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Early Adolescent, Multi-ethnic, Urban Youth's Exposure To Patterns Of Alcohol-related Neighborhood Characteristics

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Abstract

This study identified heterogeneous classes of alcohol-related neighborhood characteristics to which multi-ethnic, early adolescents in urban communities are exposed. The sample comprised 4,215 youth from 42 community areas in Chicago, Illinois who completed surveys at the beginning of 6th grade (2002). Neighborhood measures included: (1) mean number of alcohol outlets per 1,000 population per community area; (2) alcohol purchase attempt rate by pseudo-underage youth; (3) average number of alcohol advertisements within 1500 feet of each school per community; and (4) a Census 2000-based deprivation index. Parents and community leaders provided data on perceived neighborhood problems and parental prevention actions, and neighborhood strength and preventive action by communities, law enforcement, and community organizations, respectively. Multilevel latent class analysis identified the number and characteristics of heterogeneous latent neighborhood classes in which these youth are exposed. Five classes best described the heterogeneity among the sample: (1) Low social capital/low exposure/high access to alcohol (19.8%), (2) Low social capital/low exposure/low access to alcohol (24.5%), (3) Moderate social capital/low exposure/high access to alcohol (30.0%), (4) Moderate social capital/moderate exposure/low access to alcohol (20.1%), and (5) High social capital/moderate exposure/high access to alcohol (5.6%). The racial/ethnic distribution among the classes varied considerably. Results suggest there is substantive heterogeneity among this seemingly homogeneous urban population. Further, they highlight the socioeconomic disadvantage of these inner-city communities and the resource disparity across the racial/ethnic groups. Understanding the nuances among communities may lend to development of more efficacious preventive interventions and policy initiatives, inform theory, and help prioritize limited resources.

Keywords

Adolescents; Communities; Alcohol access; Social capital; Latent class analysis

Introduction

Demographic trends suggest that the United States is quickly moving toward a "majority-minority" society. At the time of Census 2000, three states already had more than 50% "minority" populations [1–3]. Further in 2005, the U.S. Census Bureau estimated that nearly half of children under age 5 in the United States were racial/ethnic minorities [4]. These growing segments of the population are disproportionately residents of metropolitan cities, where many social problems (e.g., crime, delinquency, drug use, public disorder, and school

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dropout) are significantly clustered [1,5–7]. As such, scientists and practitioners, alike, have become increasingly interested in describing these distinct, risky environments and subsequently examining their influence on maladaptive social and behavioral outcomes among racial/ethnic minority youth. However, this literature is sparse and much of that describing urban contexts has relied on either census data or self-report measures alone [8–14]. While informative, such studies may fail to capture the multidimensionality inherent in the contexts of urban youth. The present study addresses this gap in the literature by identifying multidimensional, heterogeneous classes of neighborhood characteristics in which multi-ethnic adolescents residing in urban communities are exposed. Specifically, neighborhoods were characterized by social capital and exposure and access to alcohol.

Research has shown the importance of social capital and exposure and access to alcohol in preventing and/or promoting a number of negative outcomes [15–24]. Youth residing in urban neighborhoods may be at disproportionate risk, as their extant social capital may be less and their exposure and access to alcohol more than their suburban and rural counterparts [15,25–28]. However, this disparate risk may not only be present across urban, suburban and rural areas, but also across neighborhoods within urban areas. This is a logical hypothesis, given the considerable variability in poverty, racial/ethnic distribution and family stability among inner-city communities [5–7]. Thus, determining and describing the heterogeneity in risk/protective factors across inner-city neighborhoods may be important to our understanding the contexts in which many racial/ethnic minority youth reside.

The present study provides a description of urban communities, using measures of social capital and exposure and access to alcohol obtained from Census 2000, reports by parents and community leaders within each study community, or assessed directly. Further, it does so using a statistical approach not applied previously to this topic. Specifically, the research questions are: (1) How many latent classes are necessary to describe heterogeneity in neighborhood characteristics of urban communities in which multi-ethnic early adolescents reside? and (2) What are the characteristics and proportions of adolescents residing in the heterogeneous latent neighborhood classes?

Methods

Data included baseline measures from a group-randomized trial of an alcohol preventive intervention for multi-ethnic urban youth (Project Northland Chicago), encompassing 42 of 77 city-defined Chicago community areas [29]. The sample in this secondary data analysis included 4,215 youth who completed school-based surveys when beginning 6th grade. Students were predominantly African American or Hispanic (42% and 30%, respectively), had an equal gender distribution (50% male), lived in the United States for all their life (86%), spoke English in their homes (72%), lived in two-parent households (53%) and were low income (70%). Participating youth had similar demographic characteristics to students throughout Chicago Public Schools (CPS) and study schools were similar to those throughout CPS with respect to truancy and math/reading test scores.

Data Collection

Students—Students were surveyed in schools during fall, 2002, when beginning 6th grade. All students enrolled in the 6th grade were eligible to participate. Surveys were administered by three-person teams of research staff using standardized protocols. Prior to survey administration, parents and students were given opportunity to refuse participation. The response rate was 91% (n = 4,259). Data collection protocols were approved by the University of Minnesota Institutional Review Board, with secondary data analyses approved by the University of Florida Institutional Review Board. Other than demographic descriptors, no self-report measures from the student survey were used for the present study. Rather, data from

their respective parents, community leaders, and neighborhood characteristics were matched to this individual-level data.

Parents—Parents of the students were surveyed in fall, 2002 (n = 3,250; 70% response rate). Hard-copy surveys were given to students, and they were asked to deliver the packet to their primary caregiver [29]. Parents were given $25 after the completed survey was returned. Students were given a $5 gift certificate for delivering the packet to their parents. Parents completing the surveys (n = 3,250) were predominantly married (54%), had one to three children living in their home (70%) and had, at the least, graduated from high school (78%). Parents responded to eleven items that assessed community action and perceived neighborhood problems.

Community Leaders—A telephone survey of community leaders in each community was conducted in 2002 (n = 344, 70% response rate). Community leaders included school council members, religious leaders, managers of recreation centers, neighborhood beat officers, neighborhood beat facilitators, and managers/leaders of neighborhood organizations. The survey instrument was based on others administrated in similar research projects and contained twenty-five items assessing neighborhood strength, neighborhood and police preventive action and organizational preventive efforts [30,31].

Neighborhood Characteristics—Data describing alcohol-related neighborhood characteristics included: (1) mean number of off-sale alcohol outlets per community area, obtained from the Chicago Licensing Department in 2002; (2) alcohol purchase attempt success rate by pseudo-underage youth, tested in 2002; and (3) average number of alcohol advertisements within 1500 feet of each school per community, assessed in spring, 2003 [20, 29]. Census 2000 data for each community were also retrieved.

Measures

Table 1 presents descriptive statistics for each measure of neighborhood risk and protection.

Protective Factors

Neighborhood strength—Five community leader survey items were used in a scale of neighborhood strength: “How would you rate the…” “…neighborhood in terms of having a strong community identity?”; “…level of community resources?”; “…participation level of residents in local activities?”; “…level of influence local residents or community groups have on decisions about local policies?”; and “…efforts of residents in addressing the prevention of alcohol use among teenagers?” (Cronbach’s alpha: 0.70).

Neighborhood and police preventive action—Nine community leader survey items were used in a scale of neighborhood and police preventive action: “How would you rate police involvement in prevention of alcohol use among teenagers in the neighborhood?”; “How would you characterize relationships between local beat officers and neighborhood residents surrounding schools?”; “If teenagers were hanging out on the block, how likely is it that residents in the neighborhood would do something about it?”; “If a store was selling alcohol to teenagers, how likely is it that residents in the neighborhood would call the police?”; “If police were called on a loud party involving young people, how likely is it that they would check to see if there was underage drinking?”; “How likely is it that a group from the neighborhood would work to reduce the amount of alcohol advertisements?”; “How likely is it that if a business served or sold alcohol to minors, the business would be cited by an enforcement agency?”; “How likely is it that if an adult provided alcohol to minors, the adult would be cited or ticketed by police?”; and “How likely is it that a minor who was in possession of alcohol would be cited or ticketed by police?” (Cronbach’s alpha: 0.89).

Organizational preventive efforts—Eight community leader survey items, with "yes/no" responses, were used in a scale assessing organizational preventive efforts: "Has your organization worked to…" "…promote alcohol-free activities for youth?"; "…increase or promote police enforcement against underage drinking?"; "…reduce public drunkenness?"; "…promote participation in a neighborhood watch or block club?"; "…restrict alcohol advertisements such as on billboards or storefronts?"; "…reduce the number of businesses that sell or serve alcohol to underage youth?"; "…promote participation in an effort to establish a "dry precinct"?"; and "…change a policy in your organization related to alcohol use?" (Cronbach's alpha: 0.79).

Community action—A community action scale was created using four items from the parent survey. The five responses ranged from "Would not do something about it" to "Definitely would do something about it": "If teenagers were hanging out on your block drinking alcohol, how likely is it that you or some of your neighbors would do something about it?"; If a store on your block was selling alcohol to teenagers, how likely is it that you or some of your neighbors would call police?"; If there was a loud party involving young people going on in a house on your block, how likely is it that you or some of your neighbors would do something about it?"; and "If there was a liquor store that had alcohol advertisements visible from outside the store, how likely is it that you or some of your neighbors would try to reduce the amount of alcohol advertisements?" (Cronbach's alpha: 0.76).

Risk Factors

Perceived neighborhood problems—A perceived neighborhood problems scale was created using seven items from the parent survey: "Below is a list of urban problems. Please check how much of a problem each of the following is on the block where you live: …drug dealing?"; "…unsupervised youth?"; "…people drinking alcohol on the street?"; "…too many stores that sell alcohol?"; "…lack of supervised activities for youth?"; "…too many alcohol advertisements?"; and "…poor police response?" (Cronbach's alpha: 0.93).

Alcohol advertisements—The number of alcohol advertisements within 1500 feet of each study school was obtained in 2003 [20]. The location of each ad was documented using a Global Positioning System. Street maps with a 1,500 foot radius around each school were created using ArcView GIS. The average number of alcohol advertisements around schools within each community area was obtained by dividing the total number of alcohol advertisements surrounding schools within each community area by the total number of schools in each community area.

Off-sale alcohol outlet density—The mean number of off-sale alcohol outlets per 1,000 population per community area was obtained by dividing the mean number of off-sale alcohol outlets per community area by the total population for each community area.

Alcohol purchase attempt rate—Commercial accessibility of alcohol to underage youth was assessed using a standardized protocol [29]. Two purchase attempts were conducted at each randomly selected off-sale alcohol outlet (n = 326 outlets, n = 652 attempts). The purchase attempt success rate was obtained by dividing the number of successful purchase attempts by the total number of attempts for each community area.

Area deprivation—An area deprivation index was created following procedures described by Singh [32]. Seventeen Census 2000 indicators were used: educational distribution (percentage of population with less than 9 years and 12 or more years of education), unemployment rate, occupational composition, median family income, income disparity, median home value, median gross rent, median monthly mortgage, home ownership rate,

family poverty rate, population below 150% of poverty threshold, single-parent household rate, percentage of households without a motor vehicle, telephone, and/or complete plumbing, and household crowding. Factor score coefficients from Singh were used to weight the indicators [32]. The scale was standardized, setting the mean and standard deviation to 100 and 20, respectively (Cronbach's alpha: 0.87).

Analytical Strategy

Measures were dichotomized at their means to improve interpretability of results and identification of how the community characteristics differed. Multilevel latent class analysis (LCA) was used to identify the number and characteristics of heterogeneous latent neighborhood classes among students residing in study communities using the nine dichotomous indicators [33]. Analyses were conducted at the individual (student) level (given the individual-level data provided by the parent), adjusting for the correlation of responses among students within each community. Mplus 4.21 was used for all analyses [34].

Multilevel LCA

LCA is a person-centered strategy that determines the number of latent classes best describing associations among a set of categorical indicators [35]. The estimated proportion of unique response patterns is expressed as a function of: (1) latent class probabilities (γ), which describe the proportion of individuals expected in each latent class and (2) conditional item-response probabilities (ρ), which describe the probability of a particular response to a manifest variable, conditional on latent class membership. Lanza et al. provide a comprehensive description of these parameters and their estimation [36].

Multilevel LCA extends LCA, allowing the model to be fit while accounting for non-independence of observations [33]. Here, item response probabilities for each student were modeled at level one and item response probabilities for each community were modeled at level two, along with variation in parameters between students within communities.

Model Selection

First, competing models were estimated and compared to determine the number of necessary classes. Selection was aided by the Bayesian Information Criterion (BIC) and Akaike Information Criterion (AIC), which provide relative measures of model fit [37,38]. Simulations suggest that among indices, BIC is superior for class enumeration; thus, the solution with the lowest BIC is preferred [36,39]. The Lo, Mendell, Rubin likelihood ratio test (LMR) may also be helpful [40]. The LMR compares nested latent class models, where fit of a model with *k* classes is compared to a model with *k*-1 classes. It yields a *p*-value used to determine if there is a statistically significant improvement in fit with the inclusion of an additional class. Unfortunately, tools for model selection do not always agree on the best-fitting model [41]. Thus, interpretation of classes must be considered throughout and founded upon substantive theory [36,42].

Second, two parameters were examined to interpret each class: (1) the conditional item-response probabilities (ρ), and (2) the class membership probabilities (γ). The ρ parameters indicate the probability of being above the mean of a neighborhood risk or protective item conditional on neighborhood class membership and provide basis to determine substantive meaning of each class. Further, γ parameters allow comparison of the prevalence of each class.

Results

Model Selection

We examined fit of models with one- through six-class solutions (Table 2). Five classes best described the heterogeneity in the neighborhoods students resided (AIC = 40256.52; BIC = 40567.50). While the BIC continued to decrease with more complex solutions, the LMR for the 5-class solution indicated that it provided better fit than that of the 4-class solution (LMR=1111.40, p=0.03). The test for the 6-class solution indicated that inclusion of the additional class did not provide a significant improvement in fit (LMR = 904.73, p = 0.29). Further, improvements in substantive interpretations beyond the 5-class solution were not observed.

Interpretation

Table 3 presents item-response probabilities for each item conditional on membership in each class. Class 1 (19.8%) was characterized by high probabilities of being above the mean for organizational preventive efforts (ρ = 0.717), commercial alcohol accessibility (ρ = 1.000) and deprivation (ρ = 0.676), but low probabilities of being above the mean on all other indicators. Class 2 (24.5%) was characterized by high probabilities of being above the mean for organizational preventive efforts (ρ = 0.659) and deprivation (ρ = 1.000), but low probabilities of being above the mean for the other indicators. Class 3 (30.0%) was characterized by high probabilities of being above the mean for neighborhood strength (ρ = 1.000), neighborhood and police preventive action (ρ = 0.919), commercial alcohol accessibility (ρ = 0.781) and deprivation (ρ = 1.000), but low probabilities of being above the mean for the other indicators. Class 4 (20.1%) was characterized by high probabilities of being above the mean for neighborhood and police preventive action (ρ = 1.000) and alcohol advertisements (ρ = 0.703), but low probabilities for being above the mean for the other indicators. Class 5 (5.6%) was characterized by high probabilities of being above the mean for neighborhood strength (ρ = 0.878), neighborhood and police preventive action (ρ = 1.000), organizational preventive efforts (ρ = 1.000), number of alcohol advertisements (ρ = 1.000) and commercial alcohol accessibility (ρ = 0.798), but low probabilities of being above the mean for the other indicators.

Several indicators were conceptualized as measures of social capital: neighborhood strength, neighborhood and police preventive action, organizational preventive efforts, community action, perceived neighborhood problems and area deprivation [15,43]. The mean number of alcohol advertisements and off-sale alcohol outlet density provided measures of exposure to alcohol, whereas the alcohol purchase attempt success rate provided a direct measure of commercial accessibility of alcohol. Thus, the five classes were labeled: (1) Low social capital/low exposure/high access to alcohol, (2) Low social capital/low exposure/low access to alcohol, (3) Moderate social capital/low exposure/high access to alcohol, (4) Moderate social capital/moderate exposure/low access to alcohol, and (5) High social capital/moderate exposure/high access to alcohol. “High,” “Moderate” and “Low” labels were assigned using the number of items in each category (i.e., social capital, exposure to alcohol, access to alcohol) that had high probabilities of being above the mean for each latent class.

Racial/Ethnic Distribution

We found considerable segregation across the neighborhood classes (Figure 1), where Hispanic youth were the clear majority in the Low social capital/low exposure/low access to alcohol and Moderate social capital/moderate exposure/low access to alcohol classes. African American youth were the clear majority for the other classes: Low social capital/low exposure/high access to alcohol, Moderate social capital/low exposure/high access to alcohol, and High social capital/moderate exposure/high access to alcohol. The majority of both African Americans and Hispanics resided in communities characterized by low social capital (58.4% and 51.5%,

respectively). Only 10% of the African American and 3% of the Hispanic youth in this sample resided in communities characterized by high social capital. The majority of African American youth resided in communities characterized by high access to alcohol (79.8%); whereas, the majority of Hispanic youth resided in communities characterized by low access to alcohol (19.9%).

Discussion

The present study examined patterns of neighborhood characteristics of 42 urban community areas in which these youth resided. We applied multilevel LCA, a person-centered analysis strategy identifying latent classes describing associations among a set of manifest variables. In this regard, this study represents a novel approach to describing neighborhood contexts of youth.

Five heterogeneous classes of neighborhoods were identified and characterized by extant social capital and exposure and access to alcohol. Twenty percent of youth resided in communities with low social capital and high access to alcohol; 24% resided in communities with low social capital and low exposure and access to alcohol; 30% resided in communities with moderate social capital and high access to alcohol; 20% resided in communities with moderate social capital and moderate exposure to alcohol; and 6% resided in communities with high social capital and moderate exposure and high access to alcohol. We found considerable heterogeneity in the racial/ethnic distribution of the classes. For example, African American youth were more likely to live in neighborhoods with high access to alcohol. The majority of both African American and Hispanic youth in the sample resided in communities characterized by low social capital, highlighting the disadvantage of these inner-city communities and the resource disparity across these racial/ethnic groups.

We must recognize that all of the neighborhoods in which these youth reside have characteristics that place their young residents at risk, as there was not a clear, “low/no risk” class (i.e., High social capital/low exposure/low access to alcohol). Urban environments are at increased risk for crime, delinquency, drug use, public disorder, school dropout, and exposure and access to alcohol relative to suburban and rural counterparts [5–7,44–47]. However, results suggest that there is substantive heterogeneity among this seemingly homogeneous population. Youth at greatest risk may be those in communities characterized by low social capital and high access to alcohol (Class 1) and moderate social capital and high access to alcohol (Class 3). African American youth were the clear majority in these neighborhood classes, which may place them at particular risk.

Much of the literature describing neighborhood contexts of youth and subsequent maladaptive behaviors has relied on census data or self-report measures, whereas this study combined census data with additional observational and parent and community-leader reported measures [8,11,13,14]. This is a particular strength, as it may provide more thorough understanding of urban communities in which many minority youth reside than provided previously. This is important for future research examining how residence in these communities affects deleterious outcomes among youth and how parents may buffer harmful effects of such environments.

This study is not without limitations. First, data included only static measures of neighborhood risk and protective factors. Ecodevelopmental theory suggests that youth and their contexts evolve across time; thus, both the number and interpretation of latent classes of neighborhoods in which the sample resided could vary across time [48]. Our data precluded such examination. Future research should examine if and how contexts of youth evolve across time. Secondly, measures of neighborhood risk and protection used do not represent the universe of neighborhood or social capital descriptors. It may prove interesting to examine heterogeneity

among youth residing in inner-city communities while including additional community measures, such as crime rates, political activism, public policies and/or measures of social structure.

Limitations notwithstanding, this study joins a scant literature describing contexts of inner-city, minority youth [6]. Further, it does so using a novel statistical approach, identifying five distinct classes of neighborhoods in which urban youth reside. The heterogeneity in the distribution of the race/ethnicities across the neighborhood classes suggests that African American youth are disproportionately exposed to neighborhoods with high access to alcohol. Further, the majority of both African American and Hispanic youth in this sample resided in communities characterized by low or moderate social capital, highlighting the disadvantage of these inner-city communities and the resource disparity across these racial/ethnic groups. Understanding the nuances in urban neighborhood contexts provides the foundation for understanding subsequent effects on family functioning and problem behaviors, may appropriately inform theory, and suggest targets for intervention [6,49].

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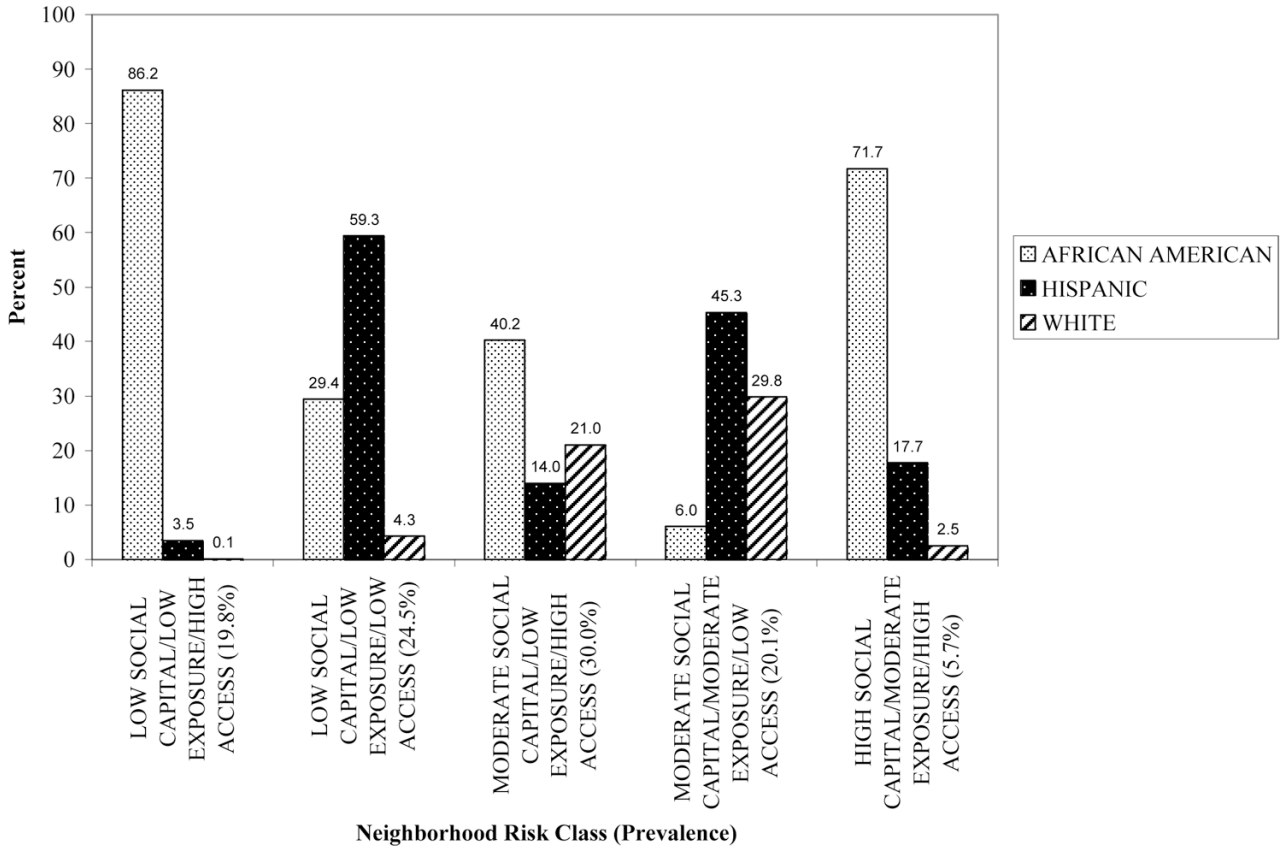

Figure 1.
Racial/ethnic distribution across neighborhood risk classes

Table 1

Descriptive statistics for variables included in the model

Variable	Median	Mean	SD	Min	Max
Protective Factors					
Neighborhood Strength[a]	16.67	16.45	2.17	5.00	25.00
Neighborhood & Police Preventive Action[b]	32.80	31.70	4.14	9.00	45.00
Organizational Preventive Efforts[c]	23.20	23.89	4.66	8.00	40.00
Community Action[d]	16.00	15.32	3.55	4.00	20.00
Risk Factors					
Perceived Neighborhood Problems[e]	19.00	20.01	9.93	7.00	35.00
Mean Number of Alcohol Ads per School per Community	8.00	17.11	21.61	0.00	74.00
Mean Number of Off-sale Alcohol Outlets per 1,000 Pop.	0.33	0.38	0.37	0.11	3.99
Alcohol Purchase Attempt Success Rate	0.33	0.35	0.20	0.00	0.72
Area Deprivation Index[f]	103.09	95.58	18.01	45.60	152.62

[a] A higher score on this scale indicates more neighborhood strength.

[b] A higher score on this scale indicates more neighborhood and police preventive action.

[c] A higher score on this scale indicates more organizational preventive efforts.

[d] A higher score on this scale indicates more community action.

[e] A higher score on this scale indicates more neighborhood problems.

[f] A higher score on this scale indicates more area deprivation.

Table 2

Model selection indices

	Number of Classes in Solution					
	1	**2**	**3**	**4**	**5**	**6**
Loglikelihood	−23979.05	−22560.67	−21367.78	−20666.09	−20079.26	−19826.73
AIC	47976.11	45159.33	42793.56	41410.17	40256.52	39771.47
BIC	48033.23	45279.92	42977.61	41657.68	40567.50	40145.90

Table 3

Item-response probabilities for each item conditional on class membership

Class Number	**1**	**2**	**3**	**4**	**5**
Class Label (Prevalence)	**Low social capital/low exposure/high access to alcohol (19.8%)**	**Low social capital/low exposure/low access to alcohol (24.5%)**	**Moderate social capital/low exposure/high access to alcohol (30.0%)**	**Moderate social capital/moderate exposure/low access to alcohol (20.1%)**	**High social capital/ moderate exposure/high access to alcohol (5.6%)**
Item					
Social Capital					
Neighborhood Strength	0.000	0.362	**1.000**	**0.558**	**0.878**
Neighborhood & Police Preventive Action	0.214	0.226	**0.919**	**1.000**	**1.000**
Organizational Preventive Efforts	**0.717**	**0.659**	0.352	0.000	**1.000**
Community Action	0.329	0.367	0.367	0.424	0.370
Perceived Neighborhood Problems	0.399	0.450	0.206	0.274	0.454
Area Deprivation Index	**0.676**	**1.000**	**1.000**	0.000	0.000
Exposure to Alcohol					
Mean Number of Alcohol Ads	0.000	0.282	0.079	**0.703**	**1.000**
Mean Number of Off-sale Alcohol Outlets per 1,000 Pop.	0.457	0.000	0.000	0.330	0.000
Access to Alcohol					
Alcohol Purchase Attempt Success Rate	**1.000**	0.000	**0.781**	0.000	**0.798**