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School Contextual Influences on the Risk for Adolescent Alcohol Misuse

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Abstract

This study investigates the association between school context and adolescent alcohol misuse. Data are from the first two waves of the National Longitudinal Study of Adolescent Health ($N = 10,574$ adolescents nested within 128 schools). Multilevel multinomial logistic regression is used to assess the association between school-level characteristics and the risk for non-, moderate, and heavy drinking. The risk for adolescent alcohol misuse varies significantly across schools after adjusting for adolescent-level predictors. Several school-level characteristics predict alcohol misuse. Notably, the risk for heavy drinking is elevated in schools located in communities that are socioeconomically advantaged, have high proportions of Non-Hispanic White residents, and are located in suburban (versus urban) areas. High aggregate levels of intoxication in schools increases the risk for heavy drinking among individual adolescents. Results suggest that the influence of social contexts on health is not uniform and that adolescent drinking is more likely in communities that are conceptualized as advantaged.

Keywords

Alcohol misuse; Adolescents; Multilevel; School context

Introduction

In recent years, research related to the social influences on adolescent alcohol misuse has expanded beyond the sphere of family and peer networks to investigate the role of the larger community. This work has generally established that alcohol use varies across social contexts such as schools and neighborhoods and is influenced by the characteristics of these communities (Cleveland and Wiebe 2003; Ennett et al. 1997; O'Malley et al. 2006). A range of studies attribute contextual influences to various factors ranging from the composition (e.g., socioeconomic (SES) and ethnic distribution of communities) to the psychosocial perceptions (e.g., collective efficacy and safety) to the social norms (e.g., prevalence and acceptance of substance use) of communities. For instance, neighborhood SES disadvantage and disorder have been linked to a greater prevalence of substance abuse, including heavy drinking, in some communities in comparison to others (Boardman et al. 2001; Hill and Angel 2005; Hoffman 2002; Lambert et al. 2004).

Moving beyond description of the relationship between social context and substance use—particularly alcohol use—towards understanding *how* the larger social environment influences this type of behavior is difficult, however. Methodologically, previous research is limited by, among other things, the use of composite variables of substance use and problem behaviors which in turn obscures the precise nature of a particular association between social context and adolescent drinking. There is some suggestion that the compositional aspects of communities influencing underage drinking differ from the factors that influence drug use and other risky behaviors (Galea et al. 2004). For instance, prior research generally suggests that negative aspects of disadvantaged communities, such as low SES, hazardous living conditions, and disorder increase reports of externalizing behaviors among youth (Aneshensel and Sucoff 1996; Beyers et al. 2003; Leventhal and Brooks-Gunn 2000). However, other multilevel studies focused on substance use indicate that average levels of alcohol use are higher in schools from advantaged communities (Ennett et al. 1997; Hoffman 2006). And while communities with high concentrations of ethnic minorities are often conceptualized as disadvantaged, studies of adolescent substance use (i.e., alcohol, tobacco and marijuana use) demonstrate that schools characterized by larger proportions of students who were foreign-born or of an ethnic minority group had lower average rates of alcohol use in particular (Kim and McCarthy 2006; O'Malley et al. 2006).

Inconsistencies with the general association between contextual-level disadvantage and health are also reported for the psychosocial aspects of communities. Aggregate levels of alcohol, tobacco, and marijuana use are higher in schools with low levels of social cohesion (Ennett et al. 1997). In contrast, research on community attitudes indicates that adolescent alcohol use was more frequent in schools where drinking is perceived as socially acceptable as well as commonplace (Cleveland and Wiebe 2003) and less likely in schools with high average levels of disapproval towards the use of substance use in general (Kumar et al. 2002; O'Malley et al. 2006). Other work suggests that this relationship is outcome-specific in that aggregate reports of intoxication across schools are associated with increased individual-level risk for marijuana use but not drunkenness (Kuntsche and Jordan 2006).

Many of these empirical findings do not conform to what is predicted by theory regarding relationships between social risk factors and problem behaviors. For instance, developmentalists posit that adolescents with sufficient support and opportunities within their environments develop assets that enable them to avoid problem behaviors (Kegler et al. 2005). Social disorganization theorists assert that the lack of social control that is characteristic of SES disadvantaged, ethnically heterogeneous, and residentially unstable areas increases problem behaviors (Catalano and Hawkins 1996). The logic of these explanations is echoed in models of contextual effects which suggest that the quality and quantity of institutional resources, interpersonal relationships, and the presence of prosocial behavioral norms act as a conduit between the environment and individual health (Leventhal and Brooks-Gunn 2000). The common denominator among these explanations is a “one size fits all” approach which places alcohol use in the same category as illicit drug use and delinquency and therefore assumes that the pathways between the environment and problem behaviors are generalizable to adolescent drinking. This is problematic because alcohol is widely used and available to most of the population. Although both excessive and underage drinking are discouraged, binge drinking among adolescents is quite prevalent (Costello et al. 1999; Kandel et al. 1997; Eaton et al. 2006; Maney et al. 2002). The social processes that foster adolescent drinking are likely to differ from other forms of deviance given that drinking alcohol is associated with adult status and may be part of the process of identity formation that is characteristic of this period of development (Newcomb and Bentler 1988).

In sum, while there is widespread support for the effects of social context on adolescent substance use, further investigation is needed to establish the particular relationship between

environmental influences and alcohol use. This study endeavors to more fully explicate the association between a primary social context of adolescents— school—and adolescent alcohol misuse by addressing the following research questions: first, to what extent does the risk for adolescent alcohol misuse vary across school communities? Second, what school-level risk factors are predictive of variation in the risk for adolescent alcohol misuse across schools? And finally, do the associations between school-level factors and adolescent alcohol misuse persist after controlling for key demographic and psychosocial risk factors at the individual level?

In addition, this study seeks to address some of the methodological limitations of prior work in this area. Critiques of this literature note that many studies of the relationship between schools and substance use fail to adequately control for the bias posed by individual-level adolescent characteristics and interpersonal processes (Aveyard et al. 2004). Previously reported findings are largely based on small, non-representative samples, thus limiting the generalizability of results (Hill and Angel 2005; Lambert et al. 2004). The findings of Ennett et al. (1997) are qualified by the fact that the analysis was based on a relatively young sample (i.e., fifth and sixth grade students). This is problematic because although alcohol use may be initiated and problem drinking may occur prior to adolescence, the epidemiological literature demonstrates that current alcohol use and binge drinking are most prevalent among teens in older age groups (Eaton et al. 2006) and that the proportion of teen drinkers increases with age during this period of the lifecourse (Duncan et al. 2006). Furthermore, the range of alcohol use behaviors investigated (e.g., current use and initiation versus binge drinking) does not necessarily capture what is inherently problematic about adolescent drinking. It is important to understand the risk of alcohol misuse during adolescence, as excessive alcohol consumption can negatively impact future health and functioning. For instance, individuals who acquire habits of excessive alcohol consumption early on disrupt their educational, physical, and social development (Andrews et al. 1997; Krohn et al. 1997) and increase their risk for alcohol use disorders during adulthood as well as other mental and physical health problems (Rohde et al. 2001).

Methods

Sample and Data Collection

This investigation uses existing data from the National Longitudinal Study of Adolescent Health (for additional information on Add Health see Bearman et al. 1997). The primary sampling unit was high schools (i.e., schools including the 11th grade and enrolling at least 30 students) stratified by region, urbanicity, school type, ethnic composition, and enrollment size. Adolescents from 80 high schools and 52 feeder schools (i.e., schools that contained 7th grade and sent students to the selected high school) participated in the baseline survey. A sample of adolescents for the in-depth *in-home interviews* was selected from the school rosters (78.9% response rate).¹ Interviews were conducted in either English or Spanish and used computer assisted personal interviewing technology (CASI) to collect sensitive data. A total of 20,745 adolescents participated in the first wave of in-home data collection conducted from 1994 to 1995. A second wave of data was collected in 1996 and involved all adolescents interviewed at baseline with the exception of those who graduated or were part of a targeted subsample (i.e., genetic siblings and disabled teens), yielding a sample size of 14,736.

¹The in-home sample included a core probability sample (n = 12,105) of a nationally representative sample of teens in grades 7 through 12, and three supplemental over-samples: ethnic minorities—African Americans from well-educated families, Chinese, Cubans, and Puerto Ricans; saturated schools (i.e., 100% of the student body was sampled); and disabled teens. The in-home interview was also administered to a supplemental “genetic” sample of siblings, which was not used for this analysis because these cases were not part of the original probability sample.

The analysis draws on information obtained from several sources of data available in Add Health. Adolescent characteristics are based on self-reported information obtained during the in-home interview, supplemented with information from the parents' survey. School-level characteristics are derived from data from the adolescent in-school questionnaire, school administrator questionnaire, and a contextual database of 1990 Census data. The final analysis is restricted to those adolescents who reported complete information from both Time 1 and Time 2. Only participants with a sample weight as well as usable individual and group identifiers were used to permit generalizability and hierarchical linkages (i.e., individuals in schools), respectively. In instances where participants were siblings, one child per family was sampled to eliminate bias from teens nested within families. The final sample was comprised of 10,574 adolescents nested in 128 schools.

Measures

Alcohol Misuse—A three-category alcohol misuse typology that categorizes the Add Health participants as non-drinkers, moderate drinkers, and heavy drinkers was created from responses to three measures of current alcohol use: number of days of use, number of days of consuming five or more drinks on occasion, and number of days of drunkenness in the past year. Response categories for each item ranged from 1 to 7 (e.g., 1 = “almost every day,” and 7 = “never”). The non-drinker category represents teens who reported never drinking as well as teens who indicated that they did not use alcohol in the past 12 months. Adolescents were classified as moderate drinkers if they reported drinking a few times a month or less but never consuming five drinks or more on occasion or becoming intoxicated. Heavy drinkers were those adolescents who reported drinking at least a few times a month and excessive drinking (i.e., either consuming five or more drinks on occasion or intoxication). This typology is comparable to measures used in community surveys assessing binge drinking as reports of drinking five or more drinks on occasion and/or the frequency of drunkenness (Bailey 1999; SAMHSA 1999).

Adolescent Characteristics—The adolescents' *demographic characteristics* are based on information collected at baseline. Gender is coded as 0 for female and 1 for male. Age is coded into three categories: young (11–14 years), middle (15–16 years), and older adolescents (17 years and older). Race/ethnicity is measured with five categories: Non-Hispanic White (NHW), African American, Latino, Asian, and Other. Two measures assess family SES based on data from the parents' survey: income and education. Annual household income is measured in thousands of dollars and logged in all analyses due to the skewed distribution of this variable. Parental education represents the average years of education of the parents or the total years of education of either the mother or father in the case of single-parent families. The family living situation is operationalized as 1 for lives with both biological parents and 0 for other family type. Baseline measures of peer alcohol use and the availability of alcohol in the home were included as controls for the *individual-level drinking norms* present in the adolescents' immediate environment. Peer drinking assesses if the teen had close friends who drink alcohol and is coded as 0 for no and 1 for yes; alcohol access in the home is coded 0 for no access and 1 for access to alcohol.

School Characteristics—Both the *compositional* and *psychosocial* aspects of the school are considered for this inquiry. School grade composition is measured as either junior high school (includes grade 7 but not grade 10), high school (includes grade 10, but not grade 7), or combination school (includes grades 7 and 10). School size is measured as small (350 students or less), mid-size (351–775 students), and large schools (776 or more students). The urbanicity of the school area is categorized as rural, urban, and suburban. The ethnic composition of the schools corresponds to the quartile percentage NHW students in these schools which was collapsed into three dummy coded variables: predominantly minority

(0% NHW), ethnically heterogeneous (1–93% NHW), and predominantly majority (94–100% NHW). The composition of the schools was also characterized by several Census tract indicators that were collapsed to the level of the school, giving an aggregate representation of the school community. School SES disadvantage is represented by a factor score based on four indicators of economic deprivation via a principal components analysis. These indicators include: proportion of households receiving public assistance, proportion of individuals living below the poverty level, proportion of individuals aged 25+ without a high school diploma, and the unemployment rate. This analysis also measured the impact of a single indicator of SES advantage by calculating the mean proportion of community residents age 25 and older with a college degree. The ethnic composition of the school community was measured by the average proportion of NHW, African American, and Latino residents in the area, respectively.

Several measures of the *psychosocial* climate of the school context are assessed using aggregates of adolescent responses to items from the in-school questionnaire. Thus, these measures represent the average score for each construct for all the students present within a given school. Perceived school cohesion among the students was calculated using a scale based on three items (e.g., “...you feel close to people at school”) using a Likert-type response scale (i.e., 1 = “strongly agree” to 5 = “strongly disagree”). The three items were reversed scored so that a higher score represented high perceptions of school connectedness; items were then summated, divided by the number of items, and collapsed to the school level. The average level of safety perceived in the school environment was calculated by aggregating responses to a single item, “...I feel safe in my school....” Responses also ranged from 1 to 5 so that a high score corresponds to high perceptions of safety. The overall drinking climate of the school was calculated by averaging students’ response to the item, “in the past 12 months, how often do you...get drunk” (i.e., 0 = “never” to 6 = “daily”).

Analytic Strategy

The data are derived from a complex sampling design, therefore all analysis accounts for the stratified sample (i.e., by region of the U.S. and the school community) as recommended for use with Add Health (Chantala and Tabor 1999). Weighted distributions of the adolescent characteristics are obtained using the SVY commands in STATA (v. 9) (StataCorp 2005). This analysis expands upon prior cross-sectional research by assessing the effect of baseline drinking status on alcohol misuse one year later. Thus, weighted predicted probabilities of Time 2 alcohol misuse by baseline drinking status and age group are calculated, adjusting for all of the adolescent-level characteristics. The multivariate analyses assess two-level multinomial logistic models for the three category dependent variable using hierarchical generalized linear modeling (HLM software, v. 6.01, Raudenbush et al. 2005). A multilevel approach is necessary as the adolescent participants in Add Health are nested in schools thus violating the assumption of independence across observations. Analytically this translates into partitioning the error variance in the outcome across models so that the variation due to the clustering is assessed. Using an iterative modeling strategy, the first step in the analysis estimates an unconditional random intercept model. The variation in alcohol misuse across schools is assessed by two pieces of information: the average risk ratios for both moderate and heavy drinking in comparison to non-drinking and the variance component for each logit (τ_{00}) which captures the extent to which the average risk varies across a population of schools. Second, the relationship between alcohol misuse and the school context is assessed by testing the effect of each school-level predictor on the random intercept model. The third step in the analysis builds a fully adjusted adolescent-level model. Contingent upon remaining contextual variation in the outcome, the final step of the analysis assesses the effects of the school-level characteristics on the risk for alcohol misuse that persists in the

fully adjusted model. All analysis uses full maximum likelihood estimation; the advantage of this approach is that the estimates produced are consistent with the true parameters, particularly when using large datasets, as well as unbiased and robust to nonnormality (Raudenbush and Bryk 2002).

Results

Sample Characteristics

Table 1 provides the weighted distributions of the adolescent and school characteristics. In the final analytic sample, boys and girls are equally represented. There are fewer teens among the oldest age group relative to the younger teens, which is attributable to the fact that teens who were graduating seniors at baseline were not re-interviewed at Time 2. Approximately two-thirds of the sample is Non-Hispanic White, with African American and Latino adolescents comprising the next two largest race/ethnicity categories. On average, these teens are from families where the average years of parental education indicates some post-secondary experience and where the median household income is slightly higher than the median annual household income in the U.S. for 1995 (U.S. Census Bureau 2000). Over half of these teens live with both biological parents. Over half of these teens report that their close friends drink and 28% reported having access to alcohol at home. The schools included in this analysis reflect the diversity of the American educational system. Approximately 40% are high schools and over 60% have large student populations. Roughly two-thirds of these schools are ethnically heterogeneous. Levels of socioeconomic disadvantage of the school community vary as represented by the principal components score which ranges from -1.10 to 2.03 and the average proportion of college educated adults ranges from 0.7 to 0.54. The ethnic distribution of the community also varies widely, from 5 to 100% NHW, 0 to 94% African American, and 0 to 80% Latino. Overall these school environments have high average perceptions of support and safety. The average frequency of drunkenness in the past year is low, ranging from reports of no drunkenness (0.01) to several occasions (1.50).

Drinking status is a state that is amenable to change over time and therefore, one the steps in this analysis was to examine the stability of drinking status between Time 1 and Time 2. Table 2 displays the predicted probabilities for alcohol misuse at Time 2 based on baseline alcohol misuse and age group. Among teens who were non-drinkers at Time 1, the probability of transitioning to moderate or heavy drinking one year later is slight; this relationship shows a slight age-graded pattern, with the probability of becoming a heavy drinker increasing across the age groups. In comparison, teens who were moderate drinkers at baseline indicate a tendency to another behavior one year later. In particular, teens in mid-adolescence are more likely to either increase or cease drinking in comparison to remaining a moderate drinker and older teens who were moderate drinkers at Time 1 are most likely to become to heavy drinkers at Time 2. Teens who were heavy drinkers at Time 1 indicate considerable stability for alcohol misuse over one year across each age group.

Hierarchical Generalized Linear Models

The first step of the multivariate analysis estimates the unconditional random intercept model to test the overall variation in the risk for alcohol misuse at Time 2 across schools. Overall, the relative risk ratio (RRR) for either moderate or heavy drinking at Time 2 is lower than the risk for non-drinking for adolescents in the “average” school (i.e., $RRR_{\text{moderate}} = 0.23$ and $RRR_{\text{heavy}} = 0.47$,² model not tabled), meaning that the risk for moderate drinking is approximately 80% less compared to non-drinking and 50% less for

² $1/\text{eb Heavy} = 1/\exp(\beta_{\text{Heavy}})$.

heavy versus non-drinking, on average across schools. The majority of the analytic sample is comprised of non-drinkers and it follows that non-drinking would be the most likely average drinking behavior across schools. However, results obtained from the null model indicate that there is substantial variation in the risk of alcohol misuse across schools evidenced by the statistically significant values for the intercept variance components (i.e., $\tau_{00(\text{Moderate})} = 0.06$, $\chi^2 = 205.66$, $p < .001$ and $\tau_{00(\text{Heavy})} = 0.44$, $\chi^2 = 928.31$, $p < .001$). Further analysis is warranted, then, to explain this school-level variation, particularly in the risk for heavy versus non-drinking.

Table 3 summarizes the results from a series of unadjusted models testing the associations of the school characteristics on the risk for alcohol misuse across schools. The risk for moderate drinking is lower in junior versus high schools where older teens are more concentrated. The risk for heavy drinking is higher in high schools in comparison to other school types. The ethnic composition of the student body also influences the risk for alcohol misuse; in each logit there is a statistically significant increased risk for alcohol misuse in schools where the majority of the students are NHW. The risk for alcohol misuse is greater in schools from socioeconomically advantaged areas. As the overall level of SES disadvantage increases in a community, the risk for heavy drinking decreases by 30%; similarly the risk for heavy drinking is three times greater than non-drinking in communities with high proportions of college educated residents. The risk for alcohol misuse also was elevated in schools from communities with high proportions of NHW residents and lower in schools from communities with high proportions of African American and Latino residents. The psychosocial school climate also affects the overall risk for alcohol misuse. Particularly, as the average level of perceived cohesion increases, the risk for heavy drinking (versus non-drinking) decreases, and the risk for moderate drinking is greater than non-drinking in schools where the overall perception of safety is high. In schools where the average frequency of drunkenness is high, the risk for heavy drinking is almost six times greater than non-drinking and is accompanied by a 73% decrease in the variance component. This suggests that the average level of drunkenness is a robust predictor of school-level variation in the risk for alcohol misuse.

The next step in this analysis adjusts the random intercept models for a comprehensive set of adolescent-level characteristics (Table 4). Model 1 shows the results for the cross-lagged regression of Time 2 alcohol misuse on baseline alcohol misuse, controlling for gender and age. The importance of these controls is demonstrated by the substantial decrease in the variance component for each logit in the multivariate model; that is, controlling for the stability of alcohol misuse, gender, and age decreases the proportion of the variance that is due to the school environment by half. The statistically significant coefficients obtained for prior alcohol misuse suggest that drinking behavior is largely stable over time. The risk for being a moderate versus non-drinker at Time 2 is lower among males than females. The risk that adolescents will remain or become heavy drinkers (versus non-drinkers) is elevated among adolescents in the oldest age group in comparison to younger teens.

Model 2 demonstrates that the addition of individual-level SES, race/ethnicity, and family structure further accounts for the variation in alcohol misuse across schools. In particular, the value of the variance component for the random intercept decreases in the logit comparing the risk for heavy versus non-drinking at Time 2 ($\tau_{00(\text{Heavy})} = 0.11$, $\chi^2 = 276.42$, $p < .001$). The risk for moderate versus non-drinking at Time 2 is elevated slightly among teens who are from high SES families (i.e., parents' education) and among teens who do not reside with both biological parents. A similar pattern is demonstrated for heavy drinking. Additionally, adolescents who are African American and Asian are less likely to be heavy versus non-drinkers than NHW teens. The final controls for individual-level drinking norms are added in Model 3. As expected, having friends who drink and access to alcohol at home

substantially increases the risk for being either a moderate or heavy drinker versus non-drinker at Time 2.

The final series of analyses assesses if the effects of the school characteristics on alcohol misuse persist in the fully adjusted model (Table 5). Two school-level characteristics remain statistically significant in the logit predicting moderate versus non-drinking: perceived school safety and community ethnic composition. The average risk for moderate alcohol use is slightly increased in schools with high average perceptions of security as well as in schools from communities with high average proportions of the NHW residents. The risk for heavy versus non-drinking is affected by several aspects of the school community. Consistent with the literature, the overall drinking climate of the school has a positive impact on the stability of heavy drinking; the risk for heavy drinking at Time 2 is increased by nearly 90% in schools with high average levels of intoxication. Accounting for this variable decreases the variation across schools ($\tau_{00} = 0.07$), suggesting that the overall drinking environment is partially accountable for differences in alcohol misuse across schools. The risk for heavy drinking is approximately 20% lower on average in urban schools versus suburban schools and accounting for urbanicity of the school's location also leads to a 20% reduction in the variance component for the risk for heavy drinking. The average level of SES disadvantage of the community has a negative effect on alcohol misuse whereas the schools in communities with higher proportions of educated residents have an elevated average risk for heavy drinking. SES disadvantage was a particularly potent predictor of risk for alcohol misuse in that accounting for this characteristic decreases the variance component to 0.06. Overall, these two indicators of community-level SES suggest that the risk for heavy drinking is greater in more socioeconomically advantaged contexts. This analysis also demonstrates that the ethnic composition of the community is protective against the risk for heavy drinking in that the risk is lower in schools from communities characterized by high proportions of African American and Latino residents.

Discussion

This analysis confirms that there is significant variation in risk for adolescent alcohol misuse, particularly heavy drinking, across schools. More importantly, this variation is not completely accounted for by individual-level adolescent characteristics, but is associated with several distinct aspects of the school environment. Adolescents who attended schools in areas characterized as suburban, socioeconomically advantaged, and with a lower concentration of ethnic minority residents had a higher risk for heavy drinking on average. The risk for heavy drinking (versus non-drinking) was also increased in schools with high aggregate reports of frequent drunkenness, substantiating that the general social acceptability of normative binge drinking is a potent risk factor for alcohol misuse. There is considerably less variation and, subsequently, less contextual-level differentiation in the risk for moderate versus non-drinking across schools. The risk for moderate alcohol use is also higher in school communities with high concentrations of NHW residents and high average perceptions of safety. In general, prior work in this area has yielded mixed results for the relationship between substance abuse in general and indicators of community disadvantage. By focusing on school effects on alcohol misuse among a nationally representative sample of teens, this analysis is able to more definitively establish that the risk for alcohol misuse was greater in communities that are typically characterized as low risk in health research, much like the results reported by Ennett et al. (1997) and parallel to studies of adolescent tobacco use—also a widely available, licit substance—which is predicted by high SES at both the individual (Soteriades and DiFranza 2003) and school levels (Novak and Clayton 2001).

Why is the risk for alcohol misuse greater in environments which theoretically should be more protective against risky behaviors? As stated above, it is conceptually problematic to categorize alcohol use with other problem behaviors that have stronger social taboos and potentially more negative consequences. Explanations of deviant behavior may be a less germane to alcohol misuse early in the lifecourse in comparison to other theories that advocate the importance of social processes such as popularity, identity formation, or stress. Given the general ubiquity of alcohol in our culture, another explanation for the increased risk of alcohol misuse in more advantaged contexts is that drinking is a more tolerable form of teenage rebellion that provides a means of transgressing against the restrictions posed by adults without the more severe problems and stigma posed by other delinquent behaviors. As a counterpoint, the risk for other problem behaviors could outweigh the risk for alcohol misuse in disadvantaged communities, in which the risk for illicit substance use, for example is more common (Galea et al. 2004). For example, other investigations have reported the presence of greater “exposure opportunity” for cocaine relative to tobacco or alcohol use among youth in disadvantaged, urban environments (Crum et al. 1996). Although one of the strengths of this analysis was the focus on the specific association between the school context and alcohol misuse, the lack of a comparison of these contextual influences on other types of substance use restricts further exploration of this explanation and is an important direction for future research.

The results of this inquiry also highlight gaps in our explanatory knowledge of the relationship between social context and health. There is a disproportionate focus on the negative qualities of low SES communities and a tendency to assume that problem behaviors are particular to individuals within these communities. Although there is little disagreement that youth residing in communities with fewer institutional resources, lower collective efficacy, and a greater prevalence of ambient hazards have poorer health outcomes (Bradley and Corwyn 2002; Leventhal and Brooks-Gunn 2000), there is also evidence that parents residing in disadvantaged communities are also more cognizant of the effect of the community on their children (Galster and Santiago 2006). This suggests that families in more socioeconomically advantaged communities may underestimate the impact of the larger environment on their children’s behavior or assume that the influence of their schools and neighborhoods is uniformly positive. Thus, it may be productive to emphasize the importance of parental support and monitoring in buffering against the negative effects of the larger social context, particularly given that other work indicates that substance abuse among affluent teens is associated with a lack of parental closeness (Luthar and Becker 2002). Similarly, the finding that higher levels of perceived school safety are associated with the increased risk for moderate drinking could be attributed to the fact that there is less monitoring in communities perceived as ‘safe,’ which increase adolescent autonomy to experiment with various behaviors, including drinking. Although more research is needed to investigate this possibility, existing evidence suggests overall that parents and communities are as important targets for preventing adolescent alcohol misuse as individual teens.

Luthar and Becker (2002) indicate that the desire for popularity in particular precipitates substance abuse among boys, suggesting that social processes linked with identity formation may provide a productive direction for future research investigating the mediating processes between contextual risk factors and adolescent alcohol misuse. Their suggestion that certain processes may be more salient for boys versus girls also raises the possibility that the counterintuitive pattern between environmental advantage and alcohol misuse may be due to group differences in the effects of schools. Subgroup variation—that is, by gender, race/ethnicity, and SES—is not explored in this analysis, but other research indicates that the relationship between contextual influences and substance use varies across certain groups of teens (Hoffman 2006; Kim and McCarthy 2006; Lambert et al. 2004). Future analysis of subgroup differences would be a productive line of research that could help further

disentangle the relationship between community advantage and alcohol misuse, especially given that other work suggests that there is wide variability in the effects of SES on substance use (Bradley and Corwyn 2002).

This analysis addressed several analytic concerns that enhance the overall contribution of these findings. The systematic control of a comprehensive range of individual-level predictors, particularly baseline drinking status, was a methodological improvement upon prior multilevel studies of substance use which are largely cross-sectional (Aveyard et al. 2004). The stability of alcohol misuse evidenced in the individual-level analysis for this study also highlights the need to conduct future longitudinal studies of substance use within a multilevel framework in order to assess the role early environments play in the development of risky behavior. The decision to focus this analysis on alcohol misuse also addresses the conceptual and empirical complication raised in previous work which suggests that the influence of contextual disadvantage varies across mental health outcomes and that the use of composite measures leads to the potential underestimation of contextual effects (Wight et al. 2006).

There also are several limitations to the current study in need of acknowledgement. First, although these findings are generalizable to the general population due to the nationally representative sample, these results are more accurately generalizable of adolescents in schools. The Add Health data does not include, for example teens who are institutionalized or truant. Thus, it is possible that the relationships between the contextual-factors and alcohol misuse are underestimated because the most at-risk adolescents are underrepresented. Second, it would be useful to assess the association between individual-level binge drinking and other indicators of alcohol use in the school community, but the present analysis is constrained by the limits of existing data. Information on attitudes and perceptions of alcohol use were not included in the inschool Add Health survey, restricting the current analysis to aggregate frequency of drunkenness. This results in some conceptual overlap with the individual-level composite measure of binge drinking, although the samples that reported on each measure were quite different. The inschool portion of the Add Health data collection surveyed approximately 90,000 teens and largely represents the reported information of the individual's peers. It is difficult to eliminate the bias produced by endogeneity in this type of investigation, although the analysis controls for several individual-level characteristics in order to reduce it. Third, although this study used multilevel analysis to acknowledge the fact that individuals do not function independently of their environments, there are other potentially influential sources of nesting (e.g., families, classrooms, etc.) that were beyond the scope of the present investigation.

Another limitation to this inquiry is the focus of this analysis on schools, which implies the importance of peers as proximal socializing influences. While it is well established that peer drinking is a potent risk factor for adolescent alcohol misuse, this focus obscures the importance of early childhood risk factors such as parental alcoholism and family conflict. The analysis controlled for certain family characteristics at the individual level (e.g., SES and family structure), however, the absence of early childhood risk factors specific to alcohol misuse could potentially have resulted in the overestimation of school effects. Several studies have attempted to disentangle the importance of family versus peer influence using longitudinal methods and recent evidence demonstrates that these factors being interrelated with family risk factors are more germane to early initiation of alcohol use, and peer influences more likely to affect increases in alcohol use and problem drinking (Power et al. 2005; Duncan et al. 2006). It will be important for future research to link this active area of investigation to contextual research, in order to assess the relative impact of multiple domains of influence (e.g., family, peers, and environments) on adolescent drinking. Finally, this study investigates a linear relationship between alcohol misuse and several aspects of

community disadvantage, however, other work suggests a threshold effect for community disadvantage such that the influence of disadvantage on health is most potent in instances of high concentrations of impoverished or affluent residents (Duncan et al. 1997).

Overall, the findings from this analysis contribute to the literature acknowledging the importance of the social environment in fostering alcohol misuse during a developmentally sensitive period of the lifecourse. The fact that variation in the risk for heavy drinking across communities persists beyond several key individual-level risk factors suggests the effect of the school environment is not compositional. Rather, the general school climate exerts a potent influence on the risk for adolescent alcohol misuse. Given that adolescent drinking is often addressed in schools, these findings in conjunction with past research can be used to more effectively target the community in alcohol abuse prevention and ‘fit’ the particular social context. The finding that the overall risk for alcohol misuse is greater in advantaged school environments confirms a pattern suggesting the influence of the environment on health and risky behavior is not monolithic. That is, if a negative behavior such as underage drinking is more likely in environments characterized as both structurally and psychosocially adequate, the mechanisms through which environments affect health are likely more complicated than originally suggested. Future investigations are needed to assess the different pathways connecting social context and health that recognizes the diverse processes involved in the development of health problems and risky behaviors.

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Table 1

Baseline descriptive characteristics, 2-wave sample [weighted]

	% or Mean (SE)
<i>Individual-level characteristics (N = 10,574)</i>	
Alcohol misuse (Time 1)	
Non-drinker	55.8
Moderate	16.3
Heavy	27.9
Alcohol misuse (Time 2)	
Non-drinker	55.2
Moderate	12.7
Heavy	32.1
Gender	
Male	49.9
Female	50.1
Age group	
11–14	41.2
15–16	38.8
17+	20.0
Race/ethnicity	
Non-Hispanic White (NHW)	67.9
African American	14.8
Latino	11.8
Asian Pacific Islander (API)	3.8
Other	1.6
Socioeconomic status	
Parents' education (years)	13.6 (0.1)
Household income (1,000 s)	43.2 (1.7)
Family structure	
Two biological parents	57.6
Other	42.4
Close friends drink	
Yes	52.5
No	47.5
Access to alcohol at home	
Yes	28.5
No	71.5
<i>School-level characteristics (N = 128)</i>	
Grade structure	
Junior high	34.4
High school	42.2
Combination	23.4

	% or Mean (SE)
Size	
Small	13.3
Medium	26.6
Large	60.2
Ethnic distribution	
Predominantly minority	13.3
Heterogeneous	64.1
Predominantly NHW	22.6
Perceived school cohesion	3.6 (0.2)
Perceived safety at school	3.8 (0.2)
Frequency of drunkenness	0.6 (0.3)
Urbanicity	
Urban	26.7
Rural	14.8
Suburban	55.5
Socioeconomic disadvantage	-0.02 (0.8)
Proportion college educated	0.2 (0.1)
Proportion Non-Hispanic White	0.8 (0.2)
Proportion African American	0.2 (0.2)
Proportion Latino	0.1 (0.1)

Predicted probabilities of alcohol misuse at Time 2, by baseline drinking status and age group (weighted $N = 10,574$)

Table 2

		Probabilities of alcohol misuse (Time 2)							
		Young adolescents (11–14 years)			Middle adolescents (15–16)			Older adolescents (17+)	
		Non	Moderate	Heavy	Non	Moderate	Heavy	Non	Heavy
Alcohol misuse (Time 1)									
Non-drinker		0.79	0.11	0.10	0.78	0.10	0.12	0.76	0.15
Moderate drinker		0.37	0.30	0.33	0.37	0.25	0.38	0.35	0.42
Heavy drinker		0.25	0.11	0.64	0.23	0.08	0.69	0.20	0.73
Total		0.65	0.14	0.21	0.53	0.12	0.35	0.46	0.43

Unadjusted multilevel multinomial regression models predicting alcohol misuse at Time 2: school-level characteristics (weighted $N = 10,574$ adolescents, 128 schools)

Table 3

	Alcohol misuse (Time 2) ^a					
	Moderate drinking			Heavy drinking		
	RRR	CI	τ_{00}	RRR	CI	τ_{00}
<i>School characteristics</i>						
Grade structure ^b						
Junior high	0.82 **	(0.71, 0.95)	0.04 ***	0.39 ***	(0.28, 0.51)	0.27 ***
Combination	1.00	(0.81, 1.24)		0.56 **	(0.40, 0.79)	
Size ^c						
Small	0.94	(0.68, 1.31)	0.06 ***	0.80	(0.53, 1.21)	0.44 ***
Medium	1.07	(0.87, 1.31)		1.08	(0.78, 1.49)	
Ethnic distribution ^d						
Predominantly minority	0.93	(0.70, 1.24)	0.05 ***	0.54 *	(0.32, 0.91)	0.41 ***
Ethnically heterogeneous	0.80 *	(0.65, 0.99)		0.66 **	(0.50, 0.88)	
Perceived school cohesion	0.89	(0.54, 1.49)	0.05 ***	0.25 ***	(0.12, 0.50)	0.39 ***
Perceived safety at school	1.27 *	(1.04, 1.56)	0.04 ***	0.88	(0.57, 1.36)	0.45 ***
Frequency of drunkenness	1.46 **	(1.14, 1.87)	0.05 ***	5.81 ***	(4.24, 7.99)	0.12 ***
<i>School community characteristics</i>						
Urbanicity ^e						
Urban	1.08	(0.92, 1.26)	0.05 ***	0.76	(0.57, 1.02)	0.42 ***
Rural	1.03	(0.80, 1.33)		0.93	(0.62, 1.40)	
Socioeconomic disadvantage	0.91	(0.82, 1.00)	0.05 ***	0.71 ***	(0.61, 0.83)	0.37 ***
Proportion college educated	1.64	(0.90, 3.01)	0.06 ***	3.21 *	(1.13, 9.13)	0.43 ***
Proportion Non-Hispanic White	1.81 ***	(1.41, 2.33)	0.02 ***	3.78 ***	(1.97, 7.25)	0.33 ***
Proportion African American	0.68 *	(0.47, 0.98)	0.05 ***	0.17 ***	(0.08, 0.34)	0.30 ***
Proportion Latino	0.80	(0.58, 1.11)	0.06 ***	0.51 *	(0.29, 0.91)	0.42 ***

- ^aReference group is non-drinkers (Time 2)
- ^bReference group is high schools
- ^cReference group is large schools
- ^dReference group is predominantly NHW students (94–100%)
- ^eReference group is suburban schools
- * $p<.05$
- ** $p<.01$
- *** $p<.001$

Table 4

Multinomial logistic regression predicting alcohol misuse at Time 2: adolescent characteristics (weighted $N = 10,574$ adolescents, 128 schools)

	Model 1		Model 2		Model 3	
	Moderate β (SE)	Heavy β (SE)	Moderate β (SE)	Heavy β (SE)	Moderate β (SE)	Heavy β (SE)
<i>Baseline alcohol misuse^a</i>						
Moderate drinker	1.51(0.12) ***	1.77(0.06) ***	1.50(0.11) ***	1.75(0.06) ***	1.39(0.10) ***	1.54(0.07) ***
Heavy drinker	1.36(0.17) ***	3.08(0.08) ***	1.37(0.20) ***	3.04(0.09) ***	1.20(0.24) ***	2.69(0.09) ***
<i>Demographic characteristics</i>						
Male (versus females)	-0.38(0.06) ***	0.11(0.08)	-0.40(0.06) ***	0.11(0.08)	-0.39(0.06) ***	0.13(0.09)
<i>Baseline age group^b</i>						
15–16 years	-0.05(0.06)	0.15(0.10)	-0.02(0.06)	0.21(0.09) *	-0.06(0.07)	0.12(0.10)
17 years and older	-0.15(0.11)	0.30(0.10) **	-0.14(0.12)	0.37(0.09) ***	-0.18(0.11)	0.29(0.09) **
<i>Socioeconomic status</i>						
Parents' education (years)			0.05(0.02) **	0.04(0.02) *	0.04(0.02) *	0.04(0.02) *
Family income (logged)			0.11(0.10)	-0.02(0.09)	0.11(0.09)	-0.01(0.08)
<i>Race/ethnicity^c</i>						
African American			-0.21(0.18)	-0.93(0.15) ***	-0.20(0.18)	-0.91(0.15) ***
Latino			0.11(0.15)	-0.15(0.09)	0.12(0.14)	-0.11(0.08)
Asian/Pacific Islander			0.09(0.12)	-0.59(0.08) ***	0.11(0.13)	-0.53(0.09) ***
Other			-0.57(0.38)	-1.04(0.52) *	-0.60(0.38)	-1.09(0.55) *
Two biological parents (versus other)			-0.27(0.08) ***	-0.17(0.06) **	-0.27(0.08) **	-0.17(0.06) **
<i>Drinking norms</i>						
Friends drink (versus not)					0.29(0.10) **	0.74(0.07) ***
Accesses alcohol at home (versus not)					0.25(0.12) *	0.17(0.07) *
Constant	-1.79(0.07) ***	-2.19(0.10) ***	-2.66(0.29) ***	-2.33(0.28) ***	-2.76(0.30) ***	-2.64(0.27) ***
<i>Intercept variance component</i>						
τ_{00}	0.03 ***	0.19 ***	0.03 *	0.11 ***	0.02 *	0.10 ***

- ^aReference group is non-drinkers (Time 1)
- ^bReference group is 11–14 years
- ^cReference group is Non-Hispanic White
- * $p < .05$
- ** $p < .01$
- *** $p < .001$

Table 5

Adjusted multilevel multinomial regression models predicting alcohol misuse at Time 2: school-level characteristics (weighted $N = 10,574$ adolescents, 128 schools)

	Alcohol misuse (Time 2) ^a					
	Moderate drinking			Heavy drinking		
	RRR	CI	τ_{00}	RRR	CI	τ_{00}
<i>School characteristics</i>						
Grade structure ^b						
Junior high	1.15	(0.95, 1.39)	0.02 *	0.88	(0.70, 1.12)	0.10 ***
Combination	0.11	(0.97, 1.51)		0.86	(0.66, 1.12)	
Size ^c						
Small	1.02	(0.76, 1.37)	0.02 *	0.77	(0.57, 1.04)	0.10 ***
Medium	1.08	(0.88, 1.33)		0.96	(0.76, 1.22)	
Ethnic distribution ^d						
Predominantly minority	0.97	(0.70, 1.34)	0.02 *	0.79	(0.53, 1.17)	0.10 ***
Ethnically heterogeneous	0.83	(0.64, 1.08)		0.95	(0.74, 1.21)	
Perceived school cohesion	1.21	(0.71, 2.07)	0.02 *	0.63	(0.37, 1.08)	0.10 ***
Perceived safety at school	1.31 *	(1.04, 1.65)	0.01 *	0.98	(0.74, 1.30)	0.10 ***
Frequency of drunkenness	1.05	(0.73, 1.51)	0.02 *	1.87 **	(1.31, 2.66)	0.07 ***
<i>School community characteristics</i>						
Urbanicity ^e						
Urban	1.06	(0.89, 1.26)	0.02 *	0.80 *	(0.66, 0.97)	0.08 ***
Rural	1.03	(0.81, 1.31)		0.81	(0.60, 1.10)	
Socioeconomic disadvantage	0.96	(0.85, 1.10)	0.02 *	0.78 ***	(0.68, 0.88)	0.06 ***
Proportion college educated	0.92	(0.46, 1.84)	0.02 *	2.39 *	(1.12, 5.04)	0.09 ***
Proportion Non-Hispanic White	1.59 *	(1.09, 2.30)	0.01 *	1.54	(0.89, 2.68)	0.10 ***
Proportion African American	0.94	(0.53, 1.68)	0.02 *	0.47 *	(0.24, 0.91)	0.09 ***
Proportion Latino	0.78	(0.56, 1.08)	0.02 *	0.57 **	(0.38, 0.86)	0.09 ***

Note Adjusted for Time 1 alcohol misuse, gender, age, parental education, income, race/ethnicity, family structure, peer drinking, and access to alcohol

- ^aReference group is non-drinkers (Time 2)
- ^bReference group is high schools
- ^cReference group is large schools
- ^dReference group is predominantly majority (NHW) students
- ^eReference group is suburban schools
- * $p < .05$
- ** $p < .01$
- *** $p < .001$