Community-Level Socioeconomic Status Effects on Adult Health*

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Do the socioeconomic characteristics of a community affect one's health? This research examines whether the socioeconomic characteristics of communities are associated with the health of community residents, over and above the socioeconomic characteristics of individual residents and their families. This is the first study to examine the independent associations between community-level socioeconomic status (SES) and individual-level health using a nationally representative sample of adults in the United States. Results indicate that a person's health is associated with SES characteristics of the community over and above one's own income, education, and assets. However, individual-level and family-level SES indicators are stronger predictors of health than community-level SES indicators. This research suggests that improving individual-level and family-level socioeconomic circumstances may be the more direct way to improve the health of individuals, but that understanding the community context in which a person lives may also ultimately be important to improving health.

Is living in a poorer community bad for one's health? Despite a seemingly renewed interest in research on socioeconomic status (SES) differentials in health, few researchers have investigated whether SES characteristics of *communities* are associated with health, over and above individual-level and family-level SES. Most research on SES differentials in health focuses on the health effects of individual-level SES (e.g., education and occupation) or of family-level SES (e.g., family income and assets; reviews in Adler et al. 1994; Anderson and Armstead 1995; Williams and Collins 1995) whereas other research focuses on the association between population-based health indicators (e.g., disease prevalence) and community-level SES (e.g., percentage of community in poverty; Crombie et al. 1989; Curtis 1990; Figueroa and Breen 1995). Although both of these types of studies indicate that individual-level, family-level, and community-level SES measures separately predict various measures of health in numerous samples, research to date has been unable to adequately answer more complex questions regarding the relationships *among* individual-level, family-level, and community-level SES in predicting health.

For example, we are not certain whether people living in high-poverty communities tend to have worse health and earlier deaths simply because they themselves are in poverty, or whether even people with higher incomes living in poverty areas have worse health and earlier deaths because they live in poverty areas. Is community-level SES simply a proxy for individual-level and family-level SES, or does community-level SES contribute something unique to one's health status?

Ecological studies that find an association

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between *community-level* SES (such as percentage of a community in poverty) and *community-level* health (such as community mortality or morbidity rates) are not able to determine whether living in a lower SES community is bad for the health of all community residents, or whether the association is simply due to the fact that lower SES people living in the lower SES communities have poorer health. Similarly, research that finds an association between *community-level* SES and *individual-level* health (Smith et al. 1996a; 1996b) cannot conclude whether a person has poor health because that person lives in a lower SES community or because that person has low SES him or herself. Only contextual research which simultaneously examines the effects of community-level SES on individual-level health, after controlling for individual-level and family-level SES can conclude whether it is lower SES communities, lower SES individuals, or both, that contribute to poor health.

Research has been unable to fully address such questions primarily because of the lack of appropriate data in existing secondary data sources. Little data are available that contain sufficient information about community-level, family-level, and individual-level SES, as well as measures of individual health status. The irony is that, although there is little empirical support for the notion that the socioeconomic characteristics of communities matter to health over and above the socioeconomic characteristics of individuals, many social and health policies that are targeted to lower income communities are based on this notion that living in lower-SES communities, per se, contributes to poor health.

The primary aim of this study is to investigate whether community-level SES is associated with individual-level health over and above the effects of individual-level and family-level SES characteristics. This is the first study to investigate this question using a nationally representative sample of adults in the United States. The results have implications for future research on SES differences in health by indicating whether or not community-level SES should be considered an important dimension of SES when predicting health. The results also address the question of whether interventions to promote and maintain the health of Americans should be targeted to lower SES individuals, to lower SES communities, or to both.

COMMUNITY-LEVEL SES AND ADULT HEALTH

The relationship between individual-level, family-level, and community-level SES, and adult health is complex. Many have argued that the socioeconomic characteristics of one's community may affect one's level of education, income, and occupation (e.g., Wilson 1987; Jencks and Mayer 1990; Foster and McLanahan 1996). In return, one's individual-level and family-level SES may affect the type of neighborhood one is able to remain in or move to.

In addition, individual-level, family-level, and community-level SES may each have a direct impact on the physical, social, and service environments of individuals, which then may impact health. Research on individual-level and family-level SES differences in health suggests that those with lower individual-level and family-level SES have worse health because they are more likely than those with higher individual-level and family-level SES to engage in unhealthy health behaviors (such as smoking, drinking, and lack of exercise), and to have weak social relationships and supports, a low sense of self-efficacy and control, poor access to quality health and social services, and high levels of exposure to physical and psychosocial hazards and stressors at work and at home (Williams 1990; House et al. 1994; Anderson and Armstead 1995; Williams and Collins 1995).

Conceptually, it is easy to picture how these linkages between individual-level and family-level SES and health might exist independently of community-level characteristics—people with lower individual-level and family-level SES may experience health disadvantage regardless of where they live. Less intuitive and less studied, but no less plausible, are the potential mechanisms linking community-level SES to health, independently of individual-level and family-level SES. Why is it that community-level SES might be expected to affect health beyond individual-level and family-level SES? Although the potential mechanisms linking community-level SES to health have not been described in a comprehensive theoretical framework, evidence from various studies suggests that the socioeconomic characteristics of communities can affect the physical, service, and social environments of communities, which in turn can impact the health of all residents.

For example, in terms of the physical environment, lower SES communities may have worse pollution that affects the health of all residents. The quality of air and water and the location of toxic waste dumps and incinerators may all differ by the socioeconomic characteristics of communities (General Accounting Office 1983; Bullard 1990). Lower SES communities may offer less healthy housing, work places, and recreational options, with potential exposure to toxins such as lead paint, asbestos, and pest infestation (Troutt 1993).

The service environment of communities may also differ by socioeconomic characteristics of communities, affecting access to adequate or high quality services for all residents. Municipal services such as policing, fire, and sanitation may be less adequate in lower SES communities, impacting the health and safety of all residents (Wallace and Wallace 1990). The existence of, quality of, and access to social services (such as congregate meals, senior centers, mental health services, and family services) may also differ by socioeconomic characteristics of communities. Necessary or high quality social services may not even exist in a community, even if some residents are able to pay for them, or access to those services may be hampered by barriers such as inadequate or unsafe transportation systems.

The social environment of communities may also differ by their socioeconomic characteristics (see review by Taylor, Repetti, and Seeman 1997). For example, lower SES communities often have higher levels of actual or perceived crime, which can directly and indirectly affect health (Macintyre, MacIver, and Sooman 1993; Sooman and Macintyre 1995). Actual crime can directly affect health through bodily harm. Fear of crime can indirectly affect health by increasing stress, promoting social isolation, preventing the health-promoting practice of walking for exercise, and preventing access to services for those fearful of traveling freely in the community. In addition, contagion or epidemic models suggest that people's behavior is influenced by the norms or values of those around them (Crane 1991), indicating that living among lower SES people may negatively affect a person's health-promoting behaviors, since lower SES neighbors are less likely to practice health-promoting behaviors such as exercising regularly and not smoking (Berkman and Breslow 1983).

In sum, the socioeconomic characteristics of communities may indirectly affect the health of community residents through the physical, service, and social environment of communities. These health effects may occur regardless of the individual-level and family-level SES of community members.

PREVIOUS STUDIES

Despite these potential explanations for an independent association between community-level SES and health, research has not advanced to the point where many of these explanations can be tested. In fact, we need to determine whether we can even detect any independent associations between community-level SES and health, after controlling for individual-level and family-level SES, before we can explain that relationship.

Yet little research has actually tested whether there remains an independent association between community-level SES and health after controlling for individual-level and family-level SES. Early work in the United States by Hochstim, Athanasopoulos, and Larkins (1968) found that residing in poverty areas in Alameda County, California in 1965 was associated with a higher number of health problems beyond the effects of race and income for both black and white adults. Unfortunately, the generalizability of these results is limited because the data are now approximately thirty years old, the study was restricted to a specific geographical area, and only one measure of individual-level or family-level SES (income) was controlled. Also, by testing the difference between living in a poverty versus a non-poverty area, these researchers tested for deprivation effects on health but not for possible gradient effects of community-level SES on health as well.

However, a more recent national study of the health of adults in the United Kingdom in 1984 and 1985 addressed these limitations and still provides support for Hochstim and colleagues' general findings. Jones and Duncan (1995) investigated the independent effects of a ward-level deprivation index on three health measures. They found associations between ward-level deprivation scores and respiratory functioning, self-rated health, and heart symptoms, over and above individual-level SES characteristics, including social class, employ-

ment status, housing tenure, and income, as well as demographic and health behavior measures. They concluded that the linear nature of the relationship between the ward deprivation index and the three health measures supports the idea that there is a gradient effect of community-level SES on health rather than solely a threshold or deprivation effect. It is not just people living in high poverty or deprivation areas that experience worse health compared to people living in all other areas, but even people living in very well-off communities seem to have better health than people living in communities just below them on the socioeconomic scale. Regarding Jones and Duncan's ward deprivation index, use of such an index of community-level SES characteristics may have the advantage of more fully describing the composite characteristics of communities, but it has the disadvantage of obscuring which of the specific community characteristics most affect health, either singly or in combination with other particular characteristics.

Whereas the above two studies investigated health outcomes, several studies in the United States have specifically examined the independent effects of community-level SES on mortality. Haan, Kaplan, and Camacho (1987) found that, in a population of adults age 35 and over living in Oakland, California in 1965, the effects of residence in a poverty area on nine-year mortality persisted after controlling separately for individual-level measures of SES, age, sex, and race, and even after adjusting for mediating behavioral factors. Two additional national studies present more recent evidence for an independent effect of community-level SES on mortality. Anderson et al. (1997) linked the National Longitudinal Mortality study to 1980 census tract data to assess the multi-level effects of income on all-cause mortality among black and white adults in the United States from 1979 to 1991. Their results indicated that community-level median income had statistically significant independent effects on mortality for those age 25 to 64 of both sexes and races after controlling for family income. There were no similar effects for those age 65 or older. LeClere, Rogers, and Peters (1997) linked the 1986 to 1990 National Health Interview Survey with the National Death Index and with census tract level data from the 1990 census. They found that community-level median income had an independent effect on mortality for men (but not for women) after controlling for individual-level education, income to needs ratio, and for age, race, and marital status. This relationship was reflected by more of a gradient relationship than a deprivation relationship, with those living in communities with the highest median income quartile less likely to die than even those in the second highest income quartile communities.

In contrast to the findings of these three United States mortality studies, Sloggett and Joshi (1994) found that level of deprivation of social wards in England no longer predicted nine-year mortality for people ages 16 to 65 after controlling for a number of individual-level SES indicators (work status, occupational class, and housing tenure variables). The results of this study may differ from the two United States studies because of genuine differences between countries. However, the different results may be due to the fact that Sloggett and Joshi controlled for more measures of individual-level and family-level SES indicators simultaneously, whereas the United States studies only controlled for one or two individual-level or family-level SES indicators at a time.

As the handful of studies described above illustrates, little research has actually investigated the independent effects of community-level SES on adult health, and those that have done so have been limited in a number of ways. Some of the studies are not generalizable because they have focused on a specific geographical area (e.g., Hochstim et al. 1968; Haan et al. 1987). Most studies have included limited numbers of community-level SES measures and/or limited individual-level and family-level SES controls (e.g., Hochstim et al. 1968; Haan et al. 1987; Anderson et al. 1997; LeClere et al. 1997), so it is unclear how the effects differ by dimension of community-level SES or how robust the independent community-level SES effects are. Finally, most studies considered only mortality (e.g., Haan et al. 1987; Sloggett and Joshi 1994; Anderson et al. 1997; LeClere et al. 1997) or few measures of health status (e.g., Hochstim et al. 1968), so it is unclear how the community-level SES effects might vary for different dimensions of health.

The current study addresses some of these previous limitations by using data from a representative sample of adults in the United

States, by including a number of measures of individual-level, family-level, and community-level SES measures, and by considering several measures of health. The primary hypothesis of this study is that community-level SES indicators are associated with health over and above the effects of individual-level and family-level SES indicators for adults in the United States. I also explore the relative importance of individual-level, family-level, and community-level SES indicators in predicting health. I use four measures of community-level SES to explore whether the relationship between community-level SES and health is sensitive to measurement of community-level SES. I also use three measures of health to investigate whether patterns differ depending on the domain of health measured.

METHODS

Data

The data for this study come from two sources which I have linked together. The first, the Americans' Changing Lives (ACL) study, is a nationally representative study containing individual-level and family-level information. The second, the 1980 census, contains information about geographical areas representing communities. Census summary statistics about community-level SES characteristics were matched to the records of each respondent in the ACL study.

ACL study. The ACL study (House 1989) was conducted in 1986 using 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 (70% response rate for sample households). Black people and people ages 60 and over were sampled at twice the rate of nonblacks and people under age 60.

1980 census. In order to have information on the socioeconomic characteristics of communities, I use data from the 1980 U.S. census in conjunction with data from the ACL study. Data from the 1980 census were used rather than data from the 1990 census because characteristics of communities in 1980 most likely affected the subsequent health status of respondents in the 1986 ACL study. The census data come from a data set that was extracted from the original 1980 decennial census tape file 3A (Adams 1992). This extracted data set summarizes information at the census tract, block numbering area, and enumeration district levels. Census tract areas are largish "neighborhood"-like areas in larger urban settings. Block numbering areas are "neighborhood"-like areas analogous to census tracts in areas that are blocked but not tracted, usually in smaller cities. Enumeration districts are similarly largish "neighborhood"-like areas in areas that are untracted and unblocked, usually in rural areas. Data from these three types of census areas can be used in combination to obtain complete national coverage for communities in both urban and rural areas in 1980.

ACL study combined with the census. Census information was matched for all respondents from the ACL study. This 100 percent match between the ACL study and the census is an important feature of this study because comparable analyses of other United States national studies that matched individual-level data with census data (e.g., Anderson et al. 1997; LeClere et al. 1997) suffer from missing data problems resulting from an inability to match all individuals with their corresponding census-level information.

Measures

Table 1 presents summary statistics for the primary study variables. Age, race, and sex were included in these analyses as control variables since all three are related to health and to SES.

Individual-level and family-level SES. I include education as an individual-level SES indicator measured continuously in years of education.

I include income as a family-level indicator of SES because it includes all sources of income received by respondents and their spouses in the previous year. I used the natural log of income because the effects of income on health have been found to diminish at increasingly higher income levels (House et al. 1990; Mirowsky and Hu 1996).

I include level of assets as a family-level indicator of SES. Although most research on SES differences in health has focused on education, income, occupation, or a combination

thereof, recent 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 study, respondents were asked how much money they would have if they cashed in and totaled up all of their current assets (excluding principal home). The lowest available response category was "less than $10,000," and there were a number of higher response categories up to "$500,000 or more." Previous research has suggested that the largest contrast between assets groups in predicting mortality is between people in the lowest end of the asset distribution and people in the remainder of the asset distribution (Mare 1990), and my initial analyses of these data provided similar results. Hence, the asset variable was categorized for these analyses 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), I neither dropped these respondents from the analysis nor imputed data for them on the asset variable. I included them in the analyses through use of a missing data dummy variable, although interpretation of results does not focus on this group.

Community-level SES variables. I chose three separate community-level SES variables because they seem to address different aspects of community socioeconomic characteristics, even though they may be related. Percentage of households receiving public assistance income and percentage adult unemployment both measure negative SES characteristics of communities. In contrast, percentage of families with incomes greater than $30,000 is a measure of more positive characteristics of communities. Recent literature has suggested that there may be a difference between the presence or absence of low-income neighbors and the presence or absence of affluent neighbors, and recent work uses this $30,000 or more cut off to represent the latter (Brooks-Gunn et al. 1993).

TABLE 1. Descriptive Information on All Variables[a]

Control Variables[b]	
Age (Years)	
Range	25–96
Mean	47.1
Std. Dev.	16.5
Race	
Black (1)	11.0%
Non-black (0)	89.0%
Sex	
Women (1)	52.9%
Men (0)	47.1%
Individual-Level SES[b]	
Education (Years)	
Range	0–17+
Mean	12.4
Std. Dev.	3.1
Family-Level SES[b]	
Income (Logged)	
Range	7.8–11.6
Mean	10.0
Std. Dev.	.9
Assets	
<$10,000	44.8%
$10,000+	48.9%
Missing	6.3%
Health Variables[b]	
# Chronic Conditions (Logged)	
Range	−.69–1.95
Mean	−.058
Std. Dev.	.708
Functional Limitations (Logged)	
Range	0–1.39
Mean	.15
Std. Dev.	.37
Self-Rated Health	
Range	1–5
Mean	2.3
Std. Dev.	1.1
Community-Level SES[c]	
% HH Receiving Public Assistance	
Range	0–58%
Mean	7.8%
Std. Dev.	7.0%
% Families with $30,000+ Income	
Range	0–84%
Mean	24.3%
Std. Dev.	16.5%
% Adult Unemployment	
Range	0–33%
Mean	6.8%
Std. Dev.	4.4%
Community Disadvantage Index	
Range	18–179
Mean	90.35
Std. Dev.	23.54

[a] Data are weighted.
[b] Data from the 1986 Americans' Changing Lives study (n=3,617).
[c] Data from the 1980 census for Americans' Changing Lives respondents.

For percentage of households receiving public assistance, public assistance includes Aid to Families with Dependent Children, General Assistance, Aid to the Aged, Blind, and Disabled, and Supplemental Security Income. Percentage adult unemployment was created by dividing the number of people ages 16 and older who were unemployed (within each census area), by the number of people ages 16 and older who were either employed in the civilian labor force or unemployed (on April 1, 1980, within each census area).

Previous analyses (not shown) indicate that the form of the relationships between the community-level SES and the health variables were primarily linear (a gradient relationship). The exception was the relationship between percentage of households receiving public assistance and functional limitations, which was best characterized by a deprivation rather than a gradient relationship. Those living in communities where 20 percent or more of the households received public assistance had worse functional limitations than those in all higher SES communities. As a result of these prior analyses, the three community-level SES variables were used in their continuous forms in the current analyses to test for gradient relationships between community-level SES variables and health.

Later analyses combine all measures of SES in regression equations. Although the three community-level SES variables are strongly correlated with each other (Table 2), there are no correlations above .55, indicating that they may not be equivalent measures of community-level SES. However, an Economic Disadvantage Index was also created by summing the three separate community-level SES measures (reversing percentage of families earning $30,000 or more) in order to examine the combined association between the community-level SES variables and health.

Health. Many studies have used only one indicator of health when studying the relationship between SES and health. However, health can be seen as a multidimensional construct having three primary dimensions: disease, disability, and subjective health (Liang 1986; Gibson 1991). SES might differentially affect various dimensions of health. Therefore, this research includes three health measures to represent each of three dimensions of health. Number of chronic conditions measures the disease dimension, functional limitations measures the disability dimension, and self-rated health measures the subjective dimension.

The number of chronic conditions respondents reported experiencing in the previous year came from a list of ten 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. Number of chronic conditions is logged in these analyses to reduce skewness (0 chronic conditions was recoded to .5 before logging). Functional limitations is a four point index ranging from no functional limitations (1) to severe functional limitations (4). The index was created by combining a question about whether respondents were in a bed or chair most or all of the day with questions regarding respondents' degree of difficulty bathing, climbing stairs, walking several blocks, and performing heavy work around the house (e.g., shoveling snow). Functional limitations is logged in these analyses to reduce skewness. Self-rated health reflects 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).

Statistical Analyses

I use OLS regression techniques in the analyses. For all analyses, the data were weighted to adjust for variation in probabilities of selection, variation in response rates by primary sampling units, and deviation of the ACL study sample from 1985 Bureau of Census estimates of the population by age, sex, and region of the country.

Hierarchical linear model techniques (e.g., HLM; Bryk and Raudenbush 1992), which have been designed for the analyses of multilevel data, are not used here. Hierarchical linear model techniques were designed for data sets that have both within-group and between-group variation, requiring many cases within each of many groups. Therefore, the technique is not used in the present study because the ACL data come from a national sampling design in which there are many sampled "groups" (i.e. census communities) but few respondents sampled within each group.[1]

Comparing traditional OLS regression methods with hierarchical linear model techniques, Bryk and Raudenbush (1992) suggest

that OLS parameter estimates are unbiased, but not as efficient as parameter estimates in hierarchical linear models. Yet Duncan, Connell, and Klebanov (1997) argue that when census data are used for community-level indicators, as is the case in these analyses, then sampling error of community-level SES measures is only a minor concern, reducing inefficiency. The clustering of observations within communities that is part of the ACL study's sampling design produces serial correlation. However, this serial correlation can be corrected by adjusting standard errors using a replication-based survey sampling error program which adjusts for the fact that respondents clustered within the same communities are likely to share characteristics compared to respondents chosen randomly from the population (Duncan et al. 1997). In this study, I use SUDAAN software (Shah et al. 1992) to adjust standard errors of OLS regression coefficients using a Taylor series linearization method.

RESULTS

We can examine the bivariate associations between each SES and health variable by referring to the full correlation matrix in Table 2. The SES variables were weakly to moderately correlated with each of the health variables. Education and income were both moderately correlated with all three health measures, and were stronger correlates of health than any of the other SES variables. The community-level SES variables were all weakly correlated with each health measure.

Health Regressed on Community-Level SES

Tables 3, 5, and 7 show the results of regressing each of the three health measures on community-level SES variables, controlling only for demographic variables (age, race, and sex). These are the types of models typically presented in ecological analyses that do not have data about individual-level and family-level SES characteristics. Because there is little research on community-level SES effects on health, I examine each of the three community-level SES variables separately (Models 1 through 3), simultaneously (Model 4), and in an index (Model 5) so that we may better explore the separate and combined health effects of the community-level SES variables.[2]

Table 3 presents the results for number of chronic conditions. Models 1, 2, and 3 show that each of the separate community-level SES variables is a statistically significant predictor of number of chronic conditions, controlling for age, race, and sex. People living in communities with lower SES have, on average, more chronic conditions than those living in communities with higher SES. Although Model 4 indicates that only percentage of families earning $30,000 or more remains statistically significant in the presence of the other two community-level SES variables, Model 5 indicates that the combination of these three community-level SES variables in the Economic Disadvantage Index is a statistically significant predictor of number of chronic conditions.

Tables 5 and 7 show similar results for functional limitations and self-rated health. Two of the three community-level SES variables are statistically significant predictors of functional limitations (percentage adult unemployment being the exception), whereas each of the three community-level SES variables predicts self-rated health, controlling for age, race, and sex. Percentage of households receiving public assistance and percentage of families earning $30,000 or more predict both functional limitations and self-rated health when all three community-level SES variables are added simultaneously (Model 4). The Economic Disadvantage Index predicts both functional limitations and self-rated health (Model 5).

These results are consistent with previous studies that have found that community-level SES is associated with individual-level health. However, these results do not indicate whether community-level SES is simply a *proxy* for individual-level and family-level SES, or whether community-level SES is associated with individual-level health over and above the effects of individual-level and family-level SES.

Health Regressed on Community-Level SES, Controlling for Individual-Level and Family-Level SES

Tables 4, 6, and 8 show what happens when the individual-level and family-level SES variables are included in the models. These mod-

TABLE 2. Correlations Among Study Variables (n=3,617)[a]

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1) Age (Years)	1.00													
(2) Race (Black)	−.02	1.00												
(3) Sex (Female)	.07**	.03	1.00											
(4) Education (Years)	−.35***	−.11**	−.06**	1.00										
(5) Income (Logged)	−.26***	−.16***	−.14***	.51***	1.00									
(6) <$10,000 Assets	−.21***	.14***	.03	−.19***	−.38***	1.00								
(7) $10,000+ Assets	.14***	−.14***	−.06*	.21***	.39***	−.88***	1.00							
(8) Missing Assets	.15***	.01	.06**	−.04*	−.04	−.23***	−.25***	1.00						
(9) % HH Receiving Public Assistance	.03	.43***	.06***	−.27***	−.31***	.20***	−.18***	−.03*	1.00					
(10) % Families with $30,000+ Income	−.04	−.18***	−.04	.34***	.37***	−.24***	.21***	.06*	−.53***	1.00				
(11) % Adult Unemployment	.04	.23***	.02	−.19***	−.16***	.11**	−.10**	−.01	.55***	−.41***	1.00			
(12) Community Disadvantage Index	.04	.30***	.05*	−.35***	−.38***	.25***	−.22***	−.05*	.77***	−.93***	.64***	1.00		
(13) # of Chronic Conditions (Logged)	.52***	.06**	.13***	−.31***	−.29***	.01	−.04	.06***	.12***	−.13***	.10***	.15***	1.00	
(14) Functional Limitations (Logged)	.39***	.02	.08***	−.25***	−.28***	.07***	−.08***	.03	.09***	−.09***	.05*	.10***	.47***	1.00
(15) Self-Rated Health	.32***	.04*	.06**	−.32***	−.32***	.09***	−.10***	.02	.14***	−.14***	.10***	.16***	.53***	.50***

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

[a] All data are weighted and standard errors are adjusted for design effects.

els test the main hypothesis that community-level SES predicts health over and above the effects of individual-level and family-level SES. Table 4 presents the results for number of chronic conditions. Models 7 through 9 indicate that percentage of families earning $30,000 or more and percentage adult unemployment remain statistically significant predictors of number of chronic conditions, over and above the effects of individual-level and family-level SES, whereas percentage of households receiving public assistance does not. Models 10 and 11 show that none of the community-level SES variables is a statistically significant predictor of number of chronic conditions when the community-level SES variables are entered simultaneously, indicating that the three community-level SES variables have some redundant associations with number of chronic conditions, rather than only independent associations. However, the Economic Disadvantage Index remains a statistically significant predictor of number of chronic conditions after controlling for individual-level and family-level SES.

These results provide some support for the hypothesis that community-level SES predicts health over and above the effects of individual-level and family-level SES. However, the size of the independent community-level SES effects is relatively small. For example, interpreting the unstandardized regression coefficient for percentage adult unemployment from Model 9, we can say that comparing a community with 0 percent unemployment to one with 20 percent unemployment only increases a person's number of chronic conditions, on average, by less than 1 percent, after controlling for individual-level and family-level SES, age, sex, and race.

Table 6 presents the results for functional limitations. In contrast to the results for number of chronic conditions, none of the community-level SES variables remains a statistically significant predictor of functional limitations, either separately or together, after controlling for individual-level and family-level SES. Nor do I find independent community-level SES effects when functional limitations is dichotomized (no functional limitations versus at

TABLE 3. Number of Chronic Conditions (Logged) Regressed on Community-Level SES Variables, Controlling for Demographic Variables (n=3,617)[a]

	Model 1		Model 2		Model 3		Model 4		Model 5	
Independent Variables	b (s.e.)[b]	β	b (s.e.)[b]	β	b (s.e.)[b]	β	b (s.e.)[b]	β	b (s.e.)[b]	β
Age	.022*** (.001)	.509	.022*** (.001)	.509	.022*** (.001)	.510	.022*** (.001)	.508	.022*** (.001)	.508
Race (Black)	.059 (.040)	.026	.101** (.035)	.045	.112** (.035)	.049	.069 (.040)	.031	.067 (.037)	.030
Sex (Female)	.129*** (.028)	.091	.129*** (.027)	.091	.133*** (.028)	.094	.128*** (.028)	.090	.128*** (.028)	.090
% HH Receiving Public Assistance	.009*** (.002)	.088					.003 (.002)	.033		
% Families with $30,000+ Income			−.005*** (.001)	−.105			−.004*** (.002)	−.084		
% Adult Unemployment					.010*** (.003)	.064	.003 (.003)	.017		
Economic Disadvantage Index									.003*** (.001)	.114
Constant	−1.235***		−1.059***		−1.245***		−1.119***		−1.472***	
	(.038)		(.048)		(.039)		(.050)		(.049)	
R^2	.288		.292		.285		.293		.293	

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

[a] All data are weighted.

[b] Standard errors are adjusted for design effects.

least some functional limitations—analyses not shown).

Table 8 presents the results for self-rated health. Only percentage of households receiving public assistance remains a statistically significant predictor of self-rated health after controlling for individual-level and family-level SES (Model 7). This effect remains in the presence of the other two community-level SES variables (Model 10). However, the Economic Disadvantage Index is not a statistically significant predictor of self-rated health (Model 11). When self-rated health was dichotomized into those with "fair" or "poor" health versus those with either "good," "very good," or "excellent" health, logistic regression results showed that percentage adult unemployment had an independent association with self-rated health as well, net of individual-level and family-level SES and control variables (analyses not shown).

These results lend partial support to the hypothesis that community-level SES has an independent association with health, controlling for individual-level and family-level SES. However, the size of the independent effect of

TABLE 4. Number of Chronic Conditions (Logged) Regressed on Community-Level SES Variables, Controlling for Individual-Level and Family-Level SES Variables (n=3,617)[a]

Independent Variables	Model 6 b (s.e.)[b]	Model 6 β	Model 7 b (s.e.)[b]	Model 7 β	Model 8 b (s.e.)[b]	Model 8 β	Model 9 b (s.e.)[b]	Model 9 β	Model 10 b (s.e.)[b]	Model 10 β	Model 11 b (s.e.)[b]	Model 11 β
Age	.020*** (.001)	.473	.020*** (.001)	.475	.021*** (.001)	.477	.020*** (.001)	.474	.021*** (.001)	.477	.021*** (.001)	.477
Race (Black)	.076* (.034)	.033	.045 (.038)	.020	.065 (.034)	.029	.059 (.034)	.026	.050 (.038)	.022	.049 (.036)	.022
Sex (Female)	.114*** (.028)	.080	.113*** (.028)	.080	.114*** (.027)	.081	.114*** (.028)	.080	.114*** (.028)	.080	.114*** (.028)	.080
Education (Years)	−.019*** (.005)	−.083	−.018** (.005)	−.078	−.017** (.005)	−.074	−.018** (.005)	−.078	−.016** (.005)	−.072	−.016** (.005)	−.071
Income (Logged)	−.068*** (.016)	−.089	−.064*** (.016)	−.083	−.060*** (.016)	−.078	−.067*** (.016)	−.087	−.060*** (.016)	−.079	−.059*** (.016)	−.077
Assets												
<$10,000	Omitted		Omitted		Omitted		Omitted		Omitted		Omitted	
$10,000 +	−.068* (.032)	−.048	−.067* (.032)	−.047	−.065* (.031)	−.046	−.067* (.031)	−.047	−.064* (.031)	−.045	−.064* (.031)	−.045
missing	−.117* (.053)	−.040	−.112* (.054)	−.038	−.107 (.054)	−.037	−.114* (.053)	−.039	−.107 (.054)	−.037	-.106 (.054)	−.036
% HH Receiving Public Assistance			.004 (.002)	.036					.001 (.002)	.008		
% Families with $30,000+ Income					−.002* (.001)	−.044			−.001 (.001)	−.031		
% Adult Unemployment							.006* (.003)	.037	.004 (.003)	.024		
Economic Disadvantage Index											.002** (.001)	.052
Constant	−.130 (.175)		−.219 (.178)		−.202 (.175)		−.201 (.177)		−.248 (.178)		−.401* (.196)	
R^2	.308		.309		.310		.310		.311		.310	

* $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$.
[a] All data are weighted.
[b] Standard errors are adjusted for design effects.

percentage of households receiving public assistance is relatively small; it suggests that those living in communities where 50 percent of households received public assistance, for example, had a self-rated health score that was lower by about .4, as compared to those living in communities where no households received public assistance, after controlling for individual-level and family-level SES, age, race, and sex.[3]

Relative Importance of Individual-Level, Family-Level, and Community-Level SES

One purpose of this study was to explore the relative importance of individual-level, family-level, and community-level SES indicators in predicting health. As described earlier in Table 2, bivariate relationships indicate that education and income are more highly correlated with all three measures of health than are any of the community-level SES variables. In addition, we can compare the relative importance of the SES variables in multivariate models by inspecting the standardized regression coefficients from Tables 4, 6, and 8. For example, Model 8 in Table 4 indicates that the standardized beta coefficients for education (−.074), income (−.078), and $10,000 or more in assets (−.046) are all larger than that of percentage of families earning $30,000 or more (−.044) when predicting number of chronic conditions. In all cases, education and income have larger standardized beta coefficients than the community-level SES variables for all three measures of health. The community-level SES effects are sometimes comparable to the effects of having $10,000 or more in assets. In Table 8, the differences in importance between levels of SES are particularly striking since education and income seem to be especially important to self-rated health, compared to each of the community-level SES variables. Because Table 6 indicates no independent associations between community-level SES and functional limitations in the first place, and because income and assets are both statistically significant predictors of functional limitations, we can conclude that these family-level SES variables are more important to functional limitations than are the community-level SES variables. In sum, although there are some independent associations between community-level SES and health, it is important to note that individual-level and family-level

TABLE 5. Functional Limitations (Logged) Regressed on Community-Level SES Variables, Controlling for Demographic Variables (n=3,617)[a]

Independent Variables	Model 1 b (s.e.)[b]	Model 1 β	Model 2 b (s.e.)[b]	Model 2 β	Model 3 b (s.e.)[b]	Model 3 β	Model 4 b (s.e.)[b]	Model 4 β	Model 5 b (s.e.)[b]	Model 5 β
Age	.009***	.381	.009***	.381	.009***	.382	.009***	.380	.009***	.380
	(.000)		(.000)		(.000)		(.000)		(.000)	
Race (Black)	−.011	−.009	.012	.010	.019	.016	−.008	−.007	−.001	−.001
	(.014)		(.016)		(.016)		(.015)		(.015)	
Sex (Female)	.040**	.054	.041**	.055	.042**	.057	.040**	.054	.040**	.054
	(.013)		(.013)		(.013)		(.013)		(.013)	
% HH Receiving Public Assistance	.004***	.077					.003*	.054		
	(.001)						(.001)			
% Families with $30,000+ Income			−.002***	−.073			−.001*	−.052		
			(.000)				(.001)			
% Adult Unemployment					.003	.034	−.001	−.011		
					(.002)		(.002)			
Economic Disadvantage Index									.001***	.081
									(.000)	
Constant	−.304***		−.236***		−.298***		−.260***		−.388***	
	(.020)		(.019)		(.020)		(.028)		(.035)	
R^2	.158		.159		.155		.160		.160	

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

[a] All data are weighted.

[b] Standard errors are adjusted for design effects.

SES indicators are still better predictors of health than community-level SES indicators.[4]

DISCUSSION

We know that lower SES communities tend to have more residents with worse health than higher SES communities (Crombie et al. 1989; Curtis 1990; Figueroa and Breen 1995), but is this only because people living in lower SES communities tend to have lower SES themselves? Or is there something about lower SES communities that is detrimental to the health of residents, no matter what their own SES level? This research is the first to use a national sample of adults in the United States to investigate whether community-level SES is associated with a number of individual-level health measures, over and above individual-level and family-level SES.

The results of this study provide some support for the hypothesis that community-level SES is associated with health, over and above

TABLE 6. Functional Limitations (Logged) Regressed on Community-Level SES Variables, Controlling for Individual-Level and Family-Level SES Variables (n=3,617)a

Independent Variables	Model 6 b (s.e.)[b]	Model 6 β	Model 7 b (s.e.)[b]	Model 7 β	Model 8 b (s.e.)[b]	Model 8 β	Model 9 b (s.e.)[b]	Model 9 β	Model 10 b (s.e.)[b]	Model 10 β	Model 11 b (s.e.)[b]	Model 11 β
Age	.008*** (.000)	.355	.008*** (.000)	.356	.008*** (.000)	.354	.008*** (.000)	.355	.008*** (.000)	.355	.008*** (.000)	.355
Race (Black)	−.017 (.015)	−.014	−.023 (.015)	−.020	−.016 (.015)	−.013	−.018 (.015)	−.015	−.024 (.015)	−.021	−.016 (.016)	−.014
Sex (Female)	.028* (.013)	.038	.028* (.013)	.038	.028* (.013)	.038	.028* (.013)	.038	.028* (.013)	.038	.028* (.013)	.038
Education (Years)	−.005 (.003)	−.046	−.005 (.003)	−.044	−.006 (.003)	−.048	−.005 (.003)	−.046	−.005 (.003)	−.047	−.005 (.003)	−.046
Income (Logged)	−.052*** (.009)	−.130	−.051*** (.009)	−.128	−.053*** (.009)	−.132	−.052*** (.009)	−.130	−.052*** (.009)	−.131	−.052*** (.009)	−.130
Assets												
<$10,000	Omitted		Omitted		Omitted		Omitted		Omitted		Omitted	
$10,000 +	−.064*** (.015)	−.086	−.063*** (.015)	−.086	−.064*** (.015)	−.087	−.063*** (.015)	−.086	−.064*** (.015)	−.087	−.064*** (.015)	−.086
missing	−.090** (.027)	−.059	−.089** (.027)	−.058	−.091** (.027)	−.060	−.090** (.027)	−.059	−.090** (.027)	−.059	−.090** (.027)	−.059
% HH Receiving Public Assistance			.001 (.001)	.014					.001 (.001)	.022		
% Families with $30,000+ Income					.000 (.000)	.009			.000 (.001)	.018		
% Adult Unemployment							.000 (.001)	.004	.000 (.001)	.000		
Economic Dis-advantage Index											.000 (.000)	-.002
Constant	.384*** (.098)		.366*** (.096)		.392*** (.096)		.381*** (.098)		.371*** (.096)		.389*** (.099)	
R^2	.194		.194		.194		.194		.194		.194	

* $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$.
[a] All data are weighted.
[b] Standard errors are adjusted for design effects.

the effects of individual-level and family-level SES. Specifically, percentage of households receiving public assistance had an independent association with self-rated health, controlling for individual-level and family-level SES. Percentage of families earning $30,000 or more, percentage adult unemployment, and a composite Economic Disadvantage Index each had an association with number of chronic conditions, controlling for individual-level and family-level SES. Therefore, not only is one's health associated with one's income, education, and asset level, but one's health is also independently associated with some socioeconomic characteristics of the community. However, not all of the community-level SES predictors continued to predict all of the health measures after controlling for individual-level and family-level SES, and those independent community-level SES effects that did remain were quite small in magnitude.

Another exploratory research question in this study asked whether individual-level and family-level SES measures are better predictors of health than community-level SES measures. The results indicate that individual-level and family-level SES indicators are stronger predictors of health than community-level SES indicators, as has been suggested in previous studies (Sloggett and Joshi 1994; LeClere et al. 1997). Therefore, I do not argue that community-level SES is more important than individual-level and family-level SES in predicting health. Rather, this research suggests that community-level SES should be considered an additional dimension of SES when considering the relationship between SES and health. It also suggests that improving individual-level and family-level socioeconomic circumstances may be the most direct way to improve the health of individuals. However, understanding the community context in which a person lives may also ultimately be important in improving individual and population health. The results of this study do not support funneling a majority of resources into lower SES areas rather than to lower SES people. As others have argued (Berk, Cunningham, and Beauregard 1991), such a focus on lower SES areas ignores the many lower SES people who live in higher SES areas who might benefit from less area-focused assistance.

The results of this study are generally consistent with previous research that has found an independent relationship between community-level SES and individual-level health (Hochstim et al. 1968; Jones and Duncan 1995)

TABLE 7. Self-Rated Health Regressed on Community-Level SES Variables, Controlling for Demographic Variables (n=3,617)[a]

Independent Variables	Model 1 b (s.e.)[b]	β	Model 2 b (s.e.)[b]	β	Model 3 b (s.e.)[b]	β	Model 4 b (s.e.)[b]	β	Model 5 b (s.e.)[b]	β
Age	.021*** (.001)	.317	.021*** (.001)	.318	.021*** (.001)	.319	.021*** (.001)	.316	.021*** (.001)	.316
Race (Black)	−.042 (.053)	−.012	.083 (.048)	.024	.102 (.053)	.030	−.027 (.055)	−.008	.014 (.048)	.004
Sex (Female)	.065 (.042)	.030	.068 (.042)	.032	.075 (.043)	.035	.063 (.043)	.029	.065 (.043)	.031
% HH Receiving Public Assistance	.021*** (.003)	.137					.014*** (.003)	.092		
% Families with $30,000+ Income			−.008*** (.002)	−.123			−.005* (.002)	−.080		
% Adult Unemployment					.018*** (.004)	.076	.000 (.005)	.002		
Economic Disadvantage Index									.006*** (.001)	.143
Constant	1.140*** (.075)		1.480*** (.071)		1.151*** (.076)		1.321*** (.094)		.715*** (.148)	
R^2	.123		.123		.114		.128		.127	

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

[a] All data are weighted.

[b] Standard errors are adjusted for design effects.

and mortality (Haan et al. 1987; Anderson et al. 1997; LeClere et al. 1997). However, these results differ from previous research in a number of ways. First, previous work linking community-level SES to individual-level health has often focused only on deprivation effects—for example, investigating how residence in a poverty area is related to health (e.g., Hochstim et al. 1968) and mortality (Haan et al. 1987), rather than investigating how various levels of community-level SES are related to health. In contrast, the results of this study suggest that it is not just people living in the worst SES communities that have worse health compared to everyone else (deprivation effects). Rather, people living in higher SES communities generally have better health than those living in communities with slightly lower SES (gradient effects). Jones and Duncan (1995) similarly found gradient relationships between a ward deprivation index and measures of health in their national study of adults in the United Kingdom, and LeClere and colleagues (1997) reported a gradient relationship between com-

TABLE 8. Self-Rated Health Regressed on Community-Level SES Variables, Controlling for Individual-Level and Family-Level SES Variables (n=3,617)[a]

Independent Variables	Model 6 b (s.e.)[b]	Model 6 β	Model 7 b (s.e.)[b]	Model 7 β	Model 8 b (s.e.)[b]	Model 8 β	Model 9 b (s.e.)[b]	Model 9 β	Model 10 b (s.e.)[b]	Model 10 β	Model 11 b (s.e.)[b]	Model 11 β
Age	.016***	.240	.016***	.243	.016***	.241	.016***	.241	.016***	.242	.016***	.243
	(.001)		(.001)		(.001)		(.001)		(.001)		(.001)	
Race (Black)	−.012	−.003	−.076	−.022	−.016	−.005	−.032	−.009	−.078	−.023	−.034	−.010
	(.045)		(.046)		(.043)		(.043)		(.047)		(.043)	
Sex (Female)	.022	.010	.020	.009	.022	.010	.022	.010	.020	.009	.021	.010
	(.044)		(.044)		(.044)		(.044)		(.044)		(.044)	
Education (Years)	−.049***	−.143	−.046***	−.135	−.048***	−.141	−.047***	−.139	−.047***	−.137	−.047***	−.137
	(.009)		(.009)		(.009)		(.009)		(.009)		(.009)	
Income (Logged)	−.196***	−.169	−.187***	−.161	−.193***	−.166	−.194***	−.167	−.190***	−.164	−.188***	−.162
	(.040)		(.040)		(.040)		(.040)		(.040)		(.040)	
Assets												
<$10,000	Omitted		Omitted		Omitted		Omitted		Omitted		Omitted	
$10,000 +	−.098	−.046	−.094	−.044	−.097	−.045	−.096	−.045	−.095	−.045	−.094	−.044
	(.052)		(.052)		(.051)		(.052)		(.052)		(.052)	
missing	−.164	−.037	−.152	−.035	−.160	−.036	−.160	−.036	−.156	−.035	−.154	−.035
	(.098)		(.098)		(.100)		(.098)		(.100)		(.099)	
% HH Receiving Public Assistance			.007**	.049					.007*	.048		
			(.002)						(.003)			
% Families with $30,000+ Income					−.001	−.010			.001	.015		
					(.002)				(.002)			
% Adult Unemployment							.007	.030	.003	.014		
								(.004)		(.004)		
Economic Disadvantage Index											.001	.029
											(.001)	
Constant	4.173***		3.990***		4.147***		4.087***		3.990***		3.944***	
	(.410)		(.410)		(.404)		(.409)		(.409)		(.421)	
R^2	.182		.184		.183		.183		.184		.183	

* $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$.
[a] All data are weighted.
[b] Standard errors are adjusted for design effects.

munity-level median income and mortality for men in their United States study.

This study also differs from most previous studies because I found that the independent association between community-level SES and health varies both by measure of community-level SES and by measure of health. Although potential reasons for this variation are both many and speculative, I conclude at this time that the independent association between community-level SES and individual-level health may not be as robust as some researchers have suggested. Similar analyses that have looked at the independent effects of community characteristics on other individual-level outcomes have similarly found weak independent community-level effects (e.g., Simcha-Fagan and Schwartz 1986; Jencks and Mayer 1990; Elliott et al. 1996).

One clear limitation of this study is that the data are cross-sectional. Therefore, although I found independent associations between community-level SES and health, I cannot confirm that living in lower SES communities led to worse health, although prior work looking at mortality suggests this causal relationship (Haan et al. 1987; Anderson et al. 1997). Nevertheless, it is important to recognize that the cross-sectional results represent the cumulative impact of all causal effects over a lifetime, with the end result being that people living in lower SES areas are somewhat more likely to have worse health than people living in higher SES areas, regardless of their own or their family's SES. Though this cross-sectional finding is important in its own right, longitudinal studies are clearly needed to determine causation.

Most of the methodological limitations of this study have most likely led to an *underestimation* of community-level SES effects on health. For example, the effects of community-level SES on health may have been underestimated in this study because I could not fully consider how long people lived in their communities.[5] People living in a community for a long time are more "exposed" to their community than people who recently moved there. Those "exposed" for longer are probably more likely to have their health affected by their community's characteristics. Future research should explore the impact of length of community residence on the relationship between community-level SES and health.

Just as individuals may change residence over time, communities themselves also change over time. Because information from the 1980 census was used in conjunction with the 1986 ACL study, this time lag means that the 1980 characteristics of communities may not have coincided with the actual community characteristics providing the context for people in 1986. Perhaps even more importantly, measuring community-level SES at one point in time ignores potential effects of stability and change in a given community on the health of individual residents (Sampson 1991).

The effects of community-level SES on health may also be underestimated in this study because of crude measures of community boundaries. Clearly, census areas do not necessarily correspond with the self-defined communities of individual respondents. Though physical and service environments may be more appropriately characterized at larger census levels, the social patterns of individuals often do not correspond with census areas. Some individuals may have social networks and interactions that are bounded within a very small neighborhood area, while the social patterns of others may transcend large geographical boundaries. Although difficult to do, including information about self-defined communities in future research might result in a more accurate picture of the relationship between community-level SES and health, particularly as this relationship occurs through social environment mediating mechanisms.

Further, the effects of community-level SES on health may have been underestimated in this study because the effects of community-level SES on health *through* its effects on individual-level and family-level SES were not considered. For example, if the SES characteristics of a community affect one's education or income level, then controlling for individual-level and family-level education and income in this study may have overcontrolled for any indirect effects of community-level SES on health *through* education and income.

The association between community-level SES and health may also be *overestimated* in this study. There may be unmeasured factors that affect both a person's residential choice and one's health, resulting in a spurious independent association between community-level SES and health. It also may be that community-level SES is simply capturing an unmeasured dimension of individual-level or family-level SES. For example, community-level 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-level and family-level SES more thoroughly than most studies.

This study also did not consider heterogeneity between communities in terms of other community-level characteristics. For example, recent work by LeClere and colleagues (1997) highlights the importance of community-level racial concentration in predicting mortality. In addition, this study did not consider differences between communities in terms of level of community participation and organization by residents. Yet LaVeist (1992) suggests the importance of level of community organization in reducing black postneonatal mortality rates. Future research might borrow from Bronfenbrenner's ecological-developmental perspective (1989) to reconceptualize the relationship between the community and the individual as reciprocal, rather than as a one-way structural relationship where the community impacts the individual.

Most importantly, future research should also ask whether the association between community-level SES and health differs by subgroup of the population. The relatively weak associations between community-level SES and health in this study may be masking stronger associations for subgroups of the population. For example, gerontological research suggests that the community environment may be more important to the lives of older adults than those of younger adults (Lawton 1977). If so, community-level SES may be a particularly salient predictor of health for older adults, as compared to younger adults. Alternately, since previous research shows that individual-level and family-level measures of education and income are generally better predictors of health and mortality at younger ages than at older ages (House et al. 1990; Elo and Preston 1996), perhaps *community-level* SES is actually not as important to health at older ages. This is in fact suggested by Anderson and colleagues (1997) and Haan and colleagues (1987) who found that community-level median income and residence in a poverty area, respectively, had no independent effects on mortality for those ages 65 and older.

There also may be interactions among levels of SES such that community-level SES may be particularly important to the health of individuals or families with lower SES. Even though living in lower SES communities seems to be somewhat detrimental to the health of residents of all SES levels, it might be particularly detrimental to lower SES individuals, representing some type of "double jeopardy" effect. Alternately, it could be that living in higher SES communities may be worse for the health of lower SES people than living in lower SES communities because lower SES people might experience structural or psychological relative deprivation in higher SES communities. One can similarly imagine that there might be complex interactions between community-level SES and gender and race as well. In fact, LeClere and colleagues (1997) suggest that community-level SES characteristics are more predictive of mortality in men than in women. In any case, there is much research to be done to determine whether community-level SES is more or less important to the health of subgroups of the population.

In conclusion, I hope that this study has helped to inspire renewed interest in research on the multi-level effects of social factors on health. Most of the important social issues of our day, including those related to health status, are characterized by complex relationships among community, family, and individual contexts. Yet it seems that researchers have been shying away from addressing such complex multi-level issues, particularly in the last two decades, because of the many methodological and conceptual difficulties involved. Despite the many methodological and conceptual pitfalls of any one multi-level study, including this one, I do believe that these studies are worth doing. However, answers to our complex multi-level questions will have to be found incrementally rather than in one landmark study. Although it is encouraging that there has been a reemergence of multi-level research focusing on child and adolescent outcomes such as prosocial competence and problem behavior (Elliott et al. 1996), substance use (Ennett et al. 1997), mental health (Aneshensel and Sucoff 1996), and sexual behavior and educational outcomes (Brooks-Gunn et al. 1993), there has not been a similar reemergence of multi-level research on more direct physical health outcomes for populations of any age. Until we can adequately

answer questions about whether and how multi-level contexts of people's lives affect their health, our society certainly will, wittingly or unwittingly, continue to perpetuate social and health policies which have maintained and will continue to maintain social inequalities in health.

NOTES

1. The range of ACL study respondents living in each enumeration district was 1–21, with a mean of 7.5 people, a standard deviation of 4.3, and a median of 6 people. The range of the number of ACL study respondents living in each census tract or block numbering area was 1–72, with a mean of 8.6 people, a standard deviation of 8.3, and a median of 6 people.
2. To further explore the combined effects of the community-level SES variables, multiplicative interaction terms among each pair of community-level SES variables were added to the models to test whether certain combinations of community-level SES characteristics were particularly predictive of health. None of the interactions between pairs of the three community-level SES variables predicted the three health measures, after controlling for age, sex, race, and individual-level and family-level SES.
3. Additional analyses including childhood SES variables indicated that the relationships between health and individual-level, family-level, and community-level SES are not simply spurious relationships resulting from the relationship between childhood SES and both adult SES and health. Similarly, further analyses also indicated that the relationships between community-level SES and health are not due to differences in rural, suburban, or rural residence at the time of the study.
4. Though I chose to include more economic-related community-level SES indicators in this study, community-level indicators of education were also explored. Neither percentage of adults ages 25 and older with 0 to 8 years of education nor percentage of adults ages 25 and older with 16 or more years of education had an independent association with any of the three measures of health, after controlling for individual-level and family-level SES and for age, race, and sex.
5. When I restricted analyses to just those who had lived in the same place for three years or more, results were not substantially different. However, three years is not long enough to measure residential stability at an individual level.

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