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# Urbanity, Rurality, and Adolescent Substance Use

Jeremy M. Wilson

*RAND Corporation, Pittsburgh, Pennsylvania*

Joseph F. Donnermeyer

*The Ohio State University, Columbus*

An important but understudied aspect of substance use research is its relationship to characteristics of the community, including if there are differences in the association between peer and family factors with use between youth living in rural and urban areas. The results of this study are based on a statewide survey of approximately 4,400 youth in a southwestern state. It tested for the inequality of coefficients from regression equations on three measures of substance use: an overall scale, alcohol use, and marijuana use. The relationship of peer influence on substance use was stronger among urban-located youth; however, there were no rural-urban differences for family factors.

**Keywords:** *substance use; rurality; urbanity; community; social disorganization*

Adolescent substance use has long been of interest to researchers in the social and behavioral sciences. Most of the theoretical development has focused on psychological traits and factors associated with the immediate social environment of youth, including peers and family (Hawkins, Catalano, & Miller, 1992; Jessor, 1992; Oetting & Beauvais, 1987). Although widely recognized as an important contributor to adolescent substance use, research on community-level factors has been neglected (Hawkins et al., 1992; Oetting, Donnermeyer, & Deffenbacher, 1998). This article focuses on the relationship of one community characteristic, namely, whether living in a rural versus an urban place makes a difference in the strength of peer group and family influences on adolescent substance use.

The rationale for this study is that various community characteristics may affect opportunities for the formation of adolescent peer groups and the ability of families to influence the behavior of children and teens. As well, different kinds of communities provide differential opportunities for learning about both prosocial and deviant behaviors within peer groups and families (Bursik, 1986; Oetting et al., 1998). Although different types of community characteristics may influence the relationships of peer and family with substance use, one of particular interest is the rurality/urbanity of a locality. It is commonly assumed that rural areas are more likely to manifest community contexts conducive to tighter social control; less anonymity; and, by extension, the development of prosocial peer groups and family cohesion that promote more conforming behaviors, including lower than average rates of substance use. In turn, urban areas are more likely to display characteristics that create community contexts in which opportunities for greater involvement in deviant peer groups and weakened family control occurs and, therefore, display higher than average rates of substance use (Donnermeyer, 1992; Oetting & Donnermeyer, 1998; Weisheit, Falcone, & Wells, 1999).

Challenging the common assumption that rural communities display less crime and deviance, including substance use by young people, is more recent research, which has found a relative convergence in rates of substance use between rural and urban youth, based on various self-report studies (Cronk & Sarvela, 1997; Donnermeyer & Scheer, 2001; Edwards, 1997; Johnston, O'Malley, & Bachman, 1997). In addition, the work of Wilkinson (1984a, 1984b) and Conger (1997) suggests that some rural areas, because of their smaller size, may be more adversely affected by such conditions as persistent poverty; geographic isolation; lack of health and other professional services; and various outside influences such as urban spillover, rapid population growth, and the relocation of industry. They suggest that these conditions may, in fact, cause some rural communities to exhibit relatively high levels of crime, substance use, and other deviant behaviors because economic and social change have the potential to more substantially and adversely influence established patterns of social control at locations with smaller populations.

The purpose of this article is to test for the relative influence of rurality/urbanity on the relationship between peer and family influences on adolescent substance use. Building from social disorganization theory (Sampson & Groves, 1989), the article examines whether peer and family influences will vary between youth from rural and urban areas. We test this hypothesis on a statewide sample of nearly 4,400 middle school students. We select middle school students because past research notes that this is the age at which young people make initial decisions about use of alcohol, marijuana, and other illicit drugs (Conger & Simons, 1997; Oetting & Donnermeyer, 1998).

## Theoretical Statement

The peer group is commonly identified as one of the most important predictors of substance use among youth (Battin, Hill, Abbott, Catalano, & Hawkins, 1998; Oetting & Beauvais, 1987). As Costanzo and Shaw (1966) observed over a quarter century ago, the peer group increases its influence on behavior from early childhood through middle adolescence, before declining in later adolescence. Peers form an important part of the immediate social environment of young people, influencing both their preferences and their actual behaviors (Oetting & Donnermeyer, 1998; Tittle, 2000). In other words, peer groups are normative by providing definitions about the acceptability of behavior, and different kinds of peer groups provide differing standards for behaviors, including the use of illicit substances (Hagen, Hefler, Classen, Boehnke, & Merkins, 1998). Also, peer groups are sources of rationalization for experimentation with different kinds of deviant behavior (Akers, 1998; Conger & Simons, 1997).

Families not only remain a primary source of socialization in general throughout childhood and early adolescence but act in specific ways to influence substance use (Farrell & White, 1998; Hawkins et al., 1992; Simons, Chao, Conger, & Elder, 2001). Like the peer group, the family is a source for prosocial or deviant norms about the use of substances. Children of parents who experiment with drugs or are drug dependent are more likely to use (Hawkins et al., 1992). Second, families are also a source of sanctions against both experimental and regular use of alcohol, tobacco, and other drugs (Oetting & Donnermeyer, 1998; Scheer, Borden, & Donnermeyer, 2000; Simons et al., 2001). Research finds that adolescents from families with low tolerance of experimental drug use, after controlling for

all other factors, were less likely to use. Third, families are a source of communication about substance use (Scheer et al., 2000). Parents and older siblings, in particular, represent individuals to whom a young person can talk about smoking, drinking, and using other drugs and thereby influence future use (Barnes & Welte, 1986; Scheer & Unger, 1998; Simons et al., 2001). Also, family cohesion, that is, the closeness of parents and their children, is predictive of substance use (Coombs & Coombs, 1988; Simons et al., 2001). Finally, differences in family structures influence substance use. For example, adolescents growing up in single-parent female-headed families show a greater likelihood of involvement with drugs (Farrell & White, 1998; Oetting & Donnermeyer, 1998).

Definitions of community emphasize several core elements. Specifically, the concept of community includes (a) a geographic referent, that is, a community comprises a limited area with specific boundaries (usually political); (b) economic activities: Communities are places that vary according to their employment base, their levels of unemployment and poverty, and the consumption patterns of their residents; (c) provision of services: Communities are places where various governmental, retail, and other services are available or provided to residents; (d) socialization: Communities are places that provide opportunities, through individuals, groups, and organizations, for residents to learn about the general or dominant culture of a society and the cultures of subgroups within society and to participate in a variety of social or group-level activities that provide the context for this learning; and (e) social control: Through the presence in the community of formal institutions (e.g., police, courts, schools) and informal groups (e.g., peers, neighbors), human behavior, whether conforming or deviant, is both facilitated and constrained (Bursik & Grasmick, 1993; Kornhauser, 1978; Sampson & Groves, 1989; Warren, 1978). It is these latter two functions that are of greatest value when examining the possible influence of rurality/urbanity on the relationship between peer and family influence and substance use.

Social disorganization theory assumes that communities with social structures that are less cohesive lack several characteristics that diminish the development of prosocial or conforming norms and encourage the development of deviant norms and behavior, including substance use. Conversely, areas with social structures marked by more organization (i.e., less disorganization) enhance prosocial development and create more opportunities for positive social bonds between youth, families, and other societal institutions (Tittle, 2000). For example, Simons, Simons, Burt, Brody, and Cutrona (2005) found in their study of communities in Iowa and Georgia that parental effects were "amplified" in neighborhoods with strong parental control relative to deviant peer associations and delinquency of daughters and sons. Because a community is a place where residents experience their society and culture, it influences the context for the expression of a wide range of attitudes and behaviors (Oetting & Donnermeyer, 1998). First, community-level factors influence the ability of families to provide opportunities to children and adolescents that in turn are associated with learning both prosocial and problem behaviors. Second, community characteristics influence opportunities to associate with different types of groups, especially informal groups such as peers. This is important for examining prosocial and deviant behaviors of adolescents because for most young people, social participation does not take on a significant extra-community context until late adolescence and early adulthood (Bronfenbrenner, 1979).

Another characteristic of social disorganization is the relatively weak presence of informal social controls within a community (Bursik & Grasmick, 1993; Tittle, 2000). In essence,

communities with a high density of acquaintanceship through informal interaction and shared membership in local groups will exhibit comparatively lower crime and deviance due to stronger social control (Freudenburg, 1986). Local social structures that exhibit high levels of disorganization are presumed to exacerbate the inability of families, schools, churches, and other groups within the community to exert influence over adolescents and increase the chance that peer groups that encourage drug-using behaviors and attitudes (e.g., delinquency, low school achievement, absenteeism, dropping out of school, etc.) have relatively greater influence. In addition, communities with high levels of social disorganization lack guardianship or the unwillingness of bystanders to discourage socially defined inappropriate behaviors through informal networks. Examples of this would include neighbors or friends calling school officials or the police if they see a group of young people on the streets during school hours or confronting a young person directly and threatening to call his or her parents. Finally, communities with high levels of social disorganization are more anonymous; that is, those who knowingly engage in illegal behaviors have greater feelings of anonymity (Freudenburg & Jones, 1991; Osgood & Chambers, 2000; Rose & Clear, 1998).

The proposition about the effects of rurality/urbanity is based on the works of Claude Fisher (1975) and Herbert Gans (1962), who in turn were influenced by such classic social theorists as Louis Wirth, George Simmel, and Ferdinand Toennies. Fisher saw urban areas (defined as places having large populations, high-density populations, and heterogeneous populations) as influencing various “pathological” (Wirth’s words) behaviors. This is because urban areas display structural characteristics typified by weak social control (i.e., weak bonds), greater anomie (i.e., normlessness), greater tolerance of differences, and more opportunities to learn behaviors that are considered by the larger society to be deviant. In other words, urban areas are more socially disorganized, leading to higher rates of deviant behavior, including substance use. The line of reasoning is that (a) size of place leads to (b) higher population density and heterogeneous population composition, which (c) lead to weaker social control, greater anomie, and greater tolerance, which in turn lead to (d) greater per capita levels of criminal and other deviant behaviors. Gans added a cautionary note to the overly deterministic view that urban and rural areas always display opposite structural characteristics. In his description of the rural village-like qualities of an Italian neighborhood in Boston, Gans claimed that it is primarily the composition (i.e., social and cultural characteristics) of people and groups within a specific geographic area that influences social organization. Although smaller size is generally associated with higher levels of social control, other factors can modify and even reverse this relationship, a theme later explored by Wilkinson (1984a, 1984b, 1990).

Most research testing social disorganization theory has focused on urban locations (Sampson & Groves, 1989; Tittle, 2000). An early example of the social disorganization approach applied to the rural community is the work of Harrell and Cisin (1980). They hypothesized that different types of rural places would vary in opportunities for learning deviant behaviors. Their reasoning was that although, in general, most rural areas have fewer opportunities for learning deviant behavior, this is not uniformly so. They explored variations of this by examining population density; town versus open-country locations; and proximity of various rural places to military bases, university and colleges, resorts, temporary work sites (i.e., rapid growth or Alaskan pipeline-type communities), and other

similar facilities. Confirming their argument, they found that rural areas with more urban characteristics or proximity to places offering greater opportunities to learn deviant behavior exhibited more substance use.

A more recent example of Fisher's line of reasoning is the study by Ingram (1993), who examined the link between urban places, urbanism, and juvenile delinquency. Following Wirth, he started with the assumption that "social ties are presumably weakened because many of the relationships that urban people have are context bound" (p. 193). Ingram's theory states that type of place (rural to urban) is directly related to urbanism (urbanism defined as weak ties, high tolerance, etc.), which is directly related to delinquency, and that urbanism mediates the type of place-delinquency relationship. Ingram found that type of place was not related to urbanism, that type of place was not related to delinquency (and therefore urbanism does not mediate the type of place-delinquency relationship), but that all types of urbanism (based on seven measures) were related to each of his three types of delinquency. In other words, more in agreement with Gans than Fisher, Ingram found that it was the composition of place that was significant.

Osgood and Chambers (2000) examined the relationship of rural community characteristics and violent crime rates among juveniles. They found that violence among juveniles in nonmetropolitan counties varied by residential instability (i.e., population turnover), family disruption (i.e., single-parent households, divorce rates), and ethnic heterogeneity. As well, the smallest nonmetropolitan counties exhibited the lowest rates of juvenile violence.

The research question that forms the focus of this article is the relationship between self-reported substance use and both peer and family influence while simultaneously considering rural or nonmetropolitan versus the urban or metropolitan status. Both criminological theory and research suggests that urban areas should display weaker social control by families and greater opportunities for young people to be involved in deviant peer groups. Hence, the relationship or link between peer influence and substance use should be stronger among youth from metropolitan counties, whereas the relationship between family influence and substance use should be stronger among youth from nonmetropolitan counties.

## Method

### Data

Data for this study came from a statewide survey of substance use among seventh-grade students from 17 communities in the Southwest. The statewide survey was part of a study to examine the relative effectiveness of prevention education programs. The sampling frame was a cluster sample, with schools randomly selected for inclusion in the study. Permission to conduct the survey was obtained from principals. Active consent procedures were utilized. Due to concerns by school officials, there were four rejections for requests to survey. These schools were replaced through a random selection process.

The statewide survey adopted the American Drug and Alcohol Survey (ADAS). ADAS is a product of the Rocky Mountain Behavioral Sciences Institute (RMBSI) in Fort Collins, Colorado, and was developed in part through grants provided by the National Institute on Drug Abuse. Its substance use scales have been repeatedly tested among a variety of adolescent groups by age, gender, race, and ethnic group status and have high reliability.

In addition, a weighted sample of ADAS respondents was compared with the nationally representative Monitoring the Future and National Adolescent Student Health Survey. Comparisons of rates of substance use were virtually identical (Oetting & Beauvais, 1990).

ADAS includes 35 computer checks for inconsistent and exaggerated responses to its 100-plus substance use questions. Some of these checks are based on the inclusion of a fake drug in the survey. In this statewide survey, which was administered in spring 1998, 3.6% of the surveys were thrown out based on these computer checks. This is about average when compared to other administrations of ADAS.

The sampling frame for this study was based on a list of middle schools provided by the state Department of Education. Only public middle schools were included in this study to control for the possible influence of private schools in reference to the larger purpose of this statewide survey. Middle school students were selected because this is a crucial age for the onset of substance use (Conger & Simons, 1997). This state Department of Education list classifies middle schools by various characteristics of the population of their catchment areas, including their location status as either nonmetropolitan or metropolitan. This status was determined by the census designation of the county as either metropolitan or non-metropolitan. The census defines metropolitan as any county with a central city of 50,000 or more persons. In addition, counties without a central city of 50,000 persons can be counted as metropolitan if they are economically tied to the central city as measured by the commuting patterns of the civilian labor force. Nonmetropolitan are all remaining counties not designated as metropolitan.

Principals from 10 metropolitan located schools and 7 nonmetropolitan located schools were contacted and asked for their respective school's cooperation in the study. Active consent procedures were used. Of all eligible students on the day of administration of the survey, the completion rate was 79.29%. Most of these can be accounted for by absenteeism; however, about one third were due to students who could not participate in completion of the survey because their parent(s)/guardian(s) did not sign the consent form. In all, 4,398 were compiled and utilized for the present study.<sup>1</sup>

ADAS includes specific, standardized instructions for survey administration, with the most important feature being that no adult is allowed to directly handle a survey once the student has started to read and answer questions. The survey was administered by teachers under the supervision of a member of the state agency that sponsored the study. Completed surveys were put into a sealed box. These boxes were mailed to RMBSI. RMBSI scanned and computerized the data at their offices. They also conducted the computer checks for exaggerators and participants with highly inconsistent answers.

## Measures

To gauge adolescent substance use, we constructed three separate measures pertaining to overall substance involvement, alcohol use, and marijuana use. Questions about the consumption of 15 specific substances comprised the substance involvement scale. These included queries about lifetime, past year, and past 30-day use. Scores ranged from *total abstinence* (1) to *drug dependency* (34). The mean value of this measure was 7.79, and its standard deviation was 8.42.

We focus primarily on alcohol use and marijuana use because those are the two most popular substances of choice for students at the middle school level (Elliott, Huizinga, & Menard, 1989; Hawkins et al., 1992). Using confirmatory factor analysis, we constructed measurement models to derive estimates of alcohol and marijuana use.<sup>2</sup> In other words, we treated each as a latent construct and derived estimates of use from pooling multiple observed measures. This approach to measurement is superior to using a single, directly measured variable as it combines information from several indicators to derive a single estimate, accounts for measurement error, offers an interval-level estimate of the construct from measures of multiple scales, and provides several measures of fit to assess how well the measures depict the construct.

Responses to six questions composed the measures of alcohol use: (a) how often in the past 12 months they used alcohol and (b) how often in the past 12 months they got drunk (*none, 1-2, 3-9, 10-19, 20-49, or 50 or more*), (c) how often in the past month they used alcohol and (d) how often in the past month they got drunk (*none, 1-2, 3-9, 10-19, or 20 or more*), (e) how they like to drink (*don't drink, just a glass or two, to feel it a little, to feel it a lot, or to get really drunk*), and (f) what kind of alcohol user they are (*nonuser, very light user, light user, moderate user, heavy user, or very heavy user*). We calculated the estimate of marijuana use from responses to three questions: (a) how often in the past 12 months they used marijuana (*none, 1-2, 3-9, 10-19, 20-49, or 50 or more*), (b) how often in the past month they used marijuana (*none, 1-2, 3-9, 10-19, or 20 or more*), and (c) what kind of marijuana user they are (*nonuser, very light user, light user, moderate user, heavy user, or very heavy user*).

We also constructed measurement models to calculate estimates of three types of peer influences and four types of family influences. The first peer influence assesses peer alcohol use. The focus of this index was on getting drunk, which was described to participants as drinking enough to "fall down or get sick." Three questions comprised this model: (a) how often their friends asked them to get drunk (*not at all, not much, some, or a lot*), (b) the number of friends who get drunk "once in a while" (*none, one or two, some of them, or most of them*), and (c) the number of friends who get drunk "almost every weekend" (*none, one or two, some of them, or most of them*). The second peer influence focused on peer marijuana use. It included two questions: (a) How many friends use marijuana and (b) how often do friends ask respondents to use marijuana. For the first question, the response options were *none, a few, most of them, and all of them*. *Not at all, not much, some, or a lot* were the available responses for the second question. The third peer influence, composed of six questions, focused on peer influence to use other drugs and included three types: cocaine, uppers, and downers. For each drug, there were two questions in the style similar to the marijuana measure, that is, how many friends use and how often do friends ask participants to use.<sup>3</sup> Response categories were also the same.

The first family influence accounted for the extent to which the family of a participant sanctioned substance use and consisted of five questions. Individuals were asked how much their family would try to stop them from (1) smoking cigarettes, (2) getting drunk, (3) "sniffing" something like glue or gas, (4) using marijuana, and (5) using other drugs.<sup>4</sup> Family involvement in school was the second family influence. This construct centered on the extent to which the family of a respondent participated in and had knowledge of events

at school. The three questions included in this estimate were (a) does your family go to school events, (b) does your family go to school meetings, and (c) how much does your family know about what is going on at school. The third family influence concentrated on the mutual care between participants and their families. Three questions comprised this estimate: (a) do you care about your family, (b) does your family care about you, and (c) does your family care what you do. The final family influence focused on the amount of discussion the family of a participant had with him or her about the dangers of substances. Five questions constituted this estimate: How much has your family talked to you about the dangers of (a) smoking cigarettes, (b) getting drunk, (c) "sniffing" something like glue or gas, (d) using marijuana, and (e) using other drugs. For the questions used to estimate all four family influence constructs, participants could respond as *not at all*, *not much*, *some*, or *a lot*. The results of the measurement of the nine latent constructs associated with reported substance use, peer influences, and family influences are summarized in Table 1. The component fit, which assesses the relationships between the observed measures to their corresponding latent construct, appears to be very good. All the constructs and measures are statistically significant ( $\alpha \leq .05$ ), and the measures are all in the hypothesized direction (i.e., positive). In addition, the construct explains at least a fair if not large amount of variance in every measure, and the standardized factor loadings are all sufficiently large (family attendance at school meetings has the smallest squared multiple correlation and standardized factor loading, which are .43 and .65, respectively). The model fit, which assesses how well the general model fits the data, appears good as well. Although the strict chi-square test indicates that the model does not fit the data perfectly and the standardized root mean square residual (RMR) is high (.17), all the remaining fit indices suggest a good fitting model. The root mean square error of approximation (RMSEA) is .03, and the normed fit index (NFI), comparative fit index (CFI), incremental fit index (IFI), and adjusted goodness of fit index (AGFI) are all .99. Overall, based on the component and model fit, we determined this specification to be appropriate and subsequently determined estimates of the constructs from it. Table 2 provides descriptive statistics of these estimates. Table 3 summarizes the descriptive statistics for all the measures by community type.

### Testing Differential Effects by Community Type

To test the relative influence of community type (i.e., rural versus urban) on the relationships between peer and family influences on reported substance use, we estimated and compared two separate ordinary least squares (OLS) regressions for each of the three types of substance use (i.e., six regressions in all). For each type of substance use, one regression was estimated for each of the nonmetropolitan ( $n = 1,862$ ) and metropolitan ( $n = 2,536$ ) youth samples. The analyses regressed overall substance use, alcohol use, and marijuana use on the three peer influence and four family influence measures. We also included three dummy variables in these equations to control for the sex of the respondent and whether the respondent's race was Mexican American or another minority (White was the baseline measure for race). For each type of substance use, the estimated coefficients in the nonmetropolitan equation were tested against the respective coefficients in the metropolitan equation to determine whether a statistical difference existed. We calculated a  $Z$  test of coefficient equality to ascertain whether the coefficients for each of the variables statistically varied between equations.<sup>5</sup>

**Table 1**  
**Component and Model Fit of the Nine-Construct**  
**Measurement Model ( $n = 4,398$ )**

	Standardized Factor Loadings	Z Ratio	$R^2$	Construct Variance	Z Ratio
Component fit					
Reported substance use					
Alcohol use					
				0.90***	105.32
Use in past 12 months <sup>a</sup>	0.95		.90		
Got drunk in past 12 months	0.97***	187.08	.94		
Use in past month	0.97***	177.42	.93		
Got drunk in past month	0.99***	173.69	.98		
How like to drink	0.95***	162.54	.91		
Kind of user	0.96***	158.57	.93		
Marijuana use					
				0.99***	302.88
Use in past 12 months <sup>a</sup>	1.00		.99		
Use in past month	0.99***	340.18	.99		
Kind of user	0.98***	302.04	.96		
Peer influences					
Alcohol					
				0.75***	53.77
Friends ask subject to get drunk <sup>a</sup>	0.86		.75		
# friends who get drunk "once in a while"	0.85***	75.38	.73		
# friends who get drunk "almost every weekend"	0.91***	90.52	.83		
Marijuana					
				0.94***	106.04
# friends who use marijuana	0.94***	144.12	.89		
Friends ask subject to use marijuana <sup>a</sup>	0.97		.94		
Other drugs					
				0.95***	127.78
# friends who use cocaine	0.97***	164.03	.94		
# friends who use uppers	0.95***	133.31	.90		
Friends ask subject to use cocaine <sup>a</sup>	0.98		.95		
Friends ask subject to use uppers	0.99***	229.09	.99		
Friends ask subject to use downers	1.00***	223.21	.99		
Family influences					
Sanctions					
				0.98***	34.84
Cigarettes	0.96***	146.05	.92		
Getting drunk <sup>a</sup>	0.99		.98		
"Sniffing"	0.96***	120.76	.92		

(continued)

**Table 1**  
**(continued)**

	Standardized Factor Loadings	Z Ratio	$R^2$	Construct Variance	Z Ratio
School involvement				0.65***	36.40
Attend school events	0.73***	48.00	.53		
Attend school meetings	0.65***	45.71	.43		
Knowledge about school <sup>a</sup>	0.81		.65		
Mutual care				0.95***	86.55
Subject care for family	0.91***	74.46	.83		
Family care for subject <sup>a</sup>	0.98		.95		
Family care for what subject does	0.95***	97.85	.91		
Discussion				0.97***	155.15
Talk about cigarettes	0.96***	193.01	.92		
Talk about getting drunk <sup>a</sup>	0.98		.97		
Talk about "sniffing"	0.96***	211.96	.91		
Talk about marijuana	0.98***	249.42	.95		
Talk about other drugs	0.98***	266.70	.96		
Model fit					
Chi-square ( <i>p</i> value) =					
2,916.13 (0.00)					
RMSEA = .03					
IFI = .99					
NFI = .99					
Standardized RMR = .17					
CFI = .99					
AGFI = .99					

Note: RMSEA = root mean square error of approximation; IFI = incremental fit index; NFI = normed fit index; RMR = root mean square residual; CFI = comparative fit index; AGFI = adjusted goodness of fit index.

a. Served as the scale for the latent construct.

\*\*\* $\alpha < .001$ .

## Findings

### Regression Results

Before we interpreted and compared the coefficients, we examined the regressions for possible problems due to multicollinearity and heteroscedasticity. Although the condition index in the nonmetropolitan regressions indicated possible multicollinearity, neither the tolerance values nor variance inflation factors substantiated a problem. Moreover, there were no two independent variables that were consistently nonstatistically significant across the three nonmetropolitan regressions. Based on this evidence, it did not appear that multicollinearity was a problem in the regressions.

The same cannot be said in terms of heteroscedasticity. Plots of the squared OLS residuals against the independent variables indicated possible nonstationarity in variance in all of the regressions due to several of the independent variables. We formally tested heteroscedasticity

**Table 2**  
**Descriptive Statistics of the Latent Construct Estimates ( $n = 4,398$ )**

Latent Construct	Minimum	Maximum	Mean	Standard Deviation
Reported substance use				
Alcohol use	0.91	5.25	1.67	0.86
Marijuana use	0.96	5.97	1.71	1.31
Peer influences				
Alcohol	0.65	4.12	1.95	0.74
Marijuana	0.83	4.91	1.93	0.89
Other drugs	0.94	3.95	1.26	0.64
Family influences				
Sanctions	0.92	4.00	3.59	0.74
School involvement	0.68	3.86	2.69	0.61
Mutual care	0.95	4.03	3.78	0.50
Discussion	1.01	4.03	3.15	0.96

**Table 3**  
**Descriptive Statistics of Measures by Community Type**

Variable	Mean (Standard Deviation)		Range	
	Metro ( $n = 2,536$ )	Nonmetro ( $n = 1,862$ )	Metro	Nonmetro
Overall substance use	7.90 (8.42)	7.65 (8.43)	1-34	1-34
Alcohol use	1.69 (0.89)	1.63 (0.82)	0.92-5.25	0.91-5.24
Marijuana use	1.72 (1.33)	1.69 (1.29)	0.96-5.96	0.96-5.97
Sex	0.48 (0.50)	0.50 (0.50)	0-1	0-1
Mexican	0.31 (0.46)	0.21 (0.41)	0-1	0-1
Other race	0.31 (0.46)	0.26 (0.44)	0-1	0-1
Peer influences				
Alcohol	1.93 (0.75)	1.97 (0.73)	0.65-4.12	.082-4.06
Marijuana	1.93 (0.89)	1.92 (0.89)	0.83-4.69	0.91-4.91
Other drugs	1.28 (0.65)	1.23 (0.62)	0.94-3.95	0.94-3.93
Family influences				
Sanctions	3.58 (0.76)	3.61 (0.72)	0.92-4.00	0.93-4.00
School involvement	2.65 (0.61)	2.74 (0.61)	0.68-3.86	0.72-3.77
Mutual care	3.75 (0.54)	3.81 (0.43)	0.95-4.03	0.95-4.03
Discussion	3.11 (0.98)	3.21 (0.93)	1.01-4.03	1.01-4.02

via the Breusch-Pagan (Bresuch & Pagan, 1979) Lagrangian-multiplier test with all 10 variables specified as the "Z" vector of variables contributing to the nonstationary variance. This test was significant for all regressions indicating that these variables collectively cause heteroscedasticity.

The  $Z$  test of coefficient equality simply requires the estimates of the coefficients to be compared and their standard errors. Given that several variables seem to be contributing to the heteroscedasticity and OLS *coefficient* estimates are unbiased in the presence of heteroscedasticity, White's (1980) heteroscedasticity-consistent covariance matrix estimator was used to compute the standard errors of the coefficients. Therefore, we calculated the  $Z$  tests of coefficient equality from the OLS coefficient estimates and their standard errors based upon White's correction.

All six regressions were statistically supported by the  $F$  test of the models (see Table 4 for the regression results). This suggests that the variables as a whole significantly explain variation in overall substance, alcohol, and marijuana use as reported by youth in both metropolitan and nonmetropolitan areas. The variation of each type of substance use explained by these variables is roughly the same between metropolitan and nonmetropolitan models. The nonmetropolitan model explains about 46% of the variation in overall substance use, whereas the metropolitan model explains approximately 45% of the variation in the same measure. The metropolitan and nonmetropolitan models explain somewhat more variation in reported alcohol use. The adjusted  $R$ -squared for these models are 58% and 55%, respectively. These variables explain most variation, however, in reported marijuana use. Sixty-five percent of marijuana use by metropolitan youth is determined by the model, whereas the same factors predict 67% of marijuana use by youth in nonmetropolitan areas.

Controlling for the other influences, there was no difference in level of overall substance use by gender for either the metropolitan or nonmetropolitan youth. However, males reported more alcohol and marijuana use than females in both community types. Regardless of urbanity level, Mexican American youth reported less alcohol and marijuana use than White youth. This relationship also held for nonmetropolitan youth in terms of overall substance use. However, there was no statistical difference in the amount of overall substance use between Mexican American and White youth in metropolitan areas. In the urban areas, there were no differences in overall substance, alcohol, or marijuana use between youth of other races and White youth. For those in nonmetropolitan areas, youth of another race reported less overall substance and alcohol use than White youth, but no difference existed in terms of marijuana use.

We expected that the measures of peer influence would be positively associated with all forms of reported substance use. As anticipated, alcohol-related peer influence positively influenced overall substance use and alcohol use for all youth. However, peer influences toward alcohol were unrelated to marijuana use for metropolitan youth and inversely related to marijuana use among nonmetropolitan youth. Peer influences toward marijuana consistently exhibited the anticipated effects. Such influences were associated with greater usage levels for all three types of substance use for all youth. A positive association existed between peer influences toward other drugs and alcohol use for youth in nonmetropolitan areas, but this was the only instance in which this specific determinant was in the expected direction. It had no statistical relationship with alcohol use reported by metropolitan youth and was negatively associated with overall substance and marijuana use for all youth.

**Table 4**  
**Results of Regressions by Level of Urbanity**  
**and Tests of Coefficient Equality**

	Metro ( <i>n</i> = 2,536)		Nonmetro ( <i>n</i> = 1,862)		Coefficient	
	Coefficient	<i>p</i> Value	Coefficient	<i>p</i> Value	Difference	Z Score
Overall substance use						
Constant	-1.51	.27	3.15	.14		
Sex	0.25	.32	0.31	.27	0.06	0.17
Mexican	-0.55	.07	-0.83*	.03	-0.29	-0.59
Other race	-0.48	.13	-1.04**	.00	-0.55	-1.15
Peer influence: Alcohol	2.21***	.00	1.10***	.00	-1.11**	-2.72
Peer influence: Marijuana	5.13***	.00	6.11***	.00	0.99*	2.14
Peer influence: Other drugs	-1.26***	.00	-2.18***	.00	-0.91	-1.68
Family influence: Sanctions	-0.58**	.01	-0.66*	.02	-0.08	-0.23
Family influence: School involvement	-1.02***	.00	-1.37***	.00	-0.35	-0.80
Family influence: Mutual care	0.44	.26	-0.47	.41	-0.91	-1.32
Family influence: Discussion	0.05	.79	0.47**	.01	0.43	1.70
Alcohol use						
Constant	0.63***	.00	0.87***	.00		
Sex	0.08***	.00	0.14***	.00	0.06	1.71
Mexican	-0.10***	.00	-0.16***	.00	-0.07	-1.51
Other race	-0.02	.42	-0.08**	.01	-0.05	-1.24
Peer influence: Alcohol	0.75***	.00	0.65***	.00	-0.11*	-2.69
Peer influence: Marijuana	0.09***	.00	0.10***	.00	0.01	0.19
Peer influence: Other drugs	0.06	.06	0.09**	.01	0.03	0.63
Family influence: Sanctions	-0.10***	.00	-0.10***	.00	0.00	0.09
Family influence: School involvement	0.03	.38	-0.01	.65	-0.04	-0.93
Family influence: Mutual care	-0.09*	.02	-0.11*	.03	-0.02	-0.38
Family influence: Discussion	0.00	.97	0.00	.82	0.00	0.14
Marijuana use						
Constant	0.76***	.00	0.95***	.00		
Sex	.11***	.00	0.12***	.00	0.01	0.18
Mexican	-0.12***	.00	-0.16***	.00	-0.04	-0.76
Other race	0.04	.32	-0.05	.26	-0.09	-1.50
Peer influence: Alcohol	-0.06	.08	-0.19***	.00	-0.13**	-2.79
Peer influence: Marijuana	1.35***	.00	1.35***	.00	0.01	0.13
Peer influence: Other drugs	-0.45***	.00	-0.36***	.00	0.08	1.20
Family influence: Sanctions	-0.17***	.00	-0.12***	.00	0.05	1.14
Family influence: School involvement	-0.07	.07	-0.15***	.00	-0.08	-1.40
Family influence: Mutual care	-0.09	.07	-0.10	.14	-0.01	-0.14
Family influence: Discussion	0.05**	.01	0.06**	.01	0.01	0.21

\* $\alpha < .05$ . \*\* $\alpha < .01$ . \*\*\* $\alpha < .001$ .

Contrary to the peer influences, we anticipated all forms of family influences would lessen the extent of all types of substance use for all youth. Sanctions against substance use followed this pattern. For all youth, greater levels of sanctions were associated with lower levels of overall substance, alcohol, and marijuana use. The involvement of families in school also exhibited an inverse relationship with overall substance use. Whereas family involvement in school activities reduced marijuana use for nonmetropolitan use, this influence was not statistically related to marijuana use by metropolitan youth or alcohol use by youth from either community type. Mutual care between a youth and his or her family was not associated with overall substance or marijuana use for youth in either type of community. Yet mutual care was inversely associated with alcohol use for all youth. In no instance was the expected relationship between discussion about the dangers of substance use and reported use supported. This determinant was statistically unrelated to overall substance use by youth in metropolitan areas and positively associated with such use by youth in nonmetropolitan areas. Family discussion exhibited no relationship with alcohol use by youth from either type of geographical area. Based on the marijuana use regressions, the more families discussed substance use the greater the likelihood that youth report using marijuana regardless of community status.

### **Tests of Coefficient Equality Results**

The differences of the coefficient estimates between the samples and the *Z* scores corresponding to their respective tests of coefficient equality are also listed in Table 4. There were no statistical differences between community types in terms of the influence of sex or race on any of the three measures of substance use.

In terms of peer influence, we expected the role of peers in decisions to use substances would be greater for youth in urban as opposed to rural areas. Consistent with our hypothesis, a statistical difference existed between youth from the two community types in terms of the impact of peer influence toward alcohol on overall substance, alcohol, and marijuana use. For all types of substance use, peer influence toward alcohol use was greater for metropolitan youth than those from nonmetropolitan areas. Based on the estimates, the effect of a 1-unit increase in peer influence toward alcohol on overall substance use would be 1.11 units greater for metropolitan youth. The same change would result in metropolitan adolescent's using 0.11 units more alcohol and 0.13 units more marijuana relative to similar individuals in nonmetropolitan communities. For the peer influence toward marijuana, however, the impact on overall substance use was greater for youth in nonmetropolitan areas. Compared to nonmetropolitan adolescents, the influence of a single unit of this determinant on overall substance was 0.99 units larger for adolescents in metropolitan communities. There was no statistical difference in the impact of this specific influence on alcohol or marijuana use between community types. The final peer influence was that relating to other drugs. The analysis revealed that the impact of this determinant was no different by type of community for any of the three types of substance use.

We anticipated all forms of family influence to play a larger role in decisions to use substances for youth from rural areas. The findings failed to support these hypotheses. The effect of family sanctions against substances, family involvement in school activities,

mutual care between youth and their families, and family discussion about the dangers of drugs on overall substance use, alcohol use, and marijuana use was statistically no different for urban youth than it was for those in rural communities.

## Discussion

This research provides evidence that peers and family influence reported substance use but also that their association is not ubiquitous across all forms of influence and types of substance use. The more peers use alcohol and marijuana, the greater the likelihood that adolescents report using substances overall. However, they are less likely to use these substances if their peers exert greater pressure on them in regard to substances other than alcohol and marijuana. Because these "other" substances used to characterize peer influence are composed of cocaine, uppers, and downers, one explanation for this may be that youth perceive these "harder" substances to cause greater detrimental effects on their peers and therefore reduce their use of overall substances (which includes such substances) when they see their peers using them. Use of these substances is reduced if their families sanction substance use and are involved in their school activities. Yet the extent to which "care" is exhibited between youth and their families is unrelated to overall substance use.

Although differences in the strength of peer and family influences on substance use were not large between youth from rural and urban places, our findings were consistent with Simons et al. (2005); that is, place does "amplify" associations to some degree. Adolescents in urban areas do not change their use of overall substances if their families talk about substance use, but the same activity actually enhances overall substance use by youth in non-metropolitan areas. Instead of reducing substance use, it appears that discussing substances with youth in rural areas may increase their curiosity about and ultimate participation in overall use.

In general, the effects of the determinants of reported alcohol use by adolescents are consistent with those suggested by and found in the literature. Youth who have peers that use and ask them to use alcohol, marijuana, and other drugs are generally more likely to use alcohol themselves. In addition, the children of families who sanction substance use and exhibit a greater caring relationship report less substance use. Not all family influences predict alcohol use though. School involvement and discussion about substances was not associated with alcohol use for either community type.

Although many relationships exist between the peer and family determinants and marijuana use, several were inconsistent with expectations derived from the literature. In terms of the peer influences, only peer influence toward marijuana was positively associated with use. Peer influence toward alcohol use was unrelated to marijuana use by metropolitan youth and inversely associated with such use by those in nonmetropolitan communities. Again, this suggests an amplification effect for youth in nonmetropolitan communities, an association more specific to rural places that may not be present for youth living in large, urban areas.

Because peer influence toward alcohol use is associated with youth alcohol use, it is possible that the same influence would decrease marijuana use as youth choose alcohol over marijuana as their primary substance of choice. Like overall substance use, peer influence

toward other drugs reduces reported marijuana use. It is possible that youth do not differentiate detrimental effects of other drugs from those specifically related to marijuana. As such, they lower both their overall substance and marijuana use when they see their peers using other types of substances. The findings regarding the influence of family characteristics on marijuana use are also rather similar to those found for overall substance use. Marijuana use is less for youth with families who sanction substance use and are involved in their school activities (except for metropolitan youth where there is no association with school involvement). Yet for youth in both types of communities, such use is not associated with how much care exists between the youth and his or her family and increases with discussion about substance use. This also is likely due to youth's acquiring a curiosity about marijuana use from such talks. It is worthy to note, however, that these specific findings, which are statistically significant, are not substantively significant.

The main objective of this study was to ascertain whether the relationship of peer and family influences on adolescent substance use differed depending upon the community type in which the adolescents lived. In that regard, we used social disorganization theory to guide our research. We started with the idea that rural areas may exhibit less social disorganization than urban areas, and consistent with the theory and research of Sampson and associates (Osgood & Chambers, 2000; Sampson & Groves, 1989; Simons et al., 2005), we suggested that rurality/urbanity, as a community-level characteristic, would influence the relationship between family and peer factors with substance use. Although our hypothesis that family influences would differ for youth in rural as opposed to urban areas was not confirmed, we did find support for the hypothesis that peer influences differ by community type. For all three types of substance use, the relationship of peer influence toward alcohol varied between youth from rural and urban communities. It appears that youth who live in urban areas are influenced to use more substances by peers who drink and ask them to drink alcohol than youth from rural areas. Interestingly, as noted above, the effect of peer influence toward alcohol on marijuana use was negative for youth from both communities. Because the magnitude of the negative association was greater for nonmetropolitan youth, the deterrent effect on the relationship is less for metropolitan youth. Therefore, for any change in peer influence toward alcohol use, the net effect on the relationship is that youth in urban communities would report greater marijuana use than youth from rural areas. Whereas this specific finding supports the contention that youth in urban areas will be influenced by their peers to use more substances than their rural counterparts for a given level of influence, the larger effect on the relationship of influence and use for rural youth does not support the idea that rural youth would be generally influenced less by their peers. That peer influence toward marijuana has a larger impact on overall substance use for rural youth also indicates that, in some cases, peers play a bigger role in rural adolescents' decisions to use substances. It is possible that these associations also reflect availability of substances.

In addition to finding that peer and family influences determine adolescent substance use, this research provides evidence that peer influences differ for youth depending on whether they live in a rural or urban area. Research that seeks to explain adolescent substance use as a function of peer influence should therefore account for the community type in which youth reside. It appears that youth who live in urban areas and have peers who use

and ask them to use alcohol are more likely to use substances overall, alcohol, and marijuana than their rural counterparts. Yet compared to urban youth, peer influences toward marijuana use have a greater impact on the overall substance use of rural youth. Future research should explore this difference, but with consideration of two other dimensions that form the most important limitations of this research. First, there is the issue of whether our results are confined to the southwest region of the United States. Would the results be comparable in other regions as well? Second, there is the question as to whether any rural–urban differences in the relationship of peer and family influences with substance use are due to structural characteristics of smaller versus larger places or due to other place-based characteristics, such as population turnover, poverty, and other factors. Both regional differences and the various social structural and economic characteristics of rural and urban communities may well modify our common assumptions about the relationships between peer-level and family-level factors with substance use. Overcoming both limitations is possible by making sure that future research increases the number of places or sampling sites from which data are drawn, both at the aggregate level and at the individual level.

## Notes

1. As in most surveys, respondents sometimes failed to answer questions. To account for this, we imputed missing responses of a continuous variable with the mean of that variable, whereas we imputed for all other missing responses the modal value of the respective variable.

2. We estimated all measurement models simultaneously. Given the numerous problems associated with treating ordinal variables as if they are continuous (see Bollen, 1989), we accounted for scale by calculating the polyserial correlation and asymptotic covariance matrices. We then weighted the polyserial correlation matrix by the asymptotic covariance matrix in a weighted least squares estimation of the model. We also tested to see if the form of the measurement models (i.e., dimensions and patterns of factor loadings, measurement errors, and latent construct covariances) and measure coefficients (i.e., estimated factor loadings) were invariant between the metropolitan and nonmetropolitan samples via a multigroup comparison analysis (Bollen, 1989). The fit (significant chi-square at a .05 alpha level; .14 standardized root mean square residual; .10 root mean square error of approximation; and .94 normed, comparative, and incremental fit indexes) of this model (based on the covariance matrix to allow estimation) appeared a reasonably good representation of the data, suggesting the form and estimates did not differ.

3. While estimating the polyserial correlation, the polychoric correlation between the measures assessing peer use of uppers and downers would not converge. We therefore excluded peer use of downers to eliminate this problem.

4. Based on the confirmatory factor analysis, the sanctions against marijuana and other substance use were associated with problems in the model as they had negative error variances and squared multiple correlations greater than unity. Upon estimating a model that excluded sanctions against other drugs, the problems were still inherent in the sanctions against marijuana measure. We therefore excluded both measures, which resulted in a good fitting model without statistical abnormalities.

5. Paternoster, Brame, Mazerolle, and Piquero (1998) have noted that scholars have often used an incorrect formula to test for the statistical equality between two coefficients that negatively biases the standard error of the difference. To get an unbiased estimate of the standard error of the difference, they recommend using the formula below. This was the formula used to test for statistical equivalence between coefficients:

$$Z = \frac{b_1 - b_2}{\sqrt{(SEb_1^2 + SEb_2^2)}}$$

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**Jeremy M. Wilson** is associate director of the Center on Quality Policing at the RAND Corporation. He also holds the Willett Chair in Public Safety in the Center for Public Safety at Northwestern University and is an

adjunct professor in the Heinz School of Public Policy and Management at Carnegie Mellon University. His research typically centers on policing, internal security, and community crime prevention. His recent books include *Community Policing in America*, *State and Local Intelligence in the War on Terrorism*, *Establishing Law and Order After Conflict*, and *Police-Community Relations in Cincinnati*.

**Joseph F. Donnermeyer** is a professor in the Rural Sociology Program at The Ohio State University (OSU). He is a member of the Criminal Justice Research Center at OSU and is the international research coordinator for the Centre for Rural Crime, University of New England, New South Wales, Australia, where he is also an adjunct professor. His research areas include rural crime and delinquency.