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Rural Community Characteristics, Economic Hardship, and Peer and Parental Influences in Early Adolescent Alcohol Use

Laura De Haan[1], Tina Boljevac[1], and Kurt Schaefer[1]

Abstract

The study explores how differences in rural community contexts relate to early adolescent alcohol use. Data were gathered from 1,424 adolescents in the sixth through eighth grades in 22 rural Northern Plains communities, as well as 790 adults, parents, teachers, and community leaders. Multilevel modeling analyses revealed that community supportiveness, as perceived by adolescents, but not adults, was associated with less lifetime and past month alcohol use, and for past month use, this relationship was stronger than perceived peer drinking or parental closeness. Perceived peer drinking and parental closeness were not associated with past month use. Adolescents experiencing family economic strain did not report greater lifetime or past month use, but living in a disadvantaged community was associated with greater past month use. Relatively affluent adolescents reported greater past month use when living in a poor community than did poorer adolescents, highlighting relationship complexity between economic disadvantage and alcohol use.

Keywords

adolescent alcohol use, community effects, rural adolescents

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Much is known about individual, family, and peer influences on adolescent alcohol use, particularly in urban settings but little is known about alcohol use in rural settings, especially in relation to community influences. Although engaging in alcohol use presents obvious risks, many drink during adolescence without serious long-term effects (Maggs & Hurrelmann, 1998). Enduring negative consequences have been predicted, however, by early age of both initiation and heavy use, both of which are linked to greater use through adulthood (Chassin, Pitts, & Prost, 2002; Guo, Collins, Hill, and Hawkins, 2000; Wilson, Battistich, Syme, & Boyce, 2002). The preadolescent years (ages 10-2) are suggested as a "particularly vulnerable period for the development of early alcohol dependence and abuse" (Gruber, DiClimente, Anderson, & Lodico, 1996, p. 298).

Recent studies comparing rural and urban adolescents have found either no differences in alcohol initiation or consumption (Donnermeyer, 1992) or that rural adolescents drink alcohol more frequently (Atav & Spencer, 2002; Lambert, Gale & Hartley, 2008; National Center on Addiction and Substance Abuse at Columbia University [CASA], 2000). Despite higher overall patterns of consumption, considerable variability in alcohol use exists among rural communities. One study of rural communities found a range of 35% to 85% in average eighth grade lifetime alcohol use (Peters, Oetting, & Edwards, 1992), and heavy drinking averaged from 1% to 29% among rural adolescents in another community study (Roski, Perry, McGovern, Williams, Farbakhsh, & Veblen-Mortenson, 1997). Factors explaining this community heterogeneity have not been identified, but community norms (Harrell & Cisin, 1980; Leukefeld, Clayton, & Myers, 1992) and higher levels of rurality (Lambert et al., 2008) have been suggested. Leukefeld et al. (1992) call for research that considers "rural substance abuse in terms of the community context in which the substance abuse occurs" (p. 111).

Although community influences on rural adolescent substance use have not been routinely studied, risk indicators have been linked to rural contexts, including socioeconomic status (Wills, Pierce, & Evans, 1996) and deterioration in social and economic life (Bickel & McDonough, 1997). Farm families reported higher community involvement, more socially resilient youth (Elder & Conger, 2000), and farm-based adolescents reported less frequent alcohol use than nonfarming rural families (Krohn, Lanza-Kaduce, & Akers, 1984). Adolescent risk taking was higher in rural communities struggling financially (Bickel & McDonough, 1997). Socioeconomic status appears important, as rural counties have among the highest poverty rates and experience more extreme and persistent poverty (Weber, Jensen, Miller, Mosley, & Fisher, 2005).

Few studies have examined rural community influences although neighborhood influences have been identified in urban neighborhoods (Sampson, Raudenbush, & Earls, 1997; Sampson, 1997). Social controls within neighborhoods may be as important for children's development as the more proximate controls inside the home (Furstenberg, 1993). The "collective efficacy," or monitoring capacity, of neighborhood adults has been found to deter problem behavior in urban youth (Sampson & Raudenbush, 1999; Sampson, Raudenbush, & Earls, 1997). Urban neighborhoods with lower social cohesion and higher percentages of poor families had higher adolescent substance use (Duncan, Duncan, & Strycker, 2002). Neighborhood stability and concentrations of affluent neighbors, however, were found protective (Brooks-Gunn, Duncan, Klebanov, & Sealand, 1993; Sampson, Morenoff, & Earls, 1999).

Jencks and Meyer (1990) theorized several paths urban neighborhoods may affect adolescent behavior, pathways that have received empirical support in urban studies. One suggested way is the *relative deprivation and affluence* of neighbors, where adolescents develop their own assessment of their economic situation in comparison to neighbors. The second is *collective socialization*, or the ability for neighborhoods to assemble necessary levels of social cohesion and support that provides a positive context for adolescents. Applying these constructs to rural communities would distinguish those factors most able to explain community differences in adolescent alcohol use. It is unknown whether these theoretical pathways are equally effective in rural contexts, but due to the tight-knit nature (Conger & Elder, 2000) and geographic boundaries (Scaramella & Keyes, 2001) of many rural communities, it is certainly plausible that differences in rural community contexts will affect alcohol use in rural, as well as urban, contexts. As living in a rural environment clearly does not protect adolescents from alcohol use (Lambert et al., 2008), examining these links is essential. It is unknown which aspects of community context are associated with early adolescent drinking.

Duncan and Raudenbush (2001) noted several difficulties in neighborhood-effects studies including gathering data from too few communities, reducing effects to mere income level, and measuring dependent and independent variables with the same adolescent or parent self-report. Community leaders are suggested as being capable of providing more reliable data on community characteristics than simple census data. They suggest pooling perceptions of at least 30 capable informants, such as parents, teachers, or law enforcement to assess community norms.

In order to determine the relative weight of community-level effects, one must examine such influences alongside variables with demonstrated

association to adolescent alcohol use. Links between parent and peer relationships and adolescent alcohol use have been well documented. Parents affect adolescent alcohol use though family support (Cleveland, 2003) and attitudes towards adolescent drinking (Donovan et al., 2004; Williams & Hine, 2002). Peer approval of alcohol, however, is linked to greater use (Cleveland, 2003) although rural youth may be less influenced by peers than urban adolescents (Donnermeyer, 2006).

This study applies theoretical concepts derived from urban neighborhood studies, that is, relative deprivation and collective socialization, testing whether they are significantly related to early adolescent initiation and past month alcohol use. We will examine whether rural adolescents are more likely to report both initiation and past month alcohol use in communities characterized by lower support and lower collective efficacy. Community-level poverty will also be explored to determine if it is more closely linked to adolescent alcohol initiation and past month use than individual-level poverty. Finally, we will examine the relative importance of community influences when known individual correlates of alcohol initiation (parental relations and peer use) are also examined.

Several strategies will be employed to examine rural community influences. Data will be gathered from adolescents, parents, community leaders, and census data, which provides a more comprehensive portrait of community life. This follows the model used by many studies of urban neighborhood effects. Multilevel modeling allows us to conceptualize both the individual and the community as levels of analysis, as individual behavior is nested within unique communities. Multilevel modeling permits relationships between individual and community constructs to function across different levels (Luke, 2004).

Method

Sample

As part of a larger project, four states were selected from among those highest in adolescent (aged 12-17) binge drinking (U.S. *Department of Health and Human Services* [DHHS], 2000): North Dakota, South Dakota, Wyoming, and Wisconsin. Because many rural towns consolidate middle schools, we determined which rural communities had schools serving sixth through eighth grade students in each state. The data were stratified in two additional ways: population and proximity from urban areas, resulting in a narrowed list of 360 towns (101 in North Dakota, 108 in South Dakota, 117 in Wisconsin, and

34 in Wyoming). Communities were contacted randomly, until 22 middle school principals agreed to participate (response rate 63%). There were seven in North Dakota, seven in Wisconsin, five in South Dakota, and three in Wyoming. Ten communities were 30 to 75 miles away from urban areas, and 12 were more than 75 miles away. Eight communities had populations between 250 and 500, seven between 501 and 1,000, and seven between 1,001 and 2,500. Community population ranged from 319 to 2,485, with an average population of 936. Fourteen communities were in frontier counties (less than seven residents per square mile).

Adolescents

In each community, all adolescents from sixth through eighth grades were asked to participate. If more than one public school served sixth through eighth grade students in a given community, public or private, all schools were surveyed. The adolescent sample of 1,424 6th-8th graders was 47% male and 84% White, with a mean age of 12.5 years (see Table 1). The response rate was 73%.

Adults

We interviewed parents, teachers, and other leaders from each community. At least 30 adult interviews, including parents, were collected from each community, but due to differences in community size, adult interviews ranged from 32 to 49, with an average of 36 adults.

Parents. Twenty percent of adolescent parents were randomly chosen from each community, resulting in 244 parent interviews (an average of 11 per community). When parents gave consent for their child's participation, they were also asked whether they would be willing to participate in a telephone interview. If there were more volunteers than needed, parents were selected at random. Parent data were not matched to individual children but aggregated as a reference group. Parents were asked about perceptions of their community, including attitudes toward adolescent drinking. They were not asked about activities of their own adolescent children, so it was not problematic if they had more than one child in sixth through eighth grades. Because fathers tend to have more permissive attitudes towards adolescent drinking than mothers (DeHaan & Thompson, 2003), efforts were made to obtain an equal number of fathers and mothers. Single parent homes were interviewed regardless of gender. Step-parents could participate provided they were living in the child's primary residence (see Table 1).

Table 1. Characteristics of Adolescent and Adult Samples

	n	%	n	%
Race (several indicated more than one)				
White	1268	82	777	98
Hispanic	57	4	9	.1
African American	16	1	0	0
Native American	107	7	5	< .1
Asian	29	2	1	< .1
Grade				
6	441	32		
7	486	35		
8	478	33		
Place of residence				
Town	760	53		
Farm	264	19		
Country, not farm	393	28		
Status of biological parents				
Currently married to each other	889	65		
Currently separated	330	24		
One or both parents deceased	51	3		
Never married to each other	99	7		
Plans after high school				
Go to college, more education	1002	71		
Find a job	101	7		
Join the military	120	9		
Don't know	195	14		
Group membership (adults)				
Parent of a 6th, 7th, or 8th grader			244	31
Teacher			216	27
Principal			24	3
School counselor			19	2
Law enforcement			24	3
School/Community administration			43	5
Pastor/Youth minister			61	8
Coach/Youth club leader			61	8
Business owner that employs youth			21	3
Other school employee			59	8
Attends youth activities			18	2

Community leaders. All sixth through eighth grade teachers in each community were asked to participate, with an average of 9.82 teachers per community. Community leaders in each location included the following: law

enforcement officers, school principals, social services coordinators, mental health counselors, newspaper editors, mayors, clergy, agencies scout or 4H leaders, coaches, or local farmers who hired youth. We identified leaders by working with community schools and social service. As some leaders fit in several groups, a primary group was selected. Due to the small size of communities, we surveyed all available teachers, law enforcement, principals, and counselors. Clergy and business owners were selected randomly. Every effort was made to obtain comparable samples of community leaders across communities, but community leader sample size varied slightly. The combined adult sample was 98% White, 42% male, with 70% having children under the age of 18. The average age was 44.0 years, ranging from 20 to 81. A third of the adult sample were parents, 27% were teachers, and the rest were community leaders. Response rate was 86%.

Census data

Census data was obtained for each of the 22 communities (U.S. Census Bureau, 2000) using American Factfinder. Thirteen demographic variables were selected for analysis, based on models developed by Schaefer, DeHaan, and Boljevac (2009). These variables were used to create the three, factor-based community economic indicators, described in the method section.

Procedures

Data were collected from adolescents and adults in 22 communities. Adolescents completed the surveys during school time. Adult surveys were administered through telephone. Telephone surveys were selected as the optimal strategy for adults, as they significantly increase response rates over a mail-in pencil and paper strategy and because they allow interviewers to clarify misunderstandings regarding individual items. This strategy is most commonly used for survey questions not deemed too personal or intrusive for personal interview (Nardi, 2006). For each person (student or adult) who participated, US$10 was donated to participating schools.

Measures

Dependent Variables (indicated by adolescent self report). Lifetime *alcohol usage* was assessed with a single question: "Have you ever tried alcoholic beverages, such as beer, wine, or hard liquor?" *Past month alcohol use* was assessed with three items (Armor & Polich, 1982): "How many days

in the past month (30 days) did you drink beer? wine? and hard liquor?" Responses ranged from 0-30 days and were collected for each item (beer, wine, and hard liquor) and then summed. Internal consistency was .70. Lifetime use is an important indicator in early adolescence, as early initiation is linked with adverse short and long-term effects. Past month use is an important indicator of more serious levels of risk behavior.

Independent Variables

Unless otherwise indicated, all scales are Likert in type. Adolescent responses were averaged (provided they answered a majority of questions for each scale), and then summed, to minimize the effects of missing data (see Table 2 for a summary of measures).

Level-1, or individual, variables (indicated by adolescent self report)

Community supportiveness was assessed by an eight-item scale developed by Chipeur et al. (1999). Items' wording was changed from "neighborhood" to "community," as the original scale had been developed for an urban sample.

Perceived peer alcohol prevalence was assessed with a six-item scale developed by Beck and Treiman (1996). The scale assessed the alcohol-related perceived social norms of "other kids at school." Items focused on drinking frequency and intensity, alcohol-impaired driving, and binge drinking. One item was deleted due to a lower item-total correlation.

Economic strain was assessed with seven items (Connor-Smith et al., 2000) developed for adolescents and measures adolescent perceptions of economic strain. Many adolescents may not be aware of the exact nature of family financial income but are more aware of stressors associated with hardship. Economic strain was significantly and negatively associated with socioeconomic status among rural adolescents (Wadsworth & Compas, 2002).

Parental closeness was assessed with a 16-item scale modified by Lempers, Clark-Lempers, and Simons (1989). Discipline, affection, and communication were assessed. Four items with lower item-total correlations were deleted.

Level 2, or community-aggregated, variables (indicated by adult self-report and census indicators)

Collective efficacy. This 10-item measure was developed by Sampson and Raudenbush (1999). It asked adults whether neighbors would get involved in

Table 2. Psychometric Properties of Independent Variables for Both Adolescents and Adults

Scale	Number of Items	α in Validation Study	in Current Study	Sample Items
Level 1 variables (completed by adolescents)				
Community support	8	—	.91	If I needed help, I could go to anyone in my community. I feel okay asking for help from my neighbors
Perceived peer prevalence	8	.85	.91	How often do other kids your age get drunk? How often do other kids your age drink alcohol?
Economic strain	7	.90	.92	There's no money left to do something fun as a family. My family doesn't have enough money to pay the bills
Parental closeness	16	.80	.86	My parents try to understand how I see things. My parents soon forget rules they have made (−)
Level 2 variables (completed by adults)				
Collective efficacy	10	.80	.86	Would neighbors get involved if children were loitering on the street corner? This is a close-knit neighborhood
Community support	8	–	.81	In this community, everyone is willing to help each other. In this community, people support each other

a variety of circumstances, such as loitering on the street corner. The measure also included items related to social cohesion. One item with a lower item-total correlation was deleted. As this was a community-level indicator, scores were aggregated to create one score for each community.

Community supportiveness was assessed by an eight-item scale, also completed by adults. This scale was developed by Chipeur et al. (1999) and is identical to the scale used with adolescents. All adult scores were aggregated to create one score for each community.

Census-based community economic indicators

After review of current approaches in the measurement of neighborhood effects and conducting a series of Monte Carlo bootstrap investigations of each model, Schaefer, DeHaan, and Boljevac (2009) found that the optimal approach to measurement of community indicators occurred when census derived economic variables were standardized and then summed within three categories (relative disadvantage, housing stability, and relative advantage). This strategy outperformed two other common approaches of community indicators. Data reduction outperformed retaining original variables because of reduced multicollinearity. Summing of standardized variables was also found to reflect community economic circumstances more accurately than principal component analyses (see article for additional information regarding this approach). The adopted method organized socioeconomic status variables into three categories: concentrated disadvantage, housing stability, and concentrated advantage. Individual variables were standardized into zero-mean, unit-variance variables, and then summed within each of three groups of economic variables.

Concentrated Disadvantage was assessed with seven census-based, summed indicators: town-level child poverty rate, town family poverty rate, percentage of female-headed households, percentage of adult population with less than high school education, percentage of population White, and unemployment rate. As concentrated disadvantage is a measure of community poverty, a quadratic equation of this measure would compare relatively middle class communities to both lower and upper class communities, so this variable was also created. Component loadings ranged from .58 to .92, with an average factor loading of .67, accounting for 45% of the variance.

Housing stability was assessed with two census-based indicators: ratio of renter-occupied to owner-occupied housing, and changes in proportion of renter-occupied housing between 1990 and 2000. The component loading was .72, accounting for 52% of the variance.

Concentrated Advantage/Affluence was assessed with four census-based indicators: percentage of high school graduates, percentage with at least a bachelor's degree, the product of median income and family poverty rate (standard measure of relative concentration of affluence), and median household income. Component loadings ranged from .46 to .97, with an average factor loading of .75, accounting for 61% of the variance.

Analyses

Several preliminary analyses were conducted. To reduce missing data, scales were averaged (provided respondents had answered a majority of questions)

and then summed. In the adolescent population, missing data ranged from 0% to 2% among the six scales. If scale answers had not been averaged, missing data would have ranged from 0% to 9%. Among adults, missing data was originally 1% for both measures, but after measures were averaged there were no missing data in the adult sample.

We also examined for possible differences in alcohol consumption by several of the unique characteristics of our sample. Chi-square analyses revealed several state-level differences in lifetime use ($\chi^2(3) = 22.21$, $p < .001$). Post hoc comparisons indicated that adolescents in Wyoming were significantly more likely to report lifetime use than those in the Dakotas, and adolescents in Wisconsin reported more lifetime use than those in South Dakota. One-way analyses revealed no state-level differences in past month use, $F(3, 646) = 1.15$, p is *ns*.

We next examined whether the incidence of lifetime and past month use would be explained by known correlates of alcohol use in this rural population. We also explored whether factors that have been shown to affect alcohol use in urban environments, that is, adult perceived collective efficacy, community supportiveness, and census-based economic indicators, would demonstrate a similar relationship in rural environments.

A common issue with community samples focused on drug or alcohol use is that the dependent variable is highly skewed. With the present data, 85% of the sample reported no past month use. These types of data cause extreme violations of methods that assume normality of residuals. One alternative is to reduce the dependent variable to a binary or perhaps ordinal variable, but this discards important information regarding drinking severity. Intuitively, the data not only represent two phenomena: drinking versus no drinking but also the extent of drinking for those who do. A class of statistical models called zero-inflated models has been developed for precisely this type of data (Atkins & Gallop, in press; Long, 1997). These statistical procedures include two submodels: (a) a logistic regression that predicts presence or absence of events and (b) a count regression model (i.e., Poisson or negative binomial regression) that models the nonzero frequency distribution. Predictors can be included in one or both parts of the model (i.e., variables may predict presence of any drinking [logistic], and/or the rate of drinking [count regression]).

Because the data were nested within communities, multilevel (or mixed-effects) ZINB (Yau, Wang, & Lee, 2003) and logistic regression (Raudenbush & Bryk, 2002) were used to account for the correlation due to nesting. Two sets of multilevel models were conducted for each dependent variable. The first level included individual characteristics and the second level included community characteristics. Preliminary analyses demonstrated that a zero-inflated negative binomial (ZINB) model provided the best fit to the past

month use data, whereas a logistic regression was used for the lifetime use data. Analyses for the logistic models were completed in HLM 6.01, and the ZINB regression models were completed in R version 2.4.0 using code developed by Yau and colleagues (Yau et al., 2003). The individual model for lifetime use can be denoted as

$$\text{Level 1 Prob (LIFETIME USE = 1}\beta) = \varphi, \text{Log}[\varphi/1-\varphi]\eta$$
$$\eta = \beta_0 + \beta_1 \text{ (COMM SUP)} + \beta_2 \text{ (PEER)}$$
$$+ \beta_3 \text{ (ECON STRN)} + \beta_4 \text{ (PARNT)}$$
$$\text{Level 2 } \beta_0 = \gamma_{00} + u_0$$
$$\beta_1 = \gamma_{10}$$
$$\beta_2 = \gamma_{20}$$
$$\beta_3 = \gamma_{30}$$
$$\beta_4 = \gamma_{40}$$

||I|| while the full model for lifetime use, with the inclusion of community-level effects, can be denoted as:

$$\text{Level 1 Prob (LIFETIME USE = 1}\beta) = \gamma, \text{Log}[\varphi/1-\varphi]\eta$$
$$\eta = \beta_0 + \beta_1 \text{ (COMM SUP)} + \beta_2 \text{ (PEER PREV)}$$
$$+ \beta_3 \text{ (ECON STRN)} + \beta_4 \text{ (PARNT)}$$
$$\text{Level 2 } \beta_0 = \gamma_{00} + \gamma_{01} \text{ (COM SUP)} + \gamma_{02} \text{ (PEER)} + \gamma_{03} \text{ (ECON STRN)}$$
$$+ \gamma_{04} \text{ (PARNT) } u_0$$
$$\beta_1 = \gamma_{10}$$
$$\beta_2 = \gamma_{20}$$
$$\beta_3 = \gamma_{30} + \gamma_{31} \text{ (ECON STRN)} + \gamma_{32} \text{ (QUADECON STRN) ||I||}$$
$$\beta_4 = \gamma_{40}$$

||I|| Results

Lifetime use varied considerably in the 22 communities, with averages of 21% to 69% of community adolescents reporting lifetime use. Past month use also exhibited sizeable variability, with reported community averages ranging from 0 to 14 days of past month alcohol use. Although the adult sample was comprised of diverse members (i.e., parents, teachers, and several community leaders), the interclass correlations (ICC) were high for the variables taken from the adult sample. The ICC for community supportiveness was .87, with a range of .81 to .95, indicating a robust level of agreement

among adults in each community. The ICC for collective efficacy was .83, with a range from .65 to .90.

Because parents and peers often have an interactive effect in relation to adolescent alcohol use (Wood, Read, Mitchell & Brand, 2004), preliminary multilevel analyses included this interaction. As this interaction was not significant ($OR = 1.01$, $p < .87$), it was not retained in subsequent analyses. All three economic indicator variables were examined in preliminary analyses, housing stability, concentrated disadvantage, and concentrated affluence. Because housing stability and concentrated affluence variables were not related to either dependent variable in multilevel analyses, and the limited power in our level-2 analysis, these variables were dropped from subsequent analyses.

Individual level models. The first model includes level-1 predictors only. The best fit included random-effects, indicating notable variability across towns in both lifetime drinking as well as in frequency of past month use. All variables were standardized to $\overline{\text{X}} = 0$ and $SD = 1$. Logistic regression models (used for the lifetime use dependent variable) are fit on the log-odds, or logit, scale. An OR of less than 1.0 indicates a negative association with lifetime use (or less chance of lifetime use, whereas an OR greater than 1.0 is positively associated with lifetime use. Count regression models (used for past month use), including the negative binomial model, are fit on a log-scale. Thus, for the past month use models, which employed a ZINB regression, an e^β of greater than 1.0 indicates greater levels of past month use, whereas an e^β of less than 1.0 indicates less past month use.

Lifetime use. Table 3 shows the modeled associations between early adolescent individual- and community-level predictors and lifetime alcohol use. Each *SD* increase in community support was associated with a 20% decrease ($OR = 0.80$, $p < .001$) in the rate of adolescents ever having tried alcohol. There was similar effect in terms of parental closeness. Each *SD* increase in parental closeness was associated with the probability of lifetime use dropping by nearly a third ($OR = 0.71$, $p < .001$). Conversely, for each *SD* increase in perceived peer prevalence of adolescent drinking, the rate of having tried alcohol more than doubled ($OR = 2.12$, $p < .001$). Perceptions of familial economic strain were not significantly related to alcohol use ($OR = 0.94$, $p = .51$, *ns*.).

Past month use. As shown in Table 3, perceptions of parental closeness ($e^\beta = 0.54$, $p < .001$) were associated with significantly less past month use, and individuals reporting greater economic strain were also significantly less likely to report past month use ($e^\beta = 0.68$, $p < .01$). Perceived peer drinking ($e^\beta = 1.11$, $p = .32$, *ns*) was not related to past month alcohol use. Community

Table 3. Individual and family level models for both past month and lifetime use of alcohol among rural early adolescents

| | Individual Indicators | | | | Individual and Community Indicators | | | |
| | Lifetime Use (n = 1,375) | | Past Month Use (n = 1,350) | | Lifetime Use (n = 1,375) | | Past Month Use (n = 1,350) | |
	OR	CI	e^β	CI	OR	CI	e^β	CI
Individual indicators								
Intercept	0.94	(0.77, 1.15)	0.87	(0.63, 1.20)	0.94	(0.69, 1.29)	1.04	(0.71, 1.53)
Community Support	0.80***	(0.69, 0.93)	0.66*	(0.47, 0.92)	0.82**	(0.72, 0.94)	0.46***	(0.32, 0.65)
Perceived peer drinking	2.12***	(1.86, 2.42)	1.11	(0.90, 1.38)	2.16***	(1.89, 2.47)	1.16	(0.92, 1.46)
Economic strain	0.94	(0.77, 1.14)	0.68**	(0.51, 0.91)	1.02	(0.88, 1.18)	0.93	(0.64, 1.35)
Parental relationship	0.71***	(0.64, 0.80)	0.54**	(0.33, 0.88)	0.71***	(0.62, 0.81)	0.76	(0.49, 1.19)
Community indicators								
Adult collective efficacy					1.72	(0.21, 13.86)	0.34	(0.07, 1.53)
Adult community support					0.97	(0.80, 1.16)	0.91	(0.78, 1.05)
Concentrated disadvantage					1.04	(0.92, 1.17)	1.23**	(1.06, 1.42)
Concentrated disadvantage (quadratic)					1.00	(0.96, 1.04)	0.92***	(0.871, 0.96)
Interactions								
Economic strain × concentrated disadvantage (quadratic)					0.98*	(0.97, 0.99)	0.95*	(0.91, 1.00)

*p < .05. **p < .01. ***p < .001.

supportiveness was associated with less past month use, as each *SD* increase was associated with a third less past month use ($e^\beta = 0.66$, $p < .05$).

Full models. Additional community-level indicators were added to the full models, to examine both adult perceptions of the community and census-level indicators. When examining lifetime use, none of the community level indicators added additional significant variance to the model, suggesting that adolescent perceptions of individual and community factors were more influential in lifetime use than adult perceptions or census-based indicators.

Several community-level indicators were related to past month use, and several individual-level indicators were no longer significant when community-level indicators were added. Perceptions of both individual economic strain and parental relationship were no longer significantly related after this addition. Both concentrated disadvantage ($e^\beta = 1.23$, $p < .01$) and the quadratic of concentrated disadvantage, which contrasts relatively middle class communities ($e^\beta = .92$, $p < .001$) were strongly related to past month use, suggesting that adolescents living in both lower and middle class communities were more likely to report greater past month use than adolescents living in less disadvantaged communities. The interaction between quadratic concentrations of disadvantage and individual economic strain was also significant ($e^\beta = .95$, $p < .05$), indicating that highest levels of past month use occurred for individuals reporting low levels of economic strain and living in communities with moderate or high concentrations of disadvantage (see Table 3).

Discussion

This study explores how rural community features relate to early adolescent alcohol initiation and use and how these characteristics interact with known correlates of adolescent use, peers, and parents. Alcohol use among rural adolescents is an important but understudied topic, and little is known about why adolescents in some rural communities initiate alcohol use so much earlier than adolescents in others. Our study sought to apply models of community influences, theorized and tested in urban environments, to rural communities as a possible explanation for this heterogeneity.

Community differences in adolescent alcohol use were indeed present in this homogeneous sample of 22 very rural, White middle school students in the Northern Plains. Lifetime use ranged from 21% to 69%. Average past month use also ranged from 0 to 14 days across community. This indicates that rural students should not be considered as a homogeneous group. The very high averages reported in several communities highlights the fact that community context plays an important role in rural as well as urban environments.

Collective socialization as an explanation for rural adolescent alcohol use

Community features, particularly as perceived by adolescents, were related to both lifetime and past month use for rural adolescents in middle school. Consistent with collective socialization theories, adolescent perceptions of community supportiveness were significantly linked with both delays in first use of alcohol as well as reporting less past month alcohol use. This is noteworthy as community supportiveness has not been routinely considered in studies of adolescent substance use. Adolescent perceptions of a supportive community, containing adults interested in both their activities and well-being, appeared to be a strong protective factor for rural adolescents.

Contrary to research in urban environments (Duncan, Duncan, & Strycker, 2002), adult perceptions of community supportiveness and collective efficacy were not significantly linked to alcohol use. One possible reason for this discrepancy could be the limited power in our study (i.e., the small number of communities), or that rural adults were less able than urban adults to detect their community's ability to effectively support adolescents. There may also be less variation in adult perceptions of collective efficacy and supportiveness in rural contexts, giving these measures less predictive utility.

Relative deprivation as an explanation for rural adolescent alcohol use

The relationship between personal economic strain, community poverty, and alcohol use was complex. While experiencing personal economic strain was not a strong predictor (and was actually linked with less past month use), living in a community with higher concentrations of poverty, particularly if one was not experiencing financial strain, was associated with greater past month use. This supports the relative deprivation theory, as the economic health of the community context was more influential than personal circumstances. The relationship between community disadvantage and adolescent risk behavior, including alcohol use, has been found in other studies of both urban (Duncan, Duncan, & Stryker, 2002) and rural (Osgood & Chambers, 2000) environments. In our study, the relationship between community disadvantage and alcohol use remained significant, even in the presence of peer and family factors, indicating that living in a disadvantaged community is a significant risk factor for rural adolescents.

Relatively affluent adolescents reported significantly more past month use when living in a poor community than did poorer adolescents, highlighting the complexity of economic circumstances. It is interesting that adolescents reporting little economic strain were more adversely affected by community hardship than adolescents experiencing higher levels of economic strain. There are several possible explanations for this phenomenon. Adolescents who are relatively better off may have had more resources to purchase alcohol. Alcohol may also be effective in reducing perceived economic strain among adolescents living in disadvantaged communities. Another potential explanation is that financially secure adolescents are more adversely affected by living in a poor community.

Peer prevalence and family relationships

Perceptions that fellow classmates are drinking more than doubled the odds that individuals would report lifetime alcohol use. The strong relationship between lifetime use and peer drinking highlights the importance of peers in early adolescence. Contrary to other studies that highlight the importance of peers in terms of drinking frequency (Cleveland, 2003), peer influence was not linked with past month use in this study, emphasizing the uniqueness of rural contexts. It is noteworthy that adolescent-perceived community supportiveness and census-derived community disadvantage were more closely linked to past month use than perceptions of peer use.

Similar to other studies (Williams & Hine, 2002), parental closeness and monitoring were associated with significantly less early adolescent initiation, perhaps because parental relationships are more protective for rural than urban adolescents (Donnermeyer, 2006). In terms of past month use, however, community characteristics such as supportiveness and economic disadvantage were more closely linked to past month use than parental relationship.

Limitations of study

Several important limitations should be noted. First, the primarily White respondents came from the Northern Plains. Even though this region is among the highest in adolescent alcohol use and is clearly understudied, results cannot be generalized to all rural populations. Because of the demographic characteristics of the Northern Plains, interactions between racial/ethnic groups could not be examined. Although it was necessary to not examine all parents, as this might have "overpowered" the other members of the adult sample, it would have been helpful if parental responses were directly

matched to their adolescents, to examine relations between child and parental perceptions. Parental assessments of economic strain could then have been included to corroborate adolescent perceptions. Longitudinal work would undoubtedly increase understanding of community influences in lifetime use. Understanding which factors led adolescents to consider communities more supportive would be beneficial in helping delay onset and reduce frequency of alcohol use. Further study into the complex relationship between economic resources and alcohol use would also be useful.

Summary

Alcohol use was prevalent, but highly variable, among the middle school adolescents in this study. Several community features were significantly related to both lifetime and past month use. Adolescent-perceived community supportiveness was associated with less alcohol use, whereas community disadvantage was associated with greater use. Although known correlates of adolescent alcohol use, that is, perceived peer use and parental closeness, were associated with initiation of alcohol, they were not associated with past month use when community indicators were added to the equation. These results highlight the unique contributions of rural environments for early adolescents. Rural contexts appear related to adolescent alcohol initiation and past month use in different ways than in urban neighborhoods, as peer use, parental closeness, and collective efficacy were not significantly related to past month use.

Authors' Note

Declaration of Conflicting Interests

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