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Does geographic location matter for transportation risk behaviors among U.S. public high school students?

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Abstract

Introduction: Teen motor vehicle crash fatality rates differ by geographic location. Studies assessing teen transportation risk behaviors by location are inconclusive. Therefore, we explored the role of census region and metropolitan status for driving prevalence and four transportation risk behaviors among U.S. public high school students.

Methods: Data from 2015 and 2017 national Youth Risk Behavior Surveys were combined and analyzed. Multivariable models controlled for sex, age, race/ethnicity, grades in school, and school socioeconomic status.

Results: Overall, 41% of students did not always wear a seat belt. Students attending schools in the Northeast were 40% *more* likely than those in the Midwest to not always wear a seat belt. Among the 75% of students aged ≥16 years who had driven during the past 30 days, 47% texted/e-mailed while driving. Students in the Northeast were 20% *less* likely than those in the Midwest to text/e-mail while driving, and students attending suburban or town schools were *more* likely to text/e-mail while driving (20% and 30%, respectively) than students attending urban schools. Nineteen percent of students rode with a driver who had been drinking alcohol, and 7% of drivers aged ≥16 years drove when they had been drinking alcohol, with no significant differences by location for either alcohol-related behavior.

Conclusions: We found few differences in teen transportation risk behaviors by census region or metropolitan status. Age at licensure, time since licensure, driving experience, and the policy and

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Author statement

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Declaration of competing interest

The authors declare no conflicts of interest.

physical driving environment might contribute more to variation in teen fatal crashes by location than differences in transportation risk behaviors. Regardless of location, teen transportation risk behaviors remain high. Future research could address developing effective strategies to reduce teen cell phone use while driving and enhancing community implementation of existing, effective strategies to improve seat belt use and reduce alcohol consumption and driving after drinking alcohol.

Keywords

Teen driver; Alcohol-impaired driving; Distracted driving; Restraint use; Seat belt use; Metropolitan status

1. Introduction

Motor vehicle crashes continue to be a leading cause of death among adolescents in the United States (Centers for Disease Control and Prevention, National Center for Injury Prevention and Control, 2020). In 2017, almost 1,500 U.S. passenger vehicle occupants aged 14–18 years died (National Highway Traffic Safety Administration, 2021) and approximately 190,000 were injured in crashes (Centers for Disease Control and Prevention, National Center for Injury Prevention and Control, 2020). Crash fatality rates among teens vary by both geographic region and metropolitan status (Peek-Asa et al., 2010; Shults and Ali, 2010). By census region, the South often ranks highest in population-based teen crash fatality rates; in 2017, the South's fatality rate among motor vehicle occupants aged 14–18 years was almost three times the rate in the Northeast (9.0 versus 3.3 per 100,000 population, respectively) (National Highway Traffic Safety Administration, 2021; United States Census Bureau, Population Division, 2021). By metropolitan status, teens living in rural areas typically begin driving at younger ages (Shults et al., 2016a) and have higher population-based fatal crash rates than their more urban counterparts (Chen et al., 2014; Peek-Asa et al., 2010). Also, rural teen crashes are 5–6 times more likely than urban teen crashes to result in death or severe injuries (Peek-Asa et al., 2010; Vachal and Malchose, 2009). A better understanding of the factors that contribute to the sizable differences in fatal teen crash rates by these measures of location could aid in reducing the disparities.

Studies of U.S. teens' transportation risk behaviors by geographic location are limited and have reported inconclusive results. Seat belt nonuse has perhaps been most studied. Several self-report and observational surveys, as well as studies of teens involved in crashes, indicate that seat belt nonuse is more common in rural areas than urban areas (Davidson et al., 2013; García-España et al., 2012; Peek-Asa et al., 2010; Shults et al., 2016b). However, in a national survey of young drivers, García-España et al. (2012) reported that after accounting for sociodemographic factors, driving factors, and type of state seat belt law (primary or secondary enforcement), students from rural areas were as likely as their urban counterparts to report often or always wearing a seat belt. Likewise, Henk et al. (2008) reported no substantial difference in self-reported seat belt nonuse by urban/rural status among nearly 3,000 Texas teens enrolled in a driver education program.

Alcohol-related transportation risk behaviors among U.S. high school students are monitored by two ongoing, nationally representative surveys, the national Youth Risk Behavior Survey (YRBS) (Kann et al., 2016, 2018) and Monitoring the Future (MTF) (O'Malley and Johnston, 2013). An analysis of 2003 YRBS data by metropolitan status found that during the 30 days before the survey, a small but significantly higher percentage of high school students attending rural schools compared with their urban counterparts drove after drinking alcohol, but that study did not find a significant difference in the prevalence of riding with a driver who had been drinking alcohol (Greggo et al., 2005). However, that study did not account for differences in driving status, and rural teens are more likely to be drivers than urban teens (Heck and Nathaniel, 2011; Shults et al., 2016a). By region, a report of 2011 YRBS data from 41 states indicated that higher prevalences of driving after drinking alcohol were clustered among states in the upper Midwest, the Mountain West, and along the Gulf Coast (excluding Florida) (Shults and Olsen, 2012). Similarly, an analysis of 2009–2011 MTF data found that high school seniors in the Midwest were more likely than their counterparts in the West to report driving after heavy drinking (≥5 alcoholic drinks in a row) during the last two weeks (O'Malley and Johnston, 2013). No difference in the likelihood of driving after heavy drinking was noted by metropolitan status after accounting for census region and other covariates (O'Malley and Johnston, 2013).

Less is known about teen texting or e-mailing while driving (TWD) by location. A 2006 national survey of high school students reported no statistically significant difference in the frequency of cell phone use while driving (including TWD) by school urbanicity but reported large differences by hours of driving (Hafetz et al., 2010). In contrast, Henk et al. (2008) reported that Texas teens attending rural schools texted while driving at twice the rate of their urban counterparts. More recently, an analysis of 2015 YRBS data from 35 states (Li et al., 2018) found that the five states with TWD prevalences of ≥50% (Montana, Nebraska, North Dakota, South Dakota, and Wyoming) were primarily rural (with populations of <2 million) (United States Census Bureau, Population Division, 2021) and were clustered in the Upper Midwest and Mountain West.

In light of the sizable differences in teen fatal crash rates by geographic location and previous studies' inconclusive results concerning transportation risk behaviors by location, we explored the potential role of location in four teen transportation risk behaviors associated with crashes and crash-related injury among U.S. public high school students. We combined and analyzed data from the 2015 and 2017 national YRBSs to assess driving prevalence and four transportation risk behaviors: did not always wear a seat belt when riding in a car driven by someone else; rode with a driver who had been drinking alcohol; drove when they had been drinking alcohol; and texted or e-mailed while driving (TWD) by the following two measures of school location: the four U.S. census regions and four levels of metropolitan status.

2. Methods

The national YRBS is conducted by the Centers for Disease Control and Prevention (CDC) biennially to monitor priority health risk behaviors among U.S. high school students. The 2015 and 2017 YRBSs each used independent three-stage cluster samples to obtain cross-

sectional data representative of public and private school students in grades 9–12 in all 50 states and the District of Columbia (Kann et al., 2016, 2018). Details of the survey methods are described elsewhere (Kann et al., 2016, 2018). CDC's Institutional Review Board approved the YRBS protocol. Participation in the survey was anonymous and voluntary, and local parental permission procedures were used. Students recorded their responses directly on a self-administered computer-scannable answer sheet.

2.1. Definitions of school census region, metropolitan status, and socioeconomic status

We examined two measures of location: school census region and school metropolitan status. Census region was defined using the four U.S. census regions: Midwest, Northeast, South, and West. Metropolitan status was defined using the following four-level measure based on the National Center for Education Statistics locale code (Geverdt, 2015): urban, suburban, town, and rural. Metropolitan status and school socioeconomic status (SES) data were obtained from the Market Data Retrieval (MDR) commercial database, which contains information about individual U.S. schools (Market Data Retrieval, a Dun & Bradstreet Division, 2021) and were linked to the YRBS data. School SES was classified based on the percentage of each school's enrollment that qualified for the free and reduced-price meal program (Market Data Retrieval, a Dun & Bradstreet Division, 2021). Qualification for the free and reduced-price meal program was based on family size and income criteria, with lower school percentages indicating higher incomes in the students' households. We categorized the percentages into approximately equal tertiles (≤32%, 33%–65%, ≥66%).

2.2. Definitions of transportation risk behaviors

Two passenger behaviors were analyzed. Not always wearing a seat belt was assessed using the question, "How often do you wear a seat belt when riding in a car driven by someone else?" We categorized responses as always versus not always. Having ridden with a driver who had been drinking alcohol was assessed using the question, "During the past 30 days, how many times did you ride in a car or other vehicle driven by someone who had been drinking alcohol?" (0 times versus ≥1 time).

Two driver behaviors also were analyzed. Having driven when they had been drinking alcohol was assessed with the question, "During the past 30 days, how many times did you drive a car or other vehicle when you had been drinking alcohol?" Texting or e-mailing while driving was assessed with the question, "During the past 30 days, on how many days did you text or e-mail while driving a car or other vehicle?" Students indicating "I did not drive a car or other vehicle during the past 30 days" were excluded from analyses of driving behaviors; otherwise, responses for both questions were categorized as 0 times/days versus ≥1 time/day.

2.3. Definitions of individual student characteristics

Individual student characteristics included sex (female, male), age (14, 15, 16, 17, or ≥18 years), grades in school (mostly A's or B's versus mostly C's, D's, or F's), and race/ethnicity. Students were classified into four racial/ethnic groups: white, non-Hispanic (white); black, non-Hispanic (black); Hispanic or Latino of any race (Hispanic); or other or multiple races. The number of students in the other or multiple racial/ethnic groups was too

small to produce statistically stable estimates; therefore, those data are not presented, but remain in the analytic sample.

We combined data from the national 2015 and 2017 YRBSs to improve statistical power. During 2015 and 2017, respectively, the numbers of students in the samples were 15,624 and 14,765, school response rates were 69% and 75%, student response rates were 86% and 81%, and overall response rates (the product of school and student response rates) were 60% for both years. Data were weighted to adjust for school and student nonresponse and oversampling of black and Hispanic students. We restricted the study population to public school students (n = 29,448) because we wanted to assess school SES, and that measure was not available for private school students (n = 941). Students aged <14 years (n = 140) were excluded because most students of that age are not in high school, and because passenger fatality data suggest that youth aged <14 years are less likely than older teens to ride as passengers with teen drivers (Insurance Institute for Highway Safety, 2021a). In addition, students with missing data for age (n = 140) were excluded, resulting in an analytic sample size of 29,168 for the analyses of passenger behaviors (i.e., not always wearing a seat belt and riding with a driver who had been drinking alcohol). Thirty-four percent (n = 9,760) of the observations were missing data for at least one transportation risk behavior in the study. Among those observations, 39% (n = 3,766) were missing data for only one transportation risk behavior. One percent of the analytic sample (n = 311) had missing data for census region, and four percent (n = 1,167) had missing data for metropolitan status.

For the driver behavior questions (i.e., drove when they had been drinking alcohol and texted or e-mailed while driving), the sample was further restricted to students who drove a car or other vehicle during the 30 days before the survey and who were aged ≥16 years (n = 12,561), the age at which adolescents in every jurisdiction except New Jersey and New York City are legally permitted to drive while unsupervised under certain conditions (Insurance Institute for Highway Safety, 2021a). Students who did not answer either of the driving questions (n = 1,071) were excluded from analyses of driving behaviors. To provide context for the risky driving behaviors, we included the proportions of drivers by location in the results. Students who responded to either driver behavior question with a response other than “I did not drive a car or other vehicle during the past 30 days” were defined as drivers.

2.4. Multivariable statistical analysis

We conducted multivariable regression analysis to explore the potential role of census region and metropolitan status in the four transportation risk behaviors. Eight separate models were constructed, with each model controlling for the following student characteristics that were associated with transportation risk behaviors in prior research: sex, age, race/ethnicity, grades in school, and school SES (García-España et al., 2012; Hafetz et al., 2010; Henk et al., 2008; Li et al., 2018; O’Malley and Johnston, 2013; Shults and Olsen, 2012; Shults et al., 2016b; Vachal and Malchose, 2009). The four models with the independent variable of census region also controlled for metropolitan status, and the four models with the independent variable of metropolitan status also controlled for census region. We considered confidence intervals that did not overlap to approximate a significant difference at the 2-sided α of 0.05. Weighted percentages, crude prevalence ratios (CPRs), adjusted prevalence

ratios (APRs), and 95% confidence intervals (95% CIs) were calculated using SAS (version 9.3) with SAS callable SUDAAN (release 11.0.1) to account for the complex survey design. SUDAAN's logistic procedure and the predicted marginal statement with the adjusted risk ratios option was used to calculate APRs.

3. Results

Table 1 presents the demographic characteristics of the total study population by metropolitan status. Overall, 63% of students attended either urban (25%) or suburban schools (38%). Forty percent of students in the Northeast attended urban schools, whereas only 21% of students in the South attended urban schools. Black students (39%) and Hispanic students (39%) attended urban schools in statistically significantly (hereafter referred to as significantly) higher proportions than white students (14%).

3.1. Prevalence of transportation risk behaviors and driving, by census region and metropolitan status

3.1.1. Did not always wear a seat belt—Forty-one percent of students did not always wear a seat belt when riding in a car driven by someone else (Table 2). By census region, not always wearing a seat belt ranged 19 percentage points, with 33% in the West, 37% in the Midwest, 43% in the South, and 52% in the Northeast. Not always wearing a seat belt was significantly higher among students in the Northeast than among students in the Midwest or the West, and significantly higher in the South than in the West. By metropolitan status, the behavior was significantly higher among students attending urban schools (45%) than among students attending suburban schools (37%).

3.1.2. Rode with a driver who had been drinking alcohol—Nineteen percent of students rode with a driver who had been drinking alcohol during the 30 days before the survey. By census region, prevalence ranged from 18% to 20%, and by metropolitan status, prevalence ranged from 17% to 20%, with no significant differences by either location variable.

3.1.3. Drivers aged ≥16 years—Seventy-five percent of students aged ≥16 years drove a car or other vehicle during the 30 days before the survey. By census region, driving prevalence in the Midwest (85%) was significantly higher than in the South (78%), the West (70%), or the Northeast (64%). Driving prevalence was also significantly higher in the South than in the Northeast or the West. By metropolitan status, driving prevalence among students attending urban schools (64%) was significantly lower than in the other three metropolitan settings; students attending suburban schools (74%) had a significantly lower driving prevalence than students attending town (82%) or rural schools (81%).

3.1.4. Drove when they had been drinking alcohol among drivers aged ≥16 years—Among students aged ≥16 years who drove during the 30 days before the survey, 7% drove at least once when they had been drinking alcohol. Prevalence ranged from 7% to 8% by census region and from 7% to 9% by metropolitan status, with no significant differences by either location variable.

3.1.5. Texted or e-mailed while driving (TWD) among drivers aged ≥16 years

—Forty-seven percent of students aged ≥16 years who drove engaged in TWD at least once during the 30 days before the survey. By census region, TWD ranged from 41% in the Northeast to 52% in the Midwest but did not differ significantly. By metropolitan status, TWD ranged from 38% to 52%, with TWD among students attending urban schools (38%) being significantly lower than among students attending suburban (48%), town (52%), or rural schools (49%).

3.2. Multivariable analyses

Multivariable analyses indicated that few significant differences existed in the likelihood of engaging in transportation risk behaviors by either location variable (Table 3). By census region, the adjusted models estimated that students in the Northeast were 40% *more* likely than their counterparts in the Midwest to not always wear a seat belt (APR = 1.4, 95% CI 1.2–1.6), and students in the Northeast who drove were 20% *less* likely than their counterparts in the Midwest to engage in TWD (APR = 0.8, 95% CI 0.7–0.9). By metropolitan status, significant differences for the adjusted models existed only for TWD. Students attending suburban or town schools were 20–30% *more* likely to engage in TWD than their urban counterparts (APR suburban = 1.2, 95% CI 1.1–1.3; APR town = 1.3, 95% CI 1.1–1.4). No significant differences were found by census region or metropolitan status for either alcohol-related transportation risk behavior.

4. Discussion

Consistent with previous research, we found sizable differences in the proportions of U.S. public high school students who drove by census region (Shults et al., 2015) and metropolitan status (Heck and Nathaniel, 2011; Shults et al., 2015, 2016a); however, we found few differences in the measured transportation risk behaviors among drivers or passengers by either location variable. These location variables are broad, and therefore, not sensitive to differences in transportation risk behaviors at the state or local level, where most policies and programs to address teen transportation risk behaviors are implemented. In addition to the national YRBS data analyzed in this study, there are YRBS data for most states and for some local school districts, tribal governments, and United States territories (Centers for Disease Control and Prevention, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention, 2020). These data can serve as a valuable resource for decision making at the state and local levels.

Our study did note differences by census region and metropolitan status for not always wearing a seat belt and texting or e-mailing while driving. Students attending schools in the Northeast were *more* likely to not always wear a seat belt and *less* likely to engage in TWD than their counterparts in the Midwest. Likewise, students attending urban schools (versus suburban or town schools) were *less* likely to engage in TWD. These findings might be related to differing transportation patterns. Teens living in more densely populated areas, such as exist in much of the Northeast, might walk, bike, take ride share vehicles, or ride public transportation more often than their counterparts in other regions (Davis et al., 2012; McDonald and Trowbridge, 2009; Shults et al., 2015). Thus, they might not have developed

the habit of always buckling up when riding in a car. Also, when riding in a taxi or ride share vehicle, as occurs more frequently in densely populated areas, passengers often ride in the back seat, and seat belt use in the back seat is generally lower than in the front seat (Beck et al., 2019). Likewise, teens who drive in more densely populated urban areas are likely to drive shorter distances, and thus might have less opportunity or sense less need to text while driving than teens living outside of urban areas. Indeed, Hafetz et al. (2010) reported that less frequent cell phone use while driving (including TWD) among teens was associated with less time spent on the road.

Our finding of no significant differences by census region or metropolitan status for driving after drinking alcohol stands in contrast with previous studies. Two previous studies reported higher prevalence (Shults and Olsen, 2012) or likelihood (O'Malley and Johnston, 2013) of the behavior among students in the Midwest, one reported higher prevalence among students in suburban or rural areas (Heck and Nathaniel, 2011), and one reported higher likelihood among students in rural areas (Greggo et al., 2005). The lack of consistent findings could be related to questionnaire design and analytic methods differences, such as varied definitions of alcohol use before driving, not excluding nondrivers, and different covariates included in multivariable analyses.

Prevalence of the four teen transportation risk behaviors we examined remain high regardless of census region or metropolitan status. Our finding that 41% of students did not always wear a seat belt confirms that nonuse and inconsistent use persists among teens (Davidson et al., 2013; García-España et al., 2012; Shults et al., 2016b), even as seat belt use among adults in the U.S. approaches 90% (Shakya et al., 2020). TWD was similarly high at 47%, even though TWD by teen drivers is prohibited by law in 49 states, and all teen cell phone use while driving is prohibited or restricted in 36 states and the District of Columbia (Insurance Institute for Highway Safety, 2021b).

Driving after drinking any amount of alcohol is both illegal and especially dangerous for inexperienced teen drivers. Voas et al. (2012) found that drivers aged 16–20 years with blood alcohol concentrations (BACs) of 0.050%–0.079% (below the adult legal threshold for driving while intoxicated in all states but Utah) were about 6 times as likely to be involved in a fatal crash as their counterparts with 0.0% BACs. Even at 0.020%–0.049% BAC, teens were almost three times as likely to be in a fatal crash as their sober counterparts (Voas et al., 2012).

Full adoption and enforcement of effective state-based policies, such as primary enforcement of seat belt laws (Alderman and Johnston, 2018; García-España et al., 2012; Shults et al., 2016b) for all occupants, underage alcohol consumption and drinking and driving laws (Alderman and Johnston, 2018; Fell et al., 2016; Romano et al., 2015; Shults et al., 2001), and comprehensive graduated driver licensing systems (Alderman and Johnston, 2018; Centers for Disease Control and Prevention, National Center for Injury Prevention and Control, 2016; Chen et al., 2014; Shults and Olsen, 2012), could improve teen transportation safety. Additional research into understanding teens' perceptions and motivations surrounding cell phone use while driving could be beneficial in developing effective strategies to reduce TWD (Hafetz et al., 2010; Li et al., 2018).

A relatively small number of well-designed, community-based interventions to improve teen transportation safety have proven either effective or promising (Curry et al., 2015a; Elder et al., 2005). For example, several school-based instructional interventions were effective in reducing riding with drinking drivers among students (Elder et al., 2005). A systematic review and meta-analysis of brief alcohol interventions on drinking and driving among teens and young adults reported promising results (Steinka-Fry et al., 2015). Likewise, multiple programs aimed at improving parental supervision of their teen drivers have shown promise in reducing some risky driving behaviors (Curry et al., 2015a). Teen driving researchers note that effective interventions are grounded in established, applicable theory (Curry et al., 2015a; Elder et al., 2005; Foss and Williams, 2015). These interventions tend to be multifaceted and involve direct, active engagement over an extended time period (Alderman and Johnston, 2018; Curry et al., 2015a; Elder et al., 2005; Foss and Williams, 2015).

Improving transportation safety while meeting the transportation needs of teens occurs ultimately at the community level. By collecting and utilizing local data regarding teens' transportation patterns and risk behaviors, communities can better target strategies to address teens' specific transportation and safety needs and identify groups at high risk (Centers for Disease Control and Prevention, National Center for Injury Prevention and Control, 2016; Scott-Parker et al., 2019).

4.1. Limitations

As with all self-report surveys, YRBS results might be subject to social desirability bias. The YRBS does not quantify how much students drive, and rural teens generally begin driving at younger ages (Shults et al., 2016a) and typically drive more than their urban counterparts (Heck and Nathaniel, 2011; Shults et al., 2016a). Also, 34% of the observations in the full data set were missing data for at least one transportation risk behavior, which could have biased the findings. However, the adjusted prevalence ratios (calculated using observations with no missing data) were consistently similar to the crude prevalence ratios, suggesting that any bias due to missing data was small. As illustrated by some unreliable estimates in Table 1, even large surveys such as this one can have difficulty obtaining adequate sample sizes from less urban areas. The small number of students attending town or rural schools might have reduced the power to detect differences in transportation risk behaviors across metropolitan status. Moreover, this study's national data did not allow for analyses at more localized levels. Such analyses could potentially reveal more differences in teen transportation risk behaviors by location than found in this study. However, our study adds value to the literature by describing the differences we did find at those levels and highlights the importance of conducting future studies using different measures of geographic location. Lastly, these findings apply only to high school youth aged ≥14 years who attend public schools.

5. Conclusions

Important disparities persist in teen motor vehicle crash fatality rates by census region and metropolitan status (National Highway Traffic Safety Administration, 2021; United States Census Bureau, Population Division, 2021; Shults and Ali, 2010). We found that few

differences existed in teen transportation risk behaviors by these location measures, which suggests that their contribution to these disparities is small. More important contributors likely include age at licensure (Curry et al., 2015b; McCartt et al., 2009), time since licensure (Curry et al., 2015b; Gershon et al., 2018; McCartt et al., 2009), driving experience (Curry et al., 2015b; Foss and Williams, 2015; Heck and Nathaniel, 2011; McCartt et al., 2009; Shults et al., 2016a), and the physical and policy environment (Alderman and Johnston, 2018; Fell et al., 2016; Foss and Williams, 2015; Peek-Asa et al., 2010; Scott-Parker et al., 2015; Shults and Ali, 2010; Shults et al., 2001; Vachal and Malchose, 2009).

Overall, teen transportation risk behaviors remain high in the United States. Effective policies to increase teen seat belt use, decrease underage alcohol consumption, and decrease driving after drinking alcohol exist but have not been fully implemented (Alderman and Johnston, 2018; Fell et al., 2016; García-España et al., 2012; Romano et al., 2015; Shults and Olsen, 2012; Shults et al., 2001, 2016b). Additional research into effective strategies to prevent cell phone use while driving by teens could be beneficial.

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Abbreviations:

APR	adjusted prevalence ratio
CI	95% confidence interval
CPR	crude prevalence ratio
SES	socioeconomic status
TWD	texted or e-mailed while driving
YRBS	Youth Risk Behavior Survey

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Table 1

Demographic characteristics of U.S. public high school students[a], by school metropolitan status[b], national Youth Risk Behavior Surveys, 2015 and 2017.

	Total	Urban	Suburban	Town	Rural
	Column % (95% CI)[c]	Row % (95% CI)[c]	Row % (95% CI)[c]	Row % (95% CI)[c]	Row % (95% CI)[c]
Total	–	25 (19–32)	38 (30–47)	18 (13–26)	19 (13–25)
Sex					
Female	49 (48–50)	25 (19–32)	38 (30–47)	19 (13–27)	19 (13–25)
Male	51 (50–52)	25 (19–32)	38 (31–47)	18 (12–26)	19 (13–25)
Age					
14 years	11 (10–12)	26 (19–35)	40 (31–50)	15 (10–22)	19 (13–26)
15 years	25 (25–26)	26 (20–34)	38 (31–46)	18 (12–25)	18 (13–25)
16 years	26 (25–26)	25 (18–32)	38 (30–46)	19 (13–28)	18 (13–25)
17 years	24 (23–25)	23 (17–31)	39 (30–48)	19 (13–27)	19 (14–26)
≥18 years	14 (13–15)	25 (19–33)	37 (29–46)	19 (12–27)	19 (13–26)
Race/Ethnicity[d]					
White, non-Hispanic	52 (49–56)	14 (10–20)	38 (29–47)	24 (17–34)	24 (17–34)
Black, non-Hispanic	14 (12–16)	39 (27–54)	38 (26–52)	12 (5–27)[f]	10 (6–18)[f]
Hispanic	24 (21–27)	39 (28–51)	36 (26–46)	12 (7–19)	13 (8–22)
Grades in School					
Mostly A’s or B’s	75 (73–77)	23 (18–30)	39 (31–48)	19 (13–27)	19 (14–26)
Mostly C’s, D’s, or F’s	25 (23–27)	27 (20–34)	36 (28–45)	19 (13–27)	18 (13–26)
School Census Region					
Midwest	17 (11–25)	16 (8–30)[f]	44 (29–59)	23 (12–41)[f]	17 (8–31)[f]
Northeast	15 (9–24)	40 (22–62)	45 (26–65)	8 (2–28)[g]	7 (2–25)[g]
South	36 (27–46)	21 (12–34)	30 (18–46)	22 (12–37)	27 (17–39)
West	32 (23–42)	26 (15–41)	41 (26–58)	17 (6–38)[f]	16 (8–29)[f]
School SES[e]					
≤32% (Highest SES)	33 (26–41)	17 (10–28)	51 (39–64)	12 (5–27)[f]	20 (11–33)
33–65%	50 (42–57)	21 (14–31)	32 (22–44)	27 (18–37)	20 (13–30)
≥66% (Lowest SES)	17 (13–23)	45 (30–62)	35 (19–55)	7 (2–21)[g]	13 (6–28)[f]

[a] Among students in grades 9–12 and aged ≥14 years.

[b] Metropolitan status was defined using the National Center for Education Statistics locale code.

[c] Weighted percentages and 95% confidence intervals (CIs).

[d] The total column percentages for Race/Ethnicity do not add up to 100% because other non-Hispanic race categories (American Indian/Alaska Native, Asian, Native Hawaiian/other Pacific Islander, or multiple race) are not presented.

[e]School socioeconomic status (SES), defined as the percentage of each student's school's enrollment that qualified for the free and reduced-price meal program (e.g., the highest school SES group [≤32%] has the smallest percentages of students qualifying for the meal program, which indicates better economic situations).

[f]Estimates are possibly unreliable; the relative standard error is 30%–<50%.

[g]Estimates are not reliable; the relative standard error is ≥50%.

Table 2

Percentages of U.S. public high school students[a] engaging in transportation risk behaviors, by school census region and metropolitan status[b], national Youth Risk Behavior Surveys, 2015 and 2017.

	Did not always wear a seat belt	Rode with a driver who had been drinking alcohol	Drivers aged ≥16 years[c]	Drove when they had been drinking alcohol[d]	Texted or e-mailed while driving[d]
	% (95% CI)[e]	% (95% CI)[e]	% (95% CI)[e]	% (95% CI)[e]	% (95% CI)[e]
Total	41 (38–43)	19 (18–20)	75 (73–77)	7 (7–8)	47 (45–49)
Census Region					
Midwest	37 (32–44)	20 (17–23)	85 (82–88)	8 (6–10)	52 (47–57)
Northeast	52 (45–59)	18 (16–19)	64 (59–70)	8 (5–11)	41 (36–47)
South	43 (40–47)	19 (16–21)	78 (75–81)	8 (6–9)	49 (46–51)
West	33 (30–37)	18 (17–20)	70 (65–73)	7 (6–8)	45 (41–49)
Metropolitan Status					
Urban	45 (41–50)	20 (18–23)	64 (60–68)	8 (7–9)	38 (34–43)
Suburban	37 (33–40)	18 (16–19)	74 (70–77)	7 (6–9)	48 (45–51)
Town	45 (38–52)	19 (16–23)	82 (78–86)	9 (7–11)	52 (48–56)
Rural	38 (33–42)	17 (15–19)	81 (78–84)	7 (5–9)	49 (46–53)

[a] Among students in grades 9–12 and aged ≥14 years.

[b] Metropolitan status was defined using the National Center for Education Statistics locale code.

[c] Students who drove a car or other vehicle during the 30 days before the survey.

[d] Among drivers aged ≥16 years.

[e] Weighted percentages and 95% confidence intervals (CIs).

Table 3

Crude and adjusted prevalence ratios of transportation risk behaviors among U.S. public high school students[a], by school census region and metropolitan status[b], national Youth Risk Behavior Surveys, 2015 and 2017.

	Did not always wear a seat belt	Rode with a driver who had been drinking alcohol	Drove when they had been drinking alcohol[c]	Texted or e-mailed while driving[c]
	CPR (95% CI)[d]	CPR (95% CI)[d]	CPR (95% CI)[d]	CPR (95% CI)[d]
	APR (95% CI)	APR (95% CI)	APR (95% CI)	APR (95% CI)
Census Region				
Midwest	1.0 (ref)	1.0 (ref)	1.0 (ref)	1.0 (ref)
	1.0 (ref)	1.0 (ref)	1.0 (ref)	1.0 (ref)
Northeast	**1.4 (1.1–1.7)**	0.9 (0.8–1.1)	0.9 (0.6–1.4)	0.8 (0.7–1.0)
	1.4 (1.2–1.6)	0.9 (0.8–1.1)	0.9 (0.6–1.3)	**0.8 (0.7–0.9)**
South	1.2 (1.0–1.4)	1.0 (0.8–1.2)	1.0 (0.7–1.3)	0.9 (0.8–1.0)
	1.1 (1.0–1.3)	1.0 (0.8–1.2)	1.0 (0.7–1.3)	1.0 (0.9–1.0)
West	0.9 (0.7–1.1)	0.9 (0.8–1.1)	0.8 (0.6–1.1)	0.9 (0.8–1.0)
	0.9 (0.7–1.0)	0.9 (0.7–1.0)	0.8 (0.6–1.1)	0.9 (0.8–1.0)
Metropolitan Status				
Urban	1.0 (ref)	1.0 (ref)	1.0 (ref)	1.0 (ref)
	1.0 (ref)	1.0 (ref)	1.0 (ref)	1.0 (ref)
Suburban	**0.8 (0.7–0.9)**	0.9 (0.8–1.0)	0.9 (0.7–1.2)	**1.3 (1.1–1.4)**
	1.0 (0.9–1.1)	0.9 (0.8–1.1)	1.0 (0.7–1.3)	**1.2 (1.1–1.3)**
Town	1.0 (0.8–1.2)	0.9 (0.8–1.2)	1.1 (0.9–1.5)	**1.4 (1.2–1.6)**
	1.1 (1.0–1.3)	1.0 (0.9–1.3)	1.4 (1.0–1.9)	**1.3 (1.1–1.4)**
Rural	0.8 (0.7–1.0)	0.8 (0.7–1.0)	0.8 (0.6–1.1)	**1.3 (1.1–1.5)**
	1.0 (0.9–1.1)	0.9 (0.7–1.1)	0.9 (0.7–1.3)	1.1 (1.0–1.3)

Note: Statistically significant prevalence ratios and their corresponding 95% confidence intervals are bolded. School census region models were adjusted for school metropolitan status, sex, age, race/ethnicity, grades in school, and school socioeconomic status. School metropolitan status models were adjusted for school census region, sex, age, race/ethnicity, grades in school, and school socioeconomic status.

[a] Among students in grades 9–12 and aged ≥14 years.

[b] Metropolitan status was defined using the National Center for Education Statistics locale code.

[c] Among drivers aged ≥16 years.

[d] Crude prevalence ratios (CPRs), adjusted prevalence ratios (APRs), and 95% confidence intervals (CIs).