across individuals without consideration of relevant environmental-level factors. The inclusion of factors at multiple levels allows for effects of both neighborhood and individual-level variables as well as their interactions (Diez-Roux, 1998). Here I wish to emphasize that the more comprehensive the measurement of the focal relationship, the stronger the inference that the neighborhood context has an independent effect on depressive disorders (Ross et al., 2008).

Methodological problems at the neighborhood-level include improperly measured concepts and singleton neighborhoods, those neighborhoods with only one respondent. Inferences are stronger when an index is used to measure neighborhood disadvantage rather than measuring the concept through a single item (i.e. median household income) (Kim, 2008). An additional statistical issue arises with the inclusion of multiple singleton neighborhoods. Small numbers of observations at the individual-level may decrease accuracy of confidence intervals and the precision of neighborhood-level predictors (Bell et al., 2008). However, Bell and colleagues (2008) found that a sample with a large number (500+) of singletons retained accuracy, precision, error control, and statistical power when compared to a smaller sample with 50 or less singletons.

Another methodological consideration is empirical design, which influences causal strength and generalizability. Three designs are contrasted. The first design, ecological studies, draws inferences at the individual-level from group level data and is subject to validity issues. These studies examine population-level health outcomes for a specific geographic region and take population-level social indicators, and make causal inferences at the individual level. A hypothetical example is that for neighborhoods with higher aggregated incomes and lower aggregated rates of mental illnesses; an inappropriate causal inference is that higher income results in lower mental illness. This approach excels at generating inexpensive hypothesis, but is subject to the validity issue called ‘ecological fallacy’. This method is insufficient for understanding causal processes and provides limited understanding of cross-level inferences (De Leeuw & Meijer, 2008; Schwartz, 1994).

The second design directly measures the neighborhood physical and social environment, which allows stronger causal inferences, but many of these studies lack generalizability (Diez-Roux & Mair, 2010). This study design precisely delineates the neighborhood spatial boundary by having a resident’s subjective specified boundary

corroborated by housemates, neighbors, and by third parties (Sastry, Pebley, & Zonta, 2002; Coulton et al., 2001; Christie-Mizell et al., 2003). Through the subjective definition of neighborhood and the direct measurement of psychosocial conditions, cross-level biases are reduced and causal inferences strengthened. These primary data collection studies are laborious, expensive, and limited to direct measurements of smaller regional areas. This design improves internal validity and causal inferences, but often lacks generalizability beyond the local area.

The third design utilizes census tract proxies for neighborhoods with advanced statistical methods that balance generalizability and causal inferences. The Census Bureau works with local Census Statistical Area Committees defining census tracts so that they are geographically representative areas with homogeneous socioeconomic characteristics (U.S. Census Bureau Geography Division, 2005). Census proxies as neighborhoods allow secondary data analysis with U.S. Census provided demographics characteristics. Multilevel analysis allows the investigation of meso neighborhood-level characteristics, micro features of the individual, and the combination of within and between level interactions. Often a census proxy is used during secondary analysis of data. The weakness of census tract proxies is that true causal effects are likely to be underestimated, and other unaccounted mediators and moderators suppress or explain neighborhood-level effects (Duncan et al., 1997).

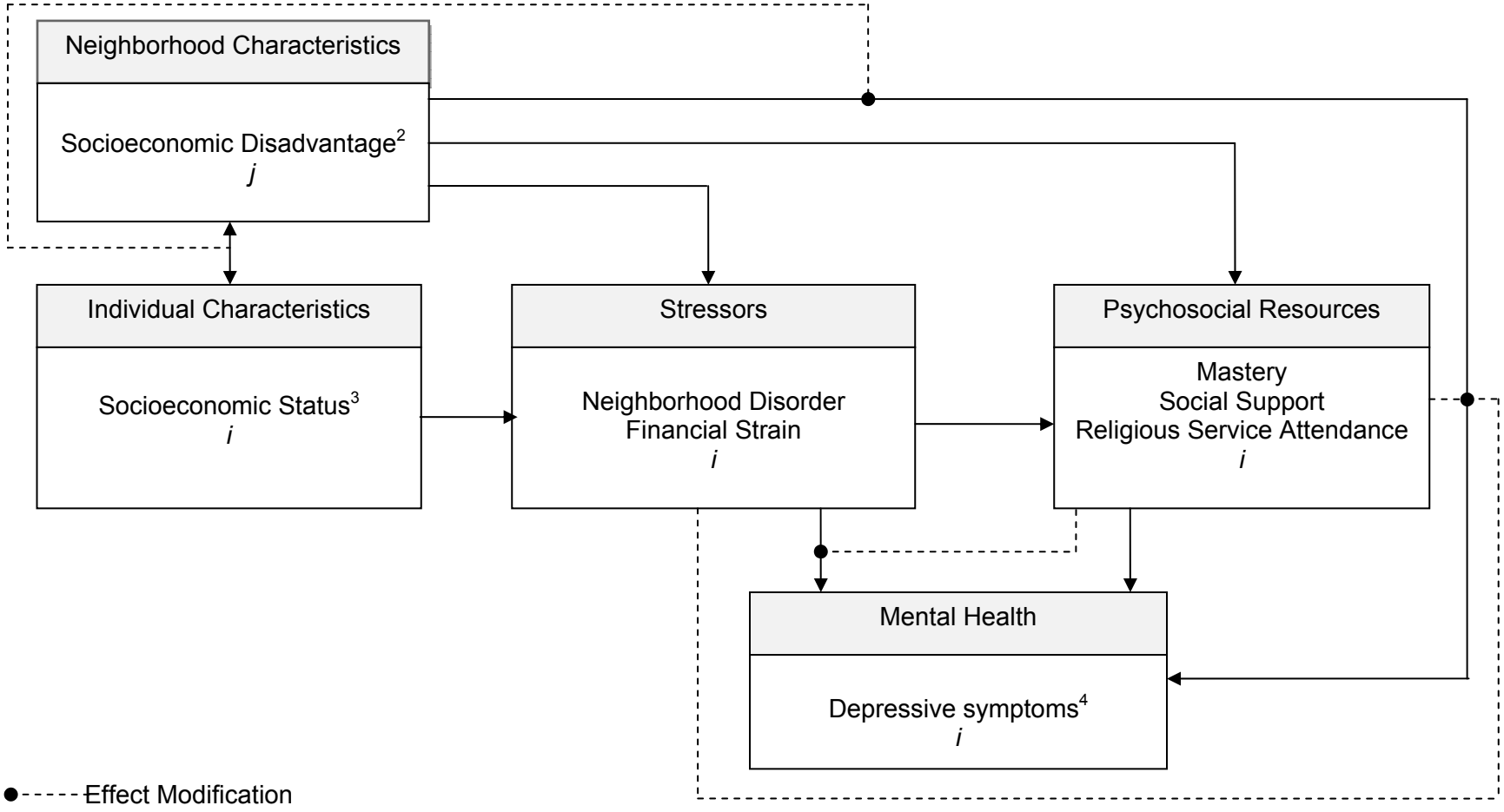
Conceptual framework

This study's conceptual framework, as shown in Figure 1.1, applies Aneshensel's Stress Process Model of Neighborhood Effects on Mental Health (Aneshensel, 2010). Aneshensel's model incorporates structural aspects of the social model (aggregated social status) with stress process theory (stressors and psychosocial resources) to examine the relationship between neighborhood characteristics and mental health. Aneshensel's model was modified in this study

by the inclusion of a cross-level effect modifier; this pathway is found between the three elements of neighborhood and individual characteristics, and mental health. This adapted model, through an upstream approach, investigates mental health by conditional exposure to stressor and resource elements, which are located between the neighborhood and individual characteristics.

This model's focal relationship is between the elements of neighborhood-level characteristics and mental health symptoms. This is mediated by individual-level characteristics and there is an individual and neighborhood cross-level interaction. This focal relationship is mediated by stressors and psychosocial resources. The neighborhood-level characteristic is socioeconomic disadvantage, operationalized from a principal component of achieved status indicators: education, employment, poverty, and public assistance. Individual-level mental health is depressive symptoms operationalized as a symptom count. Individual-level characteristics are sociodemographic characteristics associated with depressive symptoms, stressors, and resources. The cross-level effect modification pathway is an interaction between neighborhood-level socioeconomic disadvantage and age. Individual-level stressors include chronic financial strain and ambient neighborhood physical disorder. Individual-level psychosocial resources include mastery, social support, and religious service attendance.

Figure 1.1 Stress Process Model of Neighborhood Effects on Mental Health[1]



[1] Adapted from Aneshensel's *Stress Process Model of Neighborhood Effects on Mental Health* (Aneshensel, 2010)

[2] Level-2 Neighborhood socioeconomic disadvantage was defined as census tracts high in proportion of residents: aged 25 or older without a high school degree; households receiving public assistance income; residents living below the poverty level; and residents aged 16 or older who are unemployed

[3] Level-1 Socioeconomic status measurements include age, gender, race and ethnicity, education, income, wealth, employment status, and marital status

[4] Level-1 Depressive symptoms was operationalized through a modified version of the Center for Epidemiologic Studies Depression Scale (CES-D8) (Radloff, 1977)

Neighborhood-Level Characteristics: Urban Neighborhood Socioeconomic Disadvantage

Neighborhood-level effects on depressive symptoms for persons over 50 years in age are often inconclusive, possibly because researchers examine the social processes from dissimilar neighborhood environments, often including divergent population densities and differing spatial boundaries (Hybels et al., 2006; Kubzansky et al., 2005; Ross & Mirowsky, 2008). Residential social environments vary considerably; one person's closest neighbor lives on the other side of a 6-inch wall, another is separated by 6 miles of farmland. Aneshensel (2010) defines neighborhoods as people living in close proximity to one another within a particular geographical area. Urban residents live in a densely populated neighborhood and share a similar social context. The U.S Census Bureau defines an area as urban when the population density reaches 1,000 persons per square mile. The minimum population density for this study is 75% urban, a definition used by others (Aneshensel et al., 2009). The U.S. Census Bureau, in conjunction with local entities, defines a neighborhood boundary as a census tract (U.S. Census Bureau, 2005). The urban census tract has known population density and aggregated demographics, and has comparable status homology. For these reasons, this common empirical spatial delineation is this study's definition of neighborhood.

Neighborhood socioeconomic disadvantaged is defined by prior empirical evidence and conceptual relatedness. The most common neighborhood socioeconomic indicators fall into three principal measures: education, economic resources, and employment (Ross & Mirowsky, 2008). Education, income, and employment are all conceptually related to the neighborhood social environment. Income predicts home ownership, a population with an incentive to protect their investment and remove neighborhood problems (i.e. signs of physical decay and crime reducing neighborhood watch programs). Neighborhoods with more educated residents have a citizenry with high-levels of human capital that enables them to navigate local government and advocate for improvements (parks and libraries) and discourage hazards (liquor stores and

highways interchanges). High unemployment may increase the number of younger people hanging around in the neighborhood; consequently, older adults may fear these neighborhoods, believing the presence of these young people has a higher likelihood of crime. The disadvantaged neighborhood creates more distress through diminished material resources and opportunity structures. This study operationalized neighborhood disadvantage by achievement iniquities: (1) education by proportion of residents aged 25 or older without a high school degree; (2) income by proportion of households receiving public assistance and (3) the proportion of residents living below the poverty level; and (4) employment by the proportion of residents aged 16 or older who are unemployed. Neighborhood-level socioeconomic disadvantage is the conceptual model's neighborhood element.

Individual-Level Mental Health: Depressive Symptoms

The Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR) psychiatric reference guide informs numerous types of reliable assessments of depressive disorders (APA, 2000). During the clinical encounter, clinicians use the DSM-IV-TR to assess depressive disorders. The Composite International Diagnostic Interview (CIDI), another type of assessment, is a face-to-face structured diagnostic interview where non-clinicians assess psychiatric disorders (World Health Organization, 1990). For my study, I chose a third type of assessment, self-reported symptoms as measured with a modified version of the Center for Epidemiologic Studies Depression Scale (CES-D8). Unlike clinical intake scales that assess diagnosis and/or evaluate treatment, the CES-D8 is a brief self-reported scale designed to measure depressive symptomology in the general population (Radloff, 1977). The CES-D8 is assessed face-to-face, by phone, or through the mail, with similar reliability as the clinical assessment and face-to-face interview. The CES-D8 has known reliability, validity, and factor structure. It has also been tested among a wide range of sociodemographic groups, including

large surveys of persons over 50 years in age (Hybels et al., 2006). The CES-D8 permits symptom counts, which is more appropriate for addressing the aging curvilinear relationship than diagnosed depression counts (Ferraro & Rinaldo, in press). Individual-level depressive symptoms are the conceptual model's mental health element.

Individual-level Characteristics: Sociodemographic

Individual-level demographic characteristics are potential confounders in the causal mechanisms linking neighborhood socioeconomic disadvantage to depressive symptoms. These confounders may clarify the focal relationship by explaining other causes and therefore make the estimate of the focal relationship more exact. These confounders are individual-level sociodemographic characteristics that are empirically associated with depressive symptoms. This study includes the following sociodemographic characteristics: age, gender, race, ethnicity, education, income, wealth, employment, and marital status (Aneshensel et al., 2007; Kubzansky et al., 2005; Hybels et al., 2006; Ostir et al., 2003; Schieman & Meersman, 2004). Based on the inconsistent extant research reviewed above, a non-linear association between age and depressive symptoms is postulated. After adjusting for these potential individual-level confounders, there is stronger confidence that the context of the disadvantaged neighborhood contributes to depressive symptoms beyond the compositional effects due to characteristics of the individuals living in the neighborhoods. These individual-level sociodemographic characteristics are the conceptual model's individual characteristics element.

Cross-level Interaction: Neighborhood Socioeconomic Status and Age Cohort

The relationship between neighborhood-level disadvantage and depressive symptoms may differ by age. Persons from late-middle adulthood through advanced-old age experience dissimilar societal circumstances, different historical experiences, and distinct physiological

maturities. For the advanced-older age population the literature on neighborhood effects is somewhat inconsistent, most but not all studies show an effect. While for the late-middle age population, the literature consistently shows a relationship. This pattern suggests that the effect of neighborhood may be conditional on age; the stage of the life course matters. This study includes a cross-level effect modification interaction term to operationalize a conditional relationship between neighborhood socioeconomic disadvantage by age. This cross-level term is the pathway between the conceptual model's individual-level and neighborhood-level characteristics elements.

Individual-Level: Stressors

The aggregated operationalization of neighborhood-level socioeconomic disadvantage has to be confirmed by individual-level appraisal of local conditions. Wen and colleagues found that objective aggregated measures are significantly correlated with local subjective appraisals (Wen, Hawkley, & Cacioppo, 2006). However, inferential biases are avoided through individual-level appraisal of the aggregated concept neighborhood disadvantage (Ross, 2000). The lack of maintenance in the disadvantaged neighborhood can be threatening and more stressful to the older adult when perceived as an example of social disorder (Cagney et al., 2005). This study confirms neighborhood-level social disadvantage with a measure o perceived neighborhood physical disorder, a known contributor to depressive symptoms (Schieman & Meersman, 2004). This individual-level assessment measures the neighborhood environment for physical disorder on general quality and the presence of problems (i.e. vandalism, rubbish, vacant houses, and crime). The second stressor, individual-level financial strain (i.e. satisfied with finances and difficulty paying bills), further strengthens the causal interpretation of the disadvantaged neighborhood environment by specifying a plausible causal mechanism. In neighborhood studies, economic strain has a positive relationship with depression for all ages (Miech et al.,

2000), but this does not appear to have been confirmed by self-reports for persons over 50 years in age. Individual-level neighborhood disorder and financial strain are the conceptual model's stressors element.

Individual-Level: Psychosocial Resources

The psychosocial resources element is the last discussed element of the stress process conceptual model of the neighborhood effects on mental health. Individual-level personal and social resources may intervene and clarify the meaning of the focal relationship. Mastery, a personal resource variable, effectively buffers both stressful life events and chronic stressors (Pearlin, 1999). An individual high in mastery is described as having a sense of control, power, and autonomy. Mastery encourages success at school and advancement in the workplace, thus contributing to achievement inequalities. A sense of mastery is a learned, generalized expectancy shaped by social conditions, and is obstructed in the disadvantaged neighborhood (Schieman, 2010)

The intervening social resource variables are positive social support and religious service attendance. Social support buffers stress through approval, belonging, and a sense of security (Aneshensel, 1992; Wheaton, 1985). Older adults living in disadvantaged neighborhoods are more socially isolated (Krause, 1993), have higher levels of distrust of others, (Born et al., 2004), and see other residents as unsupportive, self-seeking, and dishonest (Mirowsky & Ross, 1983; Ross & Mirowsky, 2009; Marschall and Stolle, 2004). For older adults, the quantity and quality of interactions in the disadvantaged neighborhood impedes the development of social support.

A religious setting may offer a sense of personal control, self-efficacy, and belonging. Religious service attendance buffers stress through increased social resources, coping skills, and instilling positive attitudes and emotions (Chatters, 2000; Krause, 1998). Religion may also

buffer neighborhood disorder by providing a sense of connectedness and temporal stability. It is unclear if the disadvantage neighborhood inhibits access to this example of social capital. These psychosocial resources are hypothesized to intervene as causal mechanisms between neighborhood socioeconomic disadvantage and depressive symptoms. Individual-level mastery, social support, and religious service attendance are the conceptual model's psychosocial resources element.

Hypotheses

Based on existing research and the theoretical model, this study tested the conceptual model elements and pathways by means of the following hypotheses.

1. Depressive symptoms vary between neighborhoods.
2. Neighborhood socioeconomic disadvantage has a positive relationship with depressive symptoms.
3. After controlling for individual-level sociodemographic factors (age, sex, race, ethnicity, education, income, wealth, employment, and marital status), neighborhood socioeconomic disadvantage continues to be positively associated with depressive symptoms.
4. The relationship between neighborhood socioeconomic disadvantage and depressive symptoms is conditional on age.
5. Individual-level stressors (neighborhood physical disorder and financial strain) mediate the focal relationship between neighborhood-level socioeconomic disadvantage and individual-level depressive symptoms.
6. Individual-level psychosocial resources (mastery, social support, and religious service attendance) mediate the focal relationship between neighborhood-level socioeconomic disadvantage and individual-level depressive symptoms.

CHAPTER II
Methods

Introduction

This study investigated whether neighborhood socioeconomic disadvantage and depressive symptoms are associated among persons over 50 years in age, and if so, what factors explain this association. The data for this study were derived from the 2006 and 2008 waves of the Health and Retirement Study (HRS). This current study's focal relationship was composed of the independent variable urban neighborhood socioeconomic disadvantage and the dependent variable depressive symptoms. This study included the individual-level demographic control variables of age, sex, race/ethnicity, education, income, wealth, employment, and marital status. Intervening variables for the focal relationship included are: the chronic stressor of financial strain; the ambient environmental stressor of neighborhood physical disorder; the personal resource of mastery; the social resource of positive social support; and the psychosocial resource of religious service attendance. These variables were analyzed through multilevel linear regression. This chapter summarizes the methods used to conduct this study, including descriptions of the HRS sample and data collection procedures, the derivation of the analytic sample, the construction of measures, and the data analysis procedures.

Sample

This study was a secondary data analysis of the in-depth, biennial, national longitudinal Health and Retirement Study (HRS) conducted by the University of Michigan and funded by National Institute of Aging. In 1992, HRS began surveying the health, retirement, and economic status of 12,654 individuals born between 1931 and 1941. As seen in Table 2.1, the HRS survey subsequently added four new cohorts; the first enrolled cohort is referred to as the HRS1 cohort and collectively all cohorts are referred to as HRS. In 1993 the Aging and Health

Dynamics (AHEAD) cohort was added to HRS, which included 8,222 individuals born before 1924. In 1998, the third and fourth cohorts were added to HRS; this included Children of the Depression Age (CODA) with 2,320 individuals born between 1924 and 1930, and War Baby (WB) with 2,529 individuals born between 1942 and 1947. In 2004, the Early Baby Boomers (EBB) cohort was added to HRS, with 3,340 individuals born between 1948 and 1953. Through careful sampling design, HRS ensured that these five cohorts are representative of the noninstitutionalized U.S. population over 50 years of age.

Table 2.1 Data Collection Path for Health and Retirement Study. Source: Growing Older In America (National Institute on Aging, 2007)

	1992	**1993**	**1998**	**2004**
HRS1	↗ 12,654			
AHEAD		↗ 8,222		
CODA			↗ 2,320	
WB			↗ 2,529	
EBB				↗ 3,340
Total Sample	12,521	20,876	25,725	29,065

Abbreviation key
AHEAD - Aging and Health Dynamics (born <1923).
CODA - Children of the Depression Age (born 1924 - 30).
EBB - Early Boomers (born 1948 - 53).
HRS1 - Health and Retirement Study (born 1931 - 41).
WB - War Baby (born 1942 - 47).
Notes:
↗ Initial interview year for cohort.

The HRS sample was selected using a multi-stage area probability design. This included the following stages: proportionate probability of U.S. Metropolitan Statistical Areas (MSAs) and non-MSA counties; sampling of area segments within primary stage units; a complete listing of all housing units located within selected sampling area segments; then a systematic selection of household units from a selected sampling area segment. Within each sampling household unit,

an interviewer collected demographic information for each household member. The household individual (or couples that are married or in a marriage like relationship) born within the designated inclusive period were eligible and designated for the HRS interview. When two (or more) age-eligible household individuals lived together, but were neither married or in a marriage like relationship, one of these respondents was selected via a random procedure (Heeringa & Connor, 1995).

To support statistical analysis, oversampling included the following populations: African Americans, Hispanics, and Floridians. The sampling weights for the oversamples are 1.86:1 for African Americans, 1.72:1 for Hispanics, and a 2:1 for Floridians (Heeringa & Connor, 1995) for HRS1. African Americans and Hispanics were oversampled because the HRS Steering Committee and the National Institute on Aging Data Monitoring Committee regarded oversampling of these groups as crucial to successfully understanding the retirement experience (HRS, 2008). Florida was oversampled because the Congressional Appropriation specified that HRS give special attention to areas with high densities and numbers of older populations (HRS, 2008). The same basic design was used for the other cohorts, although the AHEAD cohort also used a supplemental sampling frame of Medicare enrollees.

Based on the 1991 Current Population Survey 19.2% of U.S. households were eligible for HRS1. These households were composed of 35.9% single-persons and 64.1% married or in a marriage-like relationship. The inclusion criteria for HRS1 as with subsequent waves were that participants were born within the years defining the cohort wave and that they resided in the United States. The HRS1 sample screened 69,337 housing units; of these 14 percent (9,419) were determined non-sample (unoccupied or non-households) and another 214 were members of ineligible households. There were 59,918 identified eligible households for screening, for a total sample screening response rate of 99.6%. Of these households, 15,497 were eligible for inclusion in the study, and 12,654 participated HRS1; an overall response rate of 81.4%. Overall

response rates for subsequent cohorts were 80.4% for AHEAD, 72.5% for CODA, 69.9% for WB, and 75.6% for EBB. Heeringa and Connor provided the description of the HRS survey sample design discussed here (Hayward, 2002).

Data collection

Baseline interviews were conducted face-to-face in English or Spanish; follow-up interviews usually were done by telephone, but face-to-face interviews were used when necessary, for example, if the person had difficulty hearing. Main survey topics included: demographic characteristics; health status; health care utilization; family structure; housing; religion; financial status; employment history; and retirement planning. Later HRS surveys introduced supplemental experimental modules that would become part of the main survey.

In the 2004 wave of data collection, HRS piloted a Participant Lifestyle Questionnaire. During this wave the leave-behind questionnaire was administered to a random subsample of respondents who also completed face-to-face interviews (Clarke et al., 2008). Based on these pilot data, a revised Participant Lifestyle Questionnaire was subsequently administered to all respondents over the next two waves of data collection.

During the 2006 wave, HRS randomly selected approximately fifty percent of participants to complete a supplemental assessment from March, 2006 to February, 2007. This assessment included an enhanced face-to-face interview and the revised Participant Lifestyle Questionnaire, which was mailed back to HRS. The 2008 wave collected the same supplemental assessment from the 50 percent of participants not assigned in 2006; dates were from February, 2008 to February, 2009. At both of these waves, all participants completed the standard HRS interview irrespective of whether they were assigned to the supplemental assessment.

HRS excluded the following respondents from this supplemental assessment: those living in nursing homes; those who were proxy interviewed by telephone; or those who were

self-interviewed by telephone. As seen in Table 2.2, the participants who were assigned the Participant Lifestyle Questionnaire in 2006 and 2008 waves had a response rate of about 77 percent.

Table 2.2 HRS Sample Sizes for the Supplemental Participant Lifestyle Questionnaire, HRS 2004, 2006, and 2008.

Participant Lifestyle Questionnaire	**2004**	**2006**[2]	**2008**[3]
Eligible Sample[1]	20,129	18,469	17,217
Pilot Disability	3,280	NA	NA
Pilot Psychosocial	3,273	NA	NA
Revised Psychosocial Assigned		9,570	8,839
Revised Psychosocial Completed		7,732	6,568

[1] This group was living, enrolled, and interviewed by HRS.
[2] This group was a randomly selected half sample of HRS participants.
[3] This group was the participants who did not receive the Participant Lifestyle Questionnaire in 2006.

Analytic sample

A hybrid analytic sample was formed by joining the data from the half sample who completed the 2006 supplement with the data from the half who completed the supplement during the 2008 wave. The 2006 and 2008 subsamples were joined to increase sample size and statistical power. As seen in Table 2.3, the hybrid base sample had 9,846 respondents dropped because they did not meet the analytic sample requirements. Respondents were sequentially removed from the sample for the following reasons: zero HRS sample weight; not in a HRS Cohort (based on birth year); missing HRS sample weight; and, not eligible for psychosocial questionnaire. Persons not residing in an urbanized area were also removed. Urban was defined by the U.S. Census and operationalized as those living in census tracts where at least 75% of the population lived in an urbanized area. This arbitrary cut point was selected to ensure the inclusion of predominantly urban tracts. Respondents also were dropped because they did

not respond to the psychosocial questionnaire or were interviewed by proxy. Respondents also were dropped because they were missing either a measure from the demographic information or Participant Lifestyle Questionnaire (PLQ). Missing data from the psychosocial measures of the PLQ introduces nonresponse and refusal bias; however this was less than 2% of the analytic sample. Participants in the final analytic sample, depending on when they completed the Participant Lifestyle Questionnaire, were assigned the sample weight from either 2006 or 2008. The final analytic sample was 8,623.

Table 2.3 Derivation of the HRS Hybrid Analytic Sample – Level-1 Individuals, HRS Adults Over 50 Years in Age 2006-08, n = 8,623.

	Respondents
HRS Base Sample[1]	18,469
Ineligible	
Zero HRS Sample Weight	984
Not in a HRS Cohort (Based on Birth Year)	924
Missing HRS Sample Weight	1,000
Not Eligible for Psychosocial Questionnaire[3]	1,548
Eligible	
Psychosocial Participants 2006[2]	7,562
Psychosocial Participants 2008[2]	6,451
Sequential Drops	
Psychosocial Questionnaire Non-Respondent	1,370
HRS Proxy Interview[3]	32
Missing/Invalid Census Tract Id	19
Non-Urban Census Tract Id	3,703
Zero PQ Respondent Weight	92
Missing on Study Measures	174
Final Hybrid Analytic Sample	**8,623**

[1] This was the 2006 HRS sample size.

[2] HRS divided the 2006 sample and assigned the Participant Lifestyle Questionnaire (psychosocial) to fifty percent in 2006 and the other fifty percent received it in 2008.

[3] HRS did not administer the Participant Lifestyle Questionnaire to the following: nursing home resident, proxy interview by telephone, or self-interview by telephone.

Individual Demographic Characteristics

Table 2.4 shows the analytic sample sociodemographic characteristics. Almost two thirds were female. On average, they were in their late 60's, ranging from 52 to 104. Non-Hispanic whites comprised the majority. The average level of education was just above high school graduation. Household income was above the national median at $64,438 and there was substantial wealth as well. Although this population was mostly retired, there was a large portion of employed persons. Married persons predominated, followed by the widowed.

Table 2.4. Weighted Characteristics of Analytic Sample, HRS Analytic Sample of Adults Over 50 Years in Age 2006-08, n = 8,623.

Individual-level Demographic Variables	Percentage	Standard Deviation
Age (years)	$\bar{x}$ = 69.17	9.60
under 60	20.00 %	
60 - 64	14.06 %	
65 - 69	19.57 %	
70 - 74	17.80 %	
75 - 80	15.06 %	
81 and above	13.52 %	
Gender		
Female	41.00 %	
Male	59.00 %	
Race/Ethnicity		
African-American	14.63 %	
Hispanic	8.80 %	
Other	2.05 %	
White non-Hispanic	74.52 %	
Education (years)	$\bar{x}$ = 12.89	2.95
< High School	18.11 %	
High school	33.61 %	
Some college	23.83 %	
College graduate	12.56 %	
Financial Status		
Income	$\bar{x}$ = 6.33[1]	0.13
Wealth	$\bar{x}$ = 8.60[1]	0.14
Employment Status		
Employed	35.46 %	
Retired	54.69 %	
Other	9.85 %	
Marital Status		
Never Married	3.47 %	
Divorced/Separated	12.02 %	
Married	64.41 %	
Widowed	20.09 %	

[1] Thousands of dollars, logged.

Measures

Level-1 Dependent Variable: Depressive Symptoms

Depressive symptoms was assessed from an 8 item revised version of the Center for Epidemiologic Studies Depression Scale (CES-D8) (Radloff, 1977). The question stem asked: have you experienced any of the following symptoms “most of the time in the last week”. The items were: felt depressed; felt that everything I did was an effort; my sleep was restless; I was happy; I felt lonely; I enjoyed life; I felt sad; and I could not get going. Response codes were modified for experiencing the symptom to 0 = no, 1 = yes (Soldo et al., 1997). Reverse worded items were recoded. Don’t know and refused were recoded to missing. Scores were summed across the 8 items. The recommend high-level score of 4 and above indicates a high amount of depressive symptoms (Wallace et al., 2000) and at 13.30% were nearly identical to community-based studies for persons over 55 years in age (Beekman et al., 1999). The distribution of high amount of depressive symptoms for this sample and sociodemographic groups is reported in the Results Chapter Table 3.3. The depressive symptoms scale, as seen in Table 2.5, has good reliability ($\alpha = 0.79$). The mean was 1.38, equivalent 1 of 8 symptoms, which means that the typical respondent reported a small amount of depressive symptoms. The range and standard deviation indicated that there is sufficient variability for analysis, encompassing the full range of possible values from low to high. Initially, the 8-item depressive symptoms index was positively skewed at 1.68 and leptokurtic at 5.17. After log transformation, the distribution was slightly less skewed at 0.71 and mesokurtic at 2.79.

Table 2.5 Univariate Statistics for Depressive Symptoms, Stressors, and Psychosocial Variables, HRS Analytic Sample of Adults Over 50 Years in Age 2006-08, n = 8,623.

	Median	Mean	Standard Deviation	Range min - max	Reliability
Depressive symptoms[1]	1.00	1.38	1.92	1 - 8	0.79
Neighborhood disorder	2.25	2.53	1.39	1 - 7	0.79
Financial strain	2.00	2.30	0.97	1 – 5	0.79
Mastery	5.00	4.77	1.10	1 – 6	0.86
Social support	3.17	3.15	0.52	1 – 4	0.84[2]
Religious Attendance	3.00	2.93	1.43	1 - 5	

[1] Displayed is the revised CES-D8 before log transformation.

[2] The displayed reliability value is the average of the four domains: spouse α = 0.82, children α = 0.82, family α = 0.86 and friends α = 0.84.

Level-1 Intervening Stressor Variables

Neighborhood physical disorder was assessed from a 4-item scale. The question stem defined neighborhood by "how you feel about your local area, that is everywhere within a 20 minute walk or about a mile of your home". A respondent was instructed to mark one of seven boxes that indicated how strongly they agreed between two opposing statements. The following items are from one opposing side: there are no vacant houses or storefronts in this area; people feel safe walking alone in this area after dark; there is no problem with vandalism and graffiti in this area; this area is kept very clean. Response codes were 1 = "low" through 7= "high". Reverse worded were recoded. Scores were averaged across the 4 items. Respondents with less than 2 items were coded as missing. A high score indicates a high amount of neighborhood physical disorder. As seen in Table 2.5, the scale has good reliability (α = 0.79). The mean was equivalent to a low amount of neighborhood physical disorder. The range and standard deviation indicated that there is sufficient variability for analysis.

Financial strain was assessed from a 2-item scale (Williams, Yu, Jackson, & Anderson, 1997). The question stem asked: "which of the following choices best describes how you feel about your current financial situation". The first item was self-appraisal of current financial situation, with response codes 1 = "not at all satisfied" through 5 = "completely satisfied". The

second item was the degree of difficulty paying bills, with response codes 1 = “not at all difficult” through 5 = “completely difficult”. The reverse worded was recoded. Scores were averaged across the 2 items. Respondents missing one or both items were recoded as missing. A high score of 5 indicated a high amount of financial strain. As seen in Table 2.5, the mean was equivalent to an average response code of 2.30, which means the typical responded reported that their level of financial strain was not very difficult and that they were very satisfied. The range and standard deviation indicated that there is sufficient variability for analysis.

Level-1 Intervening Psychosocial Resource Variables

Mastery was assessed from a 5 item shortened version of the Pearlin Mastery Scale (Pearlin & Schooler, 1978). The question stem asked: “how much you agree or disagree with the following statements”. The five items were: I can do just about anything I really set my mind to; when I really want to do something, I usually find a way to succeed at it; whether or not I am able to get what I want is in my own hands; what happens to me in the future mostly depends on me; and I can do the things that I want to do. Response codes were 1 = “strongly disagree” through 6 = “strongly agree”. Don’t know and refused were recoded to missing. Averages were calculated for persons with 3 or less missing items; otherwise, respondents were coded to missing. A high score of 6 indicated a high amount of mastery. As seen in Table 2.5, the scale had very good reliability ($\alpha = 0.86$). The mean was equivalent to an average response code of “somewhat agree’, which means that the typical respondent had a slightly high amount of mastery. The range and standard deviation indicated that there is sufficient variability for analysis.

Social support was assessed from a 3-item scale in four domains: spouse, children, family, and friends. The question stem asked: “please check the answer which best shows how you feel about each statement”. The items were: how much do they really understand the way

you feel about things; how much can you rely on them if you have a serious problem; and how much can you open up to them if you need to talk about your worries. Response codes were 1 = “a lot” through 4 = “not at all”. All items were reverse coded. Don’t know and refused were recoded to missing. Scores were averaged across the 4 items for each domain, and then averaged across all four domains. Averages were calculated for persons with 2 or less missing items; otherwise, respondents were coded to missing. A high score of 4 indicated a high amount of social support. As seen in Table 2.5, the scale had good reliability (spouse $\alpha = 0.82$, children $\alpha = 0.82$, family $\alpha = 0.86$ and friends $\alpha = 0.84$). The mean was equivalent to an average response code of “some” social support, which means that social support was high in this sample. The range and standard deviation indicated that values on this scale were clustered around the mean, but nonetheless had sufficient variability for analysis.

Religious behavior was assessed from 1 item that measured religious service attendance. The question stem asked: “how often have you attended religious services during the past year”. Response codes were 1 = more than once a week; 2 = once a week; 3 = two or three times a month; 4 = one or more times a year; and 5 = not at all. This question was reverse recoded. Don’t know and refused were recoded to missing. A high score of 5 indicated a high amount of religious service attendance behavior. As seen in Table 2.5, the mean was equivalent to an average response code of two or three times a month, which means the typical respondent, reported a medium amount of religious behavior. The range and standard deviation indicated that there is sufficient variability for analysis.

Level-1 Individual Level Demographic Variables

Individual-level demographic characteristics typically associated with depressive symptoms were included in the analysis. As reported above in Table 2.4, these characteristics include age, sex, race/ethnicity, education, income, wealth, employment, and marital status. Age was assessed from the question: “in what month, day, and year were you born”. Don’t know and refused were recoded to missing. Age was calculated as year of birth subtracted from the survey date, then transformed into a categorical variable: under 60, 60 - 64, 65 - 69, 70 - 74, 75 - 80, over 80. These categories were used instead of the continuous version because the association with depressive symptoms appeared to be non-linear. Gender was self-reported as either male or female.

Race and ethnicity was assessed from two questions. The ethnicity question asked: “do you consider yourself Hispanic or Latino”. Response codes were 1 = yes and 2 = no. Don’t know and refused were recoded to missing. The race question asked: “do you consider yourself primarily White or Caucasian, Black or African American, American Indian, or Asian”. Response codes were 1 = White/Caucasian; 2 = Black/African American; 3 = American Indian or Alaskan native; 4 = Asian or Pacific Islander; 5 = Hispanic/Latino; 6 = Brown, Moreno, Trigueno, or of color, combination of Black and American Indian; and 7 = Other. Don’t know and refused were recoded to missing. Race and ethnicity was recoded into four categories: non-Hispanic African-American, Hispanic, non-Hispanic Other, and non-Hispanic White.

HRS measured years of education as “what is the highest grade of school or year of college you completed”. A very small portion answered don’t know or refused, for this group years of education was imputed from the two degree status questions “did you get a high school diploma or pass a high school equivalency test” and “what is the highest degree you have earned”. Don’t know, or refused for all three items were recoded to missing. Degree to years of education imputations were 12 years for high school diploma or GED; 14 years for associates;

16 years for bachelors; 17 years for masters or doctorate. Years of education was missing for respondents reporting a degree status of less than high school diploma. These were recoded to the average number of education years for all respondents reporting less than high school diploma. During preliminary analysis, the continuous variable education was transformed into four categories: less than high school, high school, some college, and college graduate.

Income was calculated from eight household income components and is reported in thousands of dollars. These components included: respondent and spouse earnings; pensions and annuities; SSI and Social Security Disability ; social security retirement ; unemployment and workers compensation; other government transfers; household capital income; and other income. Don't know and refused were recoded as missing. The constant 1 was added to income to eliminate negative and zero values, then it was log transformed to improve the skew. During preliminary analysis, the continuous variable income was dichotomized at the median.

Wealth was calculated from the sum of all assets less the sum of all debt. Wealth is reported in tens of thousands of dollars. Don't know and refused were recoded as missing. The constant 1 was added to wealth to eliminate negative and zero values, then it was log transformed to improve the skew. During preliminary analysis, the continuous variable wealth was dichotomized at the median.

Employment status was assessed from the question: "we are interested in your present job status". The response items were: working now; temporarily laid off, on sick or other leave; unemployed and looking for work; disabled and unable to work; retired; homemaker; or other. Don't know and refused were recoded as missing. Employment status was recoded into three categories: employed, retired, and other.

Marital status was assessed from the question: "are you currently married, living with a partner, separated, divorced, widowed or have you never been married". Response items were: married, partner, separated, divorced, widowed, never married. Don't know and refused were

recoded as missing. Responses were recoded into four categories: married and living as if married were combined; separated and divorced were combined; widowed; and never married.

Level-2 Independent Variable: Neighborhood Level demographics

Neighborhoods were included if at least 75% of the tract's population lived in a US Census Bureau defined urban census tract. The Census Bureau, working with local Census Statistical Area Committees, defines these small geographic areas for their homogeneous socioeconomic characteristics (U.S. Census Bureau, 2005). This study had 8,623 individuals nested within 3,478 neighborhoods, with a range of 1 to 83 persons per neighborhood, for an average of 2.48 persons per neighborhood, and 1,690 neighborhoods represented by one person (singleton tract).

The focal independent variable, neighborhood socioeconomic disadvantage was operationalized from a principal component analysis of US Census Bureau indicators. These were obtained from the Geolytics Annual Estimates database (Geolytics, 2007). The first principal component had an Eigenvalue of 3.31; the other Eigenvalues were less than 1.00, indicating that one component is sufficient to represent the common aspects of these indicators. The factor loadings on this component were: 0.93, 0.92, 0.89, and 0.89 for the following items, proportion of residents aged 25 years or greater without a high school degree; households receiving public assistance income; residents living below the poverty level; and residents aged 16 years or greater who are unemployed. The aforementioned variables were the principal component adding the variables as weighted by the factor loadings. As seen in the correlation matrix in Table 2.6, the indicators were highly correlated (correlation coefficients between 0.77 and 0.93) and statistically significant ($p<0.001$). The neighborhood socioeconomic disadvantage index, which had excellent reliability at $\alpha = 0.89$, was similar to other studies' definitions of neighborhood socioeconomic disadvantage (Aneshensel et al., 2009).

Table 2.6 Correlations, Means, and Standard Deviations among Neighborhood-level Socioeconomic Disadvantage Index and its Components, HRS Analytic Sample of Adults Over 50 Years in Age 2006-08, n = 8,623.

	Neighborhood Socioeconomic Disadvantage Index	No High School[1]	Public Assistance[2]	Poverty[3]	Unemployed[4]
Neighborhood Socioeconomic Disadvantage Index	1.00				
No High School[1]	0.89*	1.00			
Public Assistance[2]	0.93*	0.88*	1.00		
Poverty[3]	0.94*	0.92*	0.77*	1.00	
Unemployed[4]	0.89*	0.93*	0.77*	0.82*	1.00
Mean	-0.01	0.19	0.08	0.13	0.06
Standard Deviation	1.12	0.14	0.08	0.11	0.05

[1] Proportion of residents aged 25 years or greater without a high school degree
[2] Proportion of households receiving public assistance income
[3] Proportion of residents living below the poverty level
[4] Proportion of residents aged 16 years or greater who are unemployed
* $p<0.001$

Cross-Level Interaction: Individual-level Age and Neighborhood-level Socioeconomic

Cross-level interaction terms were created by multiplying the categorical level-1 variable age by the continuous level-2 variable neighborhood socioeconomic disadvantage. The created interaction indicators included neighborhood socioeconomic disadvantaged by each age category: 60 - 64, 65 - 69, 70 - 74, 75 - 80, over 80; the reference group was under 60.

Data analysis

The focal relationship, neighborhood socioeconomic disadvantage and depressive symptom, was analyzed through a systematic introduction of hypothesized confounders and intervening variables. This logical inferential analysis is known as the elaboration model, which was first developed by Paul Lazarsfeld and later expanded by Morris Rosenberg and Carol Aneshensel (Rosenberg, 1968; Aneshensel, 2002). This analytical approach added test factors

during analysis of the relationship between the focal independent and dependent variable; this clarified the meaning of that relationship. Two types of test factors were considered. The controls for confounding were individual-level sociodemographic characteristics. The second type included intervening or mediating variables: the stressors of neighborhood disorder and financial strain, and the psychosocial resources of mastery, social support, and religious services attendance. These stressors and resources model the hypothesized causal mechanism linking neighborhood socioeconomic disadvantage and depressive symptoms.

Preliminary exploration of the data from the analytic sample tested for statistical dispersion. This included probability density tests through probability plot graphical displays (e.g. histograms and kernel density estimations). In addition, descriptive statistics were used to determine if transformations were necessary. Index variables were evaluated for internal consistency reliability. Preliminary analysis was done in STATA SE version 10 (Stata, 2009).

The first step in elaboration analysis was a bivariate examination of the hypothesized confounding and intervening variables. Cross tabulation and χ^2 analysis tested statistical independence of the distribution of the categorical measure of depressive symptoms across the values of the hypothesized confounders—sociodemographic and socioeconomic variables. The intervening variables, as potential causal mechanisms linking the focal relationship, have to be correlated with both focal variables for mediation to occur. Those intervening variables not significantly associated with either focal variable are excluded from multilevel analysis. The bivariate procedures aid in avoiding cross-level biases and understanding the causal mechanisms linking the focal independent and dependent variables.

Multilevel linear regression examined the structure of 8,623 individuals (level 1) nested within 3,478 neighborhoods (level 2). Multilevel models estimated the relationship between depressive symptoms and neighborhood socioeconomic disadvantage, net of the variation accounted for by individual-level predictors of depressive symptoms. Preliminary models

examined the main effect of neighborhood disadvantage on depressive symptoms. As seen in Table 2.7, Model 1 controlled for confounding by individual-level sociodemographic characteristics. Model 2 investigated a cross-level interaction with neighborhood disadvantage and age. Model 3 evaluated intervening individual-level stressors. To finish, Model 4 evaluated intervening individual-level psychosocial resources. All models were calculated with Hierarchical Linear and Nonlinear Modeling (HLM) 6 (Raudenbush et al., 2004). All model variables were adjusted for differences among individuals through grand-mean centering (Heck & Thomas, 1999).

Table 2.7. Multilevel Models Explaining Depressive Symptoms with Neighborhood Socioeconomic Disadvantage, Confounders, and Intervening Variables

Variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Neighborhood Disadvantage	**X**	**X**	**X**	**X**
Individual-level demographic				
Age 60 - 64 [a]	**X**	**X**	**X**	**X**
Age 65 - 69 [a]	**X**	**X**	**X**	**X**
Age 70 - 74 [a]	**X**	**X**	**X**	**X**
Age 75 - 80 [a]	**X**	**X**	**X**	**X**
Age 81 > [a]	**X**	**X**	**X**	**X**
Gender (Female) [b]	**X**	**X**	**X**	**X**
Race (African American) [c]	**X**	**X**	**X**	**X**
Race (Hispanic) [c]	**X**	**X**	**X**	**X**
Race (Other) [c]	**X**	**X**	**X**	**X**
Education	**X**	**X**	**X**	**X**
Income (log)	**X**	**X**	**X**	**X**
Wealth (log)	**X**	**X**	**X**	**X**
Employment (Retired) [d]	**X**	**X**	**X**	**X**
Employment (Other) [d]	**X**	**X**	**X**	**X**
Marital (Widowed) [e]	**X**	**X**	**X**	**X**
Marital (Divorced/Separated) [e]	**X**	**X**	**X**	**X**
Marital (Never Married) [e]	**X**	**X**	**X**	**X**
Cross-Level Interaction [a]				
Age 60 - 64 X NSD		**X**	**X**	**X**
Age 65 - 69 X NSD		**X**	**X**	**X**
Age 70 - 74 X NSD		**X**	**X**	**X**
Age 75 - 80 X NSD		**X**	**X**	**X**
Age 81 > X NSD		**X**	**X**	**X**
Individual Intervening				
Neighborhood Disorder			**X**	**X**
Financial Strain			**X**	**X**
Mastery				**X**
Religious Attendance				**X**

[a] Reference group = under 60;
[b] Reference group = Male
[c] Reference group = Non-Hispanic White;
[d] Reference group = Working;
[e] Reference group = Married

Preliminary multilevel modeling began with a one-way random effect Null Mode. In multilevel modeling the Null Model contains a response variable, no explanatory variables other than an intercept, and tests that the response variable varies across the level-2 variable. The Null Model tested Hypothesis 1: that there is no variation in depressive symptoms between neighborhoods. It is tested with the chi-square statistic for the between neighborhood variance. This model provided the basis for decomposing the total variance of depressive symptom scores into the sum of level-1 and level-2 variances. The intraclass correlation measures the degree of resemblance as a proportion of the variance of depressive symptoms that are similar for residents belonging to the same neighborhood (Diez-Roux, 2002). For the random intercept model, the intraclass correlation coefficient is the ratio of population variance between groups to the total variance (Snijders & Bosker, 1999).

Preliminary analysis continued with a Base Model. The Base Model provided a baseline estimate of variance; subsequent fitted models are compared to this estimate to determine the proportion of variance reduction. This model tests Hypothesis 2, that neighborhood socioeconomic disadvantage is positively associated with depressive symptoms, against the null hypothesis that depressive symptoms are not associated with disadvantage. It is tested with the deviance statistic between the Base Model and the Null Model that all the added coefficients equaled 0, or with the t-test for the regression coefficient. Because only one variable is added to the model, these two tests are equivalent.

Model 1 added individual-level sociodemographic characteristics, potential confounders of the focal relationship. Compositional characteristics may explain the apparent contextual effects of Model 1; inferences are stronger that the neighborhood context has an independent effect on depressive disorders when individual-level sociodemographic characteristics for depression are controlled. Model 1 tests Hypothesis 3: after controlling for individual-level sociodemographic factors (age, sex, race, ethnicity, education, income, wealth, employment,

and marital status) there continues to be a significant positive focal relationship. First a comparison with the Base Model's deviance statistic tests that the null hypothesis that Model 1's regression coefficients (added sociodemographic variables) are collectively zero against the alternative hypothesis at least one of them does not equal zero. Assuming the null hypothesis is rejected, then a t-test for individual regression coefficients tests that the null hypothesis that each coefficient equals zero.

The t-test for the regression coefficient for neighborhood socioeconomic disadvantage tests the null hypothesis that it is zero against the alternative that it is not zero. If the null hypothesis is not rejected, then the apparent focal relationship is compositional. If the null hypothesis is rejected, then the coefficient probably does not equal zero and the focal relationship may be contextual. The size of the coefficient indicates the strength of the association net of the other variables. A comparison of the size of the coefficient to the Base Model informs how much of the original association is due to (i) the characteristics of the people who live in the neighborhood as distinct from (ii) the characteristics of the neighborhood. The latter (ii) is the apparent contextual effect, which is the size of the remaining coefficient in Model 1.

Model 2 added the cross-level interaction of age × neighborhood socioeconomic disadvantage. Differences in cohort experiences, aging physiology, and position within the life course, may result in differing ecological exposure and influence. Model 2 tests Hypothesis 4: that there is a conditional relationship between neighborhood socioeconomic disadvantage and age; the effect of neighborhood socioeconomic disadvantage varies between age cohorts. This model includes Model 1's individual-level sociodemographic variables.

The deviance test compared Model 2 to Model 1; the null hypothesis is that the coefficients for the interaction terms are all collectively equal to zero against the alternative hypothesis that at least one is different from zero. Assuming it is significant means that the

impact of neighborhood socioeconomic disadvantage is conditional on age. If it were not significant, it would mean that neighborhood socioeconomic disadvantage does not appear to have a different effect on depressive symptoms at all ages.

Model 3 added two stressor variables to improve cross-level inferences and test hypothesized intervening variables to help clarify the meaning of the focal relationship. Model 3 avoids the sociologistic and psychologistic fallacies, which is a result of focusing on the causal mechanisms of one level that cannot be adequately understood without investigating relevant factors at both levels. Specifically, this inferential bias is avoided by level-1 individual confirmation of the level-2 aggregated concept of neighborhood socioeconomic disadvantaged. Model 3 tests Hypothesis 5: individual-level stressors (neighborhood physical disorder and financial strain) mediate the focal relationship. This model includes Model 1's individual-level sociodemographic variables and Model 2's cross-level interaction term.

A deviance test compared Model 3 with Model 2 that all the added coefficients equaled 0. Variable statistical significance was determined by coefficient t-tests. The level-1 adjustment for neighborhood disorder and financial strain strengthened the causal inferences on the effects of the disadvantaged neighborhood environment. Model 3 assessed whether stressor variables intervene and clarify the focal relationship, providing support for a neighborhood stress process framework.

Model 4 added three psychosocial resource variables that were hypothesized mediators of the focal relationship, which help clarifies the meaning of the focal relationship. The personal resource variable mastery effectively counteracts both stressful life events and chronic stressors (Pearlin, 1999); it is obstructed within the disadvantaged neighborhood (Shieman, 2010). The social resource variable positive social support has a known effect on mental health (Aneshensel, 1992; Wheaton, 1985); and older adults living in disadvantaged neighborhoods are more socially isolated than those living in advantaged neighborhoods (Krause, 1993). A

sense of personal control, self-efficacy, and belonging can occur within a religious setting. The psychosocial resource variable religious service attendance buffers stress (Chatters, 2000; Krause, 1998); but it is unclear if the disadvantage neighborhood obstructs access. This model tests Hypothesis 6: individual-level psychosocial resources (mastery, social support, and religious service attendance) mediate the focal relationship. This model included variables from prior models: individual-level sociodemographic variables, cross-level interaction term, and intervening stressors.

A deviance test compared Model 4 with Model 3 that all the added coefficients equaled 0. Variable statistical significance was determined by coefficient t-tests. The added psychosocial resources were hypothesized intervening variables; their inclusion was evaluated as a potential causal mechanism, linking the focal independent and dependent variables.

Summary

This chapter covered the primary sample, data collection, measures, and data analysis procedures. This included an overview of the HRS survey sample's multi-stage area probability design, the five study cohorts, and data collection procedures. This was followed by the derivation of the hybrid analytic sample, as well as its demographic characteristics. Measure reliability was stated, as well as how they were collected and coded. The reviewed measures include the dependent variable depressive symptoms; the independent variable neighborhood socioeconomic disadvantage; intervening variables neighborhood physical disorder, financial strain, mastery, social support, and religious service attendance; and the confounding demographic characteristics of age, gender, race and ethnicity, education, income, wealth, employment status, and marital status.

Elaboration model analysis is composed of multilevel models, which systematically evaluated the focal relationship. Preliminary investigation included a Null Model which evaluates

the variation of depressive symptom between neighborhoods and the Base Model which evaluates the bivariate association of neighborhood social disadvantage with depressive symptoms. Model 1 addressed the compositional hypothesis through individual-level sociodemographic confounders. Model 2 examined the conditional relationship between age and depressive symptoms and whether the focal relationship is linear, through the cross-level interaction variable of neighborhood socioeconomic disadvantage and age. Model 3 strengthened causal inferences and evaluated the stress process approach by including subjective level-1 intervening stressors. Finally, Model 4 explained the focal relationship casual pathway and evaluated the stress process approach by including intervening psychosocial resources. These four models investigated the relationship and causal pathways between neighborhood socioeconomic disadvantage and depressive symptoms.

Following this is the results chapter. First is a preliminary univariate and bivariate analysis. Second is an additional preliminary analysis that includes cross-tabulation of confounders of the focal relationship. The last results reviewed are the multilevel models (Null Model, Base Model, Model 1, Model 2, Model 3, and Model 4). The aforementioned systematic analysis will strengthen our understanding of how neighborhood socioeconomic disadvantage influences depressive symptoms.

CHAPTER III

Results

Introduction

This study investigated whether neighborhood socioeconomic disadvantage and depressive symptoms are associated with one another among persons in late-middle age to old age, and if so, what factors explain this association. A stress process framework was used to examine the focal relationship of the independent variable of neighborhood disadvantage and the dependent variable of depressive symptoms. The analytic strategy was a combined multilevel analysis with an elaboration model analysis.

Multilevel analysis allows for the simultaneous examination of the focal relationship, while also accounting for intervening variables (Diez-Roux, 2002). Multilevel analysis also permits simultaneous examination of the effects of micro-level characteristics of individuals (i.e. compositional effects) and the effects of macro-level characteristics of neighborhoods (i.e. contextual effects). Through nesting of individuals within neighborhoods, it estimates contextual effects while controlling for compositional effects.

The elaboration model is a logical inferential analysis first developed by Paul Lazarsfeld and expanded by Morris Rosenberg and Carol Aneshensel (Rosenberg, 1968; Aneshensel, 2002). This model permits the evaluation of the focal relationship by taking into account confounding effects from individual-level sociodemographic variables, as well as mediating effects through stressor and resource variables. The systematic analytic technique of the elaboration model improves causal inferences (Aneshensel, 2005), and when combined with multilevel analysis strengthens focal relationship inferences.

Correlates of the Focal Variables: Intervening Variables

Preliminary univariate and bivariate analysis involved correlation tests of the focal relationship and hypothesized intervening variables, and depressive symptoms. These tests examined: the dependent variable depressive symptoms and the independent variable neighborhood socioeconomic disadvantage; the intervening stressors variables neighborhood physical disorder and financial strain; and intervening variables psychosocial resources mastery, social support, and religious service attendance. Cross tabulations examined the distribution of depressive symptoms by its known sociodemographic predictors, which include age, gender, race and ethnicity, education, income, wealth, employment status, and marital status.

The first correlation test was for the focal variable. For the preliminary analysis, stratification and clustering were ignored and neighborhood socioeconomic disadvantage, a level-2 variable, was treated as a level-1 variable. Presented in Table 3.1, the focal independent and dependent variables were highly significant and positively correlated ($r = 0.164$, $p \leq 0.001$): As neighborhood socioeconomic disadvantage increases, so do depressive symptoms. Having established this association, there is a basis to continue correlation tests among hypothesized intervening stressors and resource variables.

For a variable to intervene within the focal relationship, it must be significantly correlated with both focal relationship variables. The hypothesized stressors neighborhood physical disorder and financial strain were positively correlated with both focal variables at a high level of statistical significance ($p \leq 0.001$). Depressive symptoms tend to be high when financial strain is high; the correlation is greater than with neighborhood physical disorder. This tendency differed as shown in neighborhood socioeconomic disadvantage, which was more strongly correlated with neighborhood physical disorder than financial strain. The stressor variables were modestly

correlated with one another, indicating a slight tendency of stressors to co-occur. The hypothesized stressor variables were viable candidates for explaining the focal relationship.

Table 3.1 Correlations Matrix of Depressive Symptoms, Neighborhood Socioeconomic Disadvantage and Stressor Variables, Weighted HRS Analytic Sample of Older Adults 2006-08, n = 8,623.

	Depressive symptoms[1]	Neighborhood Disadvantage[2]	Financial Strain	Neighborhood Disorder
Depressive symptoms[1]	1.00			
Neighborhood Disadvantage[2]	0.164***	1.00		
Financial Strain	0.302***	0.219***	1.00	
Neighborhood Disorder	0.177***	0.367***	0.210***	1.00
Mean	1.384	-0.010	2.298	2.538
SD	1.922	1.123	0.965	1.388

[1] Center for Epidemiologic Studies Depression 8-item Index before log transformation
[2] For exploratory analysis, the neighborhood socioeconomic disadvantage index was treated as a level-1 variable
*** $p \leq 0.001$

In contrast, not all psychosocial resource variables were viable mediators. As seen in Table 3.2 social support was not significantly correlated with neighborhood socioeconomic disadvantage, which is similar to the findings of others (Schieman & Meersman, 2004). Neighborhood socioeconomic disadvantage was significantly ($p \leq 0.001$) and negatively correlated with mastery and positively correlated with religious service attendance. When neighborhood socioeconomic disadvantage is high, religious service attendance tends to be high, whereas mastery tends to be low. All the psychosocial resource variables were highly significant ($p \leq 0.001$) and negatively correlated with depressive symptoms Depressive symptoms had the strongest positive correlation with mastery, followed by social support, and then religious service attendance.

Table 3.2 Correlations Matrix of Depressive Symptoms, Neighborhood Socioeconomic Disadvantage, and Psychosocial Variables, Weighted HRS Analytic Sample of Older Adults 2006-08, n = 8,623.

	Depressive Symptoms[1]	Neighborhood Disadvantage[2]	Mastery	Social Support	Religious Attendance
Depressive Symptoms[1]	1.000				
Neighborhood Disadvantage[2]	0.164***	1.000			
Mastery	-0.243***	-0.050***	1.000		
Social Support	-0.171***	-0.007	0.180***	1.000	
Religious Attendance	-0.102***	0.054***	-0.003	0.121***	1.000
Mean	1.384	-0.010	4.774	3.15	2.931
SD	1.922	1.123	1.098	0.52	1.434

[1] Center for Epidemiologic Studies Depression 8-item Index before log transformation
[2] For exploratory analysis, the neighborhood socioeconomic disadvantage index was treated as a level-1 variable
*** $p \leq 0.001$

The low correlation found among resource variables suggest they co-occur less than the stressors. Stressors may reflect the stratification of resources and power, while variations in some psychosocial resources are more closely tied to individual characteristics shaped by one's life history. With the exception of social support, the remaining hypothesized psychosocial variables were viable candidates for explaining the focal relationship. The next procedure examined sociodemographic variables as potential confounders of the focal relationship.

Cross Tabulations: Confounders of the Focal Relationship

Preliminary data analysis began with cross tabulation and χ^2 analysis, which tested statistical independence of the distribution of depressive symptoms across the values of the sociodemographic and socioeconomic variables. This analysis required transformation of continuous variables to categorical variables. The depressive symptoms measure was dichotomized at 4 and above, which is the recommended 'case making' analytic cutoff used by

HRS and others, referred to here after as depressed (Wallace, et al., 2000). The neighborhood socioeconomic disadvantage variable was dichotomized and treated as a level-1 with low socioeconomic disadvantage being below the median and high being above the median. Income and wealth also were dichotomized at the median as low and high. Education was transformed into four categories: less than high school, high school, some college, and college graduate

The results of the cross-tabulations are presented in Table 3.3. The overall analytic sample had 13.30% (n=1,147) prevalence of being depressed. The distribution of depression across socioeconomic groups differed significantly ($p \leq .001$). Neighborhoods classified as low socioeconomic status contained a 50% difference in the percent of cases than high socioeconomic status neighborhoods. Among the sociodemographic variables age had the least variability of depression; within age groups under 60 had the highest level of depression while 70 – 74 had the lowest level. The age depression distribution appears curvilinear which is supported when considering the mean of total symptoms: under 60 (mean = 1.60), 60 - 64 (mean = 1.30), 65 - 69, (mean = 1.24), 70 - 74 (mean = 1.19), 7 5 -80 (mean = 1.36), and 81 above (mean = 1.45). In other words, symptoms are highest among those under 60 years, then drop and remain relatively low until age 75 and then increase, although not to the level of the youngest group. Depression varied among other demographic subgroups. The difference by gender was 40% higher for females being depressed than males. A large difference was observed by race/ethnicity, Hispanics were twice as likely of being depressed than Whites.

Table 3.3 Percentage High Depressive Symptoms by Sociodemographic Characteristics, U.S. Urban Older Adults, Unweighted Health and Retirement Survey 2006-08, n= 8,623.

	Percent High Depressive Symptoms[1]
Total	13.30
Neighborhood-level Socioeconomic[2]	
High Disadvantage (above median)	16.50***
Low Disadvantage (below median)	10.09
Individual-level Sociodemographic	
Age	
under 60	16.61***
60-64	12.98
65-69	12.21
70-74	11.00
75-80	12.84
81 above	11.90
Gender	
Female	14.89***
Male	10.19
Race/Ethnicity	
African-American	16.81***
Hispanic	25.25
Other	12.88
White	10.86
Education	
Less than High School	23.84***
High School	13.82
Some College	11.27
College Graduate	6.22
Financial Status	
Income Low (below median)	17.94***
Income High (above median)	7.81
Wealth Low (below median)	18.27
Wealth High (above median)	8.13
Employment	
Employed	9.43***
Retired	13.84
Other	22.09
Marital Status	
Divorced/Separated	20.15***
Married	9.78
Never Married	17.11
Widowed	18.70

[1] Center for Epidemiologic Studies Depression 8-item Index before log transformation

[2] For exploratory analysis, the neighborhood socioeconomic disadvantage index was treated as a level-1 variable

*** $p \leq 0.001$

The achieved status variable education had the largest within subgroup difference, less than high school had a 3-fold increase of being depressed than college graduates. Individuals

with low income were twice as likely of being depressed when compared to those high in income. Similarly, those low in wealth were twice as likely of being depressed when compared to those high in wealth. The employment status of 'other' was twice as likely to be depressed than employed. The marital status of divorced/separated were twice as likely to be depressed than married. Cross-tabulation demonstrated that within this analytic sample, there were statistically significant variations across sociodemographic subgroups for depression. The inclusion of these individual-level sociodemographic variables during multilevel analysis strengthens causal inferences by controlling for alternate mechanisms that may explain the focal relationship.

Multilevel Models of Neighborhood Disadvantage and Depressive Symptoms

Multilevel analysis involved a preliminary test of a Null Model and the Base Model; and then an examination of models that introduced potential confounders, and hypothesized intervening variables. The Null Model evaluated the variation of depressive symptom between neighborhoods—a prerequisite for establishing a focal relationship. The Base Model evaluated the bivariate association of neighborhood social disadvantage with depressive symptoms. Then Model 1 addressed the compositional hypothesis by controlling for confounders, those individual-level sociodemographic factors associated with depressive symptoms. This was followed by Model 2 that examined the cross-level effects of the interaction between level-1 age × level-2 neighborhood socioeconomic disadvantage; age is treated as a categorical variable because its relationship with depressive symptoms is non-linear. Model 3 avoids the sociologistic and psychologistic fallacies (focusing on the causal mechanisms of one level that cannot be adequately understood without investigating relevant factors at additional levels) through the inclusion of individual-level appraisal of neighborhood conditions and self-reported financial strain. In addition, these individual-level factors strengthen macro inferences by

providing appropriate estimates of neighborhood-level effects. Multilevel analysis concluded with Model 4, which examined hypothesized intervening variables. These variables are the individual-level psychosocial resources that may further explain the focal relationship and the dependent variable of depressive symptoms. The aforementioned systematic analysis strengthens our understanding of how neighborhood socioeconomic disadvantage influences depressive symptoms.

Preliminary Multilevel Models of Neighborhood Disadvantage and Depressive Symptoms

Preliminary analysis estimated the total amount of between-neighborhood variation in depressive symptoms as an intercept-only or Null Model containing only the random intercept. As seen in Table 3.4, the Null Model revealed statistically significant variation in depressive symptoms across neighborhoods ($\chi^2 = 4650.814$, df = 3477, $p \leq 0.001$). We reject null Hypothesis 1, that depressive symptoms are constant across neighborhoods. The intra-class correlation is a statistic measuring the extent for which values of depressive symptoms are similar for individuals belonging to the same neighborhood (Snijders & Bosker, 1999). The intra-class correlation is calculated by the ratio of between neighborhood variation to total variation $\rho = \tau_{oo} / (\tau_{oo} + \sigma^2)$. Here the intra-class correlation is moderate ($\rho = .115$) indicating that most of the variation in depressive symptoms is at the individual level. This low variation was expected given the multiple areas aspect of stress process that explains depressive symptoms among individuals, as well as other sociodemographic factors at the individual-level and neighborhood-level; genetic variability along with other predispositions to depression; and the other known scientific factors that influence a person's risk.

Table 3.4 Preliminary analysis of Depressive Symptoms (log) on Neighborhood Socioeconomic Disadvantage among U.S. Urban Older Adults, Health and Retirement Survey 2006-08, Weighted Data, n = 8,623

	Null Model		Base Model	
	b	SE	*b*	SE
Intercept	0.614***	0.009	0.632***	0.009
Neighborhood disadvantage			0.127***	0.009
Intercept Variance Component				
Between-group (τ)	0.053***		0.036***	
Within-group (σ^2)	0.410		0.411	
Deviance Statistic			222.53***	

SE = Standard Error
*** $p \leq 0.001$

The next preliminary step examined the focal relationship through a Base Model. This tested whether the focal independent variable of neighborhood-level disadvantage is significantly related to depressive symptoms. As seen in Table 3.4, the Base Model revealed statistically significant variation in depressive symptoms remained across neighborhoods when neighborhood socioeconomic disadvantage was included in the model (χ^2 = 4331.72, df = 3476, $p \leq 0.001$). The deviance test compared the Null and Base models; this tests that the null hypothesis that all added coefficients (one in this case) equal 0, a hypothesis that is rejected (χ^2 = 222.53, df = 1, $p \leq 0.001$). The intra-class correlation (ρ = .081) indicates that 8.10% of the variation in depressive symptoms was explained by neighborhood socioeconomic disadvantage. Neighborhood socioeconomic disadvantage had a highly significant positive relationship with depressive symptoms (*b* = 0.127, $p \leq 0.001$). Depressive symptoms are higher among people who live in neighborhoods that are high on socioeconomic disadvantage than among people who live in less disadvantaged neighborhoods. We reject null Hypotheses 2, that there is no relationship between neighborhood socioeconomic disadvantage and depressive symptoms for persons over 50 years in age.

Multilevel Models of Neighborhood Disadvantage and Depressive Symptoms

Model 1 addressed the compositional hypotheses that individual-level sociodemographic characteristics explain the apparent contextual effect of neighborhood socioeconomic disadvantage. Self-selection bias has to be accounted for before a causal inferences is made. The inclusion of individual-level sociodemographic variables partially controls for the possibility that the socially disadvantaged (who tend to have higher depressive symptoms) are self-selected into disadvantaged neighborhoods and that this process generates the observed association between neighborhood socioeconomic disadvantage and depressive symptoms.

As seen in Table 3.5, after controlling for individual-level sociodemographic characteristics, significant variation remained for depressive symptoms across neighborhoods ($\chi 2 = 4091.28$, df = 3476, $p \leq 0.001$). The Base Model is nested within Model 1, so the difference in their deviation scores tests the null hypothesis that all of the coefficients for the added variables equal 0, a hypothesis that is rejected ($\chi^2 = 728.24$, df = 17, $p \leq 0.001$). Therefore, we conclude that the coefficient for at least one of the added variables probably differs from 0, the value indicative of no effect given that this is an additive model. Neighborhood socioeconomic disadvantage ($b = 0.052$, $p \leq 0.001$) was highly significant, and had a positive relationship with depressive symptoms, which shows support for contextual neighborhood effects hypothesis. We reject null Hypothesis 3, that compositional effect of individual-level sociodemographic factors (age, sex, race, ethnicity, education, income, wealth, employment, and marital status) fully explain the positive relationship between neighborhood socioeconomic disadvantage and depressive symptoms first observed in the Base Model.

Table 3.5 Multilevel Regressions of Depressive Symptoms (log) on Neighborhood Socioeconomic Disadvantage and Individual-Level Characteristics among U.S. Urban Older Adults, Health and Retirement Survey 2006-08, Weighted Data, n = 8,623

	Model 1	
	b	SE
Intercept	.614***	.008
Neighborhood disadvantage	.052***	.011
Individual-level demographic		
Age 60-64 [a]	-.130***	.028
Age 65-69 [a]	-.236***	.028
Age 70-74 [a]	-.256***	.029
Age 75-80 [a]	-.200***	.032
Age 81 > [a]	-.211***	.035
Gender (Female) [b]	.008	.018
Race (African American) [c]	-.006	.030
Race (Hispanic) [c]	.030	.041
Race (Other) [c]	.101~	.055
Education	-.031***	.004
Income (log)	-.205**	.065
Wealth (log)	-.201**	.064
Employment (Retired) [d]	.169***	.023
Employment (Other) [d]	.250***	.034
Marital (Widowed) [e]	.201***	.025
Marital (Divorced/Separated) [e]	.227***	.030
Marital (Never Married) [e]	.125*	.052
Intercept Variance Component		
Between-group (τ)	.021***	
Within-group (σ^2)	.387	
Deviance Statistic	728.24***	

[a] Reference group = under 60
[b] Reference group = Male
[c] Reference group = Non-Hispanic White
[d] Reference group = Working
[e] Reference group = Married
.05 < .05 $\leq$ .10; * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$

As anticipated by the preliminary analysis, Model 1 shows that depressive symptoms were unequally distributed across sociodemographic groups. When other characteristics are controlled, the age association appears slightly curvilinear. All of the coefficients are statistically significant and negative which means that each group is lower than the reference category of under age 60, which means it has the highest level of depressive symptoms. The difference is

approximately the same size for all age groups except the 60 - 64 age group; their scores were higher than all the other groups (except the reference group). Surprisingly, net of other variables, gender and race were not significantly associated with depressive symptoms, although 'Other Race' was nearly significant ($p = 0.064$). Symptoms tended to be higher among persons with limited education, income, and wealth than among those with higher socioeconomic status (SES) attainment. Large differences are seen across categories of employment and marital status. Symptoms were elevated among the retired and 'other' groups, while those currently employed were associated with lower symptoms. Persons who were separated/divorced and never married tended to have much higher symptoms than married persons. These findings were consistent with known depressive symptom risks.

Model 2 evaluated whether there is a cross-level interaction of age × neighborhood socioeconomic disadvantage. Differences in cohort historical experiences, as well as variability within the life course, may result in differing neighborhood ecological influences. For example, much older persons may be more susceptible to the effects of neighborhood because they spend more time in it relative to younger persons who tend to leave the neighborhood during the day to work. However, existing research (Aneshensel et al., 2007, Wight et al., 2009) suggest the opposite may be the case: that older persons may be less effected emotionally by their environment perhaps because other concerns such as poor health are more salient. As seen in Table 3.6, after controlling for other individual-level sociodemographic characteristics and the interaction term, significant variation remained for depressive symptoms across neighborhoods ($\chi^2 = 4081.26$, df = 3476, $p \leq 0.001$). Model 1 is nested within Model 2, so the difference in their deviation scores tests the null hypothesis that all of the coefficients for the added variables equal 0, a hypothesis that is rejected ($\chi^2 = 17.03$, df = 5, $p \leq 0.01$).We conclude that there appears to be a conditional relationship between neighborhood socioeconomic disadvantage and age.

Table 3.6 Multilevel Regressions of Depressive Symptoms (log) on Neighborhood Socioeconomic Disadvantage (NSD) and Individual-Level Characteristics among U.S. Urban Older Adults, Health and Retirement Survey 2006-08, Weighted Data, n = 8,623

	Model 2		Model 3		Model 4	
	b	SE	*b*	SE	*b*	SE
Intercept	.614***	.008	.610***	.008	.610***	.008
Neighborhood disadvantage	.069**	.020	.037~	.019	.047*	.019
Individual-level demographic						
Age 60-64 [a]	-.127***	.029	-.090**	.028	-.083**	.028
Age 65-69 [a]	-.237***	.028	-.180***	.027	-.165***	.027
Age 70-74 [a]	-.261***	.029	-.173***	.029	-.162***	.028
Age 75-80 [a]	-.207***	.032	-.114**	.032	-.114***	.031
Age 81 > [a]	-.229***	.035	-.095**	.035	-.113**	.034
Gender (Female) [b]	.008	.018	.009	.017	.027	.017
Race (African American) [c]	-.008	.030	-.045	.030	-.004	.030
Race (Hispanic) [c]	.024	.041	.027	.040	.049	.040
Race (Other) [c]	.101~	.055	.061	.055	.055	.055
Education	-.031***	.004	-.026***	.004	-.024***	.004
Income (log)	-.192**	.065	-.047	.058	-.021	.057
Wealth (log)	-.210**	.064	.021	.056	.003	.055
Employment (Retired) [d]	.166***	.023	.170***	.022	.145***	.021
Employment (Other) [d]	.246***	.034	.225***	.033	.191***	.032
Marital (Widowed) [e]	.200***	.025	.176***	.024	.181***	.024
Marital (Divorced/Separated) [e]	.226***	.030	.170***	.029	.164***	.029
Marital (Never Married) [e]	.120*	.051	.092 ~	.048	.072	.046
Cross-Level Interaction [a]						
Age 60-64 X NSD	.018	.027	.012	.026	.010	.026
Age 65-69 X NSD	-.012	.026	-.022	.025	-.033	.025
Age 70-74 X NSD	-.037	.025	-.033	.024	-.047~	.024
Age 75-80 X NSD	-.056*	.028	-.053~	.027	-.064*	.026
Age 81 > X NSD	-.087**	.028	-.087**	.028	-.094**	.027
Individual Intervening						
Neighborhood Disorder			.045***	.007	.038***	.007
Financial Strain			.173***	.010	.140***	.010
Mastery					-.108***	.008
Religious Attendance					-.034***	.006
Intercept Variance Component						
Between-group (τ)	.021***		.017***		.017***	
Within-group (σ^2)	.387		.363		.350	
Deviance Statistic	17.03**		592.25***		327.59***	

[a] Reference group = under 60
[b] Reference group = Male
[c] Reference group = Non-Hispanic White
[d] Reference group = Working
[e] Reference group = Married
05 < .05 ≤ .10; * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$

Model 2 illustrates how the impact of neighborhood socioeconomic disadvantage on depressive symptoms is conditional on age. The regression coefficients for age categories and for neighborhood socioeconomic disadvantage are significant, as are the coefficients for the new interaction terms. The coefficient for neighborhood socioeconomic disadvantage (b = 0.069) represents the slope of the regression line for depression and neighborhood socioeconomic disadvantage among the omitted reference group on age that is persons under the age of 60. The coefficients for the interaction terms assess how much the slope for that age group differs from that of the reference category. The coefficients are not statistically significant for the first three interaction terms, which mean that the slopes for persons between the ages of 60 and 74 are not significantly different than the slope for persons under the age of 60. However, the interaction terms for the next two older age groups are statistically significant and negative, that is of the opposite sign as the coefficient for neighborhood socioeconomic disadvantage. When considering the slope and age coefficient differences, we conclude that neighborhood socioeconomic disadvantage is unrelated to depressive symptoms among persons aged 75 and older.

The inclusion of the cross-level interaction term appreciably changed some of the coefficients for individual-level sociodemographic variables. Of these variables, when considering the slope, the largest coefficient changes were for income and wealth. Income and wealth now have slightly less influence on improving depressive symptoms, when considering cross-level interaction between age and neighborhood socioeconomic disadvantage.

Multilevel analysis continues with Model 3 and the introduction of stressor variables, neighborhood physical disorder and financial strain, which strengthen inferences and ascertain whether exposure to stress mediates the effect of neighborhood socioeconomic disadvantage. Model 3 avoids sociologistic fallacy of the neighborhood-level (macro) aggregated census data on depressive symptoms, by including crucial and relevant individual-level (micro) factors.

These relevant factors, pertaining to neighborhood-level socioeconomic disadvantage, are individual-level appraisal of the local neighborhood physical environment and self-reported financial strain. These individual-level factors are hypothesized as intervening variables in the causal pathway of the focal relationship. In addition, individual-level appraisal of the local environment reduces residual confounding, by controlling for a known disadvantaged neighborhood factor that is associated with depressive symptoms; in addition, this adjustment provides a more appropriate estimate of the neighborhood-level effects (Diez-Roux, 1998).

Provided in Table 3.6, after controlling for individual-level sociodemographic characteristics, the cross-level interaction of age × neighborhood socioeconomic disadvantage, and the addition of stressors, significant variation remained for depressive symptoms across neighborhoods (χ^2 = 3977.02, df = 3476, p ≤ 0.001). Model 2 is nested within Model 3, so the difference in their deviation scores tests the null hypothesis that all of the coefficients for the added variables equal 0, a hypothesis that is rejected (χ^2 = 592.25, df = 2, $p \leq 0.001$) that either one or both are not equal to zero. The neighborhood socioeconomic disadvantage coefficient was (nearly) but no longer significant (b = 0.037, $p \leq 0.052$), indicating that the non-spurious component of the focal relationship was largely explained by individual-level sociodemographic characteristics and stressors.

The coefficients for four of the five interaction age × neighborhood socioeconomic disadvantage terms are not statistically significant, indicating that the effects of neighborhood socioeconomic disadvantage on depressive symptoms are fully accounted for all age groups except the oldest old, age 81 and above. Paradoxically, for this age group, depressive symptoms decrease as neighborhood socioeconomic disadvantage increases when stress exposure is taken into consideration (along with sociodemographic characteristics).

Including the stressors variables suggests that the socially disadvantaged neighborhood is more emotionally distressing because the residents of these neighborhoods are exposed to

more financial strain and neighborhood disorder. Both individual-level stressors neighborhood physical disorder and financial strain were highly significant ($p \leq 0.001$) and intervene between the focal independent and dependent variables, as stressors increase so do depressive symptoms. We reject null Hypothesis 5 that individual-level stressors (neighborhood physical disorder and financial strain) do not mediate the focal relationship.

The stressor variables substantially changed the contribution of individual-level socioeconomic characteristics to depressive symptoms. Income and wealth were no longer significant. Their effect was fully transmitted by the set of stressor variables, implying that one of the ways in which high socioeconomic status protects emotional well-being is by shielding people from the stressors of neighborhood disorder and financial strain. Never married was no longer significantly different from married and there were modest decreases for all marital statuses. The stress from neighborhood physical disorder and financial strain intervene between the focal relationship, as well as mediate the effect of some individual-level sociodemographic variables.

The last multilevel analysis was Model 4, which introduced potential intervening individual-level resources: mastery and religious service attendance. These psychosocial resources variables may explain variability in which depressive symptoms are distributed across neighborhoods. As discussed above, mastery is a well-established personal resource that effectively mediates both stressful life events and chronic stressors; and is empirically associated with depressive symptoms. While religious service attendance mediates through increased social resources, and coping skills, this social capital is positively correlated with disadvantaged neighborhoods, and empirically associated with depressive symptoms.

Model 4 includes the variables from previous models: controls for individual-level sociodemographic confounders, cross-level interactions, and stressors. As seen in Table 3.6, after the inclusion of Model 4's resource variables, significant variation for depressive symptoms

remained across neighborhoods (χ^2 = 3962.74, df = 3476, $p \leq 0.001$). Model 3 is nested within Model 4, so the difference in their deviation scores tests the null hypothesis that all of the coefficients for the added variables equal 0, a hypothesis rejected at (χ^2 = 327.59, df = 2, $p \leq 0.001$). This means that the coefficient for at least one of the resources probably differs from 0.

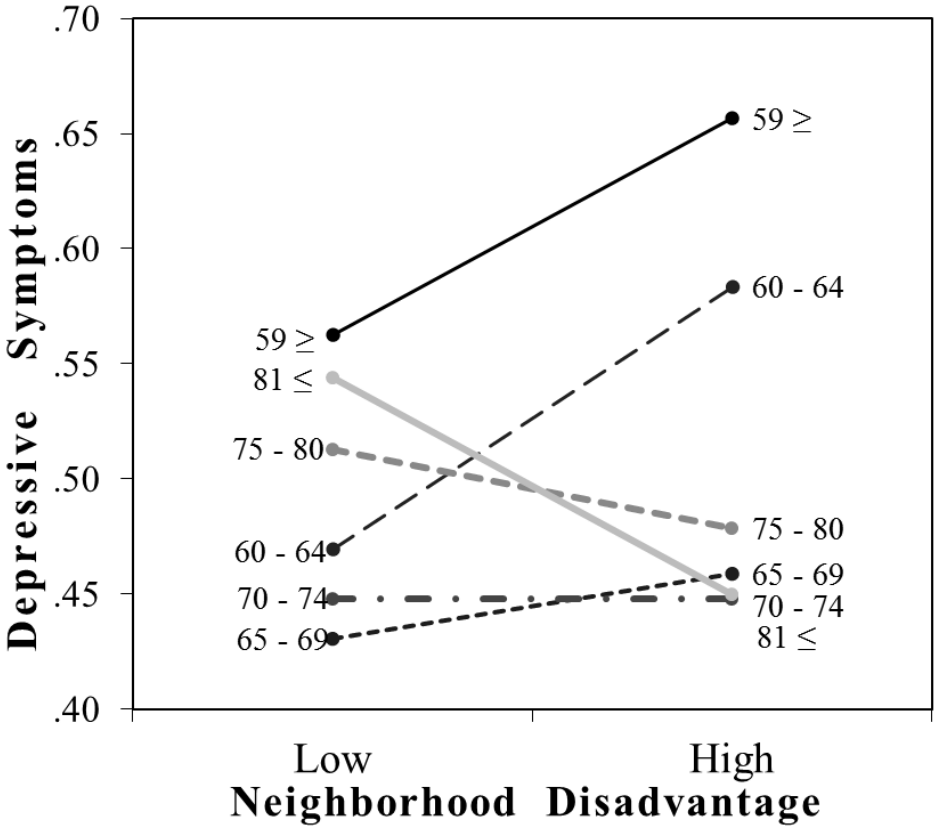
Psychosocial resources intervened the focal relationship and mediated individual-level stressors. Psychosocial resources may slightly suppress the effects of the focal relationship among the youngest age group because the neighborhood socioeconomic disadvantage coefficient increased and goes from marginally nonsignificant to significant (b = 0.047, $p \leq 0.05$). Three of the age interactions are not statistically significant, suggesting that the effect of neighborhood socioeconomic disadvantage on depressive symptoms is the same for persons ages 60-74 as for persons under the age of 60. However, two of the age interaction terms are significant and negative. The one for persons 75 to 80 is about equal to and of opposite sign from the one for persons under the age of 60, meaning that neighborhood socioeconomic disadvantage probably is not associated with depressive symptoms for this age group. For the oldest group, there appears to be a slight counterintuitive negative effect. We reject null hypothesis 6 that individual-level psychosocial resources (mastery and religious service attendance) do not mediate the focal relationship.

Both mastery and religious service attendance were highly significant ($p \leq 0.001$) and had a negative relationship with depressive symptoms. Symptoms decreased for those high on mastery and religious service attendance, indicating psychosocial resources explain some of the variation in depressive symptom. The coefficient for financial strain substantially decreased, whereas the coefficient for neighborhood disorder negligibly decreased. Thus, psychosocial resources may mediate the influence of financial strain on symptoms, but not neighborhood physical disorder.

The psychosocial resource variables substantially changed the contribution of individual-level socioeconomic characteristics to depressive symptoms. The effects of employment status retired and ‘other’ are partially transmitted by the psychosocial resource variables insofar as the size of the difference between these categories and the reference category of employed decreased from Model 3 to Model 4. The difference between being married and widowed increased slightly, while the effect of being divorced/separated decreased slightly. Psychosocial resources influence how individual-level sociodemographic characteristics relate to depressive symptoms.

As seen in Figure 3.1, neighborhood socioeconomic disadvantage is conditional on age. This figure shows age group regression equations diagramed with low neighborhood socioeconomic disadvantage (one standard deviation below the mean) and high neighborhood socioeconomic disadvantage (one standard deviation above the mean). The conditional relationship for neighborhood socioeconomic disadvantage is seen in for the categories 64 and below, as disadvantage increase so does depression, which has little to no effect on 65 to 74 year olds, and for the older ages, depressive symptoms decrease.

Figure 3.1 Regression of Depressive Symptoms (log) on Neighborhood Socioeconomic Disadvantage by Age Group among U.S. Urban Older Adults, Health and Retirement Survey 2006-08, Weighted Data, n = 8,623



+ The plot is hypothetical with covariates set to the mean (0) or the reference category: White male; who is employed and married and average on all other variables.

Summary

The focal relationship, neighborhood disadvantage and depressive symptoms among persons in late-middle age to old age, was analyzed through a combined multilevel and elaboration model. Initial correlation testing discovered that social support was a nonviable candidate for explaining the focal relationship and was excluded. Cross-tabulations demonstrated statistically significant variations of depression within all sociodemographic characteristics. Preliminary multilevel analysis found that depressive symptoms varied across

neighborhoods and had a positive relationship with socioeconomically disadvantaged neighborhoods.

Model 1 suggested that individual-level sociodemographic variables as a set were confounders, and more importantly, that the contextual effects of the socioeconomically disadvantaged neighborhood remained after controlling for individual-level compositional factors. Model 2 found an association with depressive symptoms and the cross-level interaction of age × neighborhood socioeconomic disadvantage, such that disadvantage is less strongly related to higher levels of depressive symptoms for older persons than those in late-middle age. Model 3 found that the intervening stressors neighborhood physical disorder and financial strain mediated the focal relationship. Model 4 found that the intervening resources mastery and religious service attendance mediated the focal relationship. These results support the assertion that social inequalities contribute to a disparity of stressors and resources and that this may partially explain the disproportionate depression burden among residents of disadvantaged neighborhoods.

Noteworthy is the counterintuitive finding. Those over 75 years experienced a decrease in depressive symptoms as neighborhood socioeconomic disadvantage increased. This was after stress exposure, psychosocial resources, and sociodemographic characteristics were taken into consideration. For ages 70 to 74, there was a nearly significant ($p = 0.051$) finding, suggesting that depressive symptoms may be impacted by changes in levels of neighborhood socioeconomic disadvantage. However, for the age categories below 69, there was the expected positive relationship between neighborhood disadvantage and depressive symptoms.

What follows is the conclusion chapter. This includes an interpretation and the implication of these results, situated within the research question, the study objectives, and the conceptual model. Key findings are illustrated through the framework pathways and elements. The overall results indicate that the framework, the Stress Process Model of Neighborhood

Effects on Mental Health, expands stress process theory into the neighborhood environment. This framework partially explained the distribution of mental health disparities through neighborhood social inequalities.

CHAPTER IV
Conclusion

Introduction

This study's research question was whether an association exists between social inequality and mental health disparity among adults over 50 years of age, and the factors that help to explain this association. This association was operationalized through the focal relationship of neighborhood socioeconomic disadvantage and depressive symptoms. From existing neighborhood and gerontological research, this focal relationship was examined through a stress-process framework. Framework elements and pathways were validated using an elaboration model approach—systematic introduction of third variables into the analysis. This approach clarified the meaning of the focal relationship and improved causal inferences. The overall results indicate that measures of stress process theory explain the variability of depressive symptoms and the impact of neighborhood socioeconomic disadvantage on depression symptoms.

Among persons in late-middle adulthood through advanced-old age, neighborhood socioeconomic disadvantage was significantly associated with depressive symptoms. These symptoms varied according to individual-level sociodemographic characteristics; differential exposure to stress and access to psychosocial resources; as well as, point in the life course. Those of disadvantaged social status experience elevated rates of psychological distress via individual-level and neighborhood-level characteristics**.**

Neighborhood conditions, acting through differential exposure to stress and access to psychosocial resources, appear to influence depressive symptoms. The contextual neighborhood environment contributes to an unequal distribution of societal stress, beyond the composition of the neighborhood with regard to individual-level characteristics. Neighborhood effects, when compared to individual-level sociodemographic characteristics, explain a smaller proportion of the variability of depressive symptoms.

Additional key findings include validation of neighborhood stress process framework. The adapted neighborhood stress process framework explained depressive symptoms through individual-level sociodemographic factors (age, sex, race, ethnicity, education, income, wealth, employment, and marital status); stressors (neighborhood physical disorder and financial strain); and psychosocial resources (social support and religious service attendance). These framework elements and pathways were statistically confirmed.

Informed by a life course perspective, individuals were grouped into age cohorts. Age has a curvilinear relationship with depressive symptoms. Noteworthy, an age × neighborhood disadvantage interaction term revealed a counterintuitive conditional relationship; the focal relationship was positive for late middle-age categories and negative for advanced-old age. This conditional relationship between age and neighborhood socioeconomic disadvantage may explain the inconsistent research findings within the neighborhood and depressive symptoms literature.

This could be misconstrued as neighborhood socioeconomic disadvantage being salubrious for the oldest cohorts, which seems unlikely. On the contrary, this anomaly could be a result of disproportionate mortality rates. In view of the importance of this finding, a longitudinal study design is necessary that includes co-morbidities, as well as mortality. Additionally, future neighborhood research should be informed by the unique period and cohort experiences of the life course perspective.

This chapter summarizes study findings through framework pathways; reviews limitations and strengths; and then reviews implications which are followed by a summary of the interpretations.

Findings

The Stress Process Model of Neighborhood Effects on Mental Health framework partially

explained the pathways in which neighborhood-level socioeconomic disadvantage affects individual-level depressive symptoms via sociodemographic characteristics, stressors, and resources. This study's conceptual framework, as shown in Figure 1.1, was an adaptation of Aneshensel's model (Aneshensel 2010). This framework incorporates structural aspects of the social model (aggregated social status) with stress process theory (stressors and psychosocial resources) to examine the relationship between neighborhood characteristics and mental health. This framework was modified to include a cross-level effect modification pathway, by means of an interaction between neighborhood-level socioeconomic disadvantage and age. Because a known curvilinear relationship exists between age and depressive symptoms, this interaction tested if vulnerability to neighborhood effects was conditional on point in the life course. This upstream approach, showed that mental health varied by conditional exposure to stressor and resource elements, the pathway between neighborhood and individual characteristics.

The framework's elements were tested via five specific pathways; they include:

1) the focal relationship association of neighborhood and mental health
2) the focal relationship mediated by individual-level sociodemographic characteristics to take into account compositional effects
3) the focal relationship moderated by a cross-level interaction with age
4) the focal relationship mediated by individual-level stressors
5) the focal relationship mediated by individual-level psychosocial resources

Framework elements and pathways were statistically confirmed. The framework's focal relationship, neighborhood socioeconomic disadvantage and depressive symptoms, persisted net of individual-level elements: demographic characteristics (age, sex, race, ethnicity, education, income, wealth, employment, and marital status).It was mediated by stressors (neighborhood disorder and financial strain) and psychosocial resources (mastery and religious

service attendance). In addition, the focal relationship was moderated by the cross-level pathway via an interaction between neighborhood-level socioeconomic disadvantage and age.

The initial pathway is the association between the elements neighborhood characteristics and mental health. This focal relationship was operationalized as the independent variable neighborhood-level socioeconomic disadvantage and the dependent variable individual-level depressive symptoms. This focal relationship was significant and positive: as neighborhood-level socioeconomic disadvantage increases so do depressive symptoms.

The second pathway is the individual-level characteristics as potential confounders of the focal relationship; operationalized as individual-level sociodemographic status. This pathway determines compositional or contextual effects. Because of the compositional hypothesis, individual-level self-selection bias had to be accounted for prior to making causal inferences. After controlling for known individual-level sociodemographic risk factors for depression (age, sex, race, ethnicity, education, income, wealth, employment, and marital status) the focal relationship variables coefficients remained highly significant, maintained a positive relationship. Age appeared to have a slightly curvilinear association with depressive symptoms (elevated among the lowest and highest age groups); lower-levels of achieved SES (education, income, and wealth) had higher levels of depressive symptoms; and the employed and married had lower levels of depressive symptoms compared to employment status of retired and other or the marital status of divorced/separated and widowed.

The focal relationship association is not explained by socioeconomically disadvantaged individuals who self-selected into socioeconomically disadvantaged neighborhoods. After adjusting for individual-level sociodemographic factors, the continued variability of depressive symptoms by neighborhood disadvantage allows a stronger inference that the observed effects are due to contextual qualities of the neighborhood, although proportionally smaller than

neighborhood composition. This is an important finding, for previous neighborhood research has shown discrepancies in compositional and contextual effects; perhaps this is due to inadequate consideration of individual-level factors or having less representative and more geographically isolated samples.

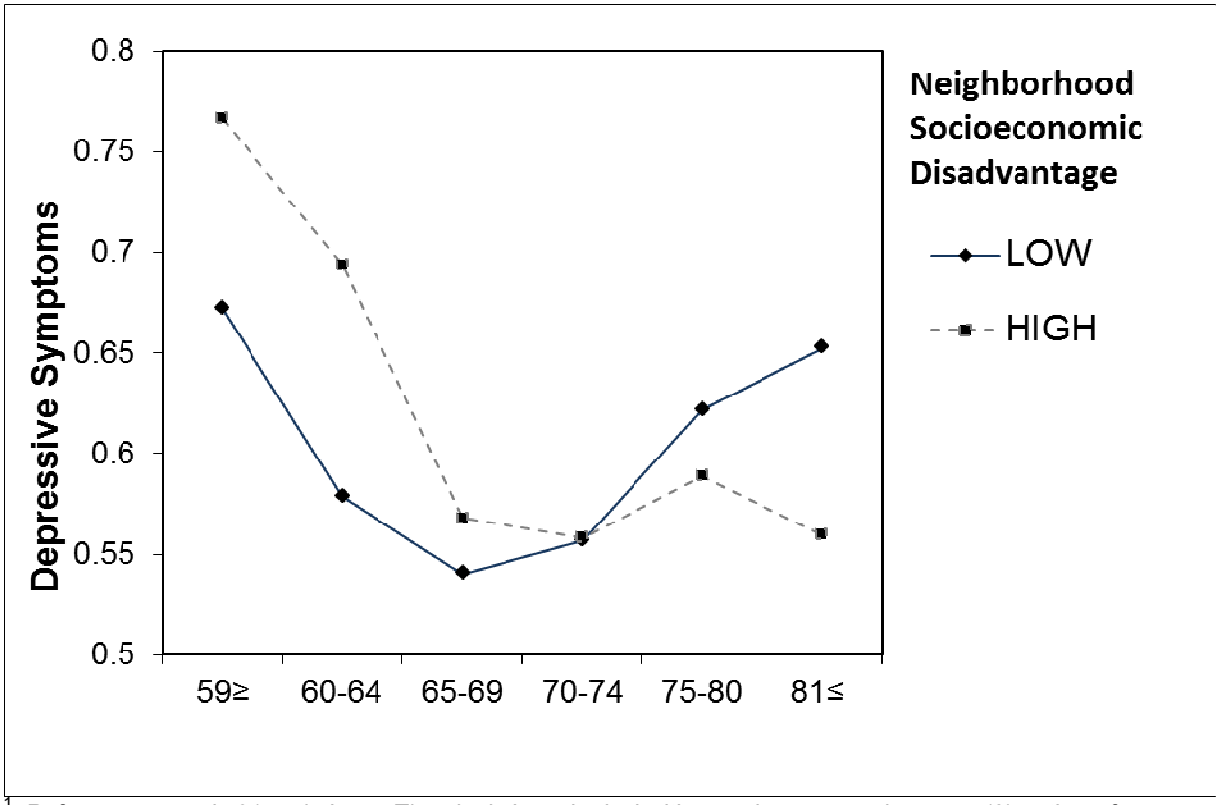
The third pathway is the cross-level interaction between neighborhood-level and individual-level characteristics as moderator of the focal relationship. This pathway was operationalized as the interaction term, age × neighborhood-level socioeconomic disadvantage and has been untested in the literature. This interaction was significant. The focal relationship was conditional on age. Position in the life course, that is, age explains differences in the impact of neighborhood effects on depressive symptoms. These differences may be due to distinctiveness between the age cohorts of late-middle adulthood and oldest-old—dissimilar societal circumstance (childrearing rates), historical experience (economic cycles), and physiological maturation (physiological changes). These cohort dissimilarities are factors associated with depressive symptomology.

An important point is that for the oldest adults a counter intuitive negative relationship was found; as neighborhood disadvantage increases depressive symptoms decreased. Overall, some of this study's lowest levels of reported depressive symptoms were by those of advanced-old age, who paradoxically resided in disadvantaged neighborhoods. Additional slope tests (not shown) confirmed that the slope was not zero and that a negative relationship was present for all age categories 70 years and above. Here I wish to emphasis the importance of this finding, the conditional relationship between age and neighborhood socioeconomic disadvantage may explain the inconsistent research findings within the neighborhood and depressive symptoms literature.

Another important implication is that a life course perspective of understanding period and cohort variability should be considered when studying this population. Grouping ages into a

single category or examining continuous age variables could misrepresent findings. As seen in Figure 4.1, with the exception of adults ages 70 - 74, there is a visible health disparity within the broad range of age and between neighborhood socioeconomic statuses. This disparity in depressive symptoms may be associated with differing morbidity and mortality.

FIGURE 4.1 Mean Depressive Symptoms by Age Group[1] and Neighborhood Disadvantage, HRS 2006-08, n = 8,623



[1] Reference group is 81 and above. The plot is hypothetical with covariates set to the mean (0) or the reference category: White male; who is employed and married and average on all other variables. There was no statistical difference between the age categories 70-74, 75-80, and 81 and above.

At lower age categories, residents of disadvantaged neighborhoods reported more symptoms than among their cohorts residing in the advantaged neighborhoods. At older ages, this relationship reverses. It is counterintuitive for this leveling off of the effect of neighborhood disadvantage on depressive symptoms between age-cohorts. Exposure to the disadvantaged

neighborhood and experiencing what is often seen as a chronic nuisance may increase the susceptibility to depressive symptoms. Among the lower age cohorts, residents of disadvantaged compared to advantaged neighborhoods had higher levels of depressive symptoms, and those with higher levels of depressive symptoms, besides having an increased risk for comorbidity and mortality have an increased odds of developing future depressive episodes. The counterintuitive finding suggests a potential survival bias.

For disadvantaged residents, a survival bias may explain the counterintuitive conditional relationship—positive for lower and negative for the higher age categories. To have depressive symptoms in old age, one has to be: at risk, exposed to causal components, and alive. For older adults, depression increases medication non-adherence, impedes recuperation, and increases risk for comorbidity (Carney and KE Freedland 2003; Romanelli et al 2002; Schultz et al 2002; Alexopoulos et al 1993; Kraenzle 1994; Lyles 2001; McEwan 2003). Furthermore, depression increases allostatic load, impairs immunity and healing; and ultimately contributes to an increased mortality risk by 4.31 fold (Leaf et al 1989; McEwan 1998; McEwan 2003). Thus older adults with depressive symptoms are more likely to experience earlier mortality.

In addition to increased risk for comorbidity and mortality, depressive symptoms for older adults is characterized by chronic and unchanged conditions. For older adults depressive symptoms go unabated. The lifetime prevalence of major depressive disorder is 16.6% and two-thirds of the population will never develop a major depressive disorder (Kessler et al 2003). However, those with a major depressive disorder are unlikely to fully recover. A 6-year study found that older adults with a major depressive episode had a bleak outlook, with only 31% fully recovering and episode-free, while 17% had no change/improvement, and 28% relapsed at least once (Yesavage et al 1983). Following from the implications, many older adults who are at risk and develop depressive disorders are likely to experience persistent symptoms with no improvement.

Older adults experiencing social inequality at both the individual-level and neighborhood-level have multiple risk factors for mortality. Neighborhood disadvantage has a long history of being linked to mortality (Haan et al., 1987; LeClere et al., 1997); equally important is that low SES increases risk for comorbidities for each major cause of mortality (Illsley and Mullen 1985). Another important aspect of this multiple disadvantage is that older residents in impoverished neighborhoods have decreased mobility (South & Crowder 1997). This is occurring while their neighborhoods are become even poorer (Massey & Denton 1993). As I noted above, older adults have an increased risk to the depressive symptoms associated mortality, while unable to avoid exposure to deleterious neighborhoods. Older low SES individuals who reside in disadvantaged neighborhoods are increasingly unable to avoid multiple morality risk factors.

Depression, in the normal life course, is characterized by a curvilinear relationship that increases for those of advanced-old age. As seen in Figure 4.1, the advantaged neighborhood residents exhibited the normal U-shaped curvilinear relationship between age and depression, while disadvantaged neighborhood residents exhibit an L-shaped (lower age having higher rates which flatten around 70 - 74). Adults in the lower age categories in the socioeconomically disadvantaged neighborhoods have a greater risk for stress-related co-morbidity and mortality. These adults experience earlier depressive symptoms burden, and because of limited mobility, cannot avoid deleterious neighborhood exposure, and as they age, have an increased mortality risk. It is conjectured here that this mortality risk contributes to the remaining older population more resilient to depressive symptoms. On the other hand, the advantaged neighborhood offers residents protection from morbidity and mortality, conferring longevity, increasing susceptibility as well to depressive symptom. Differential exposure to stress contributes to health disparities so great that a survival bias maybe responsible for what appears to be a conditional positive health effect in the disadvantaged neighborhood.

Much of the previous discussion addressed the relationship between the framework

elements depressive symptoms, neighborhood and individual sociodemographic characteristics. Along the first pathway, I established that the focal relationship exists, as neighborhood-level socioeconomic disadvantage increases so does depressive symptoms. Following this I addressed the compositional hypothesis or second pathway. Findings here suggest that although individual-level sociodemographic characteristics moderated the focal relationship, contextual qualities of the neighborhood remain associated with an increase in depressive symptoms. Finally, along the framework's third pathway, I discussed and interpreted the novel and counterintuitive cross-level interaction findings on age. These findings suggest that neighborhood socioeconomic disadvantage is positively associated with symptoms among those under 64, but has little effect among persons 65 to 74 year, and is negative at older ages.

Now I would like to bring your attention to the two remaining pathways and the two elements: stressor and psychosocial resources. Stress process theory explains how depressive symptoms are influenced by the unequal distribution of stress through psychosocial structures. These elements mediated the focal relationship. Exposure to stressors partially explained the association; while psychosocial resources suppressed it.

The fourth pathway is the individual-level stressors element as a mediator of the focal relationship. This pathway was hypothesized to partially explain depression through an unequal distribution of stress within the social environment. The stressor elements were operationalized as perceived neighborhood disorder and financial strain. The individual-level confirmation of financial strain, combined with the subjective cross-level confirmation of neighborhood-level socioeconomic disadvantage, reduces cross-level biases and strengthens causal inferences by avoiding the sociologistic fallacy.

Both stressors meditated the focal relationship, were highly significant, and had a positive relationship with depressive symptoms. These stressors explain some of the variation in depressive symptoms, as well as mediate the effect of individual-level sociodemographic

variables. The neighborhood-level socioeconomic disadvantage coefficient was marginally no longer significant, indicating that the focal relationship was fully explained by individual-level sociodemographic characteristics and stressors. Individual-level sociodemographic variables income and wealth were no longer significant. Noteworthy, is that financial strain and neighborhood physical disorder do not explain how neighborhood socioeconomic disadvantage influences the variability in depressive symptoms for those 81 and above.

The findings from pathway 4 suggest that the socially disadvantaged neighborhoods are emotionally distressing because residents are exposed to more financial strain and neighborhood disorder. And that one of the ways in which individual-level high SES protects emotional well-being is by shielding people from these stressors. I was unable to located another study including self-reports of financial strain for cross-level confirmation of the causal mechanism of the neighborhood-level socioeconomically disadvantaged environment. This means that individual-level confirmation of the aggregated neighborhood-level socioeconomic disadvantaged variable through individual-level financial strain diminished the risk of inferential bias and strengthened causal interpretation. These findings confirm the stress process model's stressor element as a mediator in the relationship between neighborhood environment and mental health. Neighborhoods higher in socioeconomic disadvantage are more stressful, and have residents who are at a greater risk for depressive symptoms, and possibly at a higher risk for other illnesses.

The fifth and final pathway is the individual-level psychosocial resources element, as a mediator of the focal relationship and intervener of stressors. This pathway, through differential access to psychosocial resources, was hypothesized to intervene as causal mechanisms and clarify the meaning of the focal relationship. This element was operationalized as mastery, social support, and religious service attendance. Social support was not associated with neighborhood disadvantage and consequently dropped from the model. This lack of association

could be a result of absence of between-neighborhood variation in my definition of positive social support; future studies should consider negative social support. Both of the psychosocial resources mastery and religious service attendance were highly significant, and had a negative relationship with depressive symptoms.

Following from these implications, individual-level psychosocial resources explain some of the variation in depressive symptoms, as well as mediate the effect of individual-level stressors. For the oldest ages, psychosocial resources revealed an even stepper paradoxical slope between the neighborhood disadvantage and depressive symptoms.

Mastery and religious service attendance suppressed the deleterious effects of neighborhood-level socioeconomic disadvantage, mediated financial strain, and only slightly buffered neighborhood disorder**.** Psychosocial resources buffer stressful life events and chronic stressors, but perhaps, have less of an impact on stressors that are perceived as beyond individual-level control, resembling neighborhood disorder. However, an increase in financial resources may benefit residents of disadvantaged neighborhoods, by directly mitigating financial stress. These findings confirm the stress process model's psychosocial resources as a mediator in the relationship between neighborhood environment and mental health outcomes.

The Stress Process Model of Neighborhood Effects on Mental Health, as depicted in Figure 1.1, supported and partially explained the relationship between neighborhood characteristics and mental health. In addition, these findings confirm the theorized relationships between all the elements in the framework: neighborhood-level and individual-level characteristics; stressors; psychosocial resources; and mental health.

Limitations

It should be noted, that this study was primarily concerned with the experience of urban residents living in a densely populated neighborhood, having homogeneous socioeconomic

characteristics, and sharing a similar social context. Limitations of this study include sample composition, the operationalization of neighborhood, and study design. This sample excluded people living in nursing homes. The overall HRS sample reports that the proportion of people living in nursing homes or assisted living facilities is lowest among ages 55 to 74, rising to 7 percent for ages 75 to 84, and suddenly increases to nearly 20 percent among ages 85 and older (NIH 2007). Socioeconomic differences could create substantial variation within cohorts.

It is reasonable to imagine that those residing in impoverished areas have more budgetary constraints; as a result, requires an increase in shared resources and living. This could offer social support as well as mattering. As impoverished older-adults become eligible for Social Security, they may subsidize their children and grandchildren, increasing their own self-concept through mattering. In the United States the intergenerational transmission of wealth, would have fewer high SES individuals relying on family members for financial assistance. For the high SES, growing older could be associated with less sharing of resources, resulting in a disparity of psychosocial resources of social relationships and mattering, benefiting those of advanced-old age in the disadvantaged neighborhood.

Neighborhoods were delineated by census tracts, and not subjectively by individual participants. This could be problematic, for third party boundaries might not correspond with the perception of neighborhood, one that may change through the life course. As social roles change during the life course, the relationship to ones' neighborhood may change, resulting in dissimilar spatial boundaries with varying social interactions, in both quantity and quality. Not allowing subjective age-cohort delineation of neighborhoods may limit their effects between age-cohorts. However, because the Census Bureau works with local Census Statistical Area Committees so that census tracts have homogeneous socioeconomic characteristics (U.S. Census Bureau Geography Division 2005) and census tract proxies allow secondary data analysis with U.S. Census provided demographics, this is an efficient manner to examine

populations. The weakness of census tract proxies is that true neighborhood-level effects are likely to be under estimated (Duncan et al 1997); whereas the strength is that subjective definition of neighborhood limits generalizability between neighborhoods. As the preceding discussion suggests, another method of delineation would likely show a stronger neighborhood effect, with decreased generalizability.

Neighborhood disadvantage was defined by a limited number of achieved socioeconomic indicators. Neighborhood environment includes additional social and physical structures associated with stress and mental health outcomes. In addition, these structures may facilitate achievement inequalities, social interactions, and ambient nuisances. This measure assumed comparable social environments when the index was similar; this comparison omits important socioeconomic details. A static snapshot may mask temporal economic processes; what appears identical by the index, could be socially different. For example, a formerly affluent neighborhood in decline will retain beneficial social and physical infrastructure absent from the neighborhood that was always impoverished. Segregation and neighborhood inequality in the former manufacturing areas of the Midwestern United States could differ from the neighborhood experiencing gentrification in the Western United States; all of which are missed in the neighborhood-level socioeconomic indicator.

Self-reported data is another limitation of this study. As well as the outcome variable, both stressors and resources were self-reported. Depressive symptoms were measured through a brief self-reported modified version of the Center for Epidemiologic Studies Depression Scale (CES-D8). A more reliable measure is the clinical assessment, which at the population-level is cost prohibitive. In addition, the measure of depression is a point prevalence measurement and not indicative of the population burden.

The speculation of a mortality and morbidity survival bias can only be answered though a longitudinal study design. A longitudinal study would allow examination of causal relationship

between neighborhood disadvantage and depressive symptoms over the life course, as well as establishing if neighborhood disadvantage contributes to a reduction of susceptibility through higher mortality. A longitudinal study would allow the teasing out of age cohort period and physiological effects; as well as a dose response relationship via length of residence.

Strengths

The study had several strengths; key among them was the sample and control of biases. The Health and Retirement Study was selected using a large national multi-stage area probability sample. This ensured that those enrolled were representative of the entire U.S. Population over 50 years of age. This sample yields strong external validity and allows generalizability to the larger population, limited to people 50 years and older. This study had 8,623 individuals nested within 3,478 neighborhoods, with a range of 1 to 83 persons per neighborhood, for an average of 2.48 persons per neighborhood. An additional strength was the control of biases. Individual-level biases were controlled through the adjustment of individual-level sociodemographic characteristics associated with depression (Diez-Roux 2001). Cross-level inferential biases were reduced and both sociologistic and psychologistic fallacies were avoided by subjective confirmation that the socially disadvantage neighborhood was more stressful.

Implications

Future research needs to examine stressors, resources, and age, as well as competing causes. Stressors are mediated by resources. Further examination is needed to elucidate how psychosocial resources mediate the effects of stressors and neighborhood disadvantage. The age interaction suggests that older adults are a diverse group, and that careful consideration is necessary when examining age as groups and as a continuous variable.

For persons over 50 years in age, their unique life course position and societal expectations necessitates a variety of examinations of age that considers social factors as well as biological processes. Older adults have much unexplored individual variability that also need to be taken into consideration, mattering and kinship might be associated with individual SES, while neighborhood exposure changes with social roles tied to employment and volunteering. A life course approach that examines individual variation between ages is suggested. In addition, a longitudinal study is necessary to review competing causes that include controls for co-morbidity and mortality.

Conclusion

The Stress Process Model of Neighborhood Effects on Mental Health framework expands the stress process theory into the neighborhood environment. This framework partially explained the distribution of mental health disparities through neighborhood social inequalities. Differential exposure to stressors and the inequitable distribution of resources result in the socially disadvantaged having disproportionate levels of psychological distress. These findings suggest that the socially disadvantaged neighborhoods are emotionally distressing because residents are exposed to more financial strain and neighborhood disorder. And that one of the ways in which individual-level high socioeconomic status (SES) protects emotional well-being is by shielding people from these stressors. However, it appears that vulnerability to disadvantaged neighborhoods is not consistent across the life course.

Healthy aging finds that, after reaching 80 years of age, individuals experience a precipitous drop in physiological health. This biological aging process is sped up or slowed down considerably by individual diet, sedentary behavior, and social influence, including socioeconomic status. More research is necessary to identify if there are key critical periods in which the detrimental effects of neighborhood disadvantage can be averted. There is a normal

curvilinear distribution of depressive symptoms across the life course.

It is important to underscore this study's abnormal findings, in that neighborhood effects were found to be conditional on age. For those of advanced-old age lower levels of depressive symptoms were found for those living in disadvantaged neighborhood; and overall they reported some of the lowest levels of depressive symptoms.

For older adults, depressive conditions are characterized by chronic and unchanged conditions, and associated with an increased risk for co-morbidity and mortality. Because of limited residential mobility, older adults residing in disadvantaged neighborhoods are unable to avoid deleterious exposure. The disadvantaged neighborhood appears to have a depressive symptom burden among the middle to old age and decreased susceptibility at advanced-old age. This could be interpreted as the advantaged neighborhood has a decreased susceptibility of depressive symptoms at middle to old age and an increased burden at advanced-old age. This counterintuitive decrease of symptoms for the advanced-old age in the disadvantaged neighborhood is speculated as survivor bias. This is a consequence of a known morbidity and mortality burden associated among individuals residing in disadvantaged neighborhoods and having low SES.

Here I wish to emphasis the importance of this finding, the conditional relationship between age and neighborhood socioeconomic disadvantage may explain the inconsistent research findings within the neighborhood and depression literature. In addition, further research is necessary to determine if the stress related disease burden experienced by middle to old-age residents of the disadvantaged neighborhoods, through excessive mortality rates, results in a disadvantaged neighborhood with an advanced-old age population who are no longer susceptible to depression.

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