

Original Article

# Do Local Social Hierarchies Matter for Mental Health? A Study of Neighborhood Social Status and Depressive Symptoms in Older Adults

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## Abstract

**Objectives:** Despite a well-established association between relative social position and health, stratification at smaller levels of social organization has received scant attention. Neighborhood is a localized context that has increasing relevance for adults as they age, thus one's relative position within this type of mesolevel group may have an effect on mental health, independent of absolute level of social and economic resources. We examine the relationship between an older adult's relative rank within their neighborhoods on two criteria and depressive symptoms.

**Method:** Using data from the Chicago Health and Aging Project, neighborhood relative social position was ascertained for two social domains: income and social reputation (number of neighbors one knows well enough to visit). Using multilevel models, we estimated the effect of relative position within the neighborhood on depressive symptoms, net of absolute level for each domain and average neighborhood level.

**Results:** Higher neighborhood relative rankings on both income and visiting neighbors were associated with fewer depressive symptoms. Although both were modest in effect, the gradient in depressive symptoms was three times steeper for the relative rank of visiting neighbors than for income. Men had steeper gradients than women in both domains, but no race differences were observed.

**Discussion:** These findings suggest that an older adult's relative position in a local social hierarchy is associated with his/her mental health, net of absolute position.

**Key Words:** Depressive symptoms—Neighborhood—Older adults—Social hierarchies

Social hierarchies have well-established consequences for physical and mental health. These consequences manifest themselves in the profound social inequalities in health widely observed in the United States and other industrialized countries, where individuals near or at the top of the social hierarchy tend to experience substantially lower disease risks relative to those at lower social positions

(Kennedy & Kawachi, 2002; Marmot, 2004; Wilkinson, 2000). In most of this work, social hierarchies are defined on a macroscale using criteria such as income or educational attainment within large heterogeneous population contexts that are relevant to behavior, power, or access to resources. However, social stratification also occurs at smaller, localized levels of social organization, such as

neighborhood, work, or school settings. Although a stream of social theory has focused on the formation of status hierarchies in these smaller, local frameworks (Berger, 1977; Ridgeway, 1991) and their potential psychosocial consequences (Hill & Buss 2010; Kanter, 1977; Mueller, Pearson, Muller, Frank, & Turner, 2010), very little is known about the impact of local social hierarchies on health and well-being for older adults.

In this article, we focus on neighborhoods as a potentially important localized social group for older adults and examine the degree to which neighborhood-level social hierarchies may be influential in mental health. Although one's neighborhood is the most geographically proximate social group at any age, research shows that both the frequency of contact with neighbors and the depths of these relationships tend to intensify in older adulthood (Cornwell, Laumann, & Schumm, 2008). A rise in both attachment to and investment in the neighborhood may be due in part to transitions out of work and other social roles that contribute to more extensive and diverse social networks in earlier stages of the life course (Shenk, Kuwahara, & Zablotsky, 2004). Given that many older adults are long-time residents in their neighborhoods, there has been ample opportunity to foster relationships with neighbors and to engage in routinized patterns of social interaction. This may lead to the establishment of local social hierarchies, which, although constructed over many years of coresidence in the same neighborhood environment, acquire particular relevance in later adulthood.

There is ample evidence of social gradients in health for older populations at higher levels of social organization. In a national context, socioeconomic status is inversely associated with a wide range of health outcomes, including mental health (e.g., Lynch & Kaplan, 1997; Singh-Manoux, Marmot, & Adler, 2005). The absolute level of material and social resources are pertinent to an understanding of mental health gradients in older adults. Our focus here shifts from an emphasis on relative differences in these resources at a macropopulation level to a mesolevel scale of social organization. We do so by examining the degree to which local neighborhood-level ranks in a social hierarchy are associated with depressive symptoms in older adults. In the following sections, we will first describe theoretical insights into the formation of mesolevel, localized, status hierarchies, with specific reference to the neighborhood context. Using these social processes as theoretical basis, we then argue why these status hierarchies may be consequential to mental health among older adults.

### Formation of Neighborhood Social Hierarchies

Formation of social hierarchies is a universal process among humans that serves basic psychological needs such as self-concept and perceived ability (Sapolsky, 2005; Suls, Martin, & Wheeler, 2002) and creates a functional way for social groups to accomplish collective goals (Ridgeway, 1991). The generation of hierarchies involves implicit or explicit ranking of individuals based on status criteria, and these characteristics can either be diffuse or be specific to the social group. In the case of the former, group members may be ranked on value statuses that are meaningful in the broader culture or at a macrolevel social scale (e.g., income) but do not serve a particular function within the group (Berger, 1977; Ridgeway, 1991). Alternatively, members may be ranked on specific status characteristics, which represent value statuses related to tasks that are critical for the function of the local group (e.g., organizing a neighborhood watch).

The observation by Foster (1965) that social groups can form out of mere geographic proximity and demographic homogeneity, not just explicit organization, opens the door for considering

neighborhood as a meaningful spatial context in which a social hierarchy may form. Urban neighborhoods are generally composed of relatively homogeneous groups in terms of race, ethnicity, and socioeconomic status. Other characteristics such as kinship ties and homeownership can further enhance social homogeneity and cohesiveness of the neighborhood environment. Thus, urban neighborhoods may form the type of geographic space where individuals perceive their neighbors as sharing similar social attributes and make an acceptable referential frame.

Theoretical and empirical research on neighborhoods shows that, within relatively homogeneous residential populations, we are likely to observe positive social norms such as collective efficacy, norms of reciprocity, and social investment (Sampson & Graif, 2009; Sampson, Morenoff, & Gannon-Rowley, 2002). Neighborhood-level social processes that generate collective efficacy govern expectations of and opportunities for residents to interact, observe, and exchange information with each other (Cagney et al., 2009). This "solidarity by similarities" positively influences neighborhood social processes such as communication and cooperation among residents, and these increased opportunities to share information with neighbors contribute to the formation of status hierarchies.

### Neighborhood Social Status and Mental Health Among Older Adults

Social processes associated with the development of localized hierarchies occur within many types of groups, and relative ranking can be consequential for persons of all ages. Yet neighborhood-level social hierarchies may be particularly pertinent to produce mental health differences among older adults for two key reasons. First, older adults may have greater attachment to their neighborhood than younger adults. As older adults exit the labor force, which removes an important domain of daytime activity and engagement, the neighborhood social space may acquire a more significant role when there is both the time and desire to engage in greater degrees of "neighboring" (Baker, Bodner, & Allman, 2003). Consistent with this, investigators have found that, relative to midlife adults, older adults tend to rely more heavily on local resources and rank social relationships with neighbors as more important (Oh, 2003; Robert, 2002). There is also an intensification of reported affect for one's neighborhood and localized area as people age (Scharf, Phillipson, & Smith, 2003).

Second, older adults may invest more in their neighborhoods than younger adults. Given that many older adults spend increasing amounts of time in the neighborhood, there are extensive opportunities to gather information and make connections with their neighbors. Older adults tend to be long-term stable residents, facilitating the network of informal social ties with neighbors (Matt & Dean, 1993; Shenk et al., 2004). Further, the increased time spent in and near one's home in older age provides the opportunity to observe the routine and nonroutine neighborhood activities from their "surveillance zone" (Rosel, 2003). Such monitoring helps the older adult develop specialized local knowledge that can be critical for crisis intervention, neighborhood safety, and instrumental support of neighbors (Wethington & Kavey, 2000; Woldoff, 2011). Thus, the older adult may receive social rewards for either providing needed assistance or passing along pertinent information.

In terms of local neighborhood-level influences, several studies have reported a link between neighborhood-level characteristics such as socioeconomic status, collective efficacy, and safety on depressive symptoms in older adults (Everson-Rose & Clark, 2010; Ross, Reynolds, & Geis, 2000). Yet this work typically examines how a particular neighborhood-level characteristic affects all of the

residents within that area. The question, then, is whether we may observe a gradient in depressive symptoms for older adults based on relative social position within their own neighborhoods.

There are remarkably few empirical studies that have considered the role of mesoscale, local social rankings on health, and related outcomes in older adult populations. One notable exception is a recent study by Marshall, Jivraj, Nazroo, Tampubolon, and Vanhoutte (2014) that examines whether inequality in housing prices within neighborhoods influences depressive symptoms among older adults. Interestingly, they found both an overall neighborhood-level effect, where a wider range of housing values in a neighborhood is associated with fewer average depressive symptoms among older residents and a separate, independent effect of one's own housing value relative to the neighborhood average on mental health. This study provides evidence that localized social hierarchies may be consequential to older adults' mental health, net of absolute levels of resources. However, given the high degree of residential stability of older adults, housing value may not have strong daily relevance for these residents. Our work extends the inquiry to two ranking criteria that may have more proximate, thus potentially stronger, effects on depressive symptoms.

Drawing on the theoretical and empirical literature on status hierarchies and neighborhood social processes that we present earlier, we hypothesize two potential mechanisms by which local status hierarchies may be consequential to mental health for older adults. The first mechanism emphasizes status based on advantages in material resources, which are typically defined in terms of income or wealth. These resources may promote mental health through reduced exposure or vulnerability to stressful life experiences, such as financial insecurity, poorer transportation options, and reduced access to essential resources (Marmot, 2004). In essence, it mimics the same mechanisms that play out at the macrolevel, except because neighborhoods tend to be quite homogenous, the differences in material resources will likely be substantially smaller in this local context, and accordingly, may produce smaller mental health inequalities.

The second mechanism involves a group-specific status based on degree of social integration in the neighborhood whereby mental health benefits may be accrued. This mechanism emphasizes the social rewards that are allocated and enacted within the group, based on the differential investment in the relationships with one's neighbors, which, in turn, provide them with a sense of control and quality of social interactions that take place in the local neighborhood environment (Sampson & Graif, 2009; Stafford, McMunn, & DeVogli, 2011). This pathway differs substantially from those that are enacted at the macrolevel, as it stresses social rewards that emanate from routine daily interactions among group members, rather than mere status categories. Because older adults are more likely to engage in active neighboring than their younger counterparts, the benefits of greater integration into this network may include better mental health (Cornwell et al., 2008). These two distinct mechanisms further serve to illustrate that multiple status hierarchies may form within smaller social groups along different sets of criteria, producing rankings that may not necessarily coincide or even overlap substantially with one another.

The literature on older adults and their neighborhood context has consistently noted differing levels of engagement in, and received benefits from, neighboring activities by gender (Shenk et al., 2004; Woldoff, 2011) and race (Small, 2007). For instance, although women tend to have higher lifetime levels of neighborhood sociability, there is a notable increase in such engagement among men as they age (Perren, Arber, & Davidson, 2004). Further, while some

work documents race differences in degree of neighborhood integration, much of the differential has likely been due to the utilization of unbalanced sampling designs where the Black neighborhoods under study had disproportionately higher rates of poverty than the White neighborhoods (Small, 2007). Because poverty is well known to be a deterrent for cooperative social processes and collective efficacy in neighborhoods, the degree that relative social position in the neighborhood is consequential for Black older adults may in fact be underestimated in previous studies. Our sample of Chicago neighborhoods had a relatively broad range of socioeconomic diversity and a similarly high degree of residential stability within each racial group, which enabled us to explore Black-White differences in the neighborhood social gradients of mental health.

In sum, the fundamental social processes through which smaller-scale, local social hierarchies—such as those operant in neighborhoods—influence the health and well-being of older adults remain largely unknown. We integrate theoretical concepts from two sociological frameworks, formation of social hierarchies and neighborhood social processes, to begin a more systematic investigation of the relationship between localized social hierarchies and well-being in later life. The primary question we address here is whether an older adult's social status within the localized neighborhood hierarchy is associated with mental health, specifically depressive symptoms. To account for the possibility that concurrent status hierarchies exist within the same neighborhood, we explore the role of two markers of neighborhood-level social status: (a) a socially diffuse criterion of socioeconomic status and (b) neighborhood-specific status criterion of social interaction. In doing so, we seek to investigate the health consequences of a social group process and attendant differences in social status, which, thus far, largely have not been studied in the empirical literature.

## Method

### Population

The data come from an ongoing, population-based study of Alzheimer's disease and other common chronic conditions in older adults, the Chicago Health and Aging Project (CHAP; Bienias, Beckett, Bennett, Wilson, & Evans, 2003). The CHAP study is conducted in three adjacent community areas in the city of Chicago, encompassing an area of 20 census tracts with a total of 82 census block groups. The CHAP study consists of an original cohort and a successive age cohort. The original cohort was identified from a census of all study area residents conducted between 1993 and 1997, and every person aged 65 and older was invited to participate. Of the 7,813 eligible residents, 6,158 (78.9%) agreed. In-home baseline interviews were conducted between 1993 and 1997, and follow-up interviews were administered in 3-year cycles. As of the third cycle (2000–2002) and ending in 2011, residents of the community area who had either turned 65 years since the inception of the study or moved into the study area are being identified in the original census and through commercially available listings. All age-eligible residents who are identified were invited to participate and form the successive age cohorts of the CHAP study. The addresses of all participants from the original and successive age cohorts who completed a CHAP interview between April 1, 2000 and August 15, 2008 have been geocoded at the Census tract and block group level and are used in the present analysis. This resulted in a sample of 6,005 participants, including 2,690 participants from the original CHAP cohort and 3,315 from the successive age cohorts. Of the 6,005 participants with completed CHAP interviews, 380 (6.3%) were excluded from

analysis due to missing data on the following variables: income (177; 2.9%), years of neighborhood residence (169; 2.8%), other variables (34; 0.6%), leaving a total number of 5,625 participants for analysis.

Given the lack of uniform criteria to define neighborhoods, we adopted a pragmatic approach by relying on methods developed in the rapidly emerging research on neighborhood factors in health. Most of the work in this area has used readily available criteria to define social environments that are reasonably homogeneous with regard to core social characteristics, in particular U.S. Census Bureau census tracts or block groups (Krieger, et al., 2002). Block groups, which in an urban setting are normally delineated to include a population of about 1,000 residents, are subunits of a census tract and therefore tend to be more homogeneous than census tracts. The present analysis included a sufficiently high density of participants in a small geographic area enabling us to use block group, rather than census tract, as definition of the relevant social environment. This smaller geographic unit better approximates the localized community in which these smaller-scale hierarchies may exist. Thus, in this study, we use the terms block group and neighborhood interchangeably. The present study had an average of 68.6 ( $SD = 34.0$ ) participants per neighborhood, with a range from 19 to 170, giving us sufficient observations for between- and within-neighborhood comparisons.

## Measures

### Depressive Symptoms

For the outcome, we utilized the Center for Epidemiologic Studies-Depression (CES-D) scale (Radloff, 1977). The CHAP study included the 10-item version of the CES-D, which has acceptable reliability and a similar factor structure compared with the original version (Kohout, Berkman, Evans, & Cornoni-Huntley, 1993). Item responses are coded in a yes–no format, yielding a summary measure ranging from 0 to 10 depressive symptoms.

### Neighborhood Social Rank Scores

We constructed measures of neighborhood-level social status on two distinct dimensions: socioeconomic status and social integration. The first dimension is measured by income. Although total household wealth may have been a more accurate measure of lifetime accumulation of economic resources, this information was not collected in the CHAP study. Personal income was assessed using a color-coded card specifying 10 income categories, ranging from less than \$5,000 per year to more than \$75,000 per year. Respondents were asked which income category represented their personal income in the past year. To construct a measure of neighborhood-level social status based on income, we computed the percentile rank score for each participant according to the income frequency distribution within each block group. This produced a neighborhood-specific percentile rank score with a range from 0 to 100, with higher scores representing higher rank within the block group. Percentile rank scores were computed from the top down, such that participants with the highest relative score within the block group were assigned the 100th percentile. The lowest percentile rank scores within a block group therefore refer to the proportion of participants with the lowest level on each variable (e.g., if 40% had the lowest income level within a block group, their percentile rank score would be 40 and not 0). The resulting block group–specific rank scores were reassembled across all block groups for the analysis.

The second dimension captures social integration. Consistent with the conceptualization and measurement of older adults'

integration into neighborhoods by Cornwell and colleagues (2008), we chose responses to the following single question: "How many of your neighbors do you know well enough to visit with inside your home at least once-a-month?" This is a unique measure because it is neighborhood specific and represents an essential function of the local context: communication and information exchange. Unlike measures that query the count of neighbors one may know, this measure taps an action-based status criterion; a persons' private home tends to represent a relatively high social barrier as focal site of social interaction, especially for interactions with non-kin neighbors. Further, visiting with neighbors is associated with greater subjective well-being among older adults relative to other forms of exchanges such as talking with neighbors on the telephone (Mair & Thivierge-Rikard, 2010). We tested alternative, less intimate, measures of interactions with neighbors and found consistent, but somewhat attenuated, effects on mental health. Thus, we elected to use the single indicator of neighborhood social integration.

For the sake of brevity, we will refer to this measure as number of visiting neighbors while recognizing that the measure assesses the number of potentially visiting neighbors rather than enacted visits by neighbors. Responses to this question ranged from 0 to 75, with responses truncated at 10 (3% of all responses) in order to limit the influence of outliers. Similar to the income-based neighborhood rank score, we created a neighborhood-level rank score for visiting neighbors after computing the percentile rank score for the responses within each block group, and then reassembling across block groups.

It is worth noting that the two rank score variables (income and visiting neighbors) represent individual-level social status, relative to others residing in the same neighborhood. We also computed the block-group average of all individual-level (absolute) responses on both variables, to derive variables that represent the general neighborhood-level social context on each dimension.

### Other Study Variables

We selected a series of demographic, social, and health-related variables that are known to shape mental health and well-being in older age: age, gender, race, marital status, educational attainment, and duration of neighborhood residence. Age was drawn from self-reported date of birth and centered at age 75. Race was a dummy variable (Black and non-Black), with non-Blacks including non-Hispanic White (>99% of all non-Blacks in the CHAP cohort). Marital status was coded as a dummy variable for being presently married/living with a partner or not. Education was reported as the highest grade or year of regular school completed, centered at 12 years of schooling. Duration of neighborhood residence was self-reported number of years living in the neighborhood.

We constructed two variables to adjust for interindividual differences in the general tendency to socialize with others that may account for the relationship between social reputation and depression: the number of friends seen at least monthly and the number of neighbors a person reported to know to by name. The correlation between the visiting neighbors rank scores and number of friends was .28, and number of neighbors known by name was .43.

We included two health-related control variables. Prevalent comorbidity is a summary count of physician-diagnosed chronic health conditions: high blood pressure, myocardial infarction, cancer, stroke, diabetes, and hip fracture. Activities of daily living (ADL) disability is a summary index of up to six activities one cannot do without help: bathing, dressing, eating, using the toilet, bed to chair transfer, and walking across a room (Branch, Katz, Knipmann, & Papsidero, 1984).

**Analysis**

We first estimated basic descriptive information of the sample for all variables. For our primary analysis, we fitted mixed-effects (multi-level) regression models to test the association between neighborhood rank scores and depressive symptoms. Due to its skewed distribution, we modeled the CES-D—dependent variable using a log-link function and assumed a negative binomial error distribution. All models included a random intercept to reflect heterogeneity in CES-D scores across block groups. In initial models, we tested the heterogeneity across block groups in the association of each rank variable with CES-D scores, but this random effect (slope) was found to be nonsignificant and therefore was omitted from the final models. Each model included the controls for demographic and health-related variables. We added neighborhood rank scores to this model, fitting a separate model for each of the two rank score variables. The model for visiting neighbors rank scores also included neighborhood-level average number of visiting neighbors as an additional control variable. For both income and visiting neighbors, we hypothesize that higher within-neighborhood percentile rank is associated with fewer depressive symptoms after adjustment for relevant control variables, including the average neighborhood level of each marker of social status.

In a secondary analysis, we refitted regression models after stratifying the sample by gender and by race to evaluate potential differences in the association between neighborhood rank scores and depressive symptoms between men and women and between Black and White older adults. Differences were tested formally by adding an interaction term for each variable (gender and race) with the neighborhood rank score variables to the original regression models. All models were fitted using the Glimmix procedure in SAS.

**Results**

The descriptive statistics are presented in [Table 1](#). In terms of the individual-level variables, participants were on average 73.4 years of age ( $SD = 6.8$ ); 61% of them were women, 73% were Black, and 49% were married. They had an average of 12.5 years of education ( $SD = 3.5$ ), and the average duration of residence in the neighborhood was 32.7 years ( $SD = 13.0$ ). Participants also reported a mean of 1.2 ( $SD = 1.0$ ) chronic medical conditions and had a mean ADL disability level of 0.3 ( $SD = 1.0$ ), with 11% reporting  $\geq 1$  ADL limitations. About a quarter (24%) of the study population had a yearly income of less than \$15,000 and about a third (35%) had a yearly income of greater than \$30,000. The average income neighborhood rank score was 58.0 ( $SD = 28.8$ ), with a range from 0.7 to 100. Participants reported an average of 2.4 ( $SD = 2.7$ ) visiting neighbors, with slightly more than a quarter (28%) reporting that they knew no neighbors well enough to have them visit in their homes. The average visiting neighbors rank score was 60.6 ( $SD = 24.1$ ), with a range from 7.7 to 100. The correlation between the income and visiting neighbor rank score variables was  $r = .13$  (data not shown). Although statistically significant, the low magnitude of the correlation suggests that the rank scores represent substantially different domains of neighborhood social status.

In terms of the neighborhood-level variables, the mean neighborhood-level income score, after averaging individual-level income levels across participants by neighborhood, was 5.8 ( $SD = 1.3$ ); however, there was a substantial spread in neighborhood-level income levels across the 82 neighborhoods, with scores ranging from 3.1 to 8.9. For the sake of reference, an individual-level score of 3 represents a yearly income of \$10,000–\$15,000, and a score of 9

**Table 1.** Basic Characteristics of Study Participants

Individual-level variables (N = 5,625)	
Age (mean, SD)	73.5 (6.8)
Gender	
Male	39%
Female	61%
Race	
Black	73%
Non-Black	27%
Marital status	
Married	49%
Unmarried	51%
Education (mean, SD)	12.5 (3.5)
Years of neighborhood residence (mean, SD)	32.7 (13.0)
Number of chronic conditions (mean, SD)	1.2 (1.0)
ADL limitations (mean, SD)	0.3 (1.0)
$\geq 1$ (%)	11%
Number of friends seen at least monthly	2.4 (3.1)
Number of neighbors known by name	8.5 (5.4)
Income (%)	
<\$15,000/year	24%
\$15,000–30,000/year	40%
>\$30,000/year	36%
Income neighborhood rank score (mean, SD)	58.0 (28.8)
Range	0.7–100
Number of visiting neighbors (mean, SD)	2.4 (2.7)
0	29%
1–2	37%
3+	34%
Visiting neighbors rank score (mean, SD)	60.6 (24.1)
Range	7.7–100
Neighborhood-level variables (N = 82)	
Number of participants per neighborhood (mean, SD)	68.6 (34.0)
Range	19–170
Neighborhood-level mean income (mean, SD)	5.8 (1.3)
Range	3.1–8.9
Neighborhood-level mean number of visiting neighbors (mean, SD)	2.4 (0.7)
Range	1.3–4.0

Note: ADL = activities of daily living.

represents a yearly income of \$50,000–\$75,000. There was considerable between-neighborhood heterogeneity on the social dimension as well, with a threefold spread in average number of visiting neighbors per neighborhood, ranging from a low of 1.3 to a high of 4.0.

**Neighborhood Social Position and Depressive Symptoms**

The results of our primary analysis confirm the hypothesis that higher neighborhood social status is associated with fewer depressive symptoms ([Table 2](#)). Specifically, income neighborhood rank scores showed a significant negative association with the CES-D (coefficient =  $-.003$ ), after controlling for neighborhood-level income and other demographic and health-related variables. Men, being married, having higher education, number of friends, number of neighbors known by name, and higher average neighborhood-level income were negatively associated with CES-D scores. Black race, number of comorbid conditions, and number of ADL limitations were positively associated with CES-D scores in this model. Age and years of living in the neighborhood were not associated with CES-D scores. Thus, net of individual level characteristics, we find a significant effect of the neighborhood’s average income level

**Table 2.** The Association of Neighborhood Social Rank Scores with Depressive Symptoms

	Neighborhood social rank: income	Neighborhood social rank: number of visiting neighbors	Neighborhood social rank: income and number of visiting neighbors
	Regression coefficient (SE)	Regression coefficient (SE)	Regression coefficient (SE)
Age	-.002 (.003)	.000 (.003)	-.001 (.003)
Male	-.152*** (.038)	-.165*** (.038)	-.144*** (.038)
Black	.216*** (.065)	.227*** (.063)	.207** (.064)
Married	-.106** (.039)	-.146*** (.038)	-.104*** (.039)
Education	-.036*** (.006)	-.041*** (.006)	-.035*** (.006)
Years of neighborhood residence	.002 (.001)	.001 (.001)	.001 (.001)
Number of comorbidities	.106*** (.018)	.113*** (.018)	.109*** (.018)
Number of ADL limitations	.139*** (.015)	.138*** (.015)	.134*** (.015)
Number of friends	-.056*** (.007)	-.047*** (.007)	-.047*** (.007)
Number of neighbors known by name	-.024*** (.004)	-.014*** (.004)	-.014*** (.004)
Mean neighborhood-level income	-.105*** (.027)	-.122*** (.031)	-.135*** (.031)
Income neighborhood rank score	-.003*** (.001)		-.003*** (.001)
Mean neighborhood-level number of visiting neighbors		-.001 (.045)	-.006 (.045)
Visiting neighbors rank score		-.006*** (.001)	-.006*** (.001)

Notes: ADL = activities of daily living.

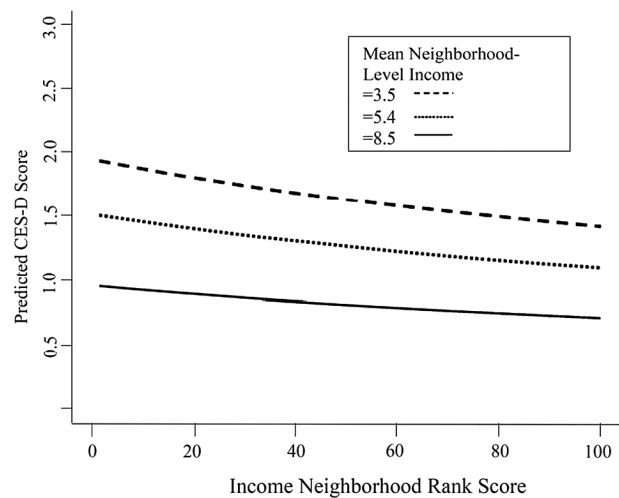
\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

on depressive symptoms as well as an independent effect of the older adult's relative income within the neighborhood.

The second model shows that higher visiting neighbors rank scores were significantly associated with lower CES-D scores (coefficient =  $-.006$ ,  $p < .001$ ). In contrast, the neighborhood-level average number of visiting neighbors was not associated with CES-D scores (coefficient =  $-.001$ ,  $p > .05$ ). Consistent with our hypothesis, older adults who visit with more neighbors, relative to others in their own neighborhood, have better mental health.

The third model includes both rank score variables and shows that the influence of each criterion of social rank on depressive symptoms is largely independent of the other social rank variable. These findings support our hypothesis that multiple, concurrent hierarchies can exist within the same mesolevel group and can have independent effects on mental health. The coefficient for the income rank score indicates that one standard unit change in rank score ( $28.8 \times .003$ ) is associated with a difference of  $.0864$  (logged) units on the CES-D. To put this in perspective, the size of this difference is just slightly smaller than between married and unmarried persons (coefficient =  $-.106$ ) and roughly equivalent to a difference of 2.4 years of education ( $.0864/.036$ ). A standard unit change on the visiting neighbors rank score ( $24.1 \times .006$ ) is associated with a difference of  $.1446$  (logged) units on the CES-D. In sum, higher social status in the neighborhood is associated with fewer depressive symptoms, and relative social status within different social hierarchies may have independent, additive effects on depressive symptom levels.

To illustrate the relationship between neighborhood social status and depressive symptoms, we have graphed predicted CES-D values as a function of income and visiting neighbors rank scores, using the results from the third model in Table 2 (covariate values set to age 75, Black married women with 12 years of education, 33 years of neighborhood residence, no ADL limitations, and no chronic conditions). Consistent with our hypothesis, predicted CES-D values gradually decrease across the range of income neighborhood rank scores, although the magnitude of the decrease is relatively small (Figure 1). For example, for the average person living in a neighborhood with a mean income value of 5.4 (middle line), someone with a low income neighborhood rank score (1st percentile) has a predicted CES-D



**Figure 1.** Predicted CES-D score as a function of income neighborhood rank score.

score of 1.50, someone with an intermediate rank score (50th percentile) has a predicted score of 1.28, whereas someone with a high rank score (100th percentile) has a predicted CES-D score of 1.09. Figure 1 further illustrates that differences in predicted CES-D scores appear much more substantial for between-neighborhood mean income levels than for within-neighborhood income rank scores. In other words, even though there is a within-neighborhood relative ranking effect on depressive symptoms, the between-neighborhood income effect is more consequential for CES-D.

Compared with the income neighborhood rank score, predicted CES-D values decline more steeply across the range of the visiting neighbors rank scores (Figure 2). This is consistent with the twofold higher magnitude of the regression coefficient ( $-.006$ ) for the visiting neighbors rank score than for the income rank score ( $-.003$ ). For the average person living in a neighborhood with a mean number of visiting neighbors of 2.3 (middle line), someone with a low income neighborhood rank score (10th percentile) has a predicted

CES-D score of 2.06, someone with a intermediate rank score (50th percentile) has a predicted score of 1.45, whereas someone with a high rank score (100th percentile) would have a predicted CES-D score of 0.94. The mean number of visiting neighbors in a particular neighborhood is negligible (and nonsignificant), meaning that older adults' relative rank of visiting neighbors within the neighborhood is associated with depressive symptoms but not the between-neighborhood differences in average number of visiting neighbors.

We next examined the consistency of our primary findings across socially relevant demographic groups, as defined by gender and race (Table 3). The income neighborhood rank score was significantly associated with depressive symptoms in both men and women, although the magnitude of the association was considerably greater among men (coefficient =  $-.006$ ) than among women (coefficient =  $-.002$ ). A formal test of the gender difference in the effect of the income neighborhood rank score confirms that this difference was statistically significant (interaction term coefficient =  $-.005$ ). Although the association between income neighborhood rank score and depressive symptoms was slightly smaller in Black respondents (coefficient =  $-.003$ ) than in non-Hispanic Whites (coefficient =  $-.004$ ), this difference was not statistically significant ( $p = .79$ ). The magnitude of the association between visiting neighbors rank scores and depressive symptoms appears slightly larger in males and non-Hispanic Whites

(coefficient =  $-.008$ ) than their female (coefficient =  $-.005$ ) and Black (coefficient =  $-.006$ ) counterparts, but formal tests of interaction terms between gender or race and visiting neighbors rank scores failed to attain statistical significance.

### Discussion

Studies of population-level hierarchies indicate that a privileged location in a social group can yield material and psychosocial benefits, yet the extent to which local social hierarchies, largely characterized by informally generated ranking criteria, may be consequential to health has received very little attention. The present study blends the social theoretical work on status hierarchies in local frameworks (Berger, Ridgeway, & Zelditch, 2002) and the empirical work examining health gradients at different levels of social organization (Marmot, 2004) to examine one type of local social hierarchy, neighborhood, to determine whether an older adult's relative social status in this level of social organization is associated with mental health.

Neighborhood is an ideal social group for exploring consequences of relative social position at older ages because adults of this age group are likely to spend more time near their homes, know more of their neighbors relative to younger persons, and invest in active neighboring (Oh, 2003; Scharf et al., 2003). Ample evidence exists that neighborhood increases in importance in older adulthood, both in terms of localized resources and investment in social relationships (Cornwell et al., 2008). Mesolevel hierarchies in other social contexts such as work or school may be more relevant in earlier stages in life, whereas relative social status in the neighborhood environment may acquire particular importance for the mental health of older adults. To explore this, we selected two distinct criteria to identify a person's neighborhood-level social position: a culturally diffuse indicator of socioeconomic status, as measured by income, and a group-specific indicator of local social integration, as measured by the number of neighbors one knows well enough to have potentially visited inside the participant's home on a monthly basis.

Regarding income, we find that having more income relative to one's neighbors is associated with fewer depressive symptoms, independent of the average level of income in the neighborhood. Relative level of income in larger, population-based contexts has been shown to be associated with gradients in mental health (Kennedy & Kawachi, 2002). Yet, within the localized social hierarchy of a neighborhood, we find an independent, moderate gradient in depressive symptoms based on one's relative income rank. Our findings are consistent with the status hierarchy literature, whereby

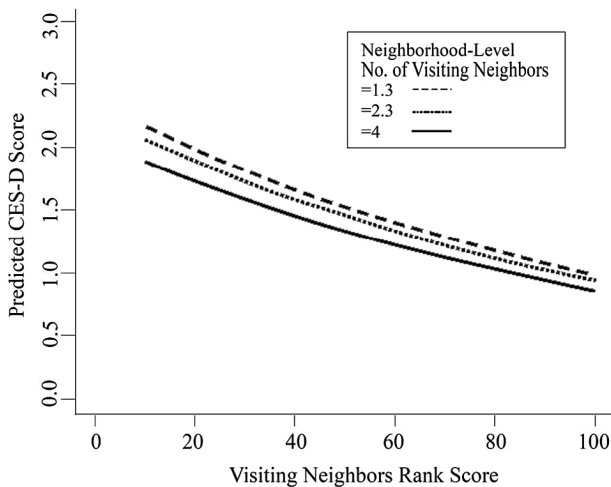


Figure 2. Predicted CES-D score as a function of visiting neighbors rank score.

Table 3. The Association of Neighborhood Social Rank Scores With Depressive Symptoms by Gender and by Race

	Men (N = 2,158) regression coefficient <sup>a</sup> (SE)	Women (N = 3,432) regression coefficient (SE)	Blacks (N = 4,087) regression coefficient <sup>b</sup> (SE)	Whites (N = 1,491) regression coefficient (SE)
Mean neighborhood-level income	$-.153^{**}$ (.043)	$-.118^{**}$ (.041)	$-.137^{**}$ (.041)	$-.134^{**}$ (.048)
Income neighborhood rank score	$-.006^{***}$ (.001)	$-.002^*$ (.001)	$-.003^{***}$ (.001)	$-.004^*$ (.002)
Mean neighborhood-level number of visiting Neighbors	$-.093$ (.068)	$.032$ (.062)	$-.014$ (.062)	$.012$ (.066)
Visiting neighbors rank score	$-.008^{***}$ (.001)	$-.005^{***}$ (.001)	$-.006^{***}$ (.001)	$-.008^{***}$ (.002)

Notes: ADL = activities of daily living.

<sup>a</sup>Adjusted for age, race, education, years of neighborhood residence, marital status, chronic conditions, ADL disability, number of friends, and number of neighbors known by name.

<sup>b</sup>Adjusted for age, gender, education, years of neighborhood residence, marital status, chronic conditions, ADL disability, number of friends, and number of neighbors known by name.

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

income is an important criterion for status hierarchies in smaller, localized groups, even when such relative differences in income are not substantial (Berger, 1977; Simpson, Willer, & Ridgeway 2012). However, this has not been linked previously to observed gradients in mental health for older adults at these smaller scales of organization like neighborhood, which is what we do here.

Our second criterion represents an older adult's degree of social integration within his or her own neighborhood. Controlling for the neighborhood average of visiting neighbors as a marker of the general expectation for sociability in that neighborhood, older adults who report a greater number of visiting neighbors relative to others in the same neighborhood tend to have fewer depressive symptoms. Higher relative rank on number of neighbor visitors had a twofold stronger effect on depressive symptoms than relative rank of income. The mental health benefits of greater relative integration in the neighborhood likely operate through the active exchange of information among neighbors about fellow residents, neighborhood events, and other topics of regular social exchange (Sampson & Graif, 2009). Thus a higher place in such a localized hierarchy reflects a form of relative social advantage, which may confer a psychological benefit in its own right, independent of the well-established health effects of supportive relationships and social interactions themselves.

We recognize that the number of neighbors who visit could potentially be confounded with one's health status and general orientation toward sociability. Older adults who are well enough and desire to seek out opportunities to interact with neighbors and build relationships with them may have a high level of activity and integration in other life domains as well. Yet a rare longitudinal study of older adults demonstrates that active "neighboring" itself is associated with less depression concurrently and up to 3 years later, with no apparent long-term influence of depression on neighboring activities (Brown et al., 2009). Thus, our finding of the robust gradient in depressive symptoms by relative number of visiting neighbors, independent of commonly used markers of both general sociability and physical health, is consistent with our hypothesis that social integration in the neighborhood is consequential to mental health.

A potential critique of our measure of social integration is that, unlike income, it is a subjective evaluation of one's social embeddedness in the neighborhood and there may be potential response bias without the inclusion of alternative responses (Schafer & Ferraro, 2011). We believe that this bias is somewhat attenuated because there is enough specificity in the question to help the respondent draw upon actual experience rather than a more general perception of potential neighbor resources. The question asked how many neighbors the respondent knew well enough to visit inside their home at least once a month. This specification regarding the frequency of these visits, and the fact that the question did not prompt the respondent to make any kind of comparison with other neighborhood residents, may reduce the likelihood of inflated counts.

We also examined potential subgroup differences in the effect of neighborhood social position on depressive symptoms. Given evidence of differing levels of engagement and importance of neighborhood by gender (Shenk et al., 2004; Woldoff 2011) and race (Small, 2007), we anticipated finding significant differences in the impact of relative neighborhood position on mental health. Although we found race differences in absolute levels of income and number of visiting neighbors, the effect of one's relative position in the neighborhood hierarchies was invariant between Black and White older adults.

There was, however, one notable gender difference. The gradient in depressive symptoms by relative neighborhood social rank on income was steeper for men than for women, consistent with other

research on stratification (Küpper & Zick, 2011; Muntaner, Sorlie, Campo, Johnson, & Backlund, 2001). No gender difference exists for visiting neighbors, suggesting that indicators of relative material status may be of greater salience for men than social integration. Future research should explore how the meaning of social hierarchies may differ by gender, particularly in localized contexts.

The innovation of this study is that we were able to take advantage of the unique design characteristics of the CHAP study, with its very dense cohort of older adults from a small, geographically defined area to capture the local status hierarchy in the particular neighborhood. Most previous studies are limited either by the small number of participants per neighborhood or by an insufficient number of neighborhoods for a reliable analysis of neighborhood effects in health. Because CHAP has neither of these challenges, we were able to construct measures of relative social position by ranking respondents who live in the same neighborhood. We acknowledge that census block group does not fully capture the social and geographic boundaries of neighborhoods, which could introduce some measurement error with regard to the relevance of particular localized space. Yet, this may be somewhat minimized because the block groups themselves represent a proximate geographic area that is relatively small and demographically homogeneous, contributing to the construction of localized reference groups (Foster, 1965; Krieger et al., 2002).

Our primary focus was to demonstrate that rankings on local social hierarchies were consequential to mental health among older adults, which may provide insights into local social processes that have received very little attention in the literature. This study did not set out to establish whether relative or absolute measures were more consequential to mental health, yet our data provide initial evidence that at least for visiting neighbors, relative rank is possibly a more relevant correlate of mental health than absolute levels on this dimension. This is much less clear for the income dimension; both absolute levels and neighborhood-level relative rankings were strongly correlated with depressive symptoms. This analysis sets the stage for future work that can use more precise methods (e.g., sociometric approaches) of capturing small-scale social hierarchies to examine their importance for the health and well-being in older adults.

In conclusion, we demonstrate that the incremental gain in both absolute social and economic resources, as well as the psychosocial benefits of having more relative to others, operates at multiple levels of social organization. Neighborhood is a particularly important social context for older adults, and our findings indicate that both economic advantage and greater neighborhood social integration are associated with better mental health. Not only the absolute level of social resources but also their socially constructed meaning within a localized neighborhood context influences well-being.

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