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Aggravating conditions: Cynical hostility and neighborhood ambient stressors

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Abstract

This study is the first to investigate neighborhood clustering of a personality trait – cynical hostility (a sense of mistrust of others amplified by suspicious antagonism.) Cynical hostility increases physiological reactivity by influencing appraisal and coping when stressful events occur and that has been well established as a predictor of cardiovascular disease, inflammation, and all-cause mortality. The analysis examines the associations of a variety of neighborhood physical and social conditions (especially ambient stressors) with individual cynical hostility, controlling for individual sociodemographics. Data are from the Chicago Community Adult Health Survey, a clustered population-based study of 3105 adults. Variation by neighborhood in cynical hostility is larger than variation of other selected health outcomes, which are commonly studied using ecological methods or for other personality measures. Controlling for neighborhood context reduces the black/white cynical hostility disparity by one-third. A measure of neighborhood ambient stressors (notably noise) significantly predicts cynical hostility, even after individual characteristics are controlled, and the effect size is larger than for other contextual predictors. Health-related psychosocial and personality traits may both cluster in and be influenced by contemporaneous neighborhoods rather than mere exogenous results of genes or early life conditions. Health-relevant psychosocial characteristics may also mediate effects of neighborhood deleterious physical conditions, thereby influencing downstream health outcomes and social disparities therein. Because residential location and neighborhood physical conditions are both modifiable, research on how ambient stressors influence health psychology may be particularly fruitful for health policy and practice.

Keywords

United States; Cynical hostility; Traffic stressors; Psychosocial stressors; Geographical clustering; Physical environment; Neighborhood; Physiological reactivity

Introduction

The link between cynical hostility (a sense of mistrust of others amplified by suspicious antagonism) and the onset of cardiovascular disease is one of the best-established in health psychology (Boyle et al., 2004; Smith, 2006). Cynical hostility is well-established as an important predictor of coronary heart disease and all-cause mortality (Boyle et al., 2004;

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Miller, Smith, Turner, Guijarro, & Hallet, 1996) and has been associated with inflammation (Graham et al., 2006; Suarez, 2003) and poor pain management (Fernandez & Turk, 1995). Hostility is linked with stress reactivity in that it predicts both appraisal of stressful circumstances and coping responses (interactional stress moderation model) (Smith, 2006). In laboratory research (Smith & Gallo, 1999; Suarez, Kuhn, Schanberg, Williams, & Zimmermann, 1998) and daily life (Benotsch, Christensen, & McKelvey, 1997; Brondolo et al., 2003), hostile individuals are more likely to display greater and more prolonged blood pressure, heart rate, and neuroendocrine changes than non-hostile persons when provoked, although they show no differences when at rest (Fredrickson et al., 2000; Suarez & Williams, 1989). Hostile individuals have lower social support as well as greater cardiovascular reactivity in the presence of social support (Chen, Gilligan, Coups, & Contrada, 2005; Smith, Glazer, Ruiz, & Gallo, 2004; Vella, Kamarck, & Shiffman, 2008). The cardiovascular link with hostility persists (Miller et al., 1996) after controlling for correlated key health behaviors including body mass and sleep (Hermann et al., 2008; Siegler, 1994; Williams, 2009). Racial/ethnic minorities and the socially disadvantaged report higher levels of cynical hostility, similar to patterns for cardiovascular outcomes (Scherwitz, Perkins, Chesney, & Hughes, 1991). Disparities in cynical hostility and other negative emotions are thus considered important contributors to disparities in downstream health outcomes (Gallo & Matthews, 2003).

Stress reactivity, personality, and residential context

Over the last 15 years, studies of the potential roles of residential neighborhoods as predictors or causes of health and health disparities have become common. There is growing importance that determinants of health cannot be captured by individual-level predictors and that variation in neighborhood conditions by race/ethnic and social groups may play an important role in social disparities in health, and that efforts to improve population health may benefit from looking beyond the traditional boundaries of the public health field to investigate the effects of policies in other areas such as urban planning. Meanwhile, methods for neighborhood research such as multilevel modeling, geographic information systems, and systematic social observation have been developed, which facilitate quantification of neighborhood conditions (Diez Roux & Mair, 2010). Neighborhood effects on a variety of physical health outcomes have been well-documented. Whereas early studies used socioeconomic and racial composition variables as proxies for unknown processes, research attention has show shifted to exploration of specific, policy-relevant, and potentially causal neighborhood conditions. Both the physical and the social features of residential neighborhoods are hypothesized to affect health by acting on stress responses; influencing health-related behaviors such as physical activity, nutrition, and social interaction; and affecting exposure to hazardous substances.

Sorting into residential neighborhoods has been shown to explain black/white disparities in health outcomes such as hypertension (Morenoff et al., 2008) and the accumulation of dysregulations across multiple physiological systems (King, Morenoff, & House, 2011). While some of this association is likely spurious due to composition and selection, the view that differential place-based exposures by social groups are an important reason for health disparities is fundamental to the large body of literature linking neighborhoods and social disparities. It is possible that psychosocial and stress processes may play a role in how place “gets under the skin.” In order to elaborate specific potential psychosocial and stress mechanisms, it makes sense to first investigate to what extent social disparities in psychological constructs may contribute to disparities in related distal health outcomes.

This paper seeks to determine whether neighborhood context may also shape personality variables, in particular cynical hostility. Personality variables are usually thought of as psychological *traits* developed early in life that individuals carry with them as they move

across social contexts, rather than as psychological *states* that are significantly affected by the contemporaneous contexts in which people live or are embedded. However, connections may exist between stress-inducing features of the neighborhood environment and health-relevant personality and psychological measures. If neighborhood context is related to key health-relevant psychological constructs, those relationships may merit further attention outside of health psychology by providing potential mechanisms explaining neighborhood effects on health. Overall, there are two potentially causal relationships between neighborhood conditions and personality/mental health: (1) personality formation as a result of *social* conditions accompanying neighborhood socioeconomic composition, and/or (2) personality formation as a stress or cognitive response to exposure to deleterious *physical* conditions. Non-causal explanations for associations between neighborhood conditions and personality include: (1) neighborhood composition (persons with similar sociodemographic traits both live in similar places and have similar personalities, creating a spurious association), (2) selective migration into neighborhoods on the basis of psychological traits, and (3) a contagion process in which a psychological attribute spreads within a community. To understand the distinction between composition and selection, consider the personality trait "openness to new experience," which is prevalent among young adults. Clustering of open individuals might be due to selection (because individuals migrated to a vibrant neighborhood seeking a diversity of experiences) or composition (because jobs were available in large cities, those who in-migrated for work were young, and young people tend to be open to experience.)

Personality features might also mediate or moderate effects of neighborhood conditions on other health outcomes. Psychosocial attributes including hostility partly explain the effects of perceived neighborhood environment quality on health (Wen, Hawkley, & Cacioppo, 2006). For example, temperament (fear and irritability) moderates the associations of neighborhood disadvantage with some developmental outcomes in children (Bush, Lengua, & Colder, 2010). Little research has investigated potential effects on personality of even neighborhood socioeconomic conditions, much less community social relations or physical conditions. Even less frequently has the hypothesized mechanisms producing such effects been described. Neighborhood economic deprivation has been shown to significantly increase maladaptive personality changes in preschool children. Hart, Atkins, and Matsuba (2008) hypothesized that neighborhood informal collective enforcement of norms (social control) might be involved, but analysis did not support this. In one of the only neighborhood studies of a closely related outcome, Ross, Mirowsky, and Pribesh (2001) present mistrust as an outcome of competition in resource-scarce neighborhoods, where individuals feel powerless to avoid or manage threats from crime. Mistrust is also higher in the presence of physical disorder. They also discussed social cohesion and control, crime, tolerance of deviance, and institutional resources as arising from disadvantage and leading to disorder and subsequently mistrust, but apparently did not test these variables as independent mechanisms for the production of mistrust. Their explanation seems to suggest that mistrust is a rational response to the prevalence of threats due to norms violations (Ross & Jang, 2000; Ross & Mirowsky, 2009).

Neighborhood physical hazards and personality in health research

Studies of effects of neighborhood physical conditions on mental health outcomes are rare. Most of the work on residential context and mental health has been limited to a few outcomes, primarily depression, which has been linked to features of the physical environment (perception of physical disorder, poor quality of the built environment, traffic problems, lack of green space or services, and lower walkability) and the social environment (community socioeconomic status and social capital, exposure to violence and social hazards, and residential stability) (Mair, Diez Roux, & Galea, 2008). Indeed, in one review

Entwisle (2007) called neighborhood toxins and physical hazards the "least studied neighborhood attribute" and argued that more studies of neighborhood poverty (the most studied attribute) should consider hazards, given that hazards are likely to be concentrated in poor communities (Havard, Deguen, Zmirou-Navier, Schillinger, & Bard, 2009; Oakes, Anderton, & Anderson, 1996). Two neighborhood-based studies have found worse mental health near environmental hazards (industrial facilities) (Boardman et al., 2008; Downey & Van Willigen, 2005).

Other research focused on health psychology and ambient stressors in the environment – including noise, air quality, traffic danger, crowding, and weather – has suggested that our physical surroundings may have surprising subconscious psychosocial effects. Substantial research documents the psychological consequences of crowding (Gove & Hughes, 1983; Wells & Harris, 2007). Dense traffic areas produce noise, air pollution, and a perception of traffic danger (Frank et al., 2006) – all potentially aggravating conditions. Vehicular burden, density of major streets, and less green parkland predict increased depressive symptoms and worse general health status (Gee & Takeuchi, 2004; Song, Gee, Fan, Takeuchi, 2007). Weather (temperature, wind power, and lack of sunlight) influences negative affect (Denisson, Butalid, Penke, & Aken, 2008), suggesting that other ambient conditions may be relevant to emotion.

Research specifically focusing on the psychosocial and health effects of environmental noise has increased more slowly than research on other built environment-related issues in recent years (Moudon, 2009), although the quality of existing work tends to be good. This scarcity occurs despite the ubiquitous nature of noise and the tendency of noise levels to be higher in poorer areas (Evans & Kantrowitz, 2002). Aircraft noise inhibits cognitive development and increases overall annoyance (Ouis, 2001; Stansfeld et al., 2005), and stress markers (Evans & Marcynyszyn, 2004) including blood pressure (Evans, Hygge, & Bullinger, 1995) and hypertension (Bodin et al., 2009), epinephrine and norepinephrine (Evans et al., 1995), and catecholamine levels (Babisch, Fromme, Beyer, & Ising, 2001). In a prospective study of adult men, road traffic noise did not predict incidence of overall minor psychiatric disorder, but there was some evidence for a relationship with anxiety levels (Stansfeld, Gallacher, Babisch, & Shipley, 1996). Boys living in disorganized, noisy home environments (in comparison with boys in calm homes) became more negative in affect with age (Matheny & Phillips, 2001). Both theory and limited empirical evidence suggest that noxious physical environments may contribute to stress and arousal that not only may increase, but also be inherent in cynical hostility.

Readers may be skeptical of environment-personality links in adults because of a claim (Terracciano, Costa, & McCrae, 2006) that with respect to the deep structure of personality, even while average levels of a personality feature within a cohort may change with age, relative position within an age cohort changes little after age 30. However, this view has been questioned on empirical grounds and for defining personality too narrowly (Field & Millsap, 1991; Helson & Stewart, 1994; Roberts & DelVecchio, 2000). Evidence from intervention research and common sense shows that some features of personality can change in later adulthood. Moreover, studies of personality development over time reveal substantial unexplained variation even after age 30, despite increasing stability with age (Roberts & DelVecchio, 2000). There is however substantial variation in age trajectories according to the personality dimension being measured (Hopwood et al., 2011).

The possibility that there may be contextual influences on personality in adult life does not contradict findings of genetic similarity among family members in personality traits (estimated at 30% for cynical hostility (Weidner et al., 2000)). Although additional controls for context over the life course might decrease heritability estimates, psychologists agree on

the existence of sizeable genetic influences on personality traits such as cynical hostility. In a study of genetic and environmental influences on personality trait stability in the transition to adulthood, genetic and early-life environmental factors became less closely linked to personality over time (Caspi, Roberts, & Shiner, 2005). Increasing stability with age may itself partly be explainable by the tendency of individuals to experience similar contexts over time (Quillian, 2003). Because people experience similar contexts over time, contextual effects are inherently underestimated when context is measured at single time points (Crowder & South, 2011). Family members likely also experience similar contexts, even when not co-resident, and this may inflate heritability estimates. Difficulty in considering life course and behavioral complexity is a continuing problem in estimating the amount of variance in an outcome due to a particular source, and further research is needed.

Using cross-sectional clustered individual data representative of Chicago and a diversity of ecological measures, this study documents and suggests an explanation for the spatial patterning of cynical hostility. The analysis first documents the extent to which hostility varies by neighborhood and among social groups and how race/ethnic and socioeconomic disparity patterns differ when local context is held constant. It then investigates whether local ambient physical stressors (e.g. noise, dangerous traffic, and poor air quality), predict cynical hostility after individual and neighborhood socioeconomic statuses have been considered. Because neighborhood conditions are highly inter-correlated, this study compares the size of the association between cynical hostility and ambient stressors with the effect sizes of other alternate associations between ecological predictors and cynical hostility. The results suggest that putative personality variables such as cynical hostility are substantially a function of contemporaneous residential environments, and hence may be modifiable by changes in residential environment.

Materials and methods

Study sample

The Chicago Community Adult Health Study (CCAHS) is a prospective multi-level study of the impact of individual and environmental factors on health, their contribution to disparities in health, and the biological, psychosocial, and behavioral pathways that are involved. The CCAHS is a probability sample of 3105 adults age 18 and older in the city of Chicago who were interviewed in person in 2001–2003, with a response rate of 71.8% (Morenoff et al., 2008). Following neighborhood definitions from the 1995 Project on Human Development in Chicago Neighborhoods (PHDCN), the 864 Census tracts that make up the city of Chicago were stratified into 343 contiguous neighborhood clusters (NCs) based on racial and income characteristics as well as local knowledge of the city's neighborhoods to create NCs with socially meaningful physical boundaries and relatively homogeneous socioeconomic status. Within each of the 80 focal NCs previously defined by PHDCN, Census blocks were selected with probability proportional to population size; in the 263 non-focal NCs, Census blocks were selected with probability proportional to population size, so that focal areas were sampled at twice the rate of the non-focal areas (PHDCN, 1995). Within each selected Census block, dwelling units (DUs) were enumerated and were selected at random. Within each sampled DU, all persons over 18 were listed, and a respondent was sampled at random with the aim of obtaining x households per focal unit NC and x households per non-focal NC before non-response. In 80 focal NCs previously defined by PHDCN were sampled at twice the rate elsewhere. The focal NCs were selected by PHDCN to achieve as broad as possible spread of SES within race/ethnic groups, and hence also of race/ethnicity within SES levels (PHDCN, 1995). This sampling frame facilitates the assessment of implications of neighborhood factors for health disparities by providing sufficient overlap among social groups in terms of their contextual conditions. Data collection for the CCAHS was approved under the University of Michigan Health Sciences

and Behavioral Sciences Institutional Review Boards. Analyses are weighted to represent Chicago's 2000 Census population in terms of age, race/ethnicity, and sex.

Measures

Adult cynical hostility—Among multiple scales measuring facets of negative affect and trust, the CCAHS chose the present operationalization by relying on the work of Miller, Jenkins, Kaplan, and Salonen (1995), Miller et al. (1996), who analyzed the psychometric properties of the 50-item Cook–Medley hostility scale (1954) and reviewed 45 studies of its relationship with physical health. The Cook–Medley cognitive hostility construct incorporates three sub-component beliefs: "that others are motivated by selfish concerns" (cynicism, the present focus), "that others are likely to be provoking and hurtful" (mistrust), and that others are "dishonest, ugly, mean, and nonsocial" (denigration) (Smith, 1994). Survey staff selected eight of the thirteen questions on the cynical hostility subscale for a pretest of over 200 respondents; analyses suggested narrowing the scale to five items. The dependent variable is a principal components factor of responses to five questions from the cynicism subscale: (a) Most people inwardly dislike putting themselves out to help other people, (b) Most people will use somewhat unfair means to gain profit or an advantage rather than lose it, (c) No one cares much what happens to you, (d) I think most people would lie in order to get ahead, and (e) I commonly wonder what hidden reasons another person may have for doing something nice for me. These questions were coded on a four-point scale from strongly disagree to strongly agree, so that higher scores are associated with higher hostility, and showed good internal reliability (Cronbach's alpha = 0.73). The use of a widely validated measure for the outcome variable facilitates comparison with the considerable literature using this measure and thus is a key asset of the present study. Table 1 shows average cynical hostility levels for major sociodemographic subgroups.

Sociodemographics—Gender is coded such that men are treated as the reference category. Race/ethnicity is coded as non-Hispanic white (the reference), non-Hispanic black, Hispanic, or other non-Hispanic. In order to facilitate comparisons by age, dummy variables represent different age groups (30–39, 40–49, 50–59, 60–69, and 70 years and over), with 18–29 as the reference group. Years of education, (12–15, and 16 or more), with 0–11 as the reference category, and first generation immigrants (second generation and beyond as the reference category) are also represented by dummy variables. Finally, the annual income of the respondent (and the respondent's spouse, if any) is represented by dummy indicators of $15,000–$39,999, $40,000 or more, and missing income, with less than $15,000 as the reference category. In bivariate analyses (Table 1), non-Hispanic blacks, Hispanics, and others report more hostility than non-Hispanic whites, and men more than women. Hostility declines with education, income, and immigration generation, and non-monotonically between ages 18 and 59, with modest declines thereafter.

Neighborhood ambient stressors—Given that using respondent perceptions of neighborhood quality might bias investigations of psychosocial outcomes (Mair et al., 2008), the neighborhood measures used here are aggregations of reports from all respondents within the NC, minimizing the importance of each respondent's response. A measure of the neighborhood's perception of ambient environmental stressors is aggregated from community survey questions about the noise level, air quality, and traffic danger in the respondents' neighborhoods, rated on 4-point Likert scales:

1. Some neighborhoods have problems with air quality because of things like exhaust from cars, trucks, and buses; smoke from nearby industrial areas; or dust and dirt from trash or construction. How would you rate the quality of the air in this neighborhood?

(1 = Excellent, 2 = Good, 3 = Fair, 4 = Poor)

2. How dangerous do you think traffic is in your neighborhood either to people driving in cars or walking on the street?

   (1 = Very dangerous, 2 = Somewhat dangerous, 3 = Not very dangerous, 4 = Not dangerous at all)

3. Some neighborhoods are noisier places to live than others. Noise can come from people living nearby, people walking or hanging out on the street, traffic, or construction. How noisy would you say your neighborhood is?

   (1 = Very noisy, 2 = Somewhat noisy, 3 = Not very noisy, 4 = Not noisy at all)

The NC-level measure is composed of the neighborhood residuals of an empirical Bayesian hierarchical linear model of a factor composed of these three items (Raudenbush & Bryk, 2002). This process also controls individual socioeconomic characteristics, adjusts for missing items, and improves neighborhood-level estimates by borrowing information from across locations (Raudenbush & Bryk, 2002). These three questions (about noise level, air quality, and traffic danger) tap into related constructs (Allen et al., 2009) – an index derived from a principal components analysis of noise, traffic, and street condition measures has a Cronbach's alpha of 0.75, and factor analysis suggests a single dimension.

No previous reports of validation of these community survey noise, traffic, and air quality questions exist. The perceived noise and traffic measures were validated in separate analyses (not shown) by comparing noise reports with trained interviewer ratings of related built environment variables (noise, traffic, pollution, and poor street condition (which may cause noise), measures of nearby construction based on aerial photography, and interviewer-observed traffic), controlling for sociodemographics and hearing ability. While race/ethnicity, age, and income disparities in perception of noise exist, controlling for neighborhood context reduces disparities and the NC-level measures tested are highly predictive of noise reports. The air quality measure was similarly validated by comparison with National Air Toxics Assessment pollution measures (U.S. Environmental Protection Agency, 2002).

Other contextual measures—The CCAHS contains other widely used NC-level measures of neighborhood quality, which could relate to cynical hostility. Perceived measures are used because perceptions of neighborhood quality have been found to be an important pathway between neighborhood conditions and health, and this seems particularly likely for psychosocial outcomes. Like the ambient stressors measures, the neighborhood social and physical conditions measures selected are scales of multiple questions related to single perceptual constructs: cohesion, social control, collective efficacy, reciprocal exchange, violence, and physical disorder. Based on questions from the PHDCN (Earls, Brooks-Gunn, Raudenbush, & Sampson, 2007), the CCAHS scales ("Chicago Community Adult Health Survey Questionnaire," 2001) are also neighborhood level measures derived from the residuals of empirical Bayes multilevel models described above.

A number of recent studies have recognized the multidimensional nature of community socioeconomic status by incorporating measures of both neighborhood disadvantage and affluence (Finch et al., 2010; Sampson, Morenoff, & Earls, 1999) developed using principal components factor analysis and 2000 Census NC-level measures (Morenoff et al., 2008). The neighborhood disadvantage factor loads positively on low family incomes, high levels of poverty, public assistance, unemployment, and vacant housing, and negatively on high family incomes. The affluence factor loads positively on measures of the proportion of employed civilians ages 16 and over in professional or managerial occupations, the

proportion of individuals ages 25 and over who have completed 16 or more years of education, and median home values. The sampling structure of the CCAHS provides substantial numbers of blacks and whites, even in the upper and lower quartiles of disadvantage and affluence (King et al., 2011).

Statistical methods

This analysis focuses on spatial clustering of individual cynical hostility and how neighborhood ambient stressors may explain this spatial clustering. The extent to which cynical hostility varies by neighborhood is quantified by computing the intra-class correlation (ICC). So that the magnitude of the ICC can be interpreted, Table 2 reports the ICC for cynical hostility along with ICCs for other health-related variables in the CCAHS. Next, the first model in Table 3 estimates patterns of standardized cynical hostility by race/ethnicity, socioeconomic status, and immigrant generation, adjusting for age and sex in an OLS model estimated in the Stata software package (StataCorp, 2009). Then, using a group-mean centered multilevel model (which is analogous to a fixed-effects analysis adding a dummy variable for all but one NC) estimated in the HLM software package (Raudenbush, Bryk, Cheong, & Congdon, 2000), version 6.0, for hierarchical linear modeling, Model 2 shows how consideration of clustering within neighborhood contexts changes estimates of disparities. The group-mean centering is then removed for Model 3, while an NC-level measure of ambient stressors is added. Models 2 and 3 also report the proportion of neighborhood-level shared variance explained by the models (adjusted ICC).

Recent social researchers have tended to focus on social explanations for psychosocial constructs rather than on physical environmental influences. Table 4 compares NC-level coefficients from multilevel models evaluating associations with cynical hostility of ambient stressors and of several neighborhood social processes, with controls for individual sociodemographics not shown. Each neighborhood-level predictor is considered separately. The predictors are standardized so that their coefficients can be directly compared in the search for the strongest ecological predictors of cynical hostility. This is important because many neighborhood studies have reported relationships between a single predictor and an outcome, without considering whether another highly correlated variable might be a better or equally valid predictor.

Results

Neighborhood clustering and cynical hostility

Table 2 shows that a substantial proportion of the overall variation in cynical hostility was attributable to differences between neighborhoods. Table 2 also lists ICCs of selected measures based on author calculations from the CCAHS using the same method. The ICC for linear outcomes is calculated by running a HLM model which clusters individuals by neighborhood but includes no predictors, and then dividing the within-neighborhood variance by the sum of the within- and between-neighborhood variances (Merlo, Chaix, Yang, Lynch, & Råstam, 2006). Specifically, the intra-class correlation of cynical hostility is 0.093, comparable to that for very good or excellent self-rated health and for pessimism, and higher than that for many other health-related measures, such as systolic blood pressure, depression, and anxiety, though not as high as for neighborhood social processes such as social cohesion and perception of disorder. Current neighborhood context is an impressive predictor of cynical hostility, which shows strong spatial clustering not only in comparison with other personality measures, but also clustering in line with or stronger than that of various other health measures often studied in the neighborhood effects literature, including CVD.

Individual characteristics and cynical hostility

Consistent with Table 1, individual results in model 1 of Table 3 show that women report a 0.25 standard deviation (SD) lower cynical hostility than men. Blacks (0.59 SD), Hispanics (0.23 SD), and non-Hispanics (0.30) of other races report more cynical hostility than non-Hispanic whites. Cynical hostility does not significantly differ across younger age groups, but decreases sharply at ages 60 and older within this cross-sectional sample, so that respondents 70 and older report one third of a standard deviation lower cynical hostility than those 18–29. Compared to those with 0–11 years of education, having 12 years (−0.15 SD) or 13 or more years (−0.38 SD) of education results in reports of less cynical hostility, while those earning $40,000 or more report (−0.22 SD) less cynical hostility than those earning less than $15,000.

Neighborhoods, ambient stressors, and cynical hostility

Model 2 presents a random-effects model in which all covariates are centered on their NC means, yielding within-neighborhood estimates of individual-level differences in cynical hostility. Inclusion of residential context in model 2 markedly changes estimates of disparities by race/ethnicity compared to model 1, decreasing the black–white disparity by 37% and the Hispanic-white disparity by 22%, while explaining 26% of the gap between those with more than 12 compared to 0–11 years of education. The results from model 2 suggest that when different social groups shared the same neighborhoods, their reports of cynical hostility were more similar.

Model 3 shows that a one standard deviation increase in neighborhood ambient stressors significantly predicts a 0.12 standard deviation increase in cynical hostility; this association does not change substantially when controls are introduced for neighborhood disadvantage and affluence (not shown). Each of the scale components (NC-level perceptions of noise, air quality, and traffic) was also independently strongly associated with cynical hostility in the presence of individual sociodemographic controls, as were trained rater assessments of noisy streets, noxious smells, and heavy traffic (not shown). Although neighborhood disadvantage (but not affluence) was independently significantly related to cynical hostility, when ambient stressors were included in the model disadvantage was not significant (not shown). In fact, nearly all of the variation in cynical hostility which is shared across neighborhoods appears to be mediated by ambient environmental stressors, as shown by the changes in the adjusted ICCs: the group-mean centered model (Model 2) shows that a considerable portion of the variance is at the NC level (adjusted ICC = 0.013), while consideration of NC ambient stressors in Model 3 reduces the adjusted ICC considerably (to 0.006). Introducing controls for a variety of individual-level characteristics, including sleep difficulties, financial stress, stressful life events, social support, parental abuse, parental affection, or discrimination due to race/ethnicity or other causes also does not substantially change the association between ambient stressors and cynical hostility (not shown), suggesting that the neighborhood variation in cynical hostility is not a function of these factors which may shape “personality” and hence predict selection into neighborhoods.

Other neighborhood characteristics and cynical hostility

The analysis continues by evaluating whether ambient stressors are the most appropriate proximate available measure to the underlying mechanism relating neighborhoods and cynical hostility. Table 4 shows standardized coefficients of conventional measures of neighborhood social conditions, which might be theoretically related to cynical hostility. The predictors include community-survey derived measures of physical disorder, violence, social cohesion, social control, collective efficacy, and reciprocal exchange. Standardizing the coefficients across NCs allows comparison of the magnitude of the effects across measures (although each construct is measured with error, so small relative differences in

effects should not be interpreted deterministically.) The ambient environmental stressors measure emerges as the strongest predictor. A number of the neighborhood quality measures are also significantly associated with cynical hostility, especially perceived disorder (positive), perceived violence (positive), and social cohesion (negative). However, each of these variables loses significance when placed in a regression with ambient environmental stressors, while the ambient stressors measure retains its significance (not shown). The ambient stressors measure also results in the greatest reduction to the adjusted ICC, which can be interpreted as meaning that it explains the highest proportion (44%) of the shared variance at the neighborhood-level. This is consistent with a potential mediating role of ambient stressors.

Because the ambient stressors measure (like all the measures in Table 4) is based on pooled self-reports, two additional cross-checks were employed. First, a composite measure was constructed based on interviewer ratings of noise, smells, and traffic on blocks in the NCs, and this measure was found to be significantly associated with cynical hostility ($p < 0.05$; not shown), although the perceived measure was preferred because of its greater sensitivity and its stronger association with other related objective measures. Second, an additional measure was created which removed each respondent when calculating the NC-level measure; the association remained (not shown), but it was unclear how to control for spatial autocorrelation when using that method.

This finding of the robust predictive power of ambient stressors with respect to cynical hostility suggests that while other significant ecological predictors are close correlates of cynical hostility, the relationships may primarily be indirect through their correlations with ambient stressors or with other neighborhood physical and social conditions (e.g. violence, disorder, low social cohesion) which are also related to ambient stressors.

Discussion

Adult cynical hostility is spatially patterned within the city to an extent comparable to health outcomes commonly studied at the neighborhood level, including CVD, and appears to be correlated with features of the residential physical environment. Results are consistent with a view of personality as a contextual and not solely individual construct. Personality dimensions are not independent of the individual's surroundings, but exist within a social and physical structure in time and space. This suggests that personality and spatial context may together mediate social disparities in health.

The analyses above also form the first population-based assessment of the potential role of ambient environmental stressors in individual personality. The comparison of the predictive abilities of ambient stressors and social processes for cynical hostility highlights the importance of comparing multiple theoretical approaches and predictors when analysis is undertaken at the neighborhood level. Any of the social process variables in Table 4 could have been theorized to predict cynical hostility, and are in fact significantly predictive, but may not be the best predictors. When variables are as highly correlated as neighborhood features are, the path toward causality needs to take a comparative route.

This same approach might be applied to other health-relevant psychological measures, although that analysis is beyond the scope of the present study. Supplementary analysis shows that the measure of trust available for a sub-sample of the CCAHS shows a relationship with ambient stressors similar to that of cynical hostility, and this may be true of other psychological measures as well. It also would be desirable to develop more precise measures of ambient physical hazards aimed at isolating the potential roles of noise, traffic danger, pollution, or other related exposures.

The broader finding that psychological traits can display strong geographic patterning suggests that health psychology researchers engaging in the neighborhood effects literature should devote more attention to neighborhood context, and in particular physical as well as social conditions in communities which may influence psychological processes. Further research should also address the potential for linkages between selective migration into or out of neighborhoods and psychological measures. The surprisingly large ICCs for some psychological characteristics compared to other health measures (including CVD) in Table 2, if they can be replicated in other neighborhood-based samples, merit an explanation. While explaining only a tenth of the overall variance in an outcome at the neighborhood level might seem trivial, the actual proportion of variance explained by neighborhoods may in fact be underestimated in cross-sectional data because individuals are exposed over their entire lifetimes (Sharkey, 2008), and exposures in areas away from the current residence may suppress or modify residential exposures (Inagami, Cohen, & Finch, 2007).

Personality factors may also be an important pathway through which neighborhood processes create socioeconomic disparities in health, given racial segregation into areas with unequal risks. Spatial patterning partly explains a racial/ethnic disparity in cynicism. Evidence for spatial patterning in cynical hostility has implications for understanding racial/ethnic disparities in psychological measures and downstream health outcomes. A caveat is that current spatial context can account for at most about one-third of the black/white gap in cynical hostility based on the changes in the race/ethnicity coefficients between Models 1 and 2 of Table 3 resulting from the inclusion of neighborhood context, suggesting that researchers should investigate other social differences as sources of these gaps, particularly racial/ethnic discrimination (Williams, Neighbors, & Jackson, 2008). Racial and income disparities in perceptions might also reflect meaningful variation in residential exposure levels if certain groups within the NC live nearer to sources of stress.

Future research should pay careful attention to the possible roles of personality and emotion in both mediating and moderating neighborhood effects on physical health. In particular, psychosocial characteristics may moderate the effects of neighborhood conditions on well-being (Diez Roux & Mair, 2010; Wen et al., 2006).

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Table 1

Frequencies and mean cynical hostility scores for individual data.

	Frequency	Population-weighted Percent of sample	Mean score on short Cook–Medley scale
Sex			
Male	1235	47.4	2.59
Female	1870	52.6	2.46
Age			
18–29	800	27.5	2.58
30–39	748	22.7	2.54
40–49	608	18.7	2.49
50–59	402	12.9	2.55
60–69	286	9.0	2.50
70+	261	9.2	2.40
Race/ethnicity			
Non-Hisp. black	1240	32.1	2.73
Non-Hisp. white	983	38.4	2.30
Hispanic	802	25.8	2.60
Non-Hisp. Other	80	3.8	2.55
Immigrant status			
1st generation	773	26.9	2.56
(Ref = 2nd or higher)	2332	73.1	2.55
Education (years)			
<12	792	23.4	2.68
12–15	1576	48.7	2.56
16+	737	27.9	2.33
Income			
$0–14,999	686	20.1	2.68
$15,000–39,999	894	26.4	2.56
$40,000+	948	34.9	2.40
Missing	577	18.6	2.55

Chicago Community Adult Health Survey, 2001–2003, $n = 3105$.

Table 2

Neighborhood intra-class correlations for selected items.

Measure	Intraclass correlation
Physical disorder	0.365
Ambient stressors	0.263
Violence	0.228
Social cohesion	0.140
Social control	0.130
Cook–Medley cynical hostility	**0.093**
Pessimism	0.091
Reciprocal exchange	0.089
Anxiety	0.068
Depression	0.063
Pulse	0.063
John Henryism	0.059
Pearlin mastery	0.057
Waist to hip ratio	0.049
Inward anger	0.042
Systolic blood pressure	0.042
Optimism	0.039
Self-esteem	0.037
Hopelessness	0.026
Outward anger	0.022

Chicago Community Adult Health Survey, 2001–2003. $n = 3105$ except systolic blood pressure $n = 2860$.

Table 3

Sociodemographics, neighborhood ambient stressors, and standardized cynical hostility.

	OLS	Hierarchical linear models	
		Group-mean centered[a]	Random effects
	1 Coef.	2 Coef.	3 Coef.
Neighborhood level			
Ambient stressors			0.12***
Individual level			
Race (ref = non-Hispanic white)			
Non-Hispanic black	0.59***	0.37***	0.53***
Hispanic	0.23***	0.18*	0.19**
Non-Hispanic other	0.30*	0.15	0.29*
Female	−0.25***	−0.31***	−0.26***
Age (ref = 18–29)			
30–39	−0.04	−0.05	−0.04
40–49	−0.11+	−0.09	−0.11+
50–59	−0.04	−0.04	−0.04
60–69	−0.21**	−0.21**	−0.18*
70+	−0.33***	−0.34***	−0.31***
First generation immigrant (ref = 2nd or higher)	0.10+	0.09	0.11+
Education (ref = 0–11 years)			
12–15 years	−0.15**	−0.14*	−0.12*
16+ years	−0.38***	−0.28***	−0.34***
Income (ref = $0–14,900)			
$15,000–39,000	−0.10+	−0.10	−0.09
$40,000+	−0.22***	−0.18**	−0.19**
Income missing	−0.06	−0.03	−0.03
Intercept	0.17*	−0.08**	0.16*
R^2	0.12	–	–
Adjusted ICC	–	0.013	0.006

*** $p < 0.001$,

** $p < 0.01$,

* $p < 0.05$,

+ $p < 0.1$ (two-tailed tests).

Chicago Community Adult Health Survey, 2001–2003.

[a] In this group-mean centered model, all covariates were centered around their neighborhood cluster means so that they reflect within-neighborhood effects.

Table 4

Standardized coefficients and adjusted ICCs of neighborhood-level potential predictors of cynical hostility.

Survey-based perceived measures		
	Coef.	**Adjusted ICC of residual**
Ambient stressors	0.116***	0.0058
Disorder	0.099***	0.0104
Violence	0.094***	0.0105
Social cohesion	−0.088***	0.0083
Collective efficacy	−0.079***	0.0092
Social control	−0.060**	0.0109
Reciprocal exchange	−0.048*	0.0115

(Results from separate regressions for each neighborhood-level variable. Regressions and ICCs adjusted for individual sociodemographics. Lower ICCs indicate a greater proportion of neighborhood-level variance explained by the predictors.).

*** $p < 0.001$,

** $p < 0.01$,

* $p < 0.05$,

+ $p < 0.1$ (two-tailed tests).

Chicago Community Adult Health Survey, 2001–2003.