NEIGHBORHOOD EFFECTS ON HEALTH:
Exploring the Links and Assessing the Evidence

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ABSTRACT: This article explores the possible causal pathways through which neighborhoods might affect health and then reviews the existing evidence. Although methodological issues make the literature inconclusive, the authors offer a provisional hypothesis for how neighborhoods shape health outcomes. They hypothesize that neighborhoods may primarily influence health in two ways: first, through relatively short-term influences on behaviors, attitudes, and health-care utilization, thereby affecting health conditions that are most immediately responsive to such influences; and second, through a longer-term process of “weathering,” whereby the accumulated stress, lower environmental quality, and limited resources of poorer communities, experienced over many years, erodes the health of residents in ways that make them more vulnerable to mortality from any given disease. Finally, drawing on the more extensive research that has been done exploring the effects of neighborhoods on education and employment, the authors suggest several directions for future research.

There is broad consensus that residents of socially and economically deprived communities experience worse health outcomes on average than those living in more prosperous areas. Studies have found that residents of poorer areas suffer from higher rates of heart disease, respiratory ailments, cancer, and overall mortality (Adler, Boyce, Chesney, Folkman, & Syme, 1993; Crombie, Kenicer, Smith, & Tunstall-Pedoe, 1989; Devesa & Diamond, 1983; Harburg, Erfurt, Chape, Hauenstein, Schull, & Schork, 1973; Jenkins, 1983). Research also suggests that in poorer neighborhoods mothers are more prone to deliver low birth weight babies, infants are more likely to die in their first year of life, and children are more likely to be hospitalized for asthma and be victims of violence (Corn, Hamrung, Ellis, Kalb, & Sperber, 1995; Coulton & Pandey, 1992; Garbarino, Dubrow, Kosteln, & Pardo, 1992; Guest, Almgren, & Hussey, 1998; Stockwell & Wicks, 1984).

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Community groups in the United States and elsewhere are paying increasing attention to health threats in their communities (Minkler, 1997). The World Health Organization launched a Healthy Cities Project Office in the late 1980s with the aim of encouraging actors in the health sector to look beyond their traditional focus on treating the sick. The office stresses the potential for improving health through controlling hazards in the built environment and creating more nurturing communities. In December 1993, more than 1,400 participants from communities around the world attended the first global conference on Healthy Cities and Communities (World Health Organization, 1995).

But despite the growing awareness of the relationship between neighborhoods and health, there has been little systematic exploration of whether those living in poor communities are sicker because they tend to be of lower socioeconomic status (SES), or because there is something unhealthy about living in such communities. A large number of researchers are now studying neighborhood effects on other outcomes, such as educational attainment and labor market success, and are using increasingly sophisticated multilevel models that help identify the effect of the neighborhood itself. Recent reviews (Ellen & Turner, 1997; Jencks & Mayer, 1990) have summarized these studies, but with the exception of teenage pregnancy, there is very little work exploring the effects of neighborhoods on health outcomes.

In this article, we focus exclusively on health outcomes and review the evidence regarding the existence of neighborhood effects. We begin by exploring the possible causal pathways by which neighborhoods might affect health, distinguishing among four different mechanisms. We then review the existing literature, organizing it into the following categories of health outcomes: health-related behaviors; mental health; low birth weight and infant mortality; adult physical health; and overall mortality. This literature review is based on a broad array of journals, ranging from those specializing in medicine and health, to journals in the fields of sociology, demography, social psychology, community development, and urban policy. We restrict ourselves to multilevel studies that include both individual data and data on community characteristics in an effort to understand what is currently known about the independent effect of neighborhoods on health.

We conclude that the relationship between neighborhoods and health is underexplored, but the current evidence does suggest a provisional story. In brief, we find the strongest evidence for independent neighborhood effects on overall mortality as well as on health outcomes that can be expected to develop and be discernible fairly quickly, such as health-related behaviors and mental health. This suggests to us that neighborhoods may primarily influence health in two ways: first, through relatively short-term influences on behaviors, attitudes, and healthcare utilization, thereby affecting health conditions that are most immediately responsive to such influences; and second, through a longer-term process of “weathering,” whereby the accumulated stress, lower environmental quality, and limited resources of poorer communities, experienced over many years, erodes the health of residents in ways that make them more vulnerable to mortality from any given disease (Geronimus, 1992). Finally, we suggest several directions for future research.

**CAUSAL MECHANISMS: HOW DO NEIGHBORHOODS AFFECT HEALTH?**

The causal relationships between neighborhood environment and health have been theorized most explicitly in the community health and human ecology literatures (Green & Ottoson, 1999). A variety of models have been proposed that describe the possible causal influences of neighborhoods on health (Wandersman & Nation, 1998). Structural models, for example, emphasize the ways in which neighborhood characteristics (such as high poverty) may influence forms of social organization, which in turn can have effects on health. Environmental
stress models, on the other hand, emphasize the health effects of proximal stressors such as pollution and overcrowding. We believe that the range of models of neighborhood effects on health can be summarized in four pathways. Neighborhoods can influence health outcomes through: (1) neighborhood institutions and resources; (2) stresses in the physical environment; (3) stresses in the social environment; and (4) neighborhood-based networks and norms.

Naturally, a neighborhood may shape health outcomes in a positive or negative manner. Motivated by poor health outcomes in low-income communities, many studies focus on the potentially negative effects of living in socially disadvantaged communities, even though many low-income areas offer strengths and social and institutional supports, and provide very healthy living environments (Wandersman & Nation, 1998). Nevertheless, because residents of distressed areas appear to be disadvantaged with respect to so many health outcomes, the questions posed here focus on why these residents fare worse on average, and whether and how their disadvantage is rooted in exposure to particular community conditions and resources.

**Neighborhood Institutions and Resources**

Neighborhoods clearly differ in their access to health care facilities. The number and quality of medical practitioners differ across neighborhoods, as does the nature of the medical technology and facilities. Poorer and less organized communities are typically at a disadvantage (McKnight, 1995; Minkler, 1997). Moreover, other characteristics of neighborhoods may also make it difficult to get to the doctor in the first place, such as poor and inadequate transportation or even high crime rates that can make people fearful of travel.

The resources in a neighborhood might also influence residents’ overall level of health (as opposed to their ability to get treated when sick). The facilities in a neighborhood might, for instance, make it more or less costly for residents to undertake health-promoting behavior, such as exercising regularly and eating nutritious foods (Robert & Yen, 1998). And some neighborhoods offer more opportunities for social interaction, which has been shown to be a critical determinant of health status (House, Landis, & Umberson, 1988).

**Physical Stresses in the Neighborhood Environment**

The most commonly discussed way in which neighborhoods influence health is through the proximity of polluting factories and toxic waste sites, which may increase people’s chances of contracting cancer and other illnesses. While the link between these environmental threats and illness is debated, few question that these threats tend to be more common in low-income areas (Anderton et al., 1994; Bullard, 1994; Hamilton, 1995; Vrijheid, 2000).

There are less conspicuous conditions that may also directly threaten residents’ health. Consider, for example, that low-income households tend to live in older housing and older neighborhoods. The existence of lead paint in older housing and other structures has been linked to neurological damage in children under the age of six, and recent studies have found a link between cockroach infestation and childhood asthma. Aging and poorly maintained environments—crumbling sidewalks, decaying stairwells, and dangerous playgrounds—likely increase the risk of accidents. And the quality of municipal services such as fire protection, sanitation, and even parks, may also influence the health and safety of residents (Wallace & Wallace, 1990).

**Social Stresses in the Neighborhood Environment**

Social conditions in a neighborhood may pose direct threats to health. Most obviously, a teenager living in a crime-ridden neighborhood is more likely to be injured. In addition, chil-
Children growing up in violent communities may suffer significant and lasting trauma from witnessing crime first-hand (Martinez & Richters, 1993). Adults may also be affected. Exposure to crime and violence has been shown to increase stress, as has exposure to other social conditions such as noise (Evans, 1997). Stress may exacerbate hypertension and other stress-related disorders, and may lead people to engage in smoking and other unhealthy behaviors as strategies of stress reduction. The accumulated effects of stress may also weaken the immune system and increase vulnerability to disease and disability (Geronimus, 1992).

Some economists have suggested an alternative path by which neighborhood crime and violence levels may influence behavior. By influencing expected life-spans, crime and violence can alter the expected costs and benefits of certain behaviors (Dow, Holmes, Philipson, & Sala-i-Martin, 1995; Ganz, 1997, 2000). For example, in more dangerous neighborhoods where expected life-spans are reduced, residents may feel they have less to lose from health risks such as smoking, that typically take a long time to manifest themselves.

**Neighborhood-Based Social Networks**

Social networks have several potential functions. They may communicate information, transmit norms about accepted behaviors, and provide social support. Neighborhood-based social networks may potentially shape health outcomes through each of these functions. First, information networks about doctors and health care are undoubtedly to some degree neighborhood-based. People learn a great deal about doctors and health care from those around them. They may hear from neighbors about which doctors are responsive, which behaviors are healthy or unhealthy, which contagious diseases are in the neighborhood, and so on. In some neighborhoods, these information networks may be quite rich, in others, relatively sparse. It should also be noted that neighborhood-based social networks may have a more significant impact on health outcomes in poorer neighborhoods, as some evidence suggests that the social networks of lower-income households are more geographically limited and more tied to neighborhoods (Altshuler, 1970).

Social networks may also shape norms about health-related behaviors in a neighborhood. For example, smoking or eating a high-fat diet may be more socially acceptable or of lesser health concern in some neighborhoods than in others. Similarly, social networks also determine the behaviors to which one is exposed. And if someone’s friends smoke, that person has a greater chance of smoking as well.

Finally, the density and supportiveness of neighborhood-based social networks may shape health outcomes. Some have argued that feelings of hopelessness and isolation are more widespread among residents of poorer and less empowered communities (Braithwaite & Lythcott, 1989; Spence, 1993). While not commonly assumed to be as harmful as smoking, drinking, and drug-use, such feelings and attitudes have been shown to weaken health (House, Landis, & Umberson, 1988).

**EVIDENCE OF NEIGHBORHOOD EFFECTS ON HEALTH**

Numerous studies have demonstrated that health outcomes vary across different neighborhoods, but it is not clear whether these disparities result from differing neighborhood conditions, or differing characteristics of households that tend to live in different neighborhoods. Providing a definitive answer to this question requires a multilevel analysis that includes information about the individual’s socioeconomic status as well as measures of the neighborhood environment. Unfortunately, very few of the studies exploring neighborhoods and health include individual-level data.
In this section, we summarize the studies that investigate the effects of neighborhood on health status, focusing on studies that include at least some individual measures, such as income, education, and race, and thus can make some claim to capturing the independent effects of the neighborhood environment. In order to identify major substantive and methodological themes, we developed a conceptually-ordered matrix display (Miles & Huberman, 1994) that summarized each article along various dimensions, including type of health outcome studied, the sample size and characteristics, the way in which geographic area is defined, the neighborhood-level causal variables, the individual-level control variables, and the estimated effect size if any. We then reordered the matrix along each conceptual dimension in order to identify patterns across the entire body of literature.

In reviewing these studies, we found that each health outcome could be categorized into one of five categories (see Table 1). Thus, we separately discuss five dimensions of health: health-related behaviors, mental health, birth outcomes, adult physical health, and overall mortality.

### Table 1

**Health Outcomes Considered**

<table>
<thead>
<tr>
<th>Category</th>
<th>Selected Outcomes</th>
</tr>
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<tbody>
<tr>
<td>Health Related Behaviors</td>
<td>Smoking, Drug and alcohol use, Diet and nutrition, Seatbelt use</td>
</tr>
<tr>
<td>Mental Health</td>
<td>Depression, Anxiety, Non-psychotic symptoms of distress</td>
</tr>
<tr>
<td>Birth Outcomes</td>
<td>Low birth weight, Infant mortality, Other pregnancy complications, Bleeding, Gestational hypertension, Late miscarriage</td>
</tr>
<tr>
<td>Adult Physical Health</td>
<td>Self-rated health, Functional limitations, Chronic conditions, Heart disease/hypertension</td>
</tr>
<tr>
<td>Mortality</td>
<td>Adult mortality</td>
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and behavioral changes can manifest themselves much more quickly and are thus more easily identified than are longer-term physiological changes. It should be noted, however, that we are not discussing all health-related behaviors here. Indeed, the behaviors and attitudes that most powerfully shape health may be precisely those that are most difficult to measure.

There are two chief types of studies that explore the relationship between neighborhood characteristics and health-related behaviors. The first type considers whether general neighborhood deprivation is linked to health-related behaviors. Although there are some anomalous results, these studies typically suggest that the socioeconomic status of a community has an independent effect on behaviors.

In a study of over 8,000 adults in the North West Thames region of England, Kleinschmidt, Hills, and Elliott (1995) find that both aggregate neighborhood SES and individual SES independently affect the prevalence of smoking. People living in electoral wards with higher scores on an economic deprivation index (which includes measures of male unemployment, household crowding, occupational status, and automobile ownership) are more likely to smoke than those living in less deprived areas, even after controlling for individual SES. Hart, Ecob, and Smith (1997), by contrast, find no evidence of area-level variation in smoking patterns in Scotland, but they do find significant variation in alcohol consumption and cholesterol levels, even after controlling for individual level education and occupation.

In a study of 15 communities in the western United States, Diehr et al. (1993) investigate the relationship between community membership (defined largely as county membership) and the prevalence of smoking, alcohol consumption, dietary fat intake, and seatbelt use. After controlling for a number of individual characteristics such as age, sex, race, marital and employment status, education, and income, they too find significant variation between communities in health-related behaviors, though the effects are small relative to individual-level effects. Their preliminary analysis suggests that the most critical community characteristic may be the prevalence of that behavior in the community.

Robert (1999) studies the relationship between various community-level characteristics and physical activity, body mass index, and smoking, by using the Americans’ Changing Lives survey data (linked to census data). While her work shows no independent association between neighborhood socioeconomic characteristics and smoking, the results do suggest a significant relationship between community-level SES and both body-mass index and physical activity.

The second type of study examines the effects of exposure to violence. Fick and Thomas (1995), for instance, measure a number of psychological indices and health-related behaviors in a group of approximately 100 youth living in low-income inner-city areas. They find that exposure to violence, both within the family and in the community, increases young people’s likelihood of smoking, as well as the likelihood of their imagining smoking in the future, even after controlling for individual SES. Psychological testing allowed the authors to speculate about the mechanisms involved in this relationship. They posit that children who grow up in violent environments may be less responsive to health promotion policies because they have less confidence in their ability to affect their own health and less trust in the judgment or efficacy of others to advise them about health-related behaviors.

Ganz (1997, 2000) interprets similar findings somewhat differently. Using both survey and census data on residents of central Harlem, Ganz also finds a strong relationship between exposure to violence and smoking behavior among adults. He hypothesizes a different causal mechanism, however. Ganz believes that threats to mortality, such as oft-witnessed neighborhood violence, may change the perceived risks of such unhealthy behaviors as smoking, since the presence of more immediate health threats will make longer-term health dangers seem more remote. Ganz thus suggests the possibility that the adoption of health-threatening behaviors may be a rational choice in environments where expected life-span is relatively short because
the health costs of such behaviors may be overshadowed by other, more immediate threats to
health.

Though the exact causal mechanisms have not been empirically established, the preponder-
ance of evidence suggests that neighborhoods can and do have significant independent effects
on health-related behaviors. In particular, community SES and levels of violence appear to be
related to the likelihood that neighborhood residents will smoke, consume alcohol, and eat an
unhealthy diet.

**Neighborhood Effects on Mental Health**

A range of studies demonstrates that various non-psychotic psychiatric disorders are asso-
ciated with the quality of social networks and social cohesion in a neighborhood, and espe-
cially to the level of violence and other ambient social hazards to which residents are exposed.
This effect has been detected across the life cycle, in children, adolescents, and adults. As with
studies in other areas, however, research has focused on documenting the relationship be-
tween neighborhood “inputs” and psychiatric “outputs,” with relatively few attempts to get
inside the black box of causal mechanisms linking one with the other.

Several studies have focused on youth. Aneshensel and Sucoff (1996), for instance, study a
sample of 877 adolescents living in Los Angeles County, and find that adolescents living in
low SES neighborhoods are significantly more likely to report the presence of ambient haz-
ardous such as violence, drug dealing, gang activity, and property damage, and also to suffer
from depression, anxiety, conduct disorder, and oppositional defiant disorder. Among these mea-
sured psychiatric disorders, one—depression—is also associated with lower reported social
cohesion in the neighborhood. The authors control for individual characteristics of age, race,
sex, family income, and housing stability. It should be noted, however, that causality is some-
what difficult to establish in this study. The authors generally assume that neighborhood con-
donitions affect psychological outcomes and not the reverse. But because the study uses subjective
measures of neighborhood environment, the authors recognize that their results may overstate
the effects of neighborhoods, as distressed adolescents are likely to hold especially negative
attitudes towards their surroundings.

The findings of other studies, however, also support the conclusion that exposure to neigh-
borhood violence has negative psychological effects. The National Institute of Mental Health
Community Violence Project (Martinez & Richters, 1993; Richters & Martinez, 1993) finds a
surprisingly high prevalence of exposure to negative neighborhood conditions such as vio-
ence in one especially vulnerable subpopulation. The authors studied 165 children 6 to10 years
of age living in a low-income, moderately violent neighborhood of Washington, DC. A ma-
jority of the children had already been approached and offered drugs, and many (40 to 60%
depending on age, type of incident, and whether parent or child was reporting) had witnessed
arrests, shootings, muggings, or other physical violence in their neighborhoods. Exposure to
violence of these forms was found to be significantly associated with the reporting of distress
symptoms among both younger and older children. Although this study also relied heavily on
respondent self-report, there was a high correlation between parent and child reports of the
child's exposure to violence, which gives some weight to the veracity of the children’s self-reports.

As for studies of the mental health of adults, Marmot et al. (1998) find no association be-
tween neighborhood conditions and the psychological well-being of adults, after controlling
for individual education level. It should be noted, however, that most studies in this area have
posed an explicit relationship between neighborhood violence and psychological well-being,
while Marmot et al. explore the effect of poverty on psychological well-being. Moreover, in
an experimental study of the Moving to Opportunity (MTO) program in Boston, Katz, Kling,
and Liebman (2000) find that parents as well as children in families that have received assistance in relocating from high-poverty areas to low-poverty areas experience psychological benefits from the move, relative to a control group given no relocation assistance. Among households who received no relocation assistance through the program (and, therefore, typically remain in high-poverty areas), the percentage of household heads describing their health as *good, very good, or excellent* is 58%. Controlling for baseline characteristics, the percentage describing their health as similarly good among households who received location assistance is 11.5 percentage points higher. Similarly, 46.5% of the household heads in the control group report feeling calm and peaceful “a good bit of the time” during the past four weeks. For the treatment group, this percentage is 10.7 percentage points greater, again controlling for baseline characteristics. Given the experimental design of MTO, this is probably the best evidence to date that neighborhoods affect mental health.

This is not to say, of course, that high-poverty neighborhoods doom residents to emotional distress. Many poor neighborhoods may have attributes that are quite beneficial to emotional well-being. Some authors have suggested that the residents of distressed, urban neighborhoods may be stronger, more resilient, and better-equipped to weather hard-times (Wandersman & Nation, 1998). Leavitt and Saegert (1990) find that small successes in neglected areas can give residents a powerful sense of accomplishment and provide them with a stronger sense of community.

### Neighborhood Effects on Birth Weight and Infant Mortality

Low birth weight and infant mortality remain significant public health problems in the United States, especially among poor and minority populations. Past research on such birth outcomes has focused on individual-level determinants. Studies have documented the importance of such factors as maternal age, parity, marital status, education, and the timing of prenatal care. But while these individual-level factors are consistently found to be significant, they collectively explain only a small proportion of the total variability seen for birth weight and mortality. Thus, it is reasonable to investigate whether neighborhood characteristics might also play a role.

Some researchers have begun to explore this possibility. We identified four multilevel studies that consider the effects of area-level characteristics on birth weight and an additional study that considers pregnancy complications more broadly. Three of the studies explore the impact of census tract characteristics, and all find that mothers residing in neighborhoods of lower socioeconomic status have a somewhat higher chance of having a low birth weight infant. Two of these three studies find that tract income level is significantly related to the probability of low birth weight (Collins & David, 1990; O’Campo, Xiaonan, Wang, & Caughy, 1997). The third study finds that women living in neighborhoods with large shares of residents receiving public assistance are at higher risk of having low birth weight infants (Duncan & Laren, 1990), though it does not find a significant relationship with poverty rates.

Ellen (2000) undertakes a multilevel analysis of the relationship between birth outcomes and racial segregation. She finds that African American women living in more highly segregated metropolitan areas are at greater risk of having a low birth weight infant than those living in less segregated areas. Furthermore, the aspect of segregation most related to birth outcomes is the degree to which black mothers are concentrated near the central city, and thus perhaps exposed to differing social services and physical environments.

Levels of violence also appear to have powerful effects on birth outcomes. Zapata, Rebollo, Atalah, Newman, & King (1992) study women in Santiago, Chile, and find that otherwise healthy women living in more violent neighborhoods are more likely to experience
pregnancy complications (such as gestational hypertension, bleeding, fetal growth retardation, pre-term contractions, and late miscarriage) compared to women living in less violent communities. This study uses geographic areas that are somewhat larger than census tracts to approximate residential neighborhoods.

Thus, a fair amount of evidence suggests a link between the social and economic environment and birth weight. Although these studies tend to have minimal controls for individual-level SES, usually relying on the education level of the mother, the two studies that include measures of individual income still find that neighborhood context (in particular, high levels of violence and high proportion receiving public assistance) has an influence on the probability of low birth weight (Duncan & Laren, 1990; Zapata, Rebolledo, Atalah, Newman, & King, 1992).

Several ecological studies also suggest a strong relationship between infant mortality and an area’s socioeconomic status (Collins & David, 1992; Coulton & Pandey, 1992; Guest, Almgren, & Hussey, 1998; LaVeist, 1992, 1993; Polednak, 1991; Stockwell & Wicks, 1984), but we discovered only two analyses of infant mortality that control for individual-level factors, and neither finds independent neighborhood effects. We do not consider this non-finding to be definitive, however, since the first study (Joyce & Racine, 1997) explores the relevance of environment on birth weight-specific death rates, and so leaves open the possibility that neighborhood environment may matter to infant mortality through influences on birth weight, and the second study (Matteson, Burr, & Marshall, 1998) uses county-level data to proxy for community environment, which may be too large a geographic area in which to measure a significant neighborhood effect.

**Neighborhood Effects on Adult Physical Health**

Relatively few studies of the effects of neighborhood on adult health control for individual characteristics beyond age and sex. Those that do control for additional individual-level characteristics find that some measures of health are independently associated with neighborhood characteristics, but these effects are generally not as strong as the effects of individual-level variables such as education and income.

Robert (1998) examines whether functional limitations, self-rated health, and number of chronic conditions are influenced by neighborhood SES as measured by the percentage of families receiving public assistance, the percentage of families earning $30,000 per year or more, and the adult unemployment rate. She finds that, controlling for individual- and family-level SES, neighborhood unemployment, the percentage of families in the neighborhood earning $30,000 per year or more, and an economic disadvantage index constructed from neighborhood SES measures are all statistically significant predictors of the number of chronic conditions, though the size of these effects is relatively small. In contrast, she finds no significant relationship between neighborhood SES measures and functional limitations, and only modest evidence of neighborhood effects on self-rated health.

Marmot et al. (1998) have similar findings. When controlling for a limited number of individual-level variables (age, race, and education), the authors find that a neighborhood-level poverty/unemployment index is modestly associated with self-rated health for both genders, and also with a measure of obesity (the waist/hip ratio) among women but not men. The effects are generally smaller than for individual-level variables such as household income and parental education.

Of the five dimensions of health reviewed in this article, current evidence suggests that adult health may be the area least strongly affected by neighborhood characteristics. Nevertheless, there is still very little multilevel research in this area with many health conditions yet to be
studied using appropriate multilevel methodology. Thus, it is still too early to tell a definitive story regarding the relationship between neighborhood characteristics and adult morbidity.

It is worth noting in passing that we found virtually no studies that explore possible links between neighborhood characteristics and children’s physical health. Among the few articles in this area were studies of asthma and lead paint poisoning. But while there is strong evidence that these conditions are influenced by physical environment and thus by neighborhood of residence, we identified no definitive work that tests whether these diseases are independently associated with neighborhood residence over and above their associations with individual or family characteristics.

**Neighborhood Effects on Overall Mortality**

A number of researchers have explored the relationship between area characteristics and mortality. Ecological studies have demonstrated a strong association between area deprivation and higher risks of mortality (Dayal et al., 1984; Jenkins, Tuthill, Tannenbaum, & Kirby, 1977; McCord & Freeman, 1990; Nesser, Tyroler, & Cassel, 1971). McCord and Freeman (1990), for example, find that the age-adjusted rate of mortality for blacks in Harlem is a full 50% higher than for American blacks overall, while LeClere, Rogers, and Peters (1997) find a strong relation between the proportion of African Americans in a census tract and mortality rates.

Recently, researchers have applied a multilevel approach to the study of mortality, incorporating both individual and neighborhood characteristics. The majority of these studies find that the relationship between area deprivation and mortality persists after controlling for individual characteristics. In the earliest such study, Haan, Kaplan, and Camacho (1987) examine the nine-year mortality experience of adults in Oakland, California. After controlling for individual demographic characteristics (race, income, employment, and marital status) and health behaviors (smoking, alcohol consumption, physical activity, body mass index, and others), they find that residents of federally designated poverty areas still experience higher mortality rates. Waitzman and Smith (1998) undertake a national-level analysis and also find elevated mortality risk associated with poverty-area residence. In a similar study, Anderson, Sorlie, Backlund, Johnson, and Kaplan (1997) link the National Longitudinal Mortality Study to census tract information to examine 11-year mortality risk, and they too find large community effects. After adjusting for individual SES, they find that black men and women residing in high poverty tracts are between 30 and 40% more likely to die than their counterparts residing in areas with higher SES.

Although the evidence appears quite strong that neighborhoods affect mortality, one study of wards in Great Britain finds that the excess mortality associated with deprived residential areas is wholly explained by the concentration in those areas of people with adverse personal or household economic factors (Sloggett & Joshi, 1994). These contradictory findings could be related to the authors’ use of a continuous measure of area deprivation, whereas those described above used a threshold-type measure. Wards are also slightly larger on average than census tracts.

**BETTER MEASUREMENT OF NEIGHBORHOOD EFFECTS**

The results above provide some evidence that neighborhood characteristics influence health. But as in all studies of neighborhood effects, there are several methodological issues that challenge the empirical research on neighborhoods and health and make unambiguous interpretations difficult. Four issues are particularly worthy of note. Table 2 outlines these issues and offers some possible solutions.
First, it is difficult to separate the effects of neighborhood environment from individual (or family) characteristics, especially those (such as values and attitudes, for example) that cannot be directly observed. Second, it may be difficult to identify and measure the neighborhood conditions that actually play the most important role in shaping outcomes for families and children. Third, the effects of neighborhood conditions may not be linear and thus not detectable in some studies. Finally, the measurement of health outcomes poses a special challenge, as many important health outcomes do not manifest themselves immediately. Failure to effectively address these challenges may cause studies either to exaggerate or minimize the effects of neighborhood environment on health outcomes.

**Distinguishing Between Neighborhood and Other Effects**

In order to isolate the independent effects of neighborhood residence, it is critical to do a multilevel analysis that includes information about individuals as well as about the neighborhoods in which they live. In this way, one can separate the effect of neighborhood residence from the effects of the characteristics of individuals who tend to live in different types of neighborhoods (e.g., high income households tend to live in affluent communities). Here we have largely restricted our review to papers that include both individual- and community-level factors. But even controlling for individual characteristics may not be sufficient. For while many individual characteristics are readily observable and can be taken into account, other relevant attributes are harder to measure and are generally not captured in empirical research. Many of these unmeasured individual attributes may influence a person’s health behaviors and status and also play a critical role in determining where that person lives. For example, people who pay special attention to their health (say, those who exercise regularly and take vitamins) may also be careful to live in what they perceive to be a good neighborhood. By ignoring these influences, studies are likely to falsely attribute to neighborhood what are truly the effects of the individual’s own characteristics and attitudes.

To date, researchers in the health arena have not confronted this problem of unobserved individual characteristics. Possible corrective approaches include instrumental variables, restricting the analysis to siblings who have presumably been exposed to identical family conditions,
or experimental designs that randomly assign individuals to different neighborhoods (Ellen & Turner, 1997). Though each of these approaches has been used in the study of employment and education outcomes (Aaronson, 1997; Duncan, Connell, & Klebanov, 1997), they remain underutilized in the study of health outcomes with the exception of the work of Katz, Kling, and Liebman. We encourage future researchers to explore these and other innovative ways to deal with the problem of unmeasured individual characteristics.

It should also be noted that it is possible for multilevel analyses to control for too much, as the individual characteristics that these studies take into account may themselves be influenced by neighborhood conditions. This issue may be of particular concern when examining health outcomes that are sensitive to behavioral influences. For example, should a study considering the effects of neighborhood on birth weight control for smoking during pregnancy? On the one hand, we would like to see whether neighborhood has an effect above and beyond individual-level factors. On the other hand, the social norms and level of stress in a community may have contributed to the mother’s decision to smoke. Thus, if we control for smoking we are understating the true role of the neighborhood environment (Ellen, 2000). We encourage researchers to keep such potential influences in mind when interpreting their results.

### Measuring Relevant Neighborhood Characteristics

Most studies of neighborhood effects use the poverty rate or another proxy measure to represent neighborhood conditions. But these proxies may not accurately reflect the neighborhood characteristics that really matter and may not, therefore, tell us how policy interventions should be targeted. Unfortunately, it is very difficult to obtain reliable data on the neighborhood characteristics that we think may be truly relevant to health outcomes (institutions, physical environmental hazards, social environmental hazards, social networks, and others). But future researchers should try to go beyond conventional census measures of deprivation. The studies above that explore the impact of crime or violence in a neighborhood (rather than simple levels of deprivation) tend to find stronger neighborhood effects.

Several recent analyses of neighborhoods have successfully used innovative techniques such as administrative data sources and windshield surveys to produce richer descriptions of the neighborhood environment (Brooks-Gunn, Duncan, & Aber, 1997; Raudenbush & Sampson 1997, 1999). We encourage health researchers to employ such techniques as well.

It is also critical to appropriately define neighborhood boundaries. Because it is difficult to find data sets that include both information about an individual’s health status and the characteristics of her neighborhood, many of the studies of community influences on health rely on county-level attributes (Diehr et al., 1993; Ganz, 1997; Gorman, 1999; Hart, Ecob, & Smith, 1997; Matteson, Burr, & Marshall, 1998). While often interpreted as “community” effects, counties are clearly much larger than what we typically consider to be a community or neighborhood. Nevertheless, certain characteristics of a county may be highly relevant to health status, like political will to support social programs, availability of health facilities, etc. But smaller units of analysis, such as census tracts, though not perfect representations of neighborhoods, are surely better proxies for true neighborhood conditions. Including about 4,000 residents on average, census tracts are roughly the size of what most envision as a neighborhood. A great deal of data are also organized by census tract.

Finally, all of the empirical studies we found are purely cross-sectional. But families move and neighborhoods change, and thus we may not be capturing neighborhood conditions for the time period in which they actually make a difference to a person’s health. Clearly, longitudinal data on individuals and their neighborhoods would advance our understanding of neighborhoods’ influence on health considerably.
Capturing Non-Linear Neighborhood Effects

Researchers should also be sensitive to non-linearity in neighborhood effects. As long as the incidence of a problem (such as violence, lead paint, or pollution) remains below a threshold level, for instance, it may have little impact on neighborhood residents. Once the incidence exceeds the threshold level, however, the problem may have dramatic effects (Crane, 1991; Quercia & Galster, 1997). If this is true, then linear estimation techniques may miss these effects.

Some existing studies do in fact explore whether such thresholds exist. Several find that neighborhood problems are only correlated with health when they achieve some threshold level of incidence (Anderson & Armstead, 1995; Duncan & Laren, 1990; Haan, Kaplan, & Camacho, 1987; O’Campo, Xiaonan, Wang, & Caughy, 1997; Waitzman & Smith, 1998). Yet some of the studies described above also find relatively linear effects (Collins & David, 1990; Marmot et al., 1998; Robert, 1998). In an earlier review of the ecological literature, Adler et al. (1994) conclude that community-level SES has effects on morbidity and mortality at all levels of SES, not just for very poor neighborhoods.

Another important challenge is that certain types of individuals may be more sensitive than others to aspects of the neighborhood environment. Families who lack social and economic resources, for instance, may generally be more susceptible to neighborhood conditions than those who can replace what is missing in their immediate surroundings. O’Campo, Xiaonan, Wang, & Caughy (1997), for instance, find that high crime rates have more of an effect on the pregnancy outcomes of women with lesser education. If such interactions exist, analyses that simply measure the average effect of neighborhood conditions across all individuals may be misleading and obscure differential impacts of specific variables for some groups of families or individuals. Thus, where theory would suggest differing effects, researchers should test for them, to the extent that data are available.

Measuring Relevant Health Outcomes

Most of the work on neighborhood effects has focused on educational and employment outcomes. Researchers have explored whether the neighborhood that an individual lives in or grew up in has any independent effect on whether she graduates from high school, whether she is employed, and/or how much she earns as an adult. Such measures are relatively easy to capture in survey data. Getting reliable information about health status is arguably more of a challenge. Many health outcomes are difficult to diagnose and may not manifest themselves for many years. While better data on health outcomes may not be available, researchers should at least be sensitive to such challenges in interpreting their results.

In sum, there are many methodological challenges in measuring neighborhood effects, though many of the pitfalls can be addressed, at least partially, with different data sources and more advanced methodology. We believe that by taking these steps, health researchers can further our understanding of neighborhood effects considerably.

SUMMARY AND CONCLUSION

Our most important conclusion from this review is that the relationship between neighborhoods and health is underexplored and calls for more careful analysis. We encourage further research that can tell us more precisely whether and how neighborhoods matter. If the social environment of a neighborhood matters to health, which aspects appear to matter most? Which health outcomes are most shaped by those conditions? Are certain types of people (older, youn-
ger, poorer, wealthier) more affected by their environment? These questions are critical to aid communities and their leaders in shaping concrete policies to improve community health.

Nevertheless, we also believe that the findings from the current studies suggest a provisional story. First, neighborhood conditions do appear to matter, independent of individual or family-level characteristics, across a broad range of outcomes. We find the strongest evidence for the independent effect of neighborhood on overall mortality. There is also reasonably sound evidence that neighborhoods—especially the levels of crime or violence in neighborhoods—shape health-related behaviors and mental health, and somewhat lesser evidence that they influence low birth weight. There is only weak evidence that neighborhoods have an independent effect on the development of particular morbid or pre-morbid physical conditions, such as functional limitations.

Assuming that future research confirms prior work, we can imagine plausible reasons for this pattern of findings. Logically enough, neighborhoods appear to significantly affect health through their influence on some of the most immediately responsive and socially malleable of individual characteristics, such as behaviors and psychological states. To a lesser degree, neighborhoods also appear to influence more distal outcomes that are themselves influenced by these more proximate outcomes (e.g., birth outcomes, which may be influenced by behavior and attitudes in the prenatal period).

Geronimus’ theory of weathering may help to explain the apparently strong effect of neighborhoods on the most distal of outcomes, that of mortality. Geronimus (1992) argues that adverse social and economic conditions such as discrimination and poverty produce cumulative socioeconomic disadvantage via higher stress, inferior health resources, and other disadvantages. These disadvantages may produce deleterious health effects over extended periods of time and can result in more fragile health and thus greater vulnerability to disease processes.

In the same way that discrimination and persistent poverty may have long-term weathering effects, continued exposure to deleterious neighborhood effects may wear down individual health and well-being over time and weaken individuals’ abilities to recover from disease. This type of neighborhood effect may not strongly express itself in a morbidity study of a single disease, such as cancer, as single disease studies are at the mercy of rare events and may lack sufficient statistical power, or at best may find a relatively small independent effect of neighborhood. But when neighborhood effects are aggregated across diseases, and when the research focus shifts from morbidity to mortality, we see stronger neighborhood effects. This poses the following possibility, which will require further research to confirm or disprove: the likelihood of contracting a specific disease varies only moderately across different communities, but the course these diseases take, and ultimately the chance of recovering from them, may be significantly shaped by one’s neighborhood environment.

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