2001, Research on Aging,
23(2), 233-258

Age Variation in the Relationship Between Community Socioeconomic Status and Adult Health

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Research demonstrating that socioeconomic status (SES) differentials in health are smaller at older ages often considers only individual SES measures (e.g., income, education) but not community SES measures (e.g., community poverty rate), although the gerontological literature suggests that community context may be particularly salient in the lives of older adults. This study uses two national surveys of adults, each matched with census data about respondents' communities, to examine whether the association between community SES and individual health is stronger at consecutively older age groups. The association between community SES and health is nonexistent or weak during younger adulthood, stronger through middle ages, strongest at ages 60 to 69, and weak again at ages 70 and older. At ages 60 to 69, community SES effects are stronger than or comparable to individual SES effects. Community SES should be considered an important dimension of SES when exploring the impact of SES on health over the life course.

Despite a large and growing literature on the relationship between socioeconomic status (SES) and health, we still do not have a good

AUTHORS' NOTE: An earlier version of this article was presented at the Annual Meeting of the Gerontological Society of America, November 1995. This research was supported by the AARP Andrus Foundation Graduate Fellowship in Gerontology, the University of Michigan Rackham Predoctoral Fellowship, the Robert Wood Johnson Foundation Scholars in Health Policy Research Program, the University of Wisconsin–Madison Graduate School, and by an NIA grant (#P30 AG17266) to the Center for Demography of Health and Aging at the University of Wisconsin–Madison. The opinions expressed in this article are solely those of the authors. We wish to thank Jim House, Sheila Feld, Berit Ingersoll-Dayton, and Al Hermalin for their comments on earlier drafts, and Jan Blakeslee at the Institute for Research on Poverty for her editing assistance.

RESEARCH ON AGING, Vol. 23 No. 2, March 2001 234-259

understanding of how age and aging affect the relationship between SES and health. With few exceptions (e.g., Ross and Wu 1996), most research in the U.S. suggests that there are diminished or nonexistent SES differentials in health and mortality among older adults compared to younger adults (Elo and Preston 1996; Haan, Kaplan, and Camacho 1987; House et al. 1990, 1994; Kitagawa and Hauser 1973; McDonough et al. 1997; Sorlie, Backlund, and Keller 1995).

Though there are a number of competing substantive and methodological explanations for this pattern of diminished SES differentials in health and mortality at older ages (Robert and House 1994), one explanation is that the observed pattern may result from poor conceptualization and measurement of SES at older ages. Although income, education, and to a lesser extent, occupation, are the standard indicators of SES used in research in the United States, these may actually be poor measures of SES for older adults (Berkman 1988; Kaplan and Haan 1989; Robert and House 1994). For example, most research on SES differentials in health has focused only on individual SES measures (e.g., education, occupation, income) rather than including community SES measures as well (e.g., percentage of unemployment in one's community, percentage of families earning $30,000 or more, etc.). This lack of attention to community SES measures is particularly striking in research on age differences in the relationship between SES and health given that gerontological research suggests that the community context may be more important to the lives of older than of younger adults (LaGory and Fitzpatrick 1992; Lawton 1980; Ward, LaGory, and Sherman 1988).

For example, early work by Lawton and colleagues suggested two reasons that community context might be particularly important to the lives of older adults. Lawton (1977) suggests that whereas high mobility in younger people may result in exposure to many different "suprapersonal environments" (such as at work, at home, and through recreational activities), many older adults may experience communities as their most salient suprapersonal environments. Similarly, Lawton and Nahemow's (1973) press-competence model of adaptation and aging suggests that the most demanding community environments are particularly salient to older adults who have compromised cognitive, psychological, or physical competence.

The socioeconomic characteristics of communities may also have more of an impact on the health of older than of younger adults when

seen from an "exposure versus impact" perspective. Although residents of all ages in lower SES communities might have equal exposure to some negative risk factors such as pollution, crime, and weak social and medical services, older adults might be particularly vulnerable to those exposures. The impact of environmental, psychosocial, and behavioral risk factors may actually increase with age, in part owing to increases in biological and potential psychological vulnerability with age (House and Robbins 1983; House et al. 1994; Rodin 1986).

Some research has examined the potential impact of community SES on individual health status, though it has not focused on age variations. Such research generally demonstrates that people living in lower SES communities are more likely to have poor health than people living in higher SES communities. Recent research specifically addresses whether these community SES effects on health persist over and above individual SES effects (Anderson et al. 1997; Diez-Roux et al. 1997; Haan et al. 1987; Krieger 1992; LeClere, Rogers, and Peters 1997, 1998; Marmot et al. 1998; O'Campo et al. 1997; Robert 1998; Waitzman and Smith 1998a). That is, are people living in lower SES communities more likely to have poor health simply because they have low SES themselves? Or, does community SES have an independent effect on health, so that a person living in a low-SES community is more likely to have worse health than a person living in a high-SES community, even if these two people have the same individual SES (i.e., income, education, assets)?

Why may the socioeconomic context of communities be associated with individual health over and above individual SES? Community socioeconomic context may affect the physical, social, and service environments of communities, which in turn affect the health of all community residents, regardless of their own SES (Robert 1998, 1999). Examples of these potential physical, service, and social environment pathways seem even clearer when we think specifically of older adults.

Physical Environment

Many older people age in place—living in the same area, if not the same home, for a long time. Old age may thus be seen as a proxy for exposure to community—the older you are, the greater your potential exposure to the community. Longer exposure to the physical

environment of an unhealthy community (see, for example, research on community differences in exposure to lead by Elreedy and colleagues 1999) suggests that older adults may suffer worse health consequences from living in that community than younger adults, regardless of their own SES, because of differences in length of exposure. Add to this the earlier argument that older adults may actually be more vulnerable to negative exposure, and then we can imagine how they may be particularly affected by the physical environments of their communities both through potential longer exposure and/or through greater vulnerability to exposure. Balfour and Kaplan (forthcoming) recently demonstrated that older adults perceiving excessive noise, inadequate lighting, and heavy traffic in their neighborhoods were more likely to experience functional loss than those reporting few neighborhood problems, even after controlling for demographic, socioeconomic, health, and behavioral risk factors.

Social Environment

Older adults in deteriorated neighborhoods may become distrustful of others, and those who are distrustful tend to be more socially isolated (Krause 1993). Social isolation can affect health in a number of ways, such as by producing a lack of emotional and tangible support. Thompson and Krause (1998) demonstrated that living in deteriorated neighborhoods promoted fear of crime among older adults, which decreased the amount of emotional support that they received. In the Tenderloin Senior Organizing Project (Minkler 1992), older adults living in deteriorating Tenderloin hotels in San Francisco listed crime as the most important health problem for older adults in their area. Fear of crime in lower-SES communities may indirectly affect the health of older adults of all SES levels by preventing them from walking for exercise and from traveling within the community to buy food and access services (Bazargan 1994; Ferraro 1995).

Service Environment

Older adults are primary beneficiaries of rich service environments. For example, the availability and accessibility of senior centers and particularly of meal sites has repercussions for their psychological and physical well-being. If lower-SES communities do not provide

adequate and quality services, or if there are significant barriers to access (such as inadequate transportation or fear of crime), the health and well-being of older adults of all SES levels may be compromised.

Unfortunately, little research has examined the simultaneous impact of individual and community SES on health, let alone tested whether there are age differences in these relationships. Yet, if community characteristics are particularly important to older adults, examining community SES indicators rather than only individual SES indicators may show continued or increased SES differentials in health at older ages.

Studies in the United States have found that community SES is associated with both individual health (Diez-Roux et al. 1997; Krieger 1992; Marmot et al. 1998; O'Campo et al. 1997; Robert 1998) and mortality (Anderson et al. 1997; Haan et al. 1987; LeClere et al. 1997, 1998; Waitzman and Smith 1998a), even after controlling for individual SES measures. However, few of these studies have examined age variations in these trends. Anderson and colleagues (1997) found that community median income had statistically significant independent effects on mortality for those age 25 to 64 after controlling for family income, but there were no similar effects for those ages 65 and older. Two other studies similarly found no independent effect of community SES on mortality among older adults (Haan et al. 1987; Waitzman and Smith 1998a). Yet, Waitzman and Smith (1998b) found that living in a metropolitan statistical area (MSA) with a high concentration of poverty was associated with a higher risk of mortality, and living in an MSA with a high concentration of affluence was associated with a lower risk among people ages 65 and older but not among people ages 30 to 64. These few studies that have examined age variation in the relationship between community SES and health have focused on mortality as the dependent variable rather than morbidity, and they have not fully examined age subgroups in more detail to look at variation across adulthood.

In sum, research on SES differentials in health across the life course has been limited by the failure to consider whether community SES might be an important dimension of SES that may significantly affect health, particularly for older adults. Similarly, research on the impact of community SES on health has not fully explored potential age variations in this relationship.

The current study uses two large national surveys of adults in the United States to test for age variation in the relationship between community SES and individual health. Our first hypothesis is that community SES differentials in health are stronger in consecutively older age groups. Our second hypothesis is that community SES is associated with health over and above the impact of individual SES, particularly at older ages. Our third hypothesis is that at older ages, community SES is more important than some individual SES measures in predicting health.

Method

DATA

The data for this study come from two national surveys of adults in the United States: the Americans' Changing Lives (ACL) study and the Midlife Development in the United States (MIDUS) study. Each of these national data sets has been linked to information from the census (1980 and 1990, respectively) to provide socioeconomic information about the communities in which respondents lived.

ACL Study

The ACL (House 1986) was conducted in 1986 through face-to-face interviews in the homes of 3,617 adults. The study used a multistage, stratified area probability sample of noninstitutionalized persons 25 years or older living in the 48 contiguous states (household response rate = 70 percent). Blacks and people ages 60 and older were sampled at twice the rate of non-Blacks and people under age 60.

MIDUS Study

MIDUS (Brim et al. 1996) respondents were drawn from a nationally representative random-digit-dial sample of noninstitutionalized, English-speaking adults of ages 25 to 74. Older people and men were oversampled. The study includes both a telephone interview and a self-administered questionnaire mailed to respondents. The response

rate was 70 percent for the telephone interview and 86.8 percent for the mail questionnaire among the telephone respondents, for a total response rate of 60.8 percent for respondents completing both the telephone and mail surveys (n = 3,032).

Census Data

To have information on the socioeconomic characteristics of communities, an extract of data from the 1980 U.S. Census (Adams 1992) was used in conjunction with data from the ACL study. These data summarize information at the census tract, block numbering area (BNA), and enumeration district (ED) levels. Census tracts are largish "neighborhood"-like areas in larger urban settings. BNAs are "neighborhood"-like areas analogous to census tracts in areas that are blocked but not tracted, usually in smaller cities. EDs are similarly largish "neighborhood"-like areas in areas that are untracted and unblocked, usually in rural areas. Census information was matched for all respondents from the ACL. This 100 percent match between the ACL and the census is an important feature of this study because comparable analyses of other U.S. national studies that matched individual data with census data were unable to accurately match all individuals with their corresponding census information (e.g., Anderson et al. 1997; LeClere et al. 1997).

Similarly, summary socioeconomic data from zip codes in the 1990 census were matched for respondents in the MIDUS. The 1980 census was used with the ACL and the 1990 census was used with the MIDUS because each preceded the collection of the data in 1986 and 1995, respectively. We were unable to match census data to the zip codes of 139 MIDUS respondents (4.6 percent of respondents) and, therefore, dropped them from the study. A comparison of these respondents to those remaining in the study indicated that the groups were similar, except by race—Black people were more likely to remain in the study than non-Blacks.

MEASURES

Table 1 presents descriptions of all major variables included in this study for the ACL and the MIDUS data.

TABLE 1
Descriptive Information on All Variables (n = 3,617)

Control Variables[a]	*ACL Study*	*MIDUS Study*
Age group (%)		
25-39	42.0	40.2
40-49	18.9	23.8
50-59	13.6	16.5
60-69	13.3	13.5
70 and older	12.3	6.0
Race (%)		
Black (1)	11.0	11.5
Non-Black (0)	89.0	88.5
Gender (%)		
Women (1)	52.9	56.3
Men (0)	47.1	43.7
Individual SES[a]		
Education (years)		
Range	0-17+	1-12
Mean	12.4	6.2
SD	3.1	2.4
Family income		
Range	$2,500-$110,000	$0-$1,200,000
Mean	$30,449	$71,788
SD	$24,043	$78,681
Assets (%)		
Less than $10,000	44.8	34.9
Greater than $10,000	48.9	54.4
Missing	6.3	10.7
Community SES[b]		
Community SES Index[c]		
Range	18-179	10.5-171.6
Mean	90.4	71.9
SD	23.5	23.8
Health variables[a]		
Number of chronic conditions		
Range	0-7	0-27
Mean	1.0	2.5
SD	1.3	2.7
Self-rated health		
Range	1-5	1-5
Mean	2.3	2.6
SD	1.1	1.0

NOTE: Data are weighted. ACL = American's Changing Lives; MIDUS = Midlife Development in the United States; SES = socioeconomic status.
a. Data from the 1986 ACL study and the 1995 MIDUS study.
b. Data from the 1980 census (census tracts or enumeration districts) for ACL respondents and from the 1990 census (zip codes) for MIDUS respondents.
c. Higher score represents lower (worse) community SES score.

Demographic Variables

Age was used as a categorical variable using the following categories: 25-39, 40-49, 50-59, 60-69, and 70 and older. The MIDUS data only included people up to age 74 so we decided that a 70 and older age group was the oldest age category we could consider with a large enough sample of this group from the MIDUS. We therefore created the 70 and older category as the oldest group in each study and then went down by 10 year increments, finally combining those ages 25 to 39 into one young-adulthood group. Missing age data were imputed for three ACL cases, based on a review of the full interview and interviewer observations, and 26 MIDUS cases, as estimated by the telephone interviewer. Race was coded as Black versus non-Black.

Individual SES

Education was measured continuously in years of education for the ACL and coded into a continuous variable representing 12 levels of education in the MIDUS (e.g., 1 = *no school/some grade school*, 2 = *eighth grade/junior high* through 11 = *Master's degree*, 12 = *Ph.D./other professional degree*). Twelve cases with missing education data in the ACL were imputed based on a review of the full interview and interviewer observations. Two cases with missing education data in the MIDUS study were imputed based on the mean education of other respondents in their same age and income group.

Income includes all sources of income received by respondents and their spouses (and by all other family members in the MIDUS) in the previous year, including personal earnings, social security, government assistance pensions, investment, alimony, and so on. The natural log of income was used in our analyses because the effects of income on health have been found to diminish at increasingly higher income levels, both in previous analyses (House et al. 1990; Mirowsky and Hu 1996) and in our own initial analyses (not shown). In the ACL, income was imputed via a regression prediction equation for 311 cases with missing data. In the MIDUS study, the average income was used to impute income for 349 respondents with missing values.

Prior research has indicated that level of assets is a predictor of health over and above both education and income, particularly for older adults (Robert and House 1996). In the ACL, respondents were

asked how much money they would have if they cashed in and totaled up all of their current assets (excluding their principal home). For these analyses, as in prior analyses (Robert 1998; Robert and House 1996), the asset variable was categorized into three groups of respondents: those reporting fewer than $10,000 in assets, those reporting $10,000 or more in assets, and those who did not respond to this question. Since respondents who did not respond to the asset question were significantly different from the rest of the respondents on a number of indicators (analyses not shown), these respondents were neither dropped from the analysis nor were data imputed for them on the asset variable. They were included in the analyses through use of a missing data dummy variable, although interpretation of results does not focus on this group.

Community SES Index

For each study, we created a Community SES Index by summing the following three community SES variables from the census: percentage of households receiving public assistance, percentage of families with incomes greater than $30,000 in the ACL or greater than $35,000 in the MIDUS (reverse coded), and percentage of adult unemployment (Robert 1998). Higher scores of Community SES Index indicate worse community socioeconomic status.

Health

We examine two indicators of health. The number of chronic conditions reflects a relatively objective measure of morbidity/comorbidity. In the ACL, respondents reported the number of chronic conditions experienced in the previous year using a list of 10 major chronic conditions: arthritis/rheumatism, lung disease, hypertension, heart attack or heart trouble, diabetes, cancer/malignant tumor, foot problems, stroke, fractured or broken bones, and urinary incontinence. Fewer than 10 cases were missing for each chronic condition and they were treated as not having the specified chronic condition. In the MIDUS, respondents reported the number of conditions that they had experienced in the past year from a list of 29 conditions. The 8 cases with

missing data were dropped from the MIDUS analyses. The number of chronic conditions is logged in these analyses to reduce skewness (0 chronic conditions was recoded to .5 before logging). Self-rated health is a subjective report of how respondents rated their health at the time of the interview on a five-point scale: *excellent* (1), *very good* (2), *good* (3), *fair* (4), *poor* (5). In the ACL, two cases with missing data were imputed for this variable based on review of the full interview and interviewer observations. In the MIDUS, two cases with missing data for self-rated health were not included in the analyses.

STATISTICAL ANALYSES

For all analyses, the ACL and MIDUS data were weighted to correct for sample selection probabilities and nonresponse, resulting in weighted samples that approximate the demographic composition of the U.S. adult population. Ordinary least squares (OLS) regression analyses were conducted to address our main hypotheses. For the ACL data analyses, we also used SUDAAN software (Shah et al. 1992) to adjust standard errors of OLS regression coefficients using a Taylor series linearization method. This was done to adjust for the serial correlation produced by the clustering of respondents within communities that results from the ACL's sampling design.

In analyses not shown, we compared the OLS regression analyses presented in this article for the ACL study to analyses we conducted with the same data using two-level linear models using SAS PROC MIXED (SAS Institute 1996; see Singer 1998) and found the analyses to be comparable. The same hierarchical linear modeling technique is not appropriate for the MIDUS data because the MIDUS sample is a national random sample of adults, resulting in the fact that there is often only one MIDUS respondent represented in a particular zip code. Multilevel models require having multiple respondents in each group clustering (i.e., zip code for the MIDUS study). Therefore, we chose not to present the hierarchical linear model results for the ACL analyses both because the results were comparable to the OLS regression analyses (with standard error adjustments for design effects), and because using the OLS analyses allows us to make easy comparisons to the MIDUS analyses.

TABLE 2
Correlations Between the Community Socioeconomic Status Index and Each Health Variable, Within Age Subgroups

	Age				
	25-39	*40-49*	*50-59*	*60-69*	*70+*
ACL study (*n*)	1,073	474	401	895	774
Number of chronic conditions (logged)	.069*	.108*	.207***	.281***	.130***
Self-rated health	.084**	.180***	.152**	.300***	.115**
MIDUS study (*n*)	949	717	609	430	178
Number of chronic conditions (logged)	–.012	.043	.108**	.110*	.115
Self-rated health	.049	.166***	.179***	.257***	.106

NOTE: All data are weighted, although unweighted *n*s are presented.
*$p \leq .05$. **$p \leq .01$. ***$p \leq .001$ (two-tailed tests).

Results

BIVARIATE ASSOCIATION BETWEEN THE COMMUNITY SES INDEX AND HEALTH

Our first hypothesis is that community SES differentials in health are stronger in consecutively older age groups. Table 2 presents the correlations between the Community SES Index and each health variable, within age subgroups, for both the ACL and MIDUS studies. Both studies demonstrate a general pattern of stronger correlations between the Community SES Index and health with each successive age group, except for a drop in the strength of the correlation at the oldest age group (ages 70 and older). For both health outcomes in both studies, the largest statistically significant correlation between Community SES Index and health was seen among those ages 60 to 69.

MULTIVARIATE ANALYSES OF AGE VARIATION IN THE ASSOCIATION BETWEEN THE COMMUNITY SES INDEX AND HEALTH

Analyses presented in Tables 3 and 4 address our second hypothesis that community SES is associated with health over and above the impact of individual SES, and that this effect is stronger at older ages.

TABLE 3
Number of Chronic Conditions (logged) Regressed on Individual SES Variables, Community SES Index, and Age by Community-SES Interactions (for the ACL study and the MIDUS study)

	ACL Study (n = *3,617*)		*MIDUS Study* (n = *2,883*)	
	Model 1	*Model 2*	*Model 1*	*Model 2*
Age				
25-39	omitted	omitted	omitted	omitted
40-49	.201***	.197***	.196***	.194***
50-59	.550***	.550***	.407***	.406***
60-69	.746***	.740***	.508***	.492***
70 and older	.863***	.863***	.388***	.370***
Race (Black)	.055	.053	–.118*	–.121*
Gender (female)	.114***	.115***	.233***	.235***
Education (years)	–.017**	–.016**	–.034***	–.034***
Income (logged)	–.059***	–.060	–.019	–.019
Assets				
Less than $10,000	omitted	omitted	omitted	omitted
Greater than $10,000	–.062	–.057	–.113**	–.114**
Missing	–.113*	–.108*	–.183**	–.186**
Community SES Index[a]	.001*	.000	.001	–.002
Community SES Index[a] × Age				
Index × 25-39		omitted		omitted
Index × 40-49		.001		.003
Index × 50-59		.004*		.005**
Index × 60-69		.007***		.005*
Index × 70 and older		.002*		.005
Constant	.394*	.385*	.716***	.716***
R^2	.310	.315	.079	.082
Chg. R^2 (F test)		.005***		.003

NOTE: SES = socioeconomic status; ACL = Americans' Changing Lives; MIDUS = Midlife Development in the United States. All data are weighted, although unweighted *n*s are presented. Unstandardized beta coefficients are presented. For the ACL, standard errors were adjusted for design effects using SUDAAN.
a. Centered variable.
*$p \leq .05$. **$p \leq .01$. ***$p \leq .001$ (two-tailed tests).

First, we briefly examine whether the Community SES Index predicts health, over and above individual SES, regardless of age. These are the types of results published in recent studies examining independent community SES effects on health (e.g., Anderson et al. 1997; Diez-Roux et al. 1997; LeClere et al. 1997, 1998; Robert 1998; Waitzman and Smith 1998a, 1998b). In Model 1 in each table, each

TABLE 4
Self-Rated Health Status Regressed on Individual SES Variables, the Community SES Index, and Age by Community-SES Interactions (for the ACL study and the MIDUS study)

	ACL Study (n = *3,617*)		*MIDUS Study* (n = *2,883*)	
Variable	*Model 1*	*Model 2*	*Model 1*	*Model 2*
Age				
25-39	omitted	omitted	omitted	omitted
40-49	.173**	.175**	.170***	.169***
50-59	.499***	.501***	.286***	.284***
60-69	.518***	.511***	.379***	.335***
70 and older	.673***	.679***	.332***	.336***
Race (Black)	–.035	–.034	.030	.018
Gender (female)	.023	.025	.018	.019
Education (years)	—.046***	–.045***	–.081***	–.081***
Income (logged)	–.193***	–.191***	–.053***	–.053***
Assets				
Less than $10,000	omitted	omitted	omitted	omitted
Greater than $10,000	–.091	–.089	–.197***	–.199***
Missing	–.158	–.159	–.209***	–.213***
Community SES Index[a]	.001	–.001	.002*	–.002
Community SES Index[a] × Age				
Index × 25-39		omitted		omitted
Index × 40-49		.003		.004*
Index × 50-59		.002		.005**
Index × 60-69		.008***		.009***
Index × 70 and older		.002		.003
Constant	4.594***	4.560***	3.614***	3.617***
R^2	.184	.187	.108	.114
Chg. R^2 (F test)		.003**		.006**

*$p \leq .05$. **$p \leq .01$. ***$p \leq .001$ (two-tailed tests).
SES = socioeconomic status; ACL = Americans' Changing Lives; MIDUS = Midlife Development in the United States. All data are weighted, although unweighted *n*s are presented. Unstandardized beta coefficients are presented. For the ACL, standard errors were adjusted for design effects using SUDAAN.
a. Centered variable.

measure of health is regressed on the Community SES Index while controlling for demographic variables (age, race, and gender), and for individual SES variables (education, income, and assets). The coefficient for the Community SES Index in Model 1 reflects the independent effect of the Community SES Index on health over and above the effects of individual SES, regardless of age.

The four Model 1 analyses present mixed results. In Table 3, Model 1 for the ACL study demonstrates an independent association between the Community SES Index and number of chronic conditions, over and above individual SES. However, Model 1 for the MIDUS study indicates that the coefficient for the Community SES Index is not statistically significant. In Table 4, we see the reverse. Model 1 for the MIDUS study demonstrates an independent association between Community SES Index and self-rated health, over and above individual SES. However, Model 1 for the ACL study indicates that the coefficient for the Community SES Index is not statistically significant.

The analyses presented for both the ACL and MIDUS studies in Model 2 (see Tables 3 and 4) examine the interaction effects between age and the Community SES Index. These results directly address our second hypothesis that community SES is associated with health over and above the impact of individual SES, particularly at older ages. The change in *R*-squared *F* test at the bottom of each of the four Model 2 columns tests whether including these interaction effects adds significantly to the models presented in Model 1. In three of the four cases, the interaction between age and the Community SES Index is a statistically significant addition to explaining variation in the health variables.

To interpret the interaction effects, each of the interaction coefficients is compared to the effects for those ages 25 to 39 (the effects for this youngest age group are represented by the coefficient for the Community SES Index). For example, in Table 3 Model 2 for the ACL study, we see that the Index × Age coefficient for those ages 40 to 49 (beta = .001) is .001 larger than the effect for those ages 25 to 39, but this difference is not statistically significant. However, the coefficient for those ages 50 to 59 (.004) is .004 larger than the effect for those ages 25 to 39, and this difference is statistically significant. Therefore, the association between the Community SES Index and number of chronic conditions in the ACL study is larger for those ages 50 to 59 than for those ages 25 to 39. The interaction coefficients generally become larger with each consecutively older age group. As with the bivariate correlation analyses in Table 2, the associations between the Community SES Index and health generally become larger with age, with the largest associations seen at ages 60 to 69, and smaller effects again at ages 70 and older.

These results provide some support for our second hypothesis: that community SES is associated with health over and above the impact of individual SES and that this effect is stronger at older ages. However, these analyses also suggest that this age interaction is not a linear one in which the largest effects would be expected at the oldest age groups. We had initially created one interaction term between age (continuously coded) and Community SES Index (continuously coded). This interaction term was statistically significant in all four models (analyses not shown), suggesting that the association between Community SES Index and health increases with age. But because this interaction term presupposes that the effects of the Community SES Index increase monotonically with age, we chose to present the interaction terms with age as dummy categories (see Tables 3 and 4). We believe this analysis better demonstrates that the relationship is not quite linear given the weaker associations in the oldest age group (ages 70 and older).

These results also suggest that studies that simply control for age when examining effects of community SES on health, independent of individual SES, may be underestimating potential community effects that are seen at some ages but not others. For example, in Table 3 Model 1 for the MIDUS study, the Community SES Index had no statistically significant effect on the number of chronic conditions, over and above the effects of individual SES. However, the interaction effects in Model 2 demonstrate associations between the Community SES Index and the number of chronic conditions that are strong at some middle and older ages and weaker at some younger ages. Similarly, in Table 4 Model 1 for the ACL study, the Community SES Index had no statistically significant effect on self-rated health, over and above the effects of individual SES. However, Model 2 indicates that Model 1 masks the strong effects of the Community SES Index at ages 60 to 69.

RELATIVE IMPACT OF INDIVIDUAL AND COMMUNITY SES ON HEALTH

Tables 5 and 6 demonstrate age subgroup analyses—within each age subgroup, each health variable is regressed on the Community SES Index and on individual education, income, assets, race, and gender (coefficients for race and gender are not shown). These tables can

be used to examine the questions addressed in the previous section, albeit with a different lens. However, we present these results primarily to address our third hypothesis that community SES is more important than some individual SES measures in predicting health at older ages.

In Table 5 for the ACL study, the Community SES Index is a statistically significant predictor of number of chronic conditions for those ages 60 to 69. Hypothesis 3 examines whether this independent effect of the Community SES Index is stronger than the independent effects of some of the individual SES measures, particularly at older ages. In this case, we see that Community SES Index has independent effects on number of chronic conditions, whereas income does not. Both education and assets have independent effects on the number of chronic conditions, though slightly smaller (–.147 and –.134) than the effect of the Community SES Index (.178). In this case, Community SES Index is a better independent predictor of number of chronic conditions than income, and it is a comparable, if not better, independent predictor than education and assets. Similarly, Table 5 for the MIDUS study shows that at ages 60 to 69, the Community SES Index is a better independent predictor of number of chronic conditions than income and assets, and a comparable independent predictor to education. In Table 6, for both the ACL and MIDUS study, when the Community SES Index is an independent predictor of self-rated health at ages 60 to 69, it is a better independent predictor than income, and a slightly worse predictor than education. Comparisons with assets vary.

In sum, we find support for our third hypothesis that at older ages, the independent health effect of community SES is often stronger than the effects of individual SES.

Discussion

Studies that examine how the relationship between SES and health varies over the life course have focused on SES as an individual characteristic without considering how community SES may affect health over the life course. Moreover, studies that examine whether community SES affects health have not adequately considered potential age variations in this relationship. This study tested whether the association between community SES and health is larger at consecutively

TABLE 5
Number of Chronic Conditions (logged) Regressed on the Community SES Index, Within Age Subgroups

	Age				
	25-39 (n = 1,073)[a]	*40-49 (n = 474)*	*50-59 (n = 401)*	*60-69 (n = 895)*	*70 and Older (n = 774)*
ACL study					
Community SES Index [d]	.000[b]	.000	.001	.006***	.002
	(.012)[c]	(.018)	(.045)	(.178)	(.073)
Education (years)	–.020*	–.015	–.004	–.032***	–.006
	(–.102)	(–.075)	(–.016)	(–.147)	(–.029)
Income (logged)	–.022	-.042	-.240***	.014	-.060
	(–.037)	(–.065)	(–.288)	(.018)	(–.075)
$10,000 and greater assets[e]	.016	–.153*	–.050	–.200*	–.058
	(.016)	(–.131)	(–.033)	(–.134)	(–.043)
R^2	.024	.069	.136	.133	.066
	Age				
	25-39 (n = 949)[a]	*40-49 (n = 717)*	*50-59 (n = 609)*	*60-69 (n = 430)*	*70 and Older (n = 178)*
MIDUS study					
Community SES Index [d]	–.002[b]	.001	.003	.004*	.004
	(–.055)[c]	(.017)	(.065)	(.113)	(.095)
Education (years)	–.025	–.047**	–.038*	–.042*	.008
	(–.057)	(–.126)	(–.102)	(–.113)	(.021)
Income (logged)	–.056*	.029	–.050	–.021	–.005
	(–.088)	(.058)	(–.071)	(–.043)	(–.007)
$10,000 and greater assets[e]	–.097	–.146	–.203	.010	–.115
	(–.052)	(–.078)	(–.099)	(.006)	(–.065)
R^2	.038	.056	.051	.068	.070

NOTE: SES = socioeconomic status. ACL = Americans' Changing Lives; MIDUS = Midlife Development in the United States. Controls for these analyses include race, gender, and missing asset data. All data are weighted. For the ACL, standard errors were adjusted for design effects using SUDAAN.
a. Unweighted *n*s are presented.
b. Unstandardized beta coefficients are presented.
c. Standardized coefficients are in parentheses.
d. Centered variable.
e. Compared to less than $10,000 assets.
*$p \leq .05$. **$p \leq .01$. ***$p \leq .001$ (two-tailed tests).

older age groups, and whether this relationship holds even after controlling for individual SES.

TABLE 6
Self-Rated Health Regressed on the Community SES Index, Within Age Subgroups

	Age				
	25-39 (n = *1,073*)[a]	*40-49* (n = *474*)	*50-59* (n = *401*)	*60-69* (n = *895*)	*70 and Older* (n = *774*)
ACL study					
Community SES Index[d]	.000[b]	.001	.000	.006***	.002
	(–.009)[c]	(.030)	(.006)	(.120)	(.045)
Education (years)	–.041**	–.066**	–.004	–.059***	–.043**
	(–.115)	(–.186)	(–.011)	(–.185)	(–.139)
Income (logged)	–.143*	–.163	–.520***	–.126**	–.062
	(–.130)	(–.148)	(–.395)	(–.113)	(–.048)
$10,000 and greater assets[e]	–.068	–.011	.008	–.472***	–.204
	(–.037)	(–.005)	(.003)	(–.213)	(–.094)
R^2	.057	.110	.157	.209	.054
	Age				
	25-39 (n = *949*)[a]	*40-49* (n = *717*)	*50-59* (n = *609*)	*60-69* (n = *430*)	*70 and Older* (n = *178*)
MIDUS study					
Community SES Index[d]	–.001[b]	.002	.003	.008***	–.001
	(–.033)[c]	(.059)	(.075)	(.197)	(–.024)
Education (years)	–.066***	–.083***	–.088***	–.095***	–.081*
	(–.153)	(–.203)	(–.223)	(–.215)	(–.176)
Income (logged)	–.087***	–.014	–.109***	–.009	–.079
	(–.135)	(–.026)	(–.144)	(–.016)	(–.099)
$10,000 and greater assets[e]	–.060	–.334***	–.280**	–.328**	–.305
	(–.032)	(–.163)	(–.129)	(–.159)	(–.140)
R^2	.060	.106	.132	.147	.113

NOTE: SES = socioeconomic status; ACL = Americans' Changing Lives; MIDUS = Midlife Development in the United States. Controls for these analyses include race, gender, and missing asset data. All data are weighted. For the ACL, standard errors were adjusted for design effects using SUDAAN.
a. Unweighted *n*s are presented.
b. Unstandardized beta coefficients are presented.
c. Standardized coefficients are in parentheses.
d. Centered variable.
e. Compared to less than $10,000 assets.
*$p \leq .05$. **$p \leq .01$. ***$p \leq .001$ (two-tailed tests).

We found that the association between community SES and health is nonexistent or weak during younger adulthood, is stronger at

middle age, and peaks at around ages 60 to 69, with smaller associations again for those ages 70 and older. These effects persist even after controlling for individual SES measures. Such results indicate that something about life in higher and lower SES communities may be protective of or detrimental to one's health. Moreover, these community effects may be strongest for people at middle and early-old ages. In fact, studies that examine the relationship between community SES and health without considering age variations likely underestimate the community effects for some middle- or older-age groups while overestimating the effects for younger or quite old age groups.

Because previous research indicated that individual SES is generally a weaker predictor of health among older adults than younger adults, we examined whether community SES might be a better predictor of health than individual SES at older ages. Using age-subgroup analyses, we found that the relative importance of individual and community SES actually varies by age. In particular, when community SES has an independent association with health at ages 60 to 69, it is a stronger predictor of health than income, and a relatively comparable predictor compared with education and assets.

It is also interesting to note that when community SES variables are not independent predictors of health in any given age group, the effects of the individual SES variables are seemingly not too strong either. For example, in Table 5 there is only one statistically significant SES predictor of the number of chronic conditions for those ages 25 to 39, 40 to 49, and 50 to 59, and none for those ages 70 and older. The point here is that although the magnitude of the community SES effects on health may seem small in absolute terms, they are actually fairly comparable with the effects of individual SES variables, which are usually interpreted as having robust effects on health.

The results of this study call into question the general finding that there are nonexistent or diminished associations between SES and health at older ages. Our study demonstrates that community SES should be considered an additional dimension of SES when investigating the association between SES and health, particularly at middle and early older ages.

Further studies are needed before firm conclusions can be made about age variations in the relationship between community SES and health. Moreover the results of this study should be evaluated in light of the following limitations.

One primary limitation of this study is that the data are cross-sectional. Therefore, we do not know whether living in lower SES communities causes worse health in middle and older ages, whether poor health affects the communities people live in (for reasons other than their individual SES as measured in this study), or, if both are true, which is the stronger explanation. We also do not know whether the findings reflect cohort effects or aging effects. Does community SES become more important to health as people age (aging effects), or is community SES a stronger predictor of health only for the current cohort of middle age and older adults (cohort effects)? Although our cross-sectional data do not allow us to directly answer this question, the fact that our two data sets demonstrate similar results even though they are 10 years apart suggests that there may be something potentially aging-related going on here. However, longitudinal data will be needed to examine this further.

Possible Sources of Underestimation

Age may simply be a proxy for some other variable, such as length of residence. We may have underestimated the association between community SES and health because we could not consider how long people lived in and were "exposed to" their communities. The stronger association at ages 60 to 69 might simply reflect a longer exposure to community for middle-age and older adults. Even if this is true, this still suggests that community context matters to health. Research now needs to investigate which dimensions of a community's physical, social, or service context matter most, why, and to whom.

Other methodological limitations (see Robert 1998, 1999) have most likely led to a further underestimation of the association between community SES and health. First, since we consider community characteristics at one point in time, we are not able to consider how stability and change in community characteristics affect the health of residents. Second, by using census areas to represent communities, we are most likely not measuring community in a way that corresponds with respondents' definitions of or experiences in their communities. Third, since most of our analyses here test for the independent effects of community SES after controlling for individual SES, we essentially do not consider the potential impact of community SES on health through its impact on individual SES. It is likely that one of the

primary ways that community context affects individual health is by affecting one's own educational, income, and asset attainment. Scholars need to more closely examine how community context works to constrain or enhance residents' own socioeconomic development.

Because both studies exclude the institutionalized population in their sampling frame, they exclude many older adults who would be of primary interest to this study—those in long-term care facilities who tend to have both poor health and lower SES. Future studies might want to include residents of nursing homes and other institutions and examine the community socioeconomic characteristics of the last community they lived in before entering the institution. Furthermore, there may have also been effects of unintentional exclusion of poorer and less healthy community-dwelling older adults, particularly in the MIDUS study. Coefficients for the age dummy variables in Tables 3 and 4 for the MIDUS study indicate that respondents ages 70 and older have better health than those younger, suggesting that it was an unusually healthy group of people ages 70 and older included. The potential problem of selection bias toward healthier older people (ages 70 and older) in the sample may partly explain the weak effect of Community SES Index on health for that age group.

Possible Sources of Overestimation

There may be unmeasured factors that affect both a person's residential choice and health (not including individual SES factors, which we did measure here), resulting in a spurious independent association between community SES and health. Community SES may also be simply capturing an unmeasured dimension of individual SES. For example, community SES may better reflect a person's permanent or lifetime income than do measures of current family income and assets. However, the combination of education, income, and assets in this study most likely measures individual SES more thoroughly than most SES studies.

In addition to these methodological issues, future research also needs to attend to theoretical issues when thinking about age variations in the relationship between community SES and health. In particular, further extension and clarification of theories about the increased importance of community at older ages emphasize that not

all older adults experience increased sensitivity to their community environments as a result of aging. Instead, older adults are more likely to experience declines in competence that then increase their sensitivity to community environments. Extending the press-competence model (Lawton and Nahemow 1973) to address the relationship between community SES and health, it may be that the higher environmental press experienced in lower SES communities leads to poorer health, particularly when one already has compromised cognitive, psychological, or physical competence. Although research has applied the press-competence model to examine depressive symptomology as an outcome in older adults (LaGory and Fitzpatrick 1992), future research might apply this model to physical health outcomes for both older adults and adults of all ages.

Moreover, as research examines potential mediators of the relationship between community SES and health, it will be important to further conceptualize how mediators may develop and change over the life course. Some recent gerontological research contributes to our knowledge about possible community mediating mechanisms for older adults (Balfour and Kaplan forthcoming; Thompson and Krause 1998). But we need to examine which of these mediators affects people of all ages, which affects specific age groups, and which appears to be either cohort-specific or to develop and change with age. Moreover, this article focuses only on adults, though we suspect that children, like older adults, may have heightened vulnerability to their community environment.

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