



Published in final edited form as:

J Child Adolesc Subst Abuse. 2017 ; 26(1): 60–65. doi:10.1080/1067828X.2016.1210550.

Recent Alcohol, Tobacco, and Substance Use Variations between Rural and Urban Middle and High School Students

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Abstract

The use of addictive substances by adolescents is a major public health concern; however, rural vs. urban variations are poorly understood. The purpose of the current study was to examine rural-urban differences in the prevalence of recent use of 11 substances in grades 6–12 in a statewide sample of students from the Georgia Student Health Survey II (n = 513,909). We found that rural-urban differences in substance use depend largely upon grade level, with rural middle school students demonstrating higher rates of alcohol, smoking tobacco, and chewing tobacco use, and urban high school students demonstrating higher rates of illicit drugs.

Keywords

rural; substance use; youth; school

Introduction

The use of addictive substances (i.e., alcohol, tobacco, and/or illicit drugs) by adolescents is currently a significant health concern in the United States, with national data suggesting that an estimated 46% of adolescents (i.e., 6.1 million) have used at least one substance in the past 30 days. More specifically, approximately 41.8% of adolescents report recent (i.e., past 30-day) alcohol use, 19.5% report recent tobacco use, and 20.8% report recent marijuana use (The National Center on Addiction and Substance Abuse [CASA], 2011a). However, the prevalence of recent alcohol, tobacco, and drug use behaviors among adolescents may be potentially influenced by contextual factors such as their geographic location (i.e., urban or rural). Namely, there are specific aspects of urban living (i.e., greater availability and prevalence of “street drug” use in more metropolitan areas; e.g., National Drug Intelligence Center, 2011; Gibbons et al., 2007; Hanson et al., 2009; U.S. Department of Health and Human Services, 2002) that may result in greater risks for illicit drug use for urban youth, in comparison to their rural counterparts. In contrast, rural adolescents may be more

vulnerable to recent alcohol and/or tobacco use due to certain cultural and structural aspects of the rural environment (i.e., a greater overall cultural acceptance of and more permissive attitudes towards alcohol and tobacco use; easy access to alcohol and tobacco products in many rural communities; increased geographic and social isolation; limited community-based facilities and events that provide alcohol-free social environments for youth; and a lack of evidence-based substance use education and prevention efforts targeting rural youth; e.g., Gale, Lenardson, Lambert, & Hartley, 2012; Hartley, 2007; Hanson et al., 2008; Hutchinson & Blakey, 2003; Lendardson, Hartley, Gale, & Pearson, 2014; Maxwell, Tachkett-Gibson, & Dyer, 2006; Radunovich & Weins, 2012; Substance Abuse and Mental Health Services Administration, 2002; VanGundy, 2006; Willging, Gilbert, Quintero, & lilliot, 2014).

Previous research exploring rural-urban difference in recent (i.e., past 30-days) substance use behaviors among adolescents consistently reveals greater alcohol and/or tobacco use among rural youth (e.g., Aloise-Young, Wayman, & Edwards, 2002; Coomber et al., 2011; Hanson et al., 2009; Gale et al., 2012; Gfroerer, Larson, & Colliver, 2007). However, the research regarding past-30 day illicit drug use among rural and urban youth reveals mixed findings. For example, Coomber et al. (2011) examined past 30-day substance use behaviors among a combined sample of 7th and 9th grade students and found that a greater percentage of rural students reported recent marijuana use, with no rural-urban differences found for other illicit drug use. However, Hanson and colleagues (2008) used the rural-urban continuum to explore the prevalence of past-30 day substance use among a combined sample of 8th, 10th, and 12th graders attending public schools in Montana and found that, while risk of alcohol and tobacco use increases in more rural areas, the risk of illicit drug used decreases along the continuum from urban to rural counties.

There is currently a shortage of evidence-based substance use education and prevention programming for middle and high school students in rural areas (e.g., Hutchinson & Blakely, 2003; Lendardson et al., 2014; Vangordy, 2006). In addition, while the previously mentioned studies offer useful information regarding the recent substance use behaviors of rural and urban students across select grade levels, there is a lack of research that explores rural-urban differences in past-30 day alcohol, tobacco, and illicit drug use within each grade level across middle and high school (i.e., grades 6–12). This type of research is needed in order to better identify the appropriate timing of prevention delivery (e.g., Johnston et al., 2013). Therefore, the purpose of the current study was to examine rural-urban differences in the prevalence of past 30-day use of each of 11 substances (i.e., alcohol, smoking tobacco, chewing tobacco, marijuana, cocaine, inhalants, steroids, ecstasy, methamphetamines, hallucinogens, and prescription drugs) within each grade 6th through 12th in order to: 1) gain a more comprehensive understanding of the rural-urban differences in recent use within both middle and high school and 2) facilitate the identification of grade-specific differences in risks in order to better inform the specific timing and focus of substance use prevention strategies targeting children and adolescents in rural areas.

Methods

Participants

Data for this study come from the 2013 Georgia Student Health Survey II, given annually to all middle and high school students in public and select private/charter schools in Georgia (Georgia Department of Education, 2014). In total, 513,909 student responses were included in the current study (18.2% rural; 80.2% urban) out of 856,747 students enrolled statewide. The study sample therefore represents approximately 60% of all 6th–12th grade students in the state.

Procedure

Students complete an anonymous survey on a school-provided computer during school hours (Goldammer, Swahn, Strasser, Ashby, & Meyers, 2013). A validity check question inquiring into the use of a fictitious drug screens out individuals who provide intentionally false responses. Each county was coded as either rural or urban using the Health Resources and Services Administration's (HRSA, 2010) rurality designations. Students from charter schools were excluded from analysis as county of residence was not available.

Measures

As part of the survey, students indicated their use in the past 30 days of eleven substances: alcohol, smoking tobacco, chewing tobacco, marijuana, cocaine, inhalants, steroids, ecstasy, methamphetamines, hallucinogens, and prescription drugs.

Data Analysis

Descriptive and crosstab analyses were used to calculate odds ratios and chi-square tests of independence were conducted to examine rural-urban differences in 30-day use of each substance (alcohol, smoking tobacco, chewing tobacco, marijuana, cocaine, inhalants, steroids, ecstasy, methamphetamines, hallucinogens, and nonmedical prescription drug use), stratified by grade. All analyses were conducted using SPSS version 21.

Results

The results of the chi-square analyses comparing rural/urban past 30-day substance use for each grade level are presented in Table 1. The largest odds ratio for each substance is noted below; all odds ratios for each substance by grade level are presented in Table 2.

Alcohol

A greater percentage of rural students across grades 6–11 reported using alcohol in the past 30 days when compared to their urban peers. However, this rural-urban difference switched for 12th graders; with a greater percentage of *urban* students endorsing past 30-day use of alcohol. For alcohol use, the greatest rural-urban differences were found for grades 6–7; with rural sixth and seventh graders having the highest comparative risk of past 30-day alcohol use (OR = 1.32).

Smoking Tobacco

For grades 6–11, a greater percentage of rural students endorsed smoking tobacco in the past 30 days when compared to urban students. However, no rural-urban difference emerged for 12th grade students. In terms of greatest comparative risk, rural 7th graders were at 1.74 times the odds of endorsing the use of smoking tobacco in the past 30 days compared to their urban peers (OR = 1.74).

Chewing Tobacco

A greater percentage of rural students across grades 6–12 reported chewing tobacco in the past 30 days when compared to their urban counterparts. As with smoking tobacco, rural 7th graders demonstrated the greatest comparative risk of using chewing tobacco in the past 30 days in comparison to their urban peers (OR = 2.27).

Marijuana

An examination of rural-urban differences in students' past 30-day marijuana use revealed no differences for middle school students (i.e., grades 6–8). However, a significant difference did emerge for high school students (i.e., grades 9–12), with a greater percentage of urban students endorsing past-30 day use of marijuana. Rural 12th graders had the lowest comparative risk of past-30 day marijuana use compared to their urban counterparts (OR = 0.65).

Cocaine

As with marijuana use, no rural-urban differences in past 30-day use of cocaine were found for grades 6–8; with a greater percentage of urban high school students (i.e., grades 9–12) reporting past 30-day cocaine use. Similarly, rural 12th graders had the lowest comparative risk of past 30-day cocaine use compared to the sample of urban 12th graders (OR = 0.63).

Inhalants

No rural-urban differences in past 30-day inhalant use were found for grades 6–9. However, a greater percentage of urban students in grades 10–12 endorsed past 30-day inhalant use. As with cocaine and marijuana use, rural 12th graders, in comparison to their urban peers, had the lowest comparative risk of past 30-day inhalant use (OR = 0.65).

Steroids

The results found for past 30-day steroid use were similar to those for inhalant use. No rural-urban differences emerged for grades 6–9; with a greater percentage of urban students in grades 10–12 reported past 30-day steroid use when compared to rural students. Akin to the results found for cocaine, marijuana, and inhalant use, rural 12th graders had the lowest comparative risk of past 30-day steroid use (OR = 0.75).

Ecstasy

Similar to the results found for marijuana and cocaine use, the percentage of students reporting past 30-day use of ecstasy was comparable for rural and urban middle schoolers (i.e., grades 6–8); with a greater percentage of urban high school students (i.e., grades 9–12)

reporting past 30-day ecstasy use when compared to their rural counterparts. In terms of risk, rural 12th graders also had the lowest odds of endorsing past 30-day use of ecstasy compared to their urban peers (OR = 0.56).

Methamphetamines

Similar to past 30-day use of inhalants and steroids, there were no rural-urban differences in methamphetamine use for students in grades 6–9; with a greater percentage of urban 10th–12th graders endorsing past 30-day methamphetamine use in comparison to their rural peers. As with marijuana, cocaine, inhalants, steroid use, and ecstasy use, rural 12th graders had the lowest comparative risk of past 30-day methamphetamine use (OR = 0.63).

Hallucinogens

The variation in rural-urban differences in past 30-day use of hallucinogens was the same as those found for marijuana, cocaine, and ecstasy—there were no rural-urban differences for grades 6–8 and a greater percentage of urban students in grades 9–12 reported past 30-day hallucinogen use when compared to rural students. Similar to the results found for risk of past 30-day use of the other illicit drugs (i.e., marijuana, cocaine, inhalants, ecstasy, and steroids), rural 12th graders evidenced the lowest comparative risk for past 30-day hallucinogen use (OR = 0.51).

Prescription Drugs

Results varied across grade levels in terms of rural-urban differences in past 30-day nonmedical prescription drug use. For grades 6, 8, 9, 10, and 11, no rural-urban differences were found; with a similar percentage of rural and urban students reporting past 30-day nonmedical use of prescription drugs. However, for grades 7 and 12, a greater percentage of urban students reported prescription drug misuse in the past 30 days. In terms of risk, rural 12th graders were also found to have the lowest odds of endorsing past 30-day nonmedical prescription drug use (OR = 0.71); which is similar to the results found across the illicit drug categories (i.e., marijuana, cocaine, inhalant, steroids, ecstasy, methamphetamines, and hallucinogens).

Discussion

Our results show that recent use of substances does vary between rural and urban students, in ways that partially confirm and partially refute previous studies. First, our study showed that among middle school students, there were no substances for which urban students reported greater use than rural students. Instead, rural students in 6th, 7th, and 8th grades each were more likely to report using alcohol, smoking tobacco, and chewing tobacco in comparison to their urban peers, and rural 7th grade students were more also likely to report use of prescription drugs. This supports previous literature that has shown higher rates of recent use of these substances in rural adolescents (e.g., Coomber et al., 2011; Cronk & Sarvela, 1997; Gale et al., 2012; Gfroerer et al., 2007; Hanson et al., 2009; Lambert, Gale, & Hartley, 2008; VanGundy, 2006); however, it does not support previous research that suggests overall differences in illegal substance use between rural and urban youth (e.g., Coomber et al., 2011; Gfroerer et al., 2007; Hanson et al., 2009; Lambert et al., 2008;

Maxwell et al., 2006; U.S. Department of Health and Human Services, 2002). These differences were found exclusively in our high school student sample, with differences increasing in magnitude across grades. For instance, urban 9th graders were only 33% more likely than rural students to report recent hallucinogen use, but by 12th grade urban students were nearly twice as likely as rural students to report hallucinogen use. This suggests that the urban-rural disparity in substance use grows in intensity at later ages. This is further supported by the decreasing levels of difference between rural and urban student use found for alcohol, smoking tobacco, and chewing tobacco – for each substance, the magnitude of the rural difference decreased between 6th and 12th grades, even reversing in direction for alcohol use (with rural 6th graders 32% more likely to report alcohol use, but urban 12th graders 22% more likely to report alcohol use).

It is important to note that nearly all rural differences had disappeared by 12th grade; in fact, there was only higher use in rural 12th graders for chewing tobacco – all other substances were either more frequently used by urban 12th graders or non-significant (including smoking tobacco, which was more frequently reported by rural students in every other grade). It is unclear why these patterns emerged in this way. It could be that rural substance use is driven more by overall permissive attitudes toward substance use (e.g., DeHaan & Boljevac, 2010; Gale et al., 2012; Lendardson et al., 2014; Maxwell et al., 2006; Meyer et al., 2008; VanGundy, 2006) which is fairly level over time, whereas urban substance use may be driven more by factors that change over time (e.g., peer pressure; e.g., CASA, 2011b; Sawyer & Stevenson, 2008). Future research should investigate how risk factors for substance use vary between rural and urban areas – it could be that there are different risk factors, or that these risk factors vary in prevalence between rural and urban. Until the specific risk factors are identified, research into developing interventions to address substance use in a culturally appropriate manner within rural and urban settings may be substantially hampered.

Regardless of the underlying reasons for the evolving magnitude and direction of substance use disparities, the fact that a fairly remarkable shift in usage occurs between middle and high school points to the importance of timing for rural and urban alcohol and substance use prevention. Given the fairly large differences seen in middle school, particularly for tobacco, it is crucial to begin implementing prevention approaches much younger than previously considered; in fact, our data support the need for alcohol and tobacco prevention to even be a part of elementary school curricula. When nearly 10% of rural 8th grade students report that they have consumed alcohol within the past 30 days, it is clear that new prevention and intervention methods focused on rural alcohol use are essential.

For high school substance use, it appears that more emphasis may need to be placed on 8th graders to prevent the demonstrated jump in use between middle and high school. Rates of smoking use and marijuana use increased by approximately 50% between 9th and 12th grades for both rural and urban students, pointing toward the need for earlier intervention. The rates of marijuana use are particularly troubling, reaching 17.5% use in 12th grade urban students and 12.2% among rural students. For urban students, this was higher than any substance other than alcohol – exceeding even smoking tobacco use. It could be that tobacco use prevention efforts are being effective in both rural and urban students but that these

prevention messages are not being perceived to also apply to marijuana. Future research should investigate the factors underlying motivation for marijuana use, particularly in high school students, to identify what it is that is triggering such high rates of use (that increase fairly steadily grade over grade).

There are some inherent limitations to our study. First, the sample comes entirely from Georgia and may not be representative in other locales. Second, we were unable to include charter school students within the sample due to the absence of county identifiers for charter schools, and private school recruitment was on a voluntary basis. This could limit the generalizability of the results; however, we feel the results at minimum represent the overall public school enrollment in the state quite well. Third, while the data are self-report, as described in the methods there was a validation check used to help clean the data prior to analysis. Fourth, while the study's measures have been used and refined over many years of data collection, the instruments are not based in formally validated measures. Finally, our study was not able to assess use of emerging substances such as spice, bathsalts, and electronic cigarettes due to these not having been included on the original data collection instrument.

In summary, we found that rural-urban differences in substance use depend largely upon grade level, with rural middle school students demonstrating consistently higher rates of alcohol, smoking tobacco, and chewing tobacco use, and urban high school students demonstrating consistently higher rates of marijuana, cocaine, inhalants, steroids, ecstasy, methamphetamines, hallucinogens, and prescription drugs. Overall, the magnitude of differences pulled toward urban disparities, with the gap between urban and rural widening, or in some cases, rural differences reversing to become urban differences. These results underscore the complex role that rurality plays in substance use, and support the need for future investigations of the differing motivations for substance use between rural and urban middle and high school students.

Acknowledgments

This research was supported in part by grant P20MD006901 through the National Institutes of Health / National Institute on Minority Health and Health Disparities. The views expressed are those of the authors. We would like to express our gratitude to the hundreds of teachers throughout the state of Georgia who facilitated collection of the GSHS II data, and to the administrators and state personnel who worked to construct the dataset. Data from the Georgia Student Health Survey II (GSHS II) was received by the Georgia Department of Education. Please note that all student survey data is anonymous and self-reported. Student race and gender have been redacted to safeguard the confidentiality of student data as required by the Federal Family Educational Rights and Privacy Act (FERPA) and other applicable state and federal laws and regulations.

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Table 1

Past 30-day use of substances by grade and rurality status.

Substance	6 th Grade		7 th Grade		8 th Grade		9 th Grade		10 th Grade		11 th Grade		12 th Grade	
	U	R	U	R	U	R	U	R	U	R	U	R	U	R
Alcohol	2.7%	3.6% ^{***}	4.6%	5.9% ^{***}	7.9%	9.7% ^{***}	13.2%	15.6% ^{***}	17.4%	19.8% ^{***}	21.7%	23.1% ^{**}	26.3%	22.7% ^{***}
Smoking Tobacco	1.2%	1.9% ^{***}	2.0%	3.5% ^{***}	3.6%	5.9% ^{***}	6.2%	8.7% ^{***}	8.2%	11.3% ^{***}	10.6%	13.9% ^{***}	14.9%	15.1%
Chewing Tobacco	0.8%	1.5% ^{***}	1.1%	2.5% ^{***}	2.0%	4.0% ^{***}	3.6%	6.6% ^{***}	4.4%	7.9% ^{***}	5.2%	8.1% ^{***}	6.4%	8.3% ^{***}
Marijuana	1.0%	1.1%	2.6%	2.6%	5.3%	5.4%	9.6%	8.7% ^{***}	12.3%	11.6% [*]	15.0%	13.3% ^{***}	17.5%	12.2% ^{***}
Cocaine	0.5%	0.6%	0.7%	0.6%	1.1%	1.0%	1.8%	1.4% ^{**}	2.3%	1.8% ^{***}	2.7%	2.2% ^{**}	3.6%	2.3% ^{***}
Inhalants	1.0%	1.0%	1.2%	1.2%	1.5%	1.4%	2.0%	1.8%	2.2%	1.8% [*]	2.5%	2.0% ^{**}	3.1%	2.1% ^{***}
Steroids	0.7%	0.8%	0.8%	0.8%	1.1%	1.1%	1.7%	1.5%	2.0%	1.6% ^{**}	2.4%	2.0% [*]	2.9%	2.2% ^{***}
Ecstasy	0.4%	0.4%	0.6%	0.5%	1.0%	0.9%	1.9%	1.5% ^{***}	2.4%	1.9% ^{***}	3.0%	2.1% ^{***}	3.9%	2.2% ^{***}
Meth	0.6%	0.6%	0.6%	0.5%	0.8%	0.7%	1.5%	1.3%	1.7%	1.4% [*]	2.2%	1.7% ^{**}	2.8%	1.8% ^{***}
Hallucinogens	0.4%	0.4%	0.5%	0.4%	0.9%	0.7%	1.7%	1.3% ^{***}	2.2%	1.6% ^{***}	2.8%	1.9% ^{***}	3.6%	1.9% ^{***}
Prescription Drugs	1.5%	1.6%	1.8%	2.1% [*]	2.5%	2.5%	3.9%	3.7%	5.1%	4.8%	5.7%	5.2%	6.4%	4.7% ^{***}

Notes: % of students who endorsed use in the past 30 days;

* Difference is significant at $p < .05$;

** $p < .01$;

*** $p < .0001$.

Table 2

Odds ratios for past 30-day substance use by grade and rurality status.

Substance	6 th Grade		7 th Grade		8 th Grade		9 th Grade		10 th Grade		11 th Grade		12 th Grade	
	OR	P-Value	OR	P-Value	OR	P-Value	OR	P-Value	OR	P-Value	OR	P-Value	OR	P-Value
Alcohol	1.32	<.001	1.32	<.001	1.24	<.001	1.22	<.001	1.17	<.001	1.10	.001	0.82	<.001
Smoking Tobacco	1.55	<.001	1.74	<.001	1.69	<.001	1.44	<.001	1.42	<.001	1.35	<.001	1.01	.754
Chewing Tobacco	1.94	<.001	2.27	<.001	2.08	<.001	1.90	<.001	1.84	<.001	1.60	<.001	1.33	<.001
Marijuana	1.14	.125	0.99	.872	1.02	.704	0.89	<.001	0.93	.03	0.87	<.001	0.65	<.001
Cocaine	1.10	.45	0.93	.51	0.93	.413	0.78	.001	0.77	<.001	0.80	.001	0.63	<.001
Inhalants	1.01	.89	1.05	.586	0.94	.390	0.89	.100	0.83	.012	0.80	.002	0.65	<.001
Steroids	1.16	.141	0.94	.547	1.01	.944	0.88	.089	0.78	.002	0.83	.012	0.75	<.001
Ecstasy	1.05	.742	0.86	.225	0.90	.260	0.76	<.001	0.78	.001	0.68	<.001	0.56	<.001
Methamphetamines	0.97	.778	0.84	.158	0.84	.104	0.86	.056	0.83	.02	0.79	.004	0.63	<.001
Hallucinogens	1.00	.983	0.85	.214	0.84	.107	0.75	<.001	0.74	<.001	0.68	<.001	0.51	<.001
Prescription Drugs	1.05	.529	1.17	.016	0.99	.921	0.95	.28	0.95	.268	0.92	.082	0.71	<.001