Neighborhood Disadvantage, Disorder, and Health*

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We examine the question of whether living in a disadvantaged neighborhood damages health, over and above the impact of personal socioeconomic characteristics. We hypothesize that (1) health correlates negatively with neighborhood disadvantage adjusting for personal disadvantage, and that (2) neighborhood disorder mediates the association, (3) partly because disorder and the fear associated with it discourage walking and (4) partly because they directly impair health. Data are from the 1995 Community, Crime, and Health survey, a probability sample of 2,482 adults in Illinois, with linked information about the respondent's census tract. We find that residents of disadvantaged neighborhoods have worse health (worse self-reported health and physical functioning and more chronic conditions) than residents of more advantaged neighborhoods. The association is mediated entirely by perceived neighborhood disorder and the resulting fear. It is not mediated by limitation of outdoor physical activity. The daily stress associated with living in a neighborhood where danger, trouble, crime and incivility are common apparently damages health. We call for a bio-demography of stress that links chronic exposure to threatening conditions faced by disadvantaged individuals in disadvantaged neighborhoods with physiological responses that may impair health.

Does neighborhood disadvantage impair the physical health of residents? If so, how? Residential areas characterized by high rates of poverty or single-mother households and by low rates of college education and home ownership add collective or environmental disadvantages to the personal ones of residents (Massey1996; Wilson 1996). Living in a disadvantaged neighborhood may damage health, over and above the impact of personal socioeconomic characteristics that limit residential options (Jones and Duncan 1995; LeClere, Rogers, and Peters 1997; Robert 1998, 1999).

This study tests the hypothesis that neighborhood disorder accounts for the association of neighborhood disadvantage with poor health. Signs of neighborhood disorder take two forms: physical disorder such as abandoned buildings, noise, graffiti, vandalism, filth, and disrepair; and social disorder such as crime, loitering, public drinking or drug use, conflicts, and indifference. Many individuals may find life under such conditions threatening and forbidding. Neighborhood disorder may discourage healthful outdoor activities such as walking. Beyond that, it may stimulate frequent terror and chronic foreboding, repeatedly flooding the body with adrenal hormones that directly undermine health.

NEIGHBORHOOD DISADVANTAGE, DISORDER, AND HEALTH

Neighborhood Disadvantage and Disorder

The lack of economic and social resources in disadvantaged neighborhoods predisposes...
them to physical and social disorder. Disadvantage is a condition or circumstance unfavorable to success. To the extent that disadvantaged individuals are concentrated in geographically defined areas, disadvantage becomes characteristic of their neighborhoods (Massey 1996). Neighborhood disadvantage is indicated by things such as the prevalence of poverty and of mother-only households. Massey (1996) argues that concentration of poverty creates alienation of many types because it erodes public order. Wilson (1996) also considers neighborhoods to be a fundamental cause of many social problems, but he argues that family structure is a critical aspect of neighborhoods, too. According to him, poverty itself did not demolish social order when poor families typically had two parents, because two-parent families provide order and stability even in the presence of poverty.

On the opposite end of the scale, neighborhood advantages such as a high prevalence of college education and home ownership can favor success. College educated residents in a neighborhood provide collective human capital and positive role models (Wilson 1996). They contribute to an environment in which many adults have skills, jobs, opportunities, and connections outside the neighborhood. Likewise, in neighborhoods with high levels of home ownership many residents have wealth that inheres in the neighborhood. Because the value of each home depends on the quality of the neighborhood, home-owning residents have a substantial personal interest in preserving and improving it.

Informal social control weakens in disadvantaged neighborhoods, where many residents are poor and poorly educated, few own homes, and single-parent families are common (Sampson, Raudenbush, and Earls 1997). The combination of few economic resources, little human capital, and weak control generates a threatening and disordered environment characterized by incivility and crime. Neighborhood disadvantage might provoke disorder because of limited opportunity (Wilson 1987, 1996), lack of social integration and cohesion (Sampson and Groves 1989), and normative climates conducive to disorderly behavior (Brewster, Billy, and Grady 1993; Elliot et al. 1996; Jencks and Mayer 1990). Poor and isolated neighborhoods may have few jobs, so that residents perceive little opportunity for employment (Wilson 1996). Young people who see little chance to succeed may be less likely to stay in school and more likely to engage in illegitimate activities, thus increasing the level of disorder in the neighborhood. Disadvantaged neighborhoods may also lack the informal social ties that bind neighbors together and help maintain social order (Sampson and Groves 1989). Disadvantaged neighborhoods also have fewer resources like good schools, parks, and services, which may indicate to residents that mainstream society has abandoned them; residents, in response, may abandon conventional, orderly behavior (LaGrange et al. 1992; Taylor and Hale 1986; Wilson 1987). In neighborhoods with greater social and economic resources, residents have the assets, abilities and self-interests conducive to order and safety.

Evidence Regarding Neighborhood Disadvantage and Health

Multilevel analyses suggest that neighborhood disadvantage may negatively affect residents’ health, over and above the effects of personal disadvantages. A multilevel analysis adjusts for individual socioeconomic and demographic status when correlating health with aggregate neighborhood conditions. Multilevel research often finds poorer health associated with indications of neighborhood disadvantage net of personal attributes, although the estimated effects of neighborhood characteristics tend to be small and inconsistent compared to those of individual attributes. Robert (1998) correlated three health measures with the proportion of households in the census tract receiving public assistance, the percent of families with incomes of less than $30,000, and the percent of adults unemployed. An index of the three aspects of neighborhood economic disadvantage correlates significantly with a resident’s number of diagnosed chronic conditions, and the percentage of families receiving public assistance correlates significantly with self-reported health, even with adjustment for personal education and household income and assets. However, the correlations with physical functioning were not statistically significant after adjusting for individual-level socioeconomic status (Robert 1998). Two multilevel studies examine the association of heart disease with neighborhood disadvantage. One finds that neighborhood
socioeconomic deprivation is associated with heart disease in the United States, adjusting for individual socioeconomic status (Diez-Roux et al. 1997); another finds neighborhood public assistance and poverty rates, low median income, and female headship rates predict women's heart disease mortality (LeClere, Rogers, and Peters 1998). Some multilevel studies look at the association of all-cause mortality with measures of neighborhood disadvantage. One finds that low median income in American neighborhoods predicts greater mortality among men, but not women, adjusting for individual-level education and household income relative to needs (LeClere, Rogers, and Peters 1997). A U.S. urban study finds neighborhood poverty associated with mortality among younger Americans, but not among those over age 55, with adjustment for individual-level socioeconomic status (Waitzman and Smith 1998). British studies find ward-level deprivation associated with poor respiratory functioning, heart symptoms, and poor self-reported health (Jones and Duncan 1995), and with chronic illness (Sloggett and Joshi 1998), but not with all-cause mortality (Sloggett and Joshi 1994), adjusting for individual-level socioeconomic status.

The overall pattern of findings suggests that neighborhood disadvantage may correlate with some collective or environmental factor that impairs health net of the impact of personal disadvantages that lead individuals to live in such neighborhoods. However, the tenuous and inconsistent correlations suggest that neighborhood disadvantage does not directly impair health, but rather predisposes neighborhoods to the harmful conditions. The mechanisms by which neighborhood disadvantage may affect health are largely unknown. This study examines the possibility that neighborhood disorder is one link.

Neighborhood Disorder and Health

Daily exposure to a threatening, noxious environment may erode health. Neighborhoods with high levels of disorder present residents with observable signs and cues that social control is weak (Skogan 1986; 1990; Skogan and Maxfield 1981; Taylor and Hale 1986; Taylor and Shumaker 1990). In these neighborhoods, residents report noise, litter, crime, vandalism, graffiti, people hanging out on the streets, public drinking, run-down and abandoned buildings, drug use, danger, trouble with neighbors, and other incivilities associated with a breakdown of social control (Geis and Ross 1998; LaGrange, Ferraro, and Supancic 1992; Lewis and Maxfield 1980; Lewis and Salem 1986; Skogan 1986, 1990). These signs indicate a potential for harm, even to residents who have not been victimized. The signs of disorder suggest that many neighbors do not respect other people or their property, that agents of social control are unable or unwilling to cope with local problems, and that the neighborhood has been abandoned and its residents must fend for themselves (Skogan 1990; Taylor and Hale 1986).

A threatening and noxious environment characterized by crime, harassment, danger, and incivility may undermine physical health for several reasons. One reason is that such an environment may discourage the physical activity needed to maintain health. Another reason is that it may stimulate psychophysiological responses that directly undermine health. We discuss these below.

Disorder, fear, and walking. The stress of living in a neighborhood with high levels of disorder may damage health indirectly if fear decreases outdoor physical activity. When people live with disorder in their neighborhood, they often feel afraid (LaGrange et al. 1992; Lewis and Salem 1986; Taylor and Shumaker 1990). People who fear being robbed, attacked, or physically injured and who are afraid to leave the house are unlikely to walk for pleasure, exercise, or transportation (Ross 1993). At the other extreme, quiet, safe, clean neighborhoods may invite outdoor activity. Where there is no apparent danger, people may take walks for pleasure and exercise, and commuters may walk to the train station or to work.

The disorder found in disadvantaged neighborhoods may impair health because it discourages outdoor physical activity. Lack of physical activity is second only to smoking in its negative health consequences. Walking is the most common physical activity, reported by about 20 percent of Americans (U. S. Bureau of the Census 1985). Walking is typically a moderate, non-aerobic exercise. Compared to the inactivity of a sedentary lifestyle, any physical activity, aerobic or not, increases life expectancy (Berkman and Breslow 1983). Walking reduces the risk of
cardiovascular problems, colon cancer, back
pain, osteoporosis, obesity, high blood pres-
sure, constipation, varicose veins, adult onset
diabetes, and it improves subjective health
(Caspersen et al. 1992; Duncan, Gordon, and
Scott 1991; Leon et al. 1987; Magnus,
Matroos, and Strackee 1979; Paffenbarger et
al. 1986; Ross and Wu 1995; Segovia, Bartlett,
and Edwards 1989; U.S. Preventive Task Force
1989).

Disorder, fear, and stress. Disorder and the
fear it engenders may impair health directly,
apart from discouraging healthful outdoor
activity such as walking. Biomedical research
shows that a threatening environment can pro-
duce physiological responses that may impair
health in several ways: by creating symptoms
experienced as illness, by increasing suscepti-
ability to pathogens and pathological condi-
tions, and by accelerating the degradation of
critical physiological systems (Fremont and
Bird 2000; McEwen 2000; Taylor, Repetti,
and Seeman 1997).

According to current biomedical theory,
threats stimulate the fight or flight response,
which has two phases (Memler, Cohen, and
Wood 1996; Thibodeau and Patton 1997). In
the initial alarm stage, sympathetic nerve
fibers stimulate the adrenal medulla to release
the hormone epinephrine and the neurotrans-
mmitter norepinephrine. This increases heart
rate; blood pressure; and respiration rate;
dilates the blood vessels of the heart, lungs,
and skeletal muscles; constricts the vessels of
the digestive tract; and releases glucose from
the liver into the blood. The activation of the
sympathetic nerves also stimulates the sweat
glands and suppresses the salivary glands.
These physiological responses may be experi-
enced as illness, particularly if the response
becomes frequent or generalized and thus
seemingly detached from specific stimuli.
Individuals exposed to chronic psychosocial
strains develop heightened reactivity (Pike et
al. 1997; Pruessnser et al. 1997). They enter the
stage of alarm more readily, quickly, and
intensely, and take longer to recover from it.

In the follow-up resistance stage of the
“fight or flight” response, an endocrine gland
in the brain called the anterior pituitary releas-
es adrenocorticotropic stimulating hormone
(ACTH), which stimulates the release of corti-
sone and cortisol (hydrocortisone) from the
adrenal cortex. These hormones suppress pain,
inflammation, allergy, and immunity. They
raise blood glucose levels by decreasing glu-
cose metabolism and accelerating the conver-
sion of fats and proteins (including muscle) to
glucose. While cortisone and cortisol relieve
some symptoms, they appear to create oth-
ers—notably fatigue and sleep disturbance
(Glaser and Kiecolt-Glaser 1998; Brunner
1997). Excess cortisone and cortisol produces
central obesity, hypertension, and hyper-
glycemia (Thibodeau and Patton 1997).

The hormones released in both phases of the
stress response may reduce resistance to infec-
tions and cancers (Glaser et al. 1999; Herbert
and Cohen 1993; Irwin et al. 1997). Chronic
stress appears to inhibit innate, nonspecific
immunity, in which natural killer lymphocytes
detect and destroy cells that show signs of viral
infection or other abnormalities. It also
appears to suppress the production of antibod-
ies and T-lymphocytes keyed to detect and
destroy specific invaders. As a result, social
and psychological stress undermines the
immune system’s ability to suppress an infec-
tion before it produces unpleasant or incapaci-
tating symptoms. Psychosocial stress corre-
lates positively with the likelihood of develop-
ing symptoms after exposure to cold viruses,
and with antibody concentrations that suggest
widespread viral proliferation (Cohen, Tyrrell,
and Smith 1991). It also may reactivate latent
viral infections such as varicella zoster, herpes
simplex, and Epstein Barr (Cohen et al. 1999;
Cohen and Herbert 1996; Glaser and Kiecolt-
Glaser 1998; Irwin et al. 1998). Chronic expo-
sure to a threatening environment may under-
mine the body’s natural defenses.

Stress hormones also can exacerbate or even
instigate chronic health conditions (Fremont
and Bird 2000; McEwen 2000). Stressors can
precipitate heart problems such as irregular
beat (arrhythmia) and platelet clotting which
can produce inadequate bloodflow (ischemia),
perhaps resulting in death of heart tissue
(infarction). The alarm phase of the “fight-or-
flight” response thus may stimulate a heart
attack. It also can damage the lining of coro-
nary arteries, instigating the formation of
plaque that eventually occludes the arteries.
Chronic stress increases “allostatic load,”
which “refers to the price the body pays for
being forced to adapt to adverse psychosocial
or physical situations” (McEwen 2000:110).
For example, the cortisol released in the resis-
tance phase apparently accelerates the progres-
sive thickening and hardening of arteries
through the buildup of fatty plaque (atherosclerosis) and perhaps also the buildup of calcium salts and scar tissue (arteriosclerosis) throughout the body, including arteries supplying the heart, brain, and other vital organs. Atherosclerosis interacting with high blood pressure (another result of chronic stress) can develop into coronary heart disease (McEwen 2000).

In sum, repeated exposure to threatening conditions may impair health. People exposed to neighborhood disorder seem likely to experience more frequent and intense activation of the stress response, with possible consequences for their health.

**Hypotheses**

We hypothesize that (1) health correlates negatively with neighborhood disadvantage adjusting for personal disadvantage, and that (2) neighborhood disorder mediates the association, (3) partly because disorder and the fear associated with it discourage walking and (4) partly because they directly impair health. Figure 1 shows the processes by which neighborhood disadvantage may influence health.

**METHODS**

**Multi-level Data and Model**

In order to test the hypothesis that the neighborhood in which a person lives affects physical well-being, we distinguish individual from neighborhood disadvantage. Disadvantaged neighborhoods contain persons who, on average, are disadvantaged themselves; thus, it is possible that geographically-defined places have no effect independent of the demographic characteristics of their residents (Jencks and Mayer 1990; Jones and Duncan 1995; Robert 1998; Slogget and Joshi 1994). Disadvantaged individuals who lack social and economic resources often live in disadvantaged neighborhoods with high levels of disorder. Individuals with low incomes and little education, those who are unemployed or employed in low status jobs, minorities, and unmarried people have worse health, on average, than those with high incomes and education, employed persons, whites, and married people (Link and Phelan 1995; Mirowsky, Ross, and Reynolds 2000; Ross, Mirowsky, and Goldsteen 1990). We adjust for the personal disadvantages that lead individuals to live in disadvantaged neighborhoods and that also undermine health.

We use multilevel data in which the unit of analysis is the individual and characteristics of the respondent’s neighborhood are linked to individual survey data. Indicators of objective neighborhood disadvantage are derived from an exogenous data source—the Census Summary Tape file 3 from the 1990 Census of Population and Housing—which provides independent assessments of disadvantage in the contextual units (Blalock 1985). We, like others, use the census tract as the best approximation of the neighborhood (South and Crowder 1997; Tienda 1991).

About two-thirds of the respondents in the statewide random sample used here reside in the same tract as at least one other member of the sample. That creates the possibility of a regression residual correlated within tracts.

**FIGURE 1. Theoretical Model of the Processes by which Neighborhood Disadvantage Affects Health**
Thus, when estimating the effects of neighborhood context on health, ordinary least squares techniques may produce biased standard errors (Blalock 1985; Bryk and Raudenbush 1992; DiPrete and Forristal 1994; Goldstein 1995). We use the multilevel statistical modeling program MLn to address the possibility (Rasbash et al. 1995), by distinguishing a tract-level residual from the individual-level one (Goldstein 1995; Bryk and Raudenbush 1992). MLn uses iterative generalized least squares to estimate the slopes and two components of residual variance (\( \sigma^2 \)): residual variance at the individual level \( \sigma_i^2 \) and residual variance that is constant across individuals within a tract but random across tracts \( \sigma_r^2 \).

The multilevel model can be summarized as follows:

\[
y_{it} = \alpha + \beta'x_{it} + v_{it},
\]

where \( t \) indexes tracts and \( i \) indexes individuals within tracts, and

\[
v_{it} = u_t + \epsilon_{it}.
\]

The model assumes that: \( u_t \) are constant across individuals within tracts but random across tracts and normally distributed with a mean of 0 and variance of \( \sigma_r^2 \); \( \epsilon_{it} \) are random across tracts and individuals within tracts and normally distributed with a mean of 0 and variance of \( \sigma_i^2 \); and \( \epsilon_{it} \) and \( u_t \) are not correlated.

Concepts and Measurement

Physical health is the dependent variable. It is measured as an index of self-reported health, physical functioning, and lack of chronic conditions. Self-reported health is the respondent's subjective assessment of his or her general health as very poor (coded 1), poor (2), satisfactory (3), good (4), or very good (5). Physical functioning is measured by asking respondents how much difficulty they have with (1) going up and down stairs; (2) kneeling or stooping; (3) lifting or carrying objects less than 10 pounds, like a bag of groceries; (4) preparing meals, cleaning house, or doing other household work; (5) shopping or getting around town; (6) seeing, even with glasses; and (7) hearing, even with a hearing aid (Nagi 1976; McDowell and Newell 1987). The response categories are “a great deal of difficulty” (coded 0), “some difficulty” (coded 1), and “no difficulty” (coded 2). Exploratory factor analysis indicates that the seven items form a single factor. Our measure of physical functioning sums these seven items. Low scores indicate physical impairment or disability; high scores indicate unimpaired physical functioning. To assess chronic medical conditions, respondents were asked about a series of health problems: “The next set of questions ask about conditions that some people have been diag-
nosed as having. Have you ever been diagnosed or told by a doctor that you have: (1) heart disease, (2) high blood pressure, (3) lung disease like emphysema or lung cancer, (4) breast cancer, (5) any other type of cancer, (6) diabetes, (7) arthritis or rheumatism, (8) osteoporosis (brittle bones), (9) allergies or asthma, or (10) ulcers, ulcerative colitis, or other digestive problems." These items represent the most common health problems that threaten survival, function, and quality of life (Kochanek and Hudson 1995). The absence of each condition is scored 1 and the presence of each condition is scored 0. The resulting index counts the instances where chronic health problems are absent. Self-reported health, physical functioning, and the absence of chronic conditions load on a single factor at .82, .83, and .79, respectively. The final index is a result of standardizing each measure and taking the mean score of the three; it ranges from poor to good health (alpha = .75).

The index of objective neighborhood disadvantage adds the prevalence of poverty and of mother-only households and subtracts the prevalence of home ownership and college educated residents in the respondent's Census tract. The prevalence of poverty is the percentage of households with incomes below the federal poverty threshold. The prevalence of mother-only households is the percentage of female-headed households with children. The prevalence of college educated adults is the percentage of adults over the age of 24 with college degrees. The prevalence of home ownership is the percentage of housing units that are owner occupied. Among the tracts in the sample, the percent of households in poverty ranges from 0 to 83, with a mean of 10. The percent of mother-only households ranges from 0 to 67, with a mean of 6. The percent of adults with college degrees ranges from 0 to 51, with a mean of 14. The percent of homes that are owned ranges from .3 to 97, with a mean of 64. The index of neighborhood disadvantage divides each of the four percentages by ten, adds poor and mother-only households, subtracts home ownership and college educated residents, and divides by four. Thus, a unit increase in the scale is equivalent to an average increase of ten percentage points across the four components. The index ranges from advantaged neighborhoods in which many adults have college degrees and own their homes and few households are poor or female-headed, on the low end, to disadvantaged neighborhoods in which few adults have college degrees, many rent rather than own their homes, and many households are poor and female-headed, on the high end.

Both theoretical and empirical observations warrant measuring neighborhood disadvantage by reference to poor and mother-only households and the absence of home ownership and adults with college degrees. The prevalence of poverty is the core measure of economic disadvantage in neighborhoods (Jargowsky 1997; Massey 1996; Wilson 1987). Home ownership is an indicator of wealth that inheres in the neighborhood; it indicates neighborhood economic advantage and collective commitment to the neighborhood. The prevalence of mother-only households captures social disadvantage which is correlated with economic disadvantage but potentially makes an independent contribution to disorder because single parents may be less able to control their children and single-parent neighbors may be less able to watch each other's children (Wilson 1996). Mother-child families, moreover, are the poorest of any family type (McLanahan and Booth 1989), and poor households tend to be common where mother-headed households are common. Adults with college degrees indicate collective human capital; they provide positive role models of adults with skills, jobs, and connections outside the neighborhood, and their presence signifies to teens that opportunities exist if one stays in school and out of jail (Wilson 1996). Thus, a lack of well-educated adults in the neighborhood, too, may make an independent contribution to disorder. Poor households, mother-only households, owner occupied houses, and adults with college degrees load on a single factor at .84, .89, -.55, and -.60, respectively, and the alpha reliability of the index is .61.

Objective neighborhood disadvantage is measured using information from the Summary Tape File 3 of the 1990 Census (Bureau of the Census 1992). We matched tract-level data to the geographic location of each respondent. Seven hundred and eleven cases were missing tract level data. For the
majority of these cases (511 of 711) we were able to use data at the zip code level instead of the tract-level. Zip codes are somewhat larger units, but they are the next best approximation of a neighborhood. In order to determine the effect of substituting zip code for tract we added to the preliminary regressions a dummy variable distinguishing the two. Its coefficient was never significant and was dropped in the subsequent analyses presented here.

Perceived neighborhood disorder is measured with the Ross-Mirowsky neighborhood disorder scale (1999). Neighborhood disorder refers to conditions and activities, both major and minor, criminal and non-criminal, that residents perceive to be signs of the breakdown of social order. The index measures physical signs of disorder such as graffiti, vandalism, noise, and abandoned buildings, and social signs such as crime, people hanging out on the street, and people drinking or using drugs. It also includes reverse-coded signs of neighborhood order, such as safety, people taking care of their houses and apartments or watching out for each other.

Disorder is perceived and reported by residents of the neighborhood. In order to describe his or her neighborhood, a person must be aware of it and perceive it, and two people in the same neighborhood might describe it somewhat differently. Nonetheless, both are describing a certain place, and correlations between respondents’ reports of disorder in their neighborhood and independent assessments by researchers are moderate to high (Perkins and Taylor 1996). Table 1 lists the items in the index, along with loadings on the first rotated factor from an exploratory factor analysis. The perceived neighborhood disorder scale ranges from order on the low end to disorder on the high end of the continuum, and has an alpha reliability of .916.

Walking is measured as the number of days walked per week. Respondents were asked, “How often do you take a walk?” Open-ended responses are coded into number of days walked per week.

Fear is measured as a mean-score index of the number of days in the last week that someone (1) feared being robbed, attacked, or physically injured; (2) worried that their home would be broken into; and (3) felt afraid to leave the house (alpha = .69).

Individual sociodemographic disadvantage may create apparent contextual effects that actually are compositional, due to the disadvantaged sociodemographic characteristics of the individuals who live in disadvantaged neighborhoods (Jencks and Mayer 1990). Our models include the following individual sociodemographic attributes. Age is scored in number of years. Sex is a binary scored 1 for males and 0 for females. Race is a binary scored 1 for whites and 0 for non-whites. Education is scored in number of years. Household income is coded in thousands of

### TABLE 1. Items in Ross-Mirowsky Perceived Neighborhood Disorder Scale (1999), Theoretical Distinction between Social and Physical Disorder and Order and Empirical Associations

<table>
<thead>
<tr>
<th>Factor Loadingsa</th>
<th>Physical Disorder and Orderb</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>There is a lot of graffiti in my neighborhood</td>
</tr>
<tr>
<td></td>
<td>My neighborhood is noisy</td>
</tr>
<tr>
<td></td>
<td>Vandalism is common in my neighborhood</td>
</tr>
<tr>
<td></td>
<td>There are lot of abandoned buildings in my neighborhood</td>
</tr>
<tr>
<td></td>
<td>My neighborhood is clean</td>
</tr>
<tr>
<td></td>
<td>People in my neighborhood take good care of their houses and apartments</td>
</tr>
<tr>
<td>Social Disorder and Orderb</td>
<td>There are too many people hanging around on the streets near my home</td>
</tr>
<tr>
<td></td>
<td>There is a lot of crime in my neighborhood</td>
</tr>
<tr>
<td></td>
<td>There is too much drug use in my neighborhood</td>
</tr>
<tr>
<td></td>
<td>There is too much alcohol use in my neighborhood</td>
</tr>
<tr>
<td></td>
<td>I’m always having trouble with my neighbors</td>
</tr>
<tr>
<td></td>
<td>In my neighborhood, people watch out for each other</td>
</tr>
<tr>
<td></td>
<td>My neighborhood is safe</td>
</tr>
<tr>
<td>Alpha reliability</td>
<td>.916</td>
</tr>
<tr>
<td>Mean</td>
<td>1.811</td>
</tr>
</tbody>
</table>

aFactor loadings from structure matrix, factor 1, oblimin rotation.

bAll items are scored so that a high score indicates disorder. Disorder items are scored strongly disagree (1), disagree (2), agree (3), and strongly agree (4). Order items are scored strongly agree (1), agree (2), disagree (3), and strongly disagree (4).
dollars and logged in the regression analyses. Employment status contrasts persons employed full- or part-time for pay (coded 1) with persons who are not employed (0). Occupational status is measured by the National Opinion Research Center/General Social Survey Socioeconomic Index score (Nakao, Hodge, and Treas 1990). The non-employed are assigned the mean and employment status is included in the regressions. Marital status is coded as a series of binaries: divorced, single, widowed, and married, with married persons as the comparison category in the regression analyses. Number of children is the number under the age of 18 in the home.

Because urban areas concentrate disadvantaged neighborhoods, apparent neighborhood effects could be due to city residence. Thus, we also include urban residence, measured as a dummy variable which contrasts living in the city of Chicago (coded 1) with residence in suburbs, small cities, small towns, and rural areas (coded 0).

RESULTS

Table 2 shows the prediction of physical health in five steps. Model 1 shows the total effect of neighborhood disadvantage. Model 2 adds adjustment for individual sociodemographic characteristics. Models 3, 4, and 5 add the series of mediators: neighborhood disorder, fear, and walking.

Residents of disadvantaged neighborhoods report significantly worse health than those in more advantaged places, as shown in model 1 of Table 2. However, this significant negative coefficient may be biased by the omission of individual disadvantage that correlates with worse health and with living in a disadvantaged neighborhood. With adjustment for individual sociodemographic attributes in model 2, the coefficient associated with neighborhood disadvantage is reduced by almost 57 percent (.056 - (.024)/.056 = .57). More than half of the apparent neighborhood effect was due to the sociodemographic characteristics of residents. Nonetheless, a significant contextual effect remains. With adjustment for individual characteristics in model 2, living in a disadvantaged neighborhood is still significantly associated with worse health. Compared with residents of more advantaged neighborhoods, residents of disadvantaged neighborhoods are less likely to have high levels of physical functioning, less likely to feel healthy, and more likely to have chronic health problems.

Individual socioeconomic disadvantage is also associated with worse health. The well educated report better physical functioning, better self-reported health, and fewer health problems than the poorly educated. People with higher incomes have fewer physical limitations, fewer chronic conditions, and feel healthier more than those with lower incomes. The health returns to income diminish as income rises, as indicated by the fact that logged income was more significant than other specifications. Each dollar has a larger positive influence on health at lower levels of income than at higher. Employed persons score higher on the health index than those who are not employed, but occupational status is not significant. Men report better physical functioning, better perceived health, and fewer chronic health problems than women, people with children score higher on the health index than those without children, divorced persons score lower on the health index than do married persons, and older persons score lower on the health index than younger persons.

Standardized coefficients (not shown) indicate that an individual's own socioeconomic status has a larger effect on health than does the neighborhood in which one lives. The beta associated with neighborhood disadvantage is -.05 compared with .11 for household income, .12 for education, and .14 for employment. The health effects of one's own education, employment, and household income are more than double that of neighborhood disadvantage.

What are the mechanisms by which neighborhood disadvantage influences health? When neighborhood disorder is added in model 3, the coefficient associated with neighborhood disadvantage is reduced by 57 percent from model 2 and becomes insignificant at conventional levels (.056 - (.024)/.056 = .57). Neighborhood disorder has a significant negative association with health. People who report that there is a lot of crime, graffiti, vandalism, trouble, drug use, dirt, and danger in their neighborhood have more chronic health problems, worse self-reported health, and worse physical functioning than people in neighborhoods typified by order and safety.

Some readers may wonder whether the effect of neighborhood disorder on health results from threat or from squalor. The physi-
TABLE 2. Health (Physical functioning, self-reported health, and absence of chronic conditions) Regressed on Neighborhood Disadvantage (Model 1), Sociodemographic Characteristics (Model 2), Perceived Neighborhood Disorder (Model 3), Fear (Model 4), and Walking (Model 5) (CCH, Illinois, 1995; N = 2,252; metric coefficients with standard errors in parentheses are shown)

<table>
<thead>
<tr>
<th>Contextual</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neighborhood disadvantage</td>
<td>-.129***</td>
<td>-.056*</td>
<td>-.024</td>
<td>-.021</td>
<td>-.025</td>
</tr>
<tr>
<td></td>
<td>(.027)</td>
<td>(.027)</td>
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<td>(.027)</td>
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<tr>
<td>Sociodemographic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>.043***</td>
<td>.038***</td>
<td>.038***</td>
<td>.036***</td>
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</tr>
<tr>
<td></td>
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<td>(.008)</td>
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<td>.093***</td>
<td>.091***</td>
<td>.089***</td>
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<tr>
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<td>(.020)</td>
<td>(.020)</td>
<td>(.020)</td>
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<td>.312***</td>
<td>.311***</td>
<td>.321***</td>
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<td>(.045)</td>
<td>(.045)</td>
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<td>.001</td>
<td>.001</td>
<td>.001</td>
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</tr>
<tr>
<td></td>
<td>(.002)</td>
<td>(.002)</td>
<td>(.002)</td>
<td>(.002)</td>
<td></td>
</tr>
<tr>
<td>Divorcedb</td>
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<td>-.119*</td>
<td>-.118*</td>
<td>-.127*</td>
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<tr>
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<td>(.057)</td>
<td>(.056)</td>
<td>(.056)</td>
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<tr>
<td>Singleb</td>
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<td>-.056</td>
<td>-.053</td>
<td>-.053</td>
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</tr>
<tr>
<td></td>
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<td>(.055)</td>
<td>(.055)</td>
<td>(.055)</td>
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</tr>
<tr>
<td>Widowedb</td>
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<td>.040</td>
<td>.041</td>
<td>.027</td>
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<td>(.074)</td>
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<td>(.073)</td>
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<td>.033+</td>
<td>.036*</td>
<td>.037*</td>
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<td>(.107)</td>
<td>(.107)</td>
<td>(.107)</td>
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<tr>
<td>Age</td>
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<td>-.020***</td>
<td>-.020***</td>
<td>-.020***</td>
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<td>(.002)</td>
<td>(.002)</td>
<td>(.002)</td>
<td>(.002)</td>
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</tr>
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<td>.035</td>
<td>.034</td>
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<td>(.056)</td>
<td>(.056)</td>
<td>(.056)</td>
<td>(.056)</td>
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<tr>
<td>Sex (male = 1)</td>
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<td>.079*</td>
<td>.076*</td>
<td>.070*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(.038)</td>
<td>(.038)</td>
<td>(.038)</td>
<td>(.038)</td>
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<td>.030</td>
<td>.007</td>
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<td>(.059)</td>
<td>(.061)</td>
<td>(.060)</td>
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<td>Mediators</td>
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</tr>
<tr>
<td>Disorder</td>
<td>-226***</td>
<td>-203***</td>
<td>-203***</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>(.043)</td>
<td>(.046)</td>
<td>(.046)</td>
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<td></td>
</tr>
<tr>
<td>Fear</td>
<td>-054*</td>
<td>-050*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(.023)</td>
<td>(.023)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walking</td>
<td>-203***</td>
<td>-203***</td>
<td>-203***</td>
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<tr>
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<td>(.005)</td>
<td>(.005)</td>
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<td>.242</td>
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<td>.148</td>
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<td>R²</td>
<td>.011</td>
<td>.273</td>
<td>.281</td>
<td>.284</td>
<td>.288</td>
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<tr>
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<td>.715***</td>
<td>.708***</td>
<td>.707***</td>
<td>.700***</td>
</tr>
<tr>
<td>Error Variance (σ²)</td>
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<td>(.023)</td>
<td>(.023)</td>
<td>(.023)</td>
<td>(.023)</td>
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<tr>
<td>Neighborhood Level</td>
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<td>.006</td>
<td>.005</td>
<td>.004</td>
<td>.006</td>
</tr>
<tr>
<td>Error Variance (σ²)</td>
<td>(.015)</td>
<td>(.010)</td>
<td>(.010)</td>
<td>(.010)</td>
<td>(.010)</td>
</tr>
</tbody>
</table>

Notes: Neighborhood disadvantage = (% households below poverty line + % households female-headed with children - % adults with college degree - % households own home) / 40.

a logged
b compared to married

+ p < .10; * p < .05; ** p < .01; *** p < .001 (2-tailed tests)

dical signs of disorder may indicate exposure to toxins, carcinogens, pathogens, and physical stressors such as noise or filth. In a subsidiary analysis, we separated the disorder index into physical and social components, following the distinction in Table 1. We calculated a new index representing the difference between scores on the two subscales, physical (P) minus social (S), and added it to the regression of health on the sum of the two subscales. (Scores on each subscale are divided by the number of items, to make the two comparable.) Thus, the regression has the following form: H = b₁ + b₂(P + S) + b₃(P - S) + b₄X + etc. The coefficient b₁ represents the average effect of the two subscales. It is estimated as −.215 (t = −4.760, -4.760,
The coefficient $b_2$ represents the difference in the effects of the two subscales. It is estimated as $-1.65 (t = 3.016, p < .010)$. The significant positive $b_2$ coefficient implies that the effect of physical disorder on health is less negative ($-.215 + .165 = -.050$) and that the effect of social disorder is more negative ($-.215 - .165 = -.380$). Social disorder apparently has a larger negative effect on health than does physical disorder. This suggests that the operative factor is exposure to threat, rather than to squalor.

Adding adjustment for frequency of fear in the past week in model 4 of Table 2 further reduces the coefficient associated with neighborhood disadvantage. Comparison of models 2 and 4 shows that over sixty percent of the impact of neighborhood disadvantage on health is accounted for by disorder and fear ($-.056 - (-.021)/-.060 = .625$). People who are afraid of being robbed, attacked or injured and are afraid of leaving their house report significantly worse health than people who are not afraid. The adjustment for frequency of fear in the past week also reduces the coefficient associated with neighborhood disorder by about 9 percent, although disorder is still significant at the .001 level ($-.226 - (-.203)/-.226 = .899$).

Walking is significantly associated with good health, but its introduction in model 5 does not explain any of the effect neighborhood disadvantage on health. In fact, the coefficient associated with neighborhood disadvantage actually increases somewhat. Nor does walking explain any of the association between neighborhood disorder and health, which also increases a little with the introduction of walking.

Why do disorder and fear explain much of the effect of neighborhood disadvantage on poor health, but walking does not? In order to further understand these effects we show the predictions of the three potential mediators in Table 3. As hypothesized, in disadvantaged neighborhoods, residents report higher levels of disorder than they do in more advantaged neighborhoods. Furthermore, residents of disadvantaged neighborhoods report significantly more fear, and this is due in part to the higher levels of disorder in disadvantaged neighborhoods. Both disadvantage and disorder influence fear, and the introduction of disorder explains about 48 percent of the association between disadvantage and fear ($-.124 - .065/-1.124 = .476$). Contrary to expectations, though, residents of disadvantaged neighborhoods do not walk less. Instead, there is some evidence that they walk more. Residents of neighborhoods with a lot of disorder do not walk less than those in neighborhoods with higher levels of order, although people who feel afraid do walk less.

Health is damaged by residence in a disadvantaged neighborhood because disadvantaged neighborhoods have high levels of disorder. In these neighborhoods residents face a noxious, threatening, and dangerous environment which negatively impacts health directly and indirectly because it is associated with fear. Thus, the first part of our theoretical explanation is supported. It appears as if the small additional reduction of the disadvantage coefficient with the introduction of fear is simply due to the attenuation inherent in two levels of indirect effects. On the other hand, the hypothesis that residents of disadvantaged and disordered neighborhoods walk less is not supported. In order to further understand why, we disaggregate the neighborhood disadvantage index into its components and predict walking in Table 4.

Overall, neighborhood disadvantage has little effect on walking because economic disadvantage and educational disadvantage have opposite effects. The percent of college educated residents in the neighborhood is positively associated with walking, which supports our hypothesis. Stated the other way, the absence of college educated residents in a neighborhood, which indicates disadvantage, is associated with a decreased likelihood of walking on the part of residents. However, both aspects of economic disadvantage, poverty and the absence of home ownership, are positively associated with walking, which contradicts our theory. When both are included in the Table 4, neither is significant, and home ownership is more significant than poverty (with adjustment for neighborhood education), so we show its effect in the table. Residents of neighborhoods where most people own their homes walk significantly less than those in neighborhoods with a high percentage of renters. When neighborhood poverty is substituted for home ownership in the neighborhood, poverty has a significant positive effect on walking ($b = .024$, $Seb = .012, p = .05$). Residents of poor neighborhoods where few residents own their homes walk more, not less, which contradicts our theory.5

Walking is typically done on neighborhood streets, so we emphasized it in our theory of the mechanisms by which neighborhoods
TABLE 3. Neighborhood Disorder, Fear, and Walking Regressed on Neighborhood Disadvantage, Adjusting for Sociodemographic Characteristics; Disorder Added in Model 2 Predicting Fear, and Disorder and Fear Added in Model 2 Predicting Walking (CCH, Illinois, 1995; N = 2,252; metric coefficients with standard errors in parentheses are shown)

<table>
<thead>
<tr>
<th></th>
<th>Disorder</th>
<th>Fear</th>
<th>Walking</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Neighborhood disadvantage</td>
<td>.140***</td>
<td>.124***</td>
<td>.065***</td>
</tr>
<tr>
<td>Disadvantage</td>
<td>(.013)</td>
<td>(.026)</td>
<td>(.026)</td>
</tr>
<tr>
<td>Disorder</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Fear</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Disorder</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Fear</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Education</td>
<td>−.024***</td>
<td>−.012</td>
<td>−.002</td>
</tr>
<tr>
<td>Household incomea</td>
<td>−.049***</td>
<td>−.063***</td>
<td>−.043*</td>
</tr>
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<td>Employment status (employed = 1)</td>
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<td>.003</td>
<td>.013</td>
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<tr>
<td>Occupational Status</td>
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<td>.001</td>
<td>.002</td>
</tr>
<tr>
<td>Divorcedb</td>
<td>.037</td>
<td>.040</td>
<td>.023</td>
</tr>
<tr>
<td>Singleb</td>
<td>.044+</td>
<td>.088+</td>
<td>.068</td>
</tr>
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<td>Widowedb</td>
<td>.028</td>
<td>.036</td>
<td>.024</td>
</tr>
<tr>
<td>Number of children</td>
<td>.011</td>
<td>.038**</td>
<td>.034**</td>
</tr>
<tr>
<td>Age</td>
<td>.000</td>
<td>.001</td>
<td>.001</td>
</tr>
<tr>
<td>Race (white = 1)</td>
<td>−.122***</td>
<td>−.068</td>
<td>−.026</td>
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<td>Sex (male = 1)</td>
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<td>.046</td>
<td>.053</td>
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<td>.309***</td>
<td>.160*</td>
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<td>−.068</td>
<td>−.698</td>
</tr>
<tr>
<td>R² <em>logged</em>VN</td>
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<td>.079</td>
<td>.122</td>
</tr>
<tr>
<td>Individual Level</td>
<td>.151***</td>
<td>.595***</td>
<td>.574***</td>
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<td>Error Variance (σ²)</td>
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<td>.020</td>
<td>.019</td>
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<tr>
<td>Neighborhood Level</td>
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<td>.048***</td>
<td>.039***</td>
</tr>
<tr>
<td>Error Variance (σ²)</td>
<td>.002</td>
<td>.012</td>
<td>.011</td>
</tr>
</tbody>
</table>

+p < .10; *p < .05; **p < .01; ***p < .001 (2-tailed tests)

Notes: Neighborhood disadvantage = (% households below poverty line + % households female-headed with children - % adults with college degree - % households that own home) / 40.
a logged
b compared to married

might affect health, but since walking does not link neighborhood disadvantage to poor health, we next look at other health behaviors that might. Neighborhood normative climates could influence smoking, heavy drinking, or exercising (Duncan and Moon 1999; Ross 2000). Smoking is a binary variable for which current smokers are coded 1; heavy drinking is a binary variable for which persons who drink 4 or more drinks a day are coded 1; and exercise is coded in number of days per week that the respondent reports strenuous exercise such as running, basketball, aerobics, tennis, swimming, biking, and so on. Smoking, drinking, and exercising do not mediate the effects of neighborhood disadvantage or disorder on health. The coefficients associated with disadvantage and disorder each change by less than 1 percent with the introduction of smoking, drinking, and exercising. For instance, the coefficient associated with disorder in equation 5 of Table 2 is −.203; it increases in magnitude to −.206 with the introduction of exercising; decreases to −.201 with the introduction of smoking; and remains at −.203 with the introduction of drinking. Smoking, exercising, and heavy drinking explain almost none of the
TABLE 4. Walking Regressed on Neighborhood Home Ownership and College Education, Adjusting for Sociodemographic Characteristics (CCH, Illinois, 1995; N = 2,252; metric coefficients with standard errors in parentheses are shown)

<table>
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<td>Percent College Educated</td>
<td>.019*</td>
<td>(.009)</td>
</tr>
<tr>
<td>Percent Own Home</td>
<td>-.016**</td>
<td>(.005)</td>
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</table>

<table>
<thead>
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<th>Sociodemographic</th>
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<td>Education</td>
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<tr>
<td>Household income a</td>
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<td>(.082)</td>
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<tr>
<td>Employment status</td>
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<tr>
<td>Occupational status</td>
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<td>(.007)</td>
</tr>
<tr>
<td>Divorced b</td>
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<td>(.230)</td>
</tr>
<tr>
<td>Single b</td>
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<td>(.225)</td>
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<tr>
<td>Widowed b</td>
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<td>(.300)</td>
</tr>
<tr>
<td>Number of children</td>
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<td>(.070)</td>
</tr>
<tr>
<td>Age</td>
<td>-.022**</td>
<td>(.006)</td>
</tr>
<tr>
<td>Race (white = 1)</td>
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<td>Sex (male = 1)</td>
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<td>Constant</td>
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</tr>
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</table>

| Individual Level    | 11.841***         |               |
| Error Variance (σ²) | (.383)            |               |
| Neighborhood Level  | .016              |               |
| Error Variance (σ²) | (.151)            |               |

+ p < .10; * p < .05; ** p < .01; *** p < .001 (2-tailed tests)
a logged
b compared to married

Despite the fact that our data reveal an association between neighborhoods and health (analyses available upon request).

DISCUSSION

Neighborhood Disadvantage, Individual Disadvantage, and Health

Individuals who live in disadvantaged neighborhoods appear to suffer worse health as a result of the environment in which they live. Neighbors who live in disadvantaged neighborhoods appear to suffer worse health as a result of the environment in which they live. Despite the fact that our data reveal an association between neighborhoods and health (analyses available upon request), we also find that about half of the apparent contextual correlation is due to individual disadvantage. Adjustment for individual-level sex, age, race, employment status, income, education, occupation, marital status, and children in the home explained more than half of the association between health and neighborhood disadvantage. Persons who are not employed, who have low household incomes and low levels of education report worse health than people who are employed and who have high household incomes and education. Older persons report worse health than younger, men report better health than women, and the presence of children in the home is associated with somewhat better health. An individual's own education, income, and employment status have a larger relationship to health than does residence in a disadvantaged neighborhood.

Furthermore, living near poor, disadvantaged people is not in itself unhealthy. A neighborhood is a distinctive district or area and the people who live near one another in it. To the extent that disadvantaged individuals are concentrated geographically, disadvantage becomes characteristic of their neighborhoods. Health is not undermined directly by living near poor people, single mothers, or people who have not been to college. Rather, high rates of poverty and mother-only families and low rates of college education and home ownership compromise the ability of residents to create and maintain public order. The breakdown of social control and order in disadvantaged neighborhoods appears to form the major link to individual health.

Neighborhood Disorder and Health

Living in a poor neighborhood where many families with children are headed by women, few residents own their homes, and few adults have college degrees appears to erode health because of neighborhood disorder and the fear associated with it. The stress associated with disorder, trouble, crime, danger, and the perception that social order has broken down are associated with worse health. Looked at another way, in neighborhoods with few poor or mother-only households and many college...
Neighborhood disadvantage, disorder, and health

Educated adults and home owners, residents generally report that the neighborhood is safe, clean, and quiet, that there is little vandalism, graffiti or crime, and that people maintain their houses and apartments and watch out for each other. These perceptions of social order are associated with better health for all residents, whatever their personal status.

Causation and Selection

Could the association between neighborhood disadvantage and poor health result from unhealthy individuals moving into disadvantaged neighborhoods? While possible, it seems unlikely. The models adjust for stable traits such as race, age, and education that influence health and constrain residential options and choices. They also adjust for possible consequences of poor health that might conceivably limit housing options to disadvantaged neighborhoods: income, employment, and marital status. There seems little reason to think that unhealthy persons would move into disordered neighborhoods more frequently than healthier individuals with similar demographic and socioeconomic profiles. However, it may be that some of the association between poor health and fear reflects vulnerability felt by those who are impaired or sick. Although we may have overestimated fear’s damaging effect on health somewhat, it is precisely this association for which the best biological evidence exists. Fear stimulates the release of epinephrine and norepinephrine, followed by release of cortisol and cortisone, which, when chronic, increases blood pressure, serum cholesterol, serum glucose, atherosclerosis, and consequently the risk of diabetes, stroke, heart disease, and so on (McEwen 2000).

Walking is Not the Link

Neighborhood economic disadvantage is associated with the likelihood of walking, but not in the expected way. People who live in poor neighborhoods where few people own their homes are more likely to walk than those in more economically advantaged places. This could be due to the structure of neighborhoods where most people rent, where higher density encourages walking. The fact that people who live in the city of Chicago walk more than residents of suburbs, small cities, small towns, and rural areas gives credence to the idea that density facilitates walking for transportation. Since we have adjusted for household income, it doesn’t seem likely that this is simply due to the fact that poor people cannot afford cars, although it is possible (we have no information on car ownership). The propensity to walk in poor neighborhoods where few people own their homes could also be due to a normative climate where people hang out on the street and walk to visit others, go to the corner store, or just go down the street.

People walk more in poor neighborhoods where most people rent rather than own their homes, despite the fact that living in a disadvantaged neighborhood is associated with fear of being attacked and injured and being afraid to leave the house. This effect of dangerous streets does not overcome other effects of poor, rental neighborhoods. We had expected that residents of poor neighborhoods would walk less than the residents of affluent neighborhoods because they would be more afraid of being victimized. Residents of disadvantaged neighborhoods do have higher levels of fear: they are more afraid of being assaulted and injured, more afraid to go out on the streets, and more afraid of having their home broken into. In part this fear reflects high levels of disorder in disadvantaged neighborhoods. Residents of economically disadvantaged neighborhoods walk more than residents of more affluent neighborhoods, despite their fear.

Residents of neighborhoods in which a high proportion of adults have college degrees also walk more. Thus, two aspects of neighborhood socioeconomic status—economic status and education—have opposite effects. Possibly neighborhoods where the college-educated live have a culture of walking in which people walk for exercise, pleasure, and transportation. People may see others walking and adopt the lifestyle themselves—a contagion effect (Crane 1991)—and residents of advantaged neighborhoods are generally not afraid of being victimized on the streets.

Because neighborhood disadvantage does not decrease walking, one part of our explanation for the association between neighborhood disadvantage and health is not supported.
Stress Physiology and Bio-Demography

The endocrinologists' concept of a physiological "fight or flight" response has been around for over half a century (Selye 1956). During that same period demographers, social epidemiologists, and sociologists have repeatedly documented the concentration of health problems in disadvantaged populations. The idea of stress, and the word, has diffused and generalized throughout popular and scientific culture. While much was gained in the process, perhaps something was also lost: the centrality of imminent danger. Generalization of the stress response to life's undesirable changes, highly supervised jobs, marital conflict, and so on should not blind us to its unconditioned operation on dangerous streets.

The correlation of neighborhood disorder with poor health points to a new direction for population research on health. It provides a previously unobserved clue to the explanation of persistent and widening socioeconomic disparities in health (Elo and Preston 1996). Poor and poorly educated individuals often live in disadvantaged neighborhoods with high levels of disorder. It also underscores the need to move psychoendocrinology beyond laboratory animals and clinical populations into large scale social and demographic surveys (Umberson, Williams, and Sharp 2000). Psychologists have done much to advance knowledge of the physiological responses linking stress to poor health. As a practical matter, their samples typically consist of subjects such as students taking important examinations, married couples in conflict or under strain, family members caring for impaired elders, and the like. Their research provides valuable information on likely physiological mechanisms linking stress to poor health. We need a complimentary bio-demography that maps population distributions of bioassays indicating stress, that correlates the bioassays with social ones such as neighborhood disadvantage and disorder, and that tests the hypothesis that chronic release of endogenous catecholamines and corticosteroids links threatening environments to poor health.

Despite practical difficulties, advances in biomedical technology increasingly provide assays that use saliva, hair, urine, or blood samples feasible for use in representative household surveys (see Booth, Johnson, and Granger 1999). The association between neighborhood disorder and poor health underscores the need to move psychoendocrinology from laboratories and clinics into the world in which some individuals live, where threat and danger characterize places.

Conclusion

Living in a disadvantaged neighborhood is associated with worse health, net of the health consequences of individual disadvantage. Residents of disadvantaged neighborhoods tend to feel less healthy and have more physical impairments and chronic health problems such as high blood pressure, asthma, and arthritis. The impact of living in a disadvantaged neighborhood on physical well-being is mediated entirely by disorder in the neighborhood, which influences health both directly and indirectly, by way of fear. These neighborhoods present residents with observable signs that social control has broken down: the streets are dirty and dangerous; buildings are rundown and abandoned; graffiti and vandalism are common; and people hang out on the streets, drinking, using drugs, and creating a sense of danger. Residents in these neighborhoods face a threatening and noxious environment characterized by crime, incivility, and harassment, all of which are stressful. The chronic stress of exposure to disorder appears to impair health.

NOTES

1. Our theory focuses on neighborhood disorder as a chronic stressor that directly impairs health, and its consequences for fear and outdoor physical activity that indirectly affect health, but there may be other mechanisms by which neighborhood disadvantage affects health, some of which we address in the discussion.

2. Since approximately two-thirds of the tracts (766 of 1,169) contain only one respondent, few residents are nested in tracts. Thus, clustering is not a problem, and in fact the OLS results are substantively the same.

3. Our sample is limited to residents of one state, Illinois. However, Illinois is fairly representative of the nation as a whole because it is one of the states that has rural areas, small towns, small cities, and a major met-
ropolitan area: Chicago. Large cities everywhere in the United States have more disadvantaged neighborhoods with higher levels of disorder than do non-urban areas, but, while large cities have many things in common, they have many differences. Cities in the Midwest and Northeast may have more disadvantaged neighborhoods than those studied by Fischer (1982) in Northern California; for example, half of the total rise in concentrated poverty during the seventies was accounted for by just two cities: New York and Chicago (Wilson 1991).

4. Dichotomizing neighborhoods into very disadvantaged (one standard deviation above the mean and higher) versus others indicates there is not a cut-off above which neighborhood disadvantage affects health. The dummy variable's coefficient is smaller and less significant than the continuous form.

5. The percent of female-headed households has no significant effect on walking even when entered alone, so we pruned it from the model. The case of walking is the only one in which different components of disadvantage have opposite effects on an outcome; all four aspects of disadvantage correlate negatively with health and positively with disorder and fear. Because of this, and because the four components are highly correlated with each other, when they are entered separately in the models predicting health, disorder, and fear, multicolinearity results.

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