Neighborhood Social Ecology and Health: Street Life Potential and Body Mass Index Among Urban Adolescents

Research on the neighborhood level determinants of adolescent health and well-being has expanded markedly in the last two decades. Most research examining associations between neighborhood and adolescent outcomes has focused on macro-level structural characteristics—in particular, poverty and joblessness. More recently, however, researchers have begun to incorporate a focus on the neighborhood-level social processes and dynamics that may influence adolescent health. In part, this emphasis has stemmed from an interest in the mechanisms that link neighborhood structural disadvantage with health outcomes. Indeed, studies of neighborhood effects have moved from a relatively exclusive focus on whether contextual poverty and other forms of structural disadvantage affect adolescent outcomes to interest in how structural disadvantage exerts influence on youth well being. At the same time, researchers have recognized that poor communities exhibit variation in adverse health outcomes among youth, leading to interest in what social conditions appear to buffer some neighborhoods from what might be expected based on structural disadvantage alone.

In this study, we draw on the work of Jane Jacobs (1961) to develop hypotheses regarding the link between neighborhood physical and ecological conditions and the capacity of communities to promote the health of local youth. In her now classic critique of mid-century urban planning orthodoxy, Jacobs described the conditions under which communities foster vital street life and the consequences of dynamic social ecologies for the experience of urban children (among other groups). Specifically, she emphasized the role of high population density and diversity of primary uses (particularly, a variety and density of commercial enterprises)[1] in generating street activity throughout the day in urban neighborhoods. In turn, this activity draws "eyes on the street," serving an important social control and support function and enhancing the effectiveness of public life. Street activity and local monitoring are especially important for local children, as they create safe public spaces in which youth can engage in neighborhood-based recreation. Neighborhoods characterized by less vital and dynamic social ecologies may be seen as potentially dangerous, leading to more restrictions on neighborhood activity by parents. Youth may also experience such neighborhoods more fearfully, avoiding park and other public spaces where more vigorous recreation is likely to occur. In contrast, youth who have access to effectively monitored public space may be more physically active and healthier than those who are limited in their local options.

Data

Drawing on Jacobs' conceptualization of the conditions under which dynamic social ecologies emerge, we examine the impact of neighborhood *street life potential* on a significant health outcome for urban adolescents—body mass index (BMI). Our sample is drawn from the Project on Human Development in Chicago Neighborhoods (PHDCN) Longitudinal Cohort Survey, a multi-wave sample of children and adolescents nested within 80 Chicago neighborhood clusters" (NCs)—aggregations of 1 to 3 census tracts based on ecologically meaningful boundaries. We use data on 11 to 16 year olds from waves 1 and 2 of the survey (1995-96 and 1998-99; $N = 853$)

We link these data to information from the PHDCN Systematic Social Observation (1995), from which we draw information on commercial density and street activity. The SSO methodology was designed to observe various land use, commercial, and other physical and social characteristics of

[1] Jacobs also emphasized the role of short street blocks and a mix of old and new buildings. We do not consider these factors in the current analysis.

Chicago communities directly through the use of videotape and observer logs (Raudenbush and Sampson 1999). National Opinion Research Center observers drove a sport utility vehicle at five miles an hour down every street within the 80 sample neighborhood clusters . A videographer and two observers recorded events and conditions for each block face (one side of a street block), the original unit of observation for the study. A total of 23,816 face blocks were observed and videotaped (an average of 298 per NC). For those variables that were derived from videotapes (as opposed to observer logs), a subsample of 15,141 face-blocks were selected for viewing and coding—the baseline sample from which indicators of commercial conditions were constructed for the current analysis.[2] Three NCs were not included in the subsample, resulting in a neighborhood-level N of 77 for the analyses presented below. We also use data from the PHDCN Community Survey—an independent survey (1995-96) of Chicago residents asking respondents to report on the various aspects of their neighborhood, including social network ties and norms supporting activity on behalf of collective goals, including the social control of local youth (collective efficacy). Finally, we use 1990 census data to construct neighborhood structural controls (poverty and residential stability).

Measures

Our dependent variable is a dichotomous indicator of membership in the top 15% of adolescents with respect to BMI, measured at Wave 2. Our key independent variable, street life potential, combines three measures related to Jacobs' conceptualization of the conditions fostering effective social ecology: (1) the log of the population density, (2) the empirical Bayes residual taken from a two-level poisson model of the count of commercial enterprises (from SSO data[3]) within each NC (using the number of SSO face blocks sampled as an exposure variable), and (3) the proportion of NC face blocks with adults present on the block (also taken from SSO data). These three measures are combined into a single index at the neighborhood level ($\alpha = .86$).

Additional neighborhood level independent variables include measures of neighborhood disadvantage (including concentrated poverty and residential instability) and measures of social organization (social network ties and collective efficacy—see Sampson, Raudenbush, and Earls (1997) for a discussion of the operationalization of these variables). Family and individual level controls are taken from Wave 1 data and include age, sex, race/ethnicity (African American and Latino with white as the omitted category), immigrant generation (1st generation, 2nd generation, vs. 3rd generation or higher), family socioeconomic status (an index combining measures of income, parental education, and occupation), family structure (both biological parents vs. all other arrangements), family size, family attachment (an index of items tapping the youth subject's feelings of emotional attachment to and support from parents), pubertal status of the subject, a measure of inactivity and withdrawal (six items taken from the Childhood Behavior Checklist), and a control for Wave 1 BMI. The latter control renders the test of neighborhood effects on high BMI relatively conservative.

Analytic strategy and findings

---

[2] Coders participated in intercoder reliability training in which 90 face blocks were independently double-coded. Discussion of differences in coding outcomes was used to revise coding procedures. Subsequently, 10% of the coded face blocks were recoded and checked for comparability, producing over 98% agreement (NORC 1995; Carter et al. 1996).

[3] Business categories were as follows: banks; barber shops and beauty salons; business services (printing and copying); clothing stores; day care centers; drug stores/pharmacies; dry cleaning and tailoring services; restaurants; electronics stores; furniture stores; green grocers and delicatessens; home repair and hardware stores; laundromats; professional offices (e.g., doctors and lawyers); real estate agents; 7-11/convenience shops; specialty retailers (e.g., bookstores/software); supermarkets/grocery stores; large retailers and department stores; and travel agents.

We use random effects logit models to examine the impact of neighborhood street life potential on adolescent BMI. The modeling strategy takes into account the non-independence of subjects within neighborhoods. Table 1 reports the results of a series of hierarchical logit models examining the impact of individual, family, and neighborhood characteristics. Model 1 includes individual demographic background and family characteristics. In this initial model specification, only age exhibits a significant association with high BMI. Model 2 adds measures of pubertal development, inactivity/withdrawal, and prior BMI. All three measures are positively associated with BMI, rendering the effect of age insignificant.

Model 3 considers only the effects of neighborhood characteristics in order to assess baseline associations with high BMI. Although the effect of poverty is in the expected positive direction, it does not achieve statistical significance, nor does the coefficient for residential stability. Only the coefficient for street life potential achieves significance ($p < .10$). Finally, Model 4 includes all neighborhood, individual, and family characteristics to assess the robustness of the street life potential effect. The coefficient for street life potential increases in both magnitude and significance ($p < .05$) in Model 4, indicating that the effect of this measure on high BMI remains even in conservative models including prior BMI, age, puberty, and the individual level tendency toward inactivity/withdrawal. In models not shown, the effect of street life potential remains even when neighborhood level measures of collective efficacy and network interaction are included (separately and in combination) in models of high BMI (neither measure was significant), indicating that street life potential does not work through neighborhood level normative orientations promoting the social control of local youth or more prevalent network ties.

Conclusion

Jacobs' (1961) classic work emphasized the role of physical and ecological characteristics of urban neighborhoods in fostering beneficial environments for local youth. Neighborhoods with relatively high concentrations of people combined with diverse and prevalent commercial activity are likely to generate more dynamic and regular street activity. This street life draws attention and associated monitoring and support for those neighborhood residents who make use of street and other local public spaces. Children and young adolescents who live in neighborhoods with well-monitored and maintained public spaces are more likely to make use of them for recreation and physical activity, reducing the prevalence of overweight and obese children. In contrast, sparsely populated neighborhoods with few commercial options may experience a contraction of public space and fewer "eyes on the street." In turn, such neighborhoods may no longer be perceived as supportive of safe street (and park) activity for local children and adolescents.

Consistent with Jacobs' argument, our analyses suggest that neighborhoods with higher street life potential reduce the prevalence of high BMI youth. This finding points to the importance of considering *social ecological* conditions within urban neighborhoods (as captured by the combination of population density, diversity of use, and the presence of adults on the street). Much recent research on adolescent well-being has emphasized the role of social organizational characteristics to the exclusion of social ecology. Indeed, our models indicate that street life potential operates independently of normative orientations regarding social control measured at the neighborhood cluster level (and from a sample of *all* adults). Street life potential may cue local safety on a smaller level of aggregation, and, perhaps, for parents more readily than other local residents. Moreover, regardless of the impressions of

neighborhood adults, youth may feel more comfortable making use of public space for recreation in neighborhoods that are characterized by more dynamic social ecologies.

We intend to pursue additional analyses for this paper, including examining the possible interactions between social ecological and social organizational variables and the role of fear and parental restrictions on activity in mediating the effect of street life potential. We will also employ hierarchical Bayesian statistical modeling to examine possible spatial dependencies in street life potential (measured at the block group, rather than NC level of of aggregation).

References

Carter, Woody, Jody Dougherty, and Karen Grigorian. 1996. "Videotaping Neighborhoods." National Opinion Research Center, University of Chicago, Working Paper.

Jacobs, Jane. 1961. *The Death and Life of Great American Cities.* New York, NY: Random House.

National Opinion Research Center (NORC). 1995. PHDCN Project 4709. Systematic Social Observation Coding Manual, June 1995. NORC/University of Chicago. .

Sampson, Robert J., Stephen W. Raudenbush, and Felton Earls. 1997. "Neighborhoods and Violent Crime: A Multilevel Study of Collective Efficacy." *Science* 227:918-923.

Table 1. BMI (>= 85th Percentile) Regressed on Individual, Family, and Neighborhood Characteristics[a]

	Model			
Independent Variables	1	2	3	4
Demographic background				
Race/ethnicity				
African american	.557	.466	-	.575
	(.348)	(.366)		(.419)
Latino	.469	.233	-	.299
	(.361)	(.396)		(.414)
Sex	-.230	-.153	-	-.170
	(.197)	(.248)		(.250)
Age	.183 ***	-.107	-	-.110
	(.065)	(.092)		(.093)
Immigrant generation (vs. third)				
First	-.396	-.465	-	-.370
	(.376)	(.426)		(.440)
Second	-.278	-.435	-	-.399
	(.308)	(.361)		(.369)
Family socioeconomic status	-.067	.034	-	.024
	(.081)	(.092)		(.097)
Two biological parents	.054	.251	-	.264
	(.229)	(.262)		(.265)
Family size	-.019	.058	-	.060
	(.054)	(.061)		(.062)
Family attachment and support	-.045	.120	-	.091
	(.315)	(.365)		(.369)
Pubertal development	-	.459 *	-	.447 *
		(.245)		(.249)
Inactive/withdrawn	-	.699 **	-	.738 **
		(.323)		(.327)
Prior BMI	-	.317 ***	-	.316 ***
		(.030)		(.029)
Neighborhood				
Concentrated poverty	-	-	.198	-.013
			(.140)	(.190)
Residential stability	-	-	-.119	-.159
			(.144)	(.156)
Street life potential	-	-	-.283 *	-.363 **
			(.167)	(.180)
Intercept	-4.420 ***	-9.253 ***	-1.785 ***	-9.348 ***
	(1.041)	(1.317)	(.119)	(1.320)

[a] Random effects logit models. Neighborhood level N=77; Person level N=853

* $p < .10$ ** $p < .05$ *** $p < .01$ (two-tailed tests). Standard errors in parentheses.