

The built environment and collective efficacy

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Abstract

Collective efficacy, i.e., perception of mutual trust and willingness to help each other, is a measure of neighborhood social capital and has been associated with positive health outcomes including lower rates of assaults, homicide, premature mortality, and asthma. Collective efficacy is frequently considered a “cause”, but we hypothesized that environmental features might be the foundation for or the etiology of personal reports of neighborhood collective efficacy. We analyzed data from the Los Angeles Family and Neighborhood Study (LAFANS) together with geographical data from Los Angeles County to determine which social and environmental features were associated with personal reports of collective efficacy, including presence of parks, alcohol outlets, elementary schools and fast food outlets. We used multi-level modeling controlling for age, education, annual family income, sex, marital status, employment and race/ethnicity at the individual level. At the tract level, we controlled for tract-level disadvantage, the number of off-sale alcohol outlets per roadway mile, the number of parks and the number of fast food outlets within the tract and within 1/2 mile of the tract’s boundaries. We found that parks were independently and positively associated with collective efficacy; alcohol outlets were negatively associated with collective efficacy only when tract-level disadvantage was not included in the model. Fast food outlets and elementary schools were not linearly related to collective efficacy. Certain environmental features may set the stage for neighborhood social interactions, thus serving as a foundation for underlying health and well-being. Altering these environmental features may have greater than expected impact on health.

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Introduction

Where we live determines in part the daily exposures that influence our knowledge, attitudes, and behaviors. Our daily exposures include everything we see, who we meet, and everything we hear, feel or otherwise perceive. These daily exposures are more than just an input; they are also a series of

constraints or facilitators that actively play a role in our daily movements, our successes, failures, personal relationships, and individual well-being. People who live in the same area are more alike than those who live in different areas, not only because of the choice they made to live in that area, but because they all have common exposures. Given the likelihood that there is a dynamic relationship between people and their environments, that people act on their environments as well as environments acting on people, understanding the collective influence of neighborhood exposures could enhance

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our ability to understand the distribution of various health and social outcomes.

Problematic health conditions, such as obesity (Robert and Reither, 2004; Inagami et al., 2006; Allison et al., 2004; Lenthe and Mackenbach, 2002), sexually transmitted diseases (Cohen et al., 2000), and violence (Cunradi et al., 2000; Sampson et al., 1997, 2005), affect certain communities and racial/ethnic groups disproportionately. Many have pointed to the “built environment” (i.e., the way we design and build our communities and neighborhoods), as a source of individual outcomes such as mental health status (Weich et al., 2002; Ellaway and Macintyre, 2004; Guite et al., 2006), self-rated health (Cummins et al., 2005), obesity (Ewing et al., 2006; Frank et al., 2004; Lake and Townshend, 2006) and health behaviors such as diet (Morland et al., 2002), physical activity, (King et al., 2005; Li et al., 2005; Frank et al., 2005), and risky sex (Cohen et al., 2000). Access to food outlets, parks and recreational facilities, pharmacies, alcohol outlet stores, deteriorated housing and urban design have all been investigated in their links to health (Cohen et al., 2000; Weich et al., 2002; Ellaway and Macintyre, 2004; Guite et al., 2006; Cummins et al., 2005; Lake and Townshend, 2006; Ewing et al., 2006; King et al., 2005; Li et al., 2005; Frank et al., 2004, 2005; Hill and Peters, 1998; Hill et al., 2003; Lin, 2004; Morrison et al., 2000; Scribner et al., 1998, 1999; Morland et al., 2002; Gordon-Larsen et al., 2006). Many studies have suggested that the unequal distribution of these resources contributes to obesity (Horowitz et al., 2004; Gordon-Larsen et al., 2006), homicide (Scribner et al., 1999), and sexually transmitted diseases (Scribner et al., 1998) in low income, minority populations.

In addition to the built environment, social capital, defined as the ability to secure resources by virtue of membership in social networks, has been examined as a mechanism behind the relationship between neighborhood poverty and ill health (Cattell, 2001). Social capital can refer to specific neighborhood ties held by individuals that yield benefits to individuals (Portes and Landolt, 2000) but has also been referred to as a property possessed by communities, “features of social organization (within communities) such as trust, norms, and networks, that can improve the efficiency of society by facilitating coordinated action” (Portes and Landolt, 2000; Putnam et al., 1993). Within the framework of health, the former refers to individuals who derive a health benefit from being more

connected to specific neighborhood networks (i.e., strong social support, civic participation) and the latter to health benefits derived from living in communities with richer social interactions (i.e., high collective socialization). Despite the fact that there is broad interpretation and debate as to the “appropriate” construct of social capital (Lochner et al., 1999), various definitions have been associated with health outcomes (Kawachi et al., 1999, 2004; Caughy et al., 2000; Veenstra, 2000; Subramanian et al., 2002, 2003; Sampson et al., 1997; Martin et al., 2004; Lochner et al., 2003; Patterson et al., 2004). The diversity and heterogeneity of the different constructs of social capital probably contribute to the difficulty in understanding the magnitude of effect of “social capital” on health outcomes (Lochner et al., 1999; Kawachi et al., 2004).

“Collective efficacy,” (Sampson et al., 1997) a form of social capital, is a standardized and well-tested aggregate measure of individual perceptions of “social cohesion among neighbors combined with the willingness to intervene on behalf of the common good”. This measure was created in specific contrast to other measures of social capital, which were dependent on specific neighborhood networks or on an individual’s specific ties to those networks. Lower levels of collective efficacy have been associated with overweight and obesity in children and adolescents (Cohen et al., 2006) and a variety of other outcomes, including mental health (Araya et al., 2006; Xue et al., 2005), higher crime and homicide (Sampson et al., 1997), and all-cause mortality and mortality from cardiovascular disease (Cohen et al., 2003; Lochner et al., 2003).

The role of specific neighborhood or area characteristics may be more complex because social and physical dimensions may be interrelated (Diez-Roux, 2001). Features of the physical environment may influence not only individual social interactions but also resident perceptions of the social environment (and vice versa) (Diez-Roux, 2001). Other studies have shown that environmental and social factors are associated with the biological stress response system (Evans and Kantrowitz, 2002; Seeman and McEwen, 1996; Taylor et al., 1997; McEwen, 1998).

“Collective efficacy” is frequently considered a “cause”, but we hypothesized that environmental features might be the foundation for or the etiology of personal reports of neighborhood collective efficacy, independent of the composition of the

people who lived in the neighborhoods and their concomitant socio-demographic characteristics.

Collective efficacy is an intangible social construct, based on human resources. In contrast, features of the physical environment are tangible, capital resources. Tangible features of the environment create the settings and context in which people interact with each other; therefore, it is plausible that exposure to their design and appearance would influence these social interactions. For example, in a setting that is bright, clean, with open spaces, we might be more apt to walk outside (Li et al., 2005) and feel friendly or trusting (Altschuler et al., 2004). We might not only interact with others, but we may also observe neighbors interacting with other neighbors. In contrast, in a setting that is dark, disordered, and hazardous, we might not only be more cautious, withdrawn (Aneshensel and Sucoff, 1996) and unlikely to venture outside (Harrison et al., 2007; Shenassa et al., 2006), but also may not observe our neighbors interacting with others in ways that promote health.

Physiologically, the human brain perceives environmental stimuli and responds automatically. Not all perceptions and responses reach the level of human consciousness. The “chameleon effect” is the name given to the phenomenon that merely perceiving an action results in an increased likelihood that the perceiver will engage in that behavior, regardless of whether we are consciously aware of either the stimulus or the response (Chartrand and Bargh, 1999). Another phenomenon, called “stereotype activation”, results in automatic responses when faced with images that fit stereotypes, such as a fear reaction to individuals of different racial and ethnic backgrounds, which some people have to learn to suppress (Bargh et al., 1996; Dijksterhuis et al., 2001). The automatic and unconscious response to environmental stimuli may be a mechanism through which a construct like collective efficacy may develop.

Parks, schools, and alcohol and fast food outlets are all features of the built environment that may contribute to the development of or the undermining of social trust/collective efficacy. Parks were designed as places to relax, experience nature, exercise, socialize, play sports, have picnics and other celebrations (Olmstead, 1870). One would expect that parks that evoke positive images might facilitate social interactions and cooperation. Alcohol outlets have been shown to be associated with deviant behaviors, including assaults (Brisman and

Bergman, 1998; Kelleher et al., 1996; Scribner et al., 1994), homicides (Scribner et al., 1999), sexually transmitted diseases (Scribner et al., 1998), and motor vehicle fatalities (Scribner et al., 1994). Alcohol is a psychoactive drug that facilitates aggression and interferes with motor coordination. The presence of alcohol outlets may thus interfere with development of trust and cooperation. Fast food outlets might negatively affect collective efficacy and the development of interpersonal interactions as they encourage eating high calorie foods on the go, and discourage the slower, more considered meal preparation and meal times where people not only eat together, but converse with each other about their lives and feelings (Putnam, 2000). Greater numbers of elementary schools may enhance collective efficacy as parents congregate and interact with other parents as they deliver their children to school.

In order to test each of these hypotheses, we analyzed data collected from the Los Angeles Family and Neighborhood Survey (LAFANS).

Data and methods

We selected the LAFANS to conduct our analyses of the structural predictors of collective efficacy. The first wave of the LAFANS survey was carried out between the spring of 2000 and the end of 2001 among 65 neighborhoods (using 2000 census data, aggregated by 1990 census tract boundaries) in Los Angeles County. Although the sample contains neighborhoods across the income range, the sample-design purposefully over-sampled poor (between the 60th and 89th percentile of the poverty distribution) and very poor (top decile) neighborhoods. LAFANS was designed specifically as a multi-level survey, sampling census tracts first, then families within the tracts, and then children within these families. United States census tract boundaries normally follow visible features, but may follow governmental unit boundaries and other non-visible features. They are designed to be relatively homogeneous units with respect to population characteristics, economic status, and living conditions, and average about 4000 inhabitants (<http://ask.census.gov/>). The two census tracts eliminated from our sample were anomalous, about five times larger than the largest of the other census tracts, comprising areas larger than 126,000 acres and roadway miles greater than 350 miles.

Within census tracts our analytical sample consists of 2431 adult respondents with valid responses to a collective efficacy scale and with income information of the entire set of 2620 adult respondents interviewed. We eliminated 54 respondents who were missing responses to the collective efficacy scale, and 26 who were missing income information. We also eliminated 23 respondents who were employed and yet reported “0” income and 88 respondents from two very large census tracts. Details regarding both the sampling frame and LAFANS data are available elsewhere (Sastry et al., 2003).

Non-response rates in LAFANS are relatively low and match those of other major surveys (Sastry and Pebley, 2003); among eligible English- or Spanish-speaking households, the refusal rate was 16%. More importantly, thorough multi-variate analyses of these patterns conclude, “non-response is not a major problem in LAFANS” (Sastry and Pebley, 2003, p. 15).

Collective efficacy

Our key outcome measure of collective efficacy is based on items collected in previous research by Sampson et al. (1997), and reflects a combination of factors related to individual perception of social cohesion (five items) and informal social control in a neighborhood (three items), detailed in Table 1. These items factor together vary cohesively, as indicated by the Cronbach’s alpha of 0.77 across all items. Traditionally, collective efficacy is used

as an aggregate measure of the neighborhood, but our analysis focused on the neighborhood features that influence individual ratings of collective efficacy.

Neighborhood/tract-level disadvantage

Four summary statistics of census tracts in Los Angeles County were each standardized and then combined to measure socio-economic status (SES) and create a neighborhood “socio-economic score”: (1) percent living below the poverty line, (2) percent of households that are headed by a female, (3) percent male unemployment, and (4) percent of families receiving public assistance (Sampson et al., 1997). The tract-level disadvantage measure was analyzed as a continuous variable in our regression analyses where lower scores were associated with more disadvantaged neighborhoods (reverse coded).

Characteristics of the built environment

Based on what we understand about the built environment and relationships with health and well-being, we considered socio-demographic characteristics of a tract, as well as characteristics of the built environment. We examined population density, neighborhood socio-economic status, the distribution and diversity of land-use based on zoning boundaries, multiple measures of street connectivity, in addition to the number and concentration of alcohol outlets, the number and acreage of parks

Table 1
Components of collective efficacy measure

Item	Mean	S.D.	Range	Cronbach α
<i>Social cohesion items</i>				
This is a close-knit neighborhood	3.15	1.14	1–5	
People generally do not get along ^a	3.56	0.97	1–5	
People are willing to help neighbors	3.66	0.94	1–5	
People do not share same values ^a	3.09	1.05	1–5	
People can be trusted	3.4	1.03	1–5	
<i>Informal social control items</i>				
Neighbors do something if kids hang out	3.45	1.31	1–5	
Would do something if kid does graffiti	3.87	1.26	1–5	
Would scold kid if showing disrespect	3.35	1.25	1–5	
<i>Collective efficacy scale</i>	3.45	0.70	1.15–5.00	0.77

1, strongly disagree; 5, strongly agree.

^aReverse coded.

within various distances of one's tract of residence, the number and concentration of fast food outlets, and the number of schools. The number of alcohol outlets (and fast food restaurants) were divided by roadway miles to estimate an effective density measure for those variables. We also calculated boundaries at 1/4, 1/2, and 1 mile beyond the census tract and counted parks, fast food outlets and schools in these areas, since people who live at the edge of the tract are likely to be exposed to the contiguous neighborhoods, which may be closer than others within tract areas. The number of parks and liquor stores were analyzed as continuous measures. The characteristics of these distributions are presented in Table 2.

Individual-level covariates

In order to control for the compositional characteristics of tracts, we include a number of individual-level covariates in our statistical models. These include log age in years, college education

(reference = no college education), log annual family income, female sex (reference = male), marital status (reference = unmarried), employment (reference = unemployed), and race/ethnicity (Latino, African-American (reference = white + other)). Age and income were logged to normalize its skewed distribution. The characteristics of these distributions are presented in Table 2.

Statistical model

We estimate a simple hierarchical linear model (HLM) with a random-intercept that allows for the incorporation of both individual-level (x) and tract-level characteristics (z). This model adjusts for a heteroscedastic dependence of x on the level-two error term and contains error terms at both level one (individual-level characteristics) and level two (tract). The random-intercept models estimated here control for the non-independence of cases within census tracts, but not for any dependence across contiguous or nearby

Table 2
Descriptive statistics

Individual-level variables				
Mean age (S.D.)	39.6 (14.4)			
Median annual family income	26,200			
Female (%)	59			
Married (%)	48			
College educated (%)	19			
Employed (%)	64			
Race/ethnicity				
Latino (%)	57			
NH Black (%)	9			
NH White (%)	24			
NH Asian (%)	9			
NH other (%)	3			
Tract-level variables				
	<i>N</i>	Mean	S.D.	Range
Collective efficacy	63	3.44	0.69	1.15–5
Tract disadvantage	63	−1.36	3.48	−9.8–4.1
Off-sale alcohol outlets/roadway mile	63	0.8	0.6	0.06–2.5
Off-sale alcohol outlets/roadway mile (1/4 mile radius)	63	0.8	0.5	0.06–2.6
Off-sale alcohol outlets/roadway mile (1/2 mile radius)	63	0.7	0.5	0.1–2.3
Off-sale alcohol outlets/roadway mile (1 mile radius)	63	0.7	0.5	0.03–2.6
Parks in census tract	63	1.4	1.75	0–9
Parks in census tract (1/4 mile radius)	63	2.8	2.2	0–13
Parks in census tract (1/2 mile radius)	63	4.9	3.0	0–19
Parks in census tract (1 mile radius)	63	10.5	5.0	2–32

census tracts:

$$Y_{ij} = \gamma_{00} + \sum_{h=1}^p \gamma_{h0} x_{hij} + \sum_{k=1}^q \gamma_{0k} z_{kj} + \sum_{k=1}^q \sum_{h=1}^p \gamma_{hk} z_{kj} x_{hij} + U_{0j} + \sum_{h=1}^p U_{hj} x_{hij} + R_{ij}. \tag{1}$$

This model estimates expected change in individual level collective efficacy for an additional unit change in predictors and covariates (γ_h) for various values of x for the i th person in the j th census tract (Snijders and Bosker, 1999). Neighborhood-level predictors are considered values of z for the j th group and can be used to explain either average efficacy across tracts or variation in slopes across tracts (i.e., cross-level interactions). We are largely interested in the main effects of structural characteristics and thus, tract characteristics are used to explain mean differences across tracts. Again, all residents of the same tract receive the same value for the tract-level variables and are considered spatially dependent, an attractive feature of the HLM. We specify the following models: (1) a null model that partitions the variance to within- and between-tract components, (2) a model that includes individual-level characteristics only, and (3) a full model which includes neighborhood measures of parks within the census tract and within 1/2 mile boundaries.

Weights

The study used a multi-stage stratified sample design in which tracts, blocks within tracts and households were sampled. Tracts were stratified by the percentage of the population in the tract who were in poverty and by whether household included

children under age 18. Weights adjusted for unequal probabilities of sample selection and household non-response.

Results

Table 1 lists the items that were used to compute collective efficacy at the tract level. The reliability of our collective efficacy scale was 0.77. Our sample includes a population that is 58% Latino, 24% non-Hispanic White, and 8% African-American. The average number of parks within a census tract and within 1/4, 1/2, and 1 mile boundaries were 1.4, 2.8, 4.9, and 10.5, respectively. For fast food outlets, they were, respectively, 1.4, 5.1, 9.7, and 21.6. There was an average of 0.8 liquor stores/roadway mile within any boundary drawn around the census tract up to 1 mile (Table 2). Average roadway miles/census tract was 17.8 with a range between 6 and 79 mile.

Table 3 compares the structural features among neighborhoods high in collective efficacy and low in efficacy. High-efficacy tracts tend towards concentrated affluence, with more parks, and fewer alcohol outlets; there were no association seen between the number of fast food outlets or the number of elementary schools and collective efficacy.

The hierarchical models are presented in Table 4. Model A partitions the variance to both within- and between-tract components and allows us to estimate an intra-class correlation coefficient (ICC). The results indicate that 19.5% of the variation in collective efficacy in our sample is due to characteristics that vary between tracts. These characteristics may be due to differential composition of the tracts (i.e., different people live in different tracts) or may be due to contextual characteristics of the tracts

Table 3
Characteristics of tracts with low and high levels of collective efficacy

	High collective efficacy	Middle collective efficacy	Low collective efficacy
Tract disadvantage	0.45	-1.44	-3.27
Off-sale alcohol outlets (1/4 mile radius)	27.7	33.7	37.8
Off-sale alcohol outlets/roadway mile (1/4 mile radius)	0.62	0.78	0.90
No. of parks (1/4 mile radius)	3.4	2.77	2.15
Fast food outlets (1/4 mile radius)	5.2	5.0	4.76
No. of schools (1/4 mile radius)	2.0	2.12	2.16

Note: High collective efficacy is defined as a respondent living in a neighborhood with efficacy scores that are larger than one standard deviation above the mean, while low efficacy neighborhoods are defined as one standard deviation below the mean. Middle collective efficacy is defined as a respondent living in a neighborhood within one standard deviation of the mean. As such, the characteristics of neighborhoods at the average are represented by the descriptive characteristics in Table 2.

Table 4
Hierarchical linear regression model of collective efficacy

Total sample = 2431	Model A		Model B		Model C		Model D		Model E	
	β	p	β	p	β	p	β	p	β	p
<i>Individual-level variables</i>										
Race/ethnicity (reference White/Asian/other)										
Latino	0.18	0.005	0.19	0.003	0.20	0.003	0.19	0.003	0.19	0.003
Black	0.15	0.07	0.17	0.04	0.17	0.04	0.17	0.04	0.17	0.04
Log age	0.07	0.20	0.07	0.22	0.07	0.22	0.07	0.20	0.07	0.20
Log family income	-0.008	0.37	-0.006	0.51	-0.005	0.58	-0.005	0.58	-0.005	0.60
Married	0.09	0.06	0.09	0.06	0.09	0.06	0.09	0.06	0.09	0.06
Female	-0.01	0.76	-0.01	0.75	-0.01	0.75	-0.01	0.75	-0.01	0.76
Employed	-0.05	0.17	-0.06	0.16	-0.05	0.17	-0.05	0.17	-0.05	0.17
College	0.06	0.31	0.06	0.37	0.05	0.39	0.05	0.39	0.05	0.41
<i>Tract-level variables</i>										
Tract disadvantage			0.078	0.000	0.067	0.000	0.065	0.000	0.065	0.000
No. of parks in tract					0.04	0.024				
No. of parks in 1/2 mile							0.03		0.03	0.001
Intercept		2.92		2.87		2.95		3.03		
Deviance	4534.0	4487.26		4451.21		4452.6		4447.86		
σ_u	0.29	0.30		0.21		0.20		0.19		
σ_e	0.59	0.59		0.59		0.59		0.59		
ρ (intra-tract correlation)	0.195	0.21		0.112		0.103		0.094		
Reduction in level-2 variance (%)		0		51		55.5		60		

themselves. Our next two models attempt to capture what explains this overall variation as well as what particular characteristics of persons and tracts predict collective efficacy. Model B includes relevant individual-level covariates and explains none of the between-tract variance. Latino ethnicity is positively related to collective efficacy. The remaining individual-level variables are statistically non-significant and unrelated to collective efficacy, though marital status almost reached statistical significance.

Model C adds tract-level disadvantage, and with the addition of the individual-level characteristics, explains about 51% of the original between-tract variance. Our ICC is reduced to almost 11%, suggesting that a large proportion of the tract-level variance in collective efficacy has been explained by tract-level disadvantage. Model D adds tract-level parks to the model and explains another 0.5% of the original between-tract variance. Model E, which includes number of parks within a 1/2 mile boundary, instead of only the number of parks within the tract, explains more of the original between-tract variance. Both the number of parks and neighborhood disadvantage are statistically significant ($p < 0.001$) predictors of collective efficacy. The results of neighborhood disadvantage indicate that with greater community affluence,

collective efficacy increases. Living in a neighborhood with more parks is strongly associated with higher levels of reported efficacy. A higher density of off-sale liquor outlets in one's neighborhood (residential census tract within a 1/4 mile boundary) is negatively and marginally associated with collective efficacy when included alone in the model without neighborhood disadvantage ($\beta = -0.241$, $p = 0.003$; data not shown in Table 3.), but when included with neighborhood disadvantage becomes statistically insignificant ($\beta = 0.007$, $p = 0.921$), most likely due to high collinearity.

The number of fast food establishments and number of elementary schools were not linearly associated with levels of collective efficacy.

These effects are relatively easy to interpret within the context of a linear model. Beta coefficients represent the effect of a full one-unit increase in predictor variables on the predicted collective efficacy scores. However, given that the predictor variables are operationalized in various metrics, we will present the interpretation of the significant tract-level variables for increases at two-standard deviations from the mean of the distribution. As such, a two-standard deviation increase in the tract-level disadvantage would result in a 0.44 unit predicted increase in collective efficacy ratings

(which is more than half of a standard deviation in collective efficacy). Based upon studies linking collective efficacy to health outcomes in Chicago, we estimated that this increase in collective efficacy would be associated with the following health outcomes: a reduction of 74 premature deaths, 60 cardiovascular deaths, 104 homicides, and 11 malignant neoplasms (Cohen et al., 2003). This same effect of tract disadvantage would translate to a 48% reduction in the probability of asthma/breathing problems among adult residents of Chicago neighborhoods (Cagney and Browning, 2004). Finally, the indirect effect of a two-standard deviation increase of tract disadvantage on collective efficacy is associated with the following risks for crime in Chicago: 0.28 fewer violent crimes per neighborhood, 0.55 fewer victimizations per neighborhood, and 0.52 fewer homicides per neighborhood (Sampson et al., 1997). The estimated effects for homicide between the Sampson 1997 study differs from that by Cohen and colleagues, largely due to a difference in control variables—the estimated effect derived from the Cohen study (104 homicides) is Chicago-wide, while the effect in the Sampson study is 0.52 per Chicago neighborhood ($n = 343$), for a total of 178 homicides.

A two-standard deviation increase in the number of parks per census tract would result in a marginal 0.14 unit decrease in collective efficacy rating, a relatively small effect on the predicted rating of self-efficacy. Again, if this effect were in Chicago, it would translate to 21 fewer premature deaths, 17 fewer cardiovascular deaths, 31 fewer homicides, 3 fewer malignant neoplasms, a 14% reduction in the probability of asthma/breathing problems, 0.08 fewer violent crimes per neighborhood, 0.16 fewer victimizations per neighborhood, and 0.16 fewer homicides per neighborhood.

Discussion and conclusions

This study demonstrates an association between fixed physical features of neighborhoods, parks and alcohol outlets and personal rating of collective efficacy, a social construct, controlling for individual demographic characteristics and residential neighborhood socio-economic status. Parks are considered community assets and bring people in the surrounding areas to a common place for leisure purposes, a time when people are more likely to be open to what they see around them and receptive to others, because they are recreating together and

sharing a common space. Although we did not specifically assess the condition of these parks in Los Angeles, they usually have a full-time staff and the parks tend to be well-maintained, and there are frequent police patrols through parks in neighborhoods with higher rates of crime (Cohen et al., 2007). If parks were in poor condition and considered dangerous places where drug or gang activities occur, they may have had an opposite association with collective efficacy. The association seen between collective efficacy and parks continues to be present at the level of the census tract and at 1/4 and 1/2 mile boundaries. Parks within a 1/2 mile boundary explain a greater proportion of the original between-tract variance (7%) than parks within the census tract (4%) probably because respondents in a particular census tract may be more likely to live closer to parks in contiguous tracts rather than in their own tract, which may be 1–3 sq mile. People are more likely to visit areas that are in closer proximity to their homes, regardless of the census tract (Cohen et al., 2007).

Pedestrian-oriented, mixed-use neighborhoods have been shown to be associated with increased familiarity with neighbors and greater social engagement (Leyden, 2003). Previous studies examining spatial features of neighborhoods, such as sprawl and population density, have found increased civic engagement in very high density neighborhoods, and reduced civic engagement in sprawling neighborhoods and among people who have long commuting times (Williamson, 2002; Putnam, 2000). Our study differs from these in that we examined very specific land-use categories and their association with collective efficacy, which does not include measures of voting or political participation.

Alcohol outlet store density (alcohol outlet numbers/block group) has been associated with a resident's perception of neighborhood social and physical disorder (Sampson and Raudenbush, 2004). Off-sale alcohol outlets are places where people come and go, and are often sites for loitering and public drinking. Because alcohol is associated with the release of inhibitions in our culture, alcohol outlets may promote loose and uncontrolled behaviors. Excessive drinking alters one's perceptions and appreciation of the world around them. Drunkenness is associated with behaviors that are considered dangerous, unpredictable and unstable, so it may be no surprise that alcohol outlets do not appear to promote trusting, friendly and helpful

relationships. In our study, increased alcohol outlet store density showed an association with lower levels of collective efficacy, but because density of off-sale alcohol outlets is highly correlated with tract disadvantage, the independent association of alcohol outlets to collective efficacy could not be teased out in the hierarchical model.

The lack of linear association with schools and fast food outlets with collective efficacy may be related to the different dynamics of their use. Schools may be positively associated with collective efficacy up until a certain threshold. If there are many schools that require bussing of students and long commutes, the chance for increased collective efficacy through building relationship in frequent meetings in local neighborhoods may be diminished. Similarly fast food outlets may be used both by locals and by commuters, so the net effect of improving relationships when locals see each other may be canceled by having more outsiders in the area.

Social, environmental, and biological factors may not only be associated with each other, but also may interact with each other over the life course to affect health. Our study suggests that there is an association between features of the environment and perceptions of neighborhood social functioning that may indirectly influence health outcomes. Therefore, changes in urban design may determine health and well-being. Longitudinal studies examining changes in urban design and their effects on neighborhood social structure and health are needed.

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