
Driver and Passenger Seatbelt Use Among U.S. High School Students

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Background: In 2005, 40% of motor-vehicle occupant deaths in the group aged 16–19 years involved passengers. Although seatbelts can reduce crash mortality by 50% or more, little is known about the differences in driver-versus-passenger seatbelt use among teens.

Methods: In 2007, data from the 2001 and 2003 Youth Risk Behavior Surveys were analyzed for 12,731 black, white, and Hispanic high school students aged ≥ 16 years reporting seatbelt use as both drivers and passengers. Seatbelt use was compared for driver- and passenger-seat positions, and stratified by age, gender, race/ethnicity, school grades, and histories of either drinking and driving or riding with a drinking driver.

Results: Overall, 59% of students always used seatbelts when driving, but only 42% always buckled up as passengers. Across all covariate strata, passenger seatbelt use was significantly less prevalent than driver seatbelt use ($p < 0.001$). A concordance analysis showed that only 38% of students always wore seatbelts both when driving and while riding as a passenger. Multivariate analyses indicated that, regardless of seat position, seatbelt use was lower for young men, blacks, students with poor grades, and students who reported either drinking and driving or riding with a drinking driver.

Conclusions: U.S. high school students aged ≥ 16 years are significantly less likely to wear seatbelts as passengers than as drivers. Interventions designed to promote seatbelt use among teens need to address this disparity.

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Introduction

Motor-vehicle crashes are the leading cause of death among adolescents in the U.S., accounting for nearly 5000 fatalities and over 400,000 injuries annually among youth aged 16–19 years.¹ After adjustment for vehicle miles driven, the crash rate among youth aged 16–19 is four times higher than for older drivers.² The high risk of motor-vehicle crashes for the adolescent age group affects teen passengers as well as teen drivers. In 2005, 40% of motor-vehicle occupant deaths in the group aged 16–19 involved passengers.²

Evidence-based recommendations made by the U.S. Task Force on Community Preventive Services state “the use of safety belts is the single most effective means

of reducing fatal and nonfatal injuries in motor-vehicle crashes.”³ Numerous reports documenting lower seatbelt use among teens compared to older motorists^{4–11} have engendered a wide range of interventions to promote teen seatbelt use. However, little is known about differences in driver-versus-passenger seatbelt use among teens that could inform more-targeted interventions.

The few previous reports of seatbelt use among teen drivers and passengers have been limited to analyses of crash-fatality data¹¹ and direct-observation studies.^{5,10} Because both study designs preclude a comparison of driver and passenger seatbelt use for the same person, results from these studies are subject to confounding attributable to any of numerous factors that could have influenced who was in which seat position at the time of observation (observer-recorded seatbelt use studies) or death (crash-fatality database studies).

Findings from previous studies also lack generalizability to the U.S. teen population. The direct-observation studies have comprised small study populations limited to several high schools in specific regions. Crash-fatality data are limited to persons involved in fatal motor-vehicle crashes and are, therefore, not representative of the general motorist population.

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To address this gap, this study analyzed data from the 2001 and 2003 national Youth Risk Behavior Surveys (YRBS), which are unique because they included a question on driver seatbelt use in addition to the passenger seatbelt-use question that is routinely asked on all YRBS surveys.

Methods

The national YRBS is a biennial self-administered survey of U.S. public and private high school students in grades 9–12.¹² A stratified three-stage cluster sample design is used to obtain nationally representative samples of students. To provide sufficient statistical power for separate analyses of data among black and Hispanic students, the YRBS uses multiple strategies for oversampling by race and ethnicity.¹²

Study data were extracted from YRBS public-use data files for 2001¹³ and 2003.¹⁴ In 2001, there were 13,601 survey respondents; the school response rate was 75% and the student response rate was 83%, yielding an overall response rate of 63%.¹⁵ In 2003, there were 15,214 survey respondents; the school response rate was 81% and the student response rate was 83%, yielding an overall response rate of 67%.¹⁶ Because in many states people aged ≤ 15 years are ineligible to drive motor vehicles without supervision, analyses were limited to students aged ≥ 16 . Analyses were limited to black, white, and Hispanic students because the number of students self-identifying as other races/ethnicities was too small for meaningful analyses. In this paper, *black* refers to non-Hispanic black students, *white* refers to non-Hispanic white students, and *Hispanic* refers to students of any race who reported Hispanic ethnicity.

Seatbelt Use

While the YRBS routinely includes a question on passenger seatbelt use, the 2001 and 2003 surveys included a supplemental question on driver seatbelt use that has not been asked in other years. The driver seatbelt-use question was worded *How often do you wear a seatbelt when driving a car?* Possible responses were *I do not drive a car, never wear a seatbelt, rarely wear a seatbelt, sometimes wear a seatbelt, most of the time wear a seatbelt, and always wear a seatbelt.* The passenger seatbelt-use question was worded *How often do you wear a seat belt when riding in a car driven by someone else?* Possible responses were *never, rarely, sometimes, most of the time, and always.* For analysis, responses to both questions were coded dichotomously (*always used* versus *not always used*) to minimize misclassification bias from overreporting the frequency of seatbelt use.¹⁷

Because the driver seatbelt-use question was part of a supplemental question set not administered by some schools, students with missing responses were excluded; the demographic composition of this subpopulation by age, gender, and race/ethnicity did not differ significantly from those students who answered both seatbelt questions. Students who responded to the driver seatbelt-use question by indicating that they did not drive a car were also excluded. The final study population comprised 12,731 black, white, and Hispanic students aged ≥ 16 years who answered both the driver and passenger seatbelt-use questions and had driven cars (Table 1).

Table 1. Selection of study population—Youth Risk Behavior Surveys (YRBS), 2001 and 2003

Selection step	2001	2003	Total
TOTAL YRBS RESPONDENTS	13,601	15,214	28,815
Exclusions^a	7,566	8,518	16,804
Reason for exclusion			
Aged ≤ 15 years	4,235	4,888	9,123
Race/ethnicity not white, black, or Hispanic	1,477	1,374	2,851
Did not drive a car	2,431	3,193	5,624
Missing data on driver seatbelt-use question	2,073	1,845	3,918
Study population	6,035	6,696	12,731

^aTotal exclusions are less than the sum of individual exclusions because multiple exclusion categories can apply.

Covariates

Covariates included age (*16/17/ ≥ 18 years*); gender; race/ethnicity (*white/black/Hispanic*); school grades (*mostly A's/mostly B's/mostly C's, D's, or F's*); *rode with a driver who had been drinking alcohol (during 30 days preceding survey)*; and *drove when drinking alcohol (during 30 days preceding survey)*. Age, gender and race/ethnicity were included as covariates because they are strongly associated with seatbelt use. Because the YRBS includes no questions that directly address SES, the YRBS question on school grades was used as a proxy measure to adjust for SES as a potential confounder; academic performance during high school is strongly correlated with SES.^{18,19} The practice of drinking and driving was examined because, along with the non-use of seatbelts, it is a major risk factor for motor-vehicle crash morbidity and mortality among teens.

Data Analysis

SUDAAN software (Release 9) was used to account for the complex survey sampling strategy used in YRBS national surveys. The 2001 and 2003 surveys were re-weighted based on the proportional contribution of each survey population to the total population for both surveys combined.²⁰ Variance estimation was based on the combined primary sampling units within strata for both surveys.²⁰ All calculations accounted for the overall respondent populations prior to selection of the study population. In bivariate analyses, driver and passenger seatbelt use percentages with corresponding 95% CIs were calculated for each covariate; significance was assessed using a chi-square test statistic for complex survey samples. Bivariate concordance between seatbelt use as a driver and seatbelt use as a passenger was also examined, overall and within covariate strata. Multivariate logistic regression was used to calculate adjusted prevalence ORs and 95% CIs across strata of each covariate, using separate models for driver and passenger seatbelt use.

Results

Overall, 59.0% of students reported always wearing a seatbelt when driving a car, but only 41.9% always buckled up as passengers (Table 2). Across the strata of age, gender, race/ethnicity, school grades, drinking and driving, and riding with a drinking driver, passenger seatbelt use ranged from 10.4 to 20.7 percentage

Table 2. Prevalence of seatbelt use among U.S. high school students when driving and when riding as a passenger

Characteristic	Driver	Passenger	Prevalence difference ^b
	% ^a (95% CI)	% ^a (95% CI)	
TOTAL	59.0 (55.3, 62.6)	41.9 (38.8, 45.0)	17.1*
Age (years)			
≥18	57.8 (52.8, 62.6)	43.0 (39.0, 47.0)	14.8*
17	58.0 (54.1, 61.9)	41.8 (38.3, 45.3)	16.2*
16	60.7 (56.9, 64.4)	41.4 (38.0, 44.8)	19.3*
Gender			
Female	66.7 (62.7, 70.5)	46.0 (42.6, 49.3)	20.7*
Male	52.1 (48.4, 55.8)	38.2 (35.2, 41.4)	13.9*
Race/ethnicity			
White	60.6 (56.2, 64.8)	42.3 (38.8, 45.9)	18.3*
Black	47.3 (42.9, 51.8)	36.9 (32.4, 41.6)	10.4*
Hispanic	60.2 (54.9, 65.3)	43.8 (39.5, 48.1)	16.4*
School grades			
Mostly A's	70.7 (65.9, 75.1)	50.2 (46.2, 54.2)	20.5*
Mostly B's	61.4 (57.7, 65.1)	43.6 (40.4, 46.8)	17.8*
Mostly C's ^c	44.4 (40.3, 48.7)	31.7 (28.4, 35.1)	12.7*
Drove after drinking			
No	64.5 (60.9, 68.2)	46.3 (43.1, 49.5)	18.2*
Yes	35.3 (30.4, 40.5)	23.1 (19.9, 26.6)	12.2*
Rode with drinking driver			
No	65.8 (62.1, 69.4)	48.0 (44.8, 51.2)	17.8*
Yes	44.3 (40.0, 48.7)	28.7 (25.3, 32.3)	15.6*

^aSUDAAN-weighted percentage of students who reported always wearing a seatbelt

^bDriver prevalence (–) passenger prevalence

^cIncludes *mostly D's* and *mostly F's*

* $p < 0.0001$

points lower than driver belt use. The differences were largest for the teen subgroups most likely to buckle up when driving. Among young women, belt use while driving was 14.6 percentage points higher than for young men. When young women were passengers, however, belt use was only 7.8 percentage points higher than for young men. Black drivers' belt use was 13 percentage points lower than belt use among either white or Hispanic drivers, but this gap was only half as large for passenger seatbelt use.

Only 38.4% of all students always wore seatbelts as both drivers and passengers (Table 3). The remaining 61.6% of students comprised 37.6% who did not always buckle up as either drivers or passengers, 20.6% who always used seatbelts as drivers but not as passengers, and 3.4% who always used seatbelts as passengers but not as drivers. Stratified analyses showed only modest variation in the percentages of students who buckled up while driving but did not always wear seatbelts as passengers (range: 15.1%–23.7%). Considerable variation was evident in the percentages of students who did not always buckle up as either drivers or passengers (range: 26.5%–60.9%). The students most likely to report inconsistent seatbelt use regardless of driver/passenger status were those who drove after drinking (60.9%); rode with a drinking driver (52.1%); or had mostly C's or lower (51.8%). The students least likely to be unbuckled as both drivers and passengers were young women (30.3%) or had an A average (26.5%).

Reciprocally, the students most likely to report always buckling up while driving but not while riding as passengers were also young women (23.7%) or had A averages (23.4%).

Adjusted overall ORs showed that, for both driver and passenger seatbelt use, associations were strongest for the alcohol and grade variables (Table 4). Students who reported drinking and driving were less than one third as likely to buckle up while driving as their counterparts who did not drink and drive. Students who rode with drinking drivers were less than half as likely to buckle up as passengers than students who did not ride with drinking drivers. For both driver seatbelt use and passenger seatbelt use, the ORs decreased with declining academic performance. Young men, as both drivers and passengers, were less likely to buckle up than young women. Blacks, as both drivers and passengers, were less likely than whites to wear seatbelts. In contrast, Hispanics buckled up more often than whites when driving and while riding as passengers.

Discussion

These data show that U.S. high school students are much less likely to wear seatbelts as passengers than as drivers. While 59% of students wore seatbelts when driving, only 42% buckled up as passengers. This contrasts sharply with the narrow driver/passenger seatbelt–use gap, and the much higher overall preva-

Table 3. Driver/passenger seatbelt–use concordance among U.S. high school students (%)^a

Characteristic	Always use when driving		Do not always use when driving	
	Always use when passenger	Do not always use when passenger	Always use when passenger	Do not always use when passenger
TOTAL	38.4	20.6	3.4	37.6
Age (years)				
16	38.2	22.5	3.2	36.1
17	38.1	19.9	3.6	38.4
≥18	39.4	18.4	3.6	38.6
Gender				
Male	34.4	17.7	3.9	44.0
Female	43.0	23.7	3.0	30.3
Race/ethnicity				
White	39.0	21.6	3.3	36.1
Black	32.2	15.1	4.7	48.0
Hispanic	40.5	19.7	3.3	36.5
School grades				
Mostly A's	47.3	23.4	2.8	26.5
Mostly B's	39.9	21.6	3.7	34.8
Mostly C's ^b	28.0	16.5	3.7	51.8
Drove after drinking				
Yes	19.2	16.1	3.8	60.9
No	42.9	21.6	3.4	32.1
Rode with drinking driver				
Yes	25.8	18.5	2.9	52.8
No	44.3	21.5	3.7	30.5

^aSUDAAN-weighted percentages^bIncludes *mostly D's* and *mostly F's*

lence of seatbelt use in the general population; contemporaneous direct-observation data from the 2002 National Occupant Protection Use Survey (NOPUS) indicated that 76% of drivers and 73% of front-seat passengers wore seatbelts.²¹

The striking driver/passenger seatbelt–use disparity in this nationally representative population of teens who answered questions on both driver and passenger belt use supports the validity of the findings from a 2001 direct-observation study⁵ and a crash-fatality data study¹¹ that compared seatbelt use between mutually exclusive populations of teen drivers and passengers. In the direct-observation study,⁵ 62% of teen drivers entering parking lots at 12 high schools were buckled; seatbelt use among teen passengers was 47% when another teen was driving and 54% with adult drivers. Fatality Analysis Reporting System (FARS) data showed that, among motorists aged 16–19 years who were killed from 1995 to 2000, 36% of drivers were buckled, compared to 23% of passengers.¹¹

To our knowledge, the concordance of driver and passenger seatbelt use among teens has not previously been reported. This analysis of 2001 and 2003 YRBS data indicated that only 38% of all teen drivers always buckled up both while driving and when riding as passengers. Nearly all students who did not routinely buckle up in both seat positions fell into two groups. One group was characterized by routine seatbelt use while driving but inconsistent seatbelt use as a passenger; female students and A students were disproportionately represented.

The other group was characterized by inconsistent belt use both as drivers and passengers; male students, black students, and students who reported driving after drinking, riding with a drinking driver, or getting low grades were disproportionately represented. Few students reported consistently buckling up as passengers but not as drivers.

Multivariate analyses indicated that young men, blacks, and students with poor academic performance were at risk for not wearing seatbelts as both drivers and passengers. However, the strength of association was consistently greater for drivers. An analysis of 1991–1997 YRBS data limited only to passenger seatbelt use also revealed black/white and male/female disparities.⁶ The persistence of these disparities for passenger belt use and the greater magnitude of corresponding driver seatbelt–use disparities evident in this study suggests a need for targeted interventions to promote seatbelt use among both young men and blacks in the teen population. The decrease in seatbelt use with decreasing school grades may reflect a strong association between academic performance and the SES of high school students^{18,19}; in the adult motorist population, seatbelt use is directly correlated with social class.^{22,23}

Among students who reported either drinking and driving or riding with a drinking driver, only about one-fourth always buckled up as passengers. The ORs were similar to those reported by Sabel et al.²⁴ in a study of drinking and driving among high school

Table 4. AORs and 95% CI for seatbelt use by seat position as driver or passenger

Characteristic	Driver	Passenger
	OR ^a (±95% CI)	OR ^b (±95% CI)
Age (years)		
≥18	1.00	1.00
17	0.94 (0.80, 1.10)	0.93 (0.79, 1.09)
16	0.99 (0.84, 1.16)	0.91 (0.78, 1.05)
Gender		
Female	1.00	1.00
Male	0.65 (0.59, 0.72)	0.78 (0.72, 0.86)
Race/ethnicity		
White	1.00	1.00
Black	0.60 (0.48, 0.76)	0.89 (0.70, 1.11)
Hispanic	1.11 (0.87, 1.43)	1.27 (1.05, 1.54)
School grades		
Mostly A's	1.00	1.00
Mostly B's	0.72 (0.63, 0.83)	0.83 (0.75, 0.92)
Mostly C's ^c	0.40 (0.34, 0.48)	0.53 (0.47, 0.61)
Drove after drinking		
No	1.00	
Yes	0.32 (0.28, 0.37)	
Rode with drinking driver		
No		1.00
Yes		0.45 (0.39, 0.52)

^aStratum-specific ORs are adjusted for nonstrata covariates. All ORs are for *always wearing seatbelt as a driver* relative to *not always wearing seatbelt as a driver*. For age, the referent group is *aged ≥ 18 years*; for gender, the referent group is *female*; for race/ethnicity, the referent group is *white*; for school grades, the referent group is *mostly A's*; and for drove after drinking, the referent group is *no*.

^bStratum-specific ORs are adjusted for nonstrata covariates. All ORs are for *always wearing seatbelt as a passenger* relative to *not always wearing seatbelt as a passenger*. For age, the referent group is *aged ≥ 18 years*; for gender, the referent group is *female*; for race/ethnicity, the referent group is *white*; for school grades, the referent group is *mostly A's*; and for rode with drinking driver, the referent group is *no*.

^cIncludes *mostly D's* and *mostly F's*.

students in Washington State, which found that students who agreed with several statements comprising a school protective factor (e.g., *My teachers really care about me*) were significantly less likely to ride with drinking drivers. This raises the possibility that interventions promoting such protective factors could provide a framework for increasing teen passenger seatbelt use. Given the strong association between alcohol use and seatbelt non-use among teens, it may also be possible to identify interventions that effectively reduce the prevalence of both health-risk behaviors at the same time.

Several study limitations warrant mention. First, selection bias may have resulted because not all of the sampled high schools participated in the YRBS survey, not all of the sampled students at participating high schools participated in the survey, and some students did not have an opportunity to answer the question about seatbelt use while driving. The authors believe that any selection bias attributable to excluding those students who were asked only about passenger seatbelt use is probably minimal, because no significant differences in sociodemographic covariates were found rela-

tive to students queried about driver and passenger belt use. Second, seatbelt use was based on self-reported data. Studies comparing observed with self-reported seatbelt use have found that motorists overreport seatbelt use by 5% to 20%.²⁵ Therefore, the actual prevalence of seatbelt use among teen motorists may be even lower than the estimates based on self-reported YRBS data. Third, because the YRBS passenger seatbelt-use question made no distinction between seatbelt use in the front seat versus rear seat, passenger seat position is an important potential confounder. Residual confounding may also have resulted because information on other correlates of seatbelt use (e.g., urban versus rural, state seatbelt laws) was unavailable from the YRBS. Further research into the influence of these and other demographic, environmental, and social factors that may affect teen seatbelt use could help inform strategies to promote seatbelt use among teen motorists.

Implications for Prevention

It is unclear why disparities in driver-versus-passenger seatbelt use among teens are so marked compared to their adult counterparts. However, the low prevalence of teen passenger seatbelt use across all sociodemographic strata indicates a need for broad, sweeping interventions. The importance of promoting teen passenger seatbelt use is underscored by data showing that, as the number of teen passengers in a teen-driven vehicle increases, the likelihood of serious or fatal crashes also increases,⁷ but the prevalence of passenger seatbelt use in fatal crashes decreases.¹¹

It is noteworthy that 37% of all passengers aged 16–19 years killed as a result of motor-vehicle crashes in the U.S. during 2006 were passengers in the second or third rear seat, compared to 24% for passengers aged ≥ 20 years.²⁶ Data on seatbelt use in the front seat versus rear seat are unavailable from the YRBS, but FARS data indicate that teen passenger seatbelt use is much lower in the rear seats; among motorists aged 16–20 years killed from 1995 to 2002, front-passenger seatbelt use ranged from 23% to 31%, compared to only 7%–14% for rear-passenger belt use.²⁷ Because only a minority of states uniformly require teen motor-vehicle occupants in the rear seat to be secured in seatbelts,^{28,29} the passage of full-coverage legislation in those states could provide a foundation for reducing teen motor-vehicle crash morbidity and mortality. The potential benefit of such legislation is supported by findings from the 2005 NOPUS; in states with seatbelt-use laws covering all seat positions, 76% of rear passengers were buckled, compared to only 64% in states with laws limited to front-seat passengers.³⁰ However, primary seatbelt laws, in combination with enhanced enforcement efforts directed toward teen motorists, would likely be needed to realize the greatest benefit from the extension of

existing state seatbelt laws to cover teen passengers in the rear seat.^{27,31} Community-based interventions including education, peer-to-peer persuasion, and parental monitoring might augment efforts to promote seatbelt use.²⁷

Conclusion

These findings underscore an abysmal prevalence of teen passenger seatbelt use in the face of U.S. population-based crash-fatality data indicating that 40% of all teen motor-vehicle occupant deaths involve passengers. Because motor-vehicle crashes are the leading cause of death among American youth, there is a great need for effective interventions to promote teen passenger seatbelt use. There is a particular need for targeted interventions to address the teen subpopulations at greatest risk for non-use of seatbelts as passengers, including young men, blacks, students experiencing academic difficulties, and those with a history of either drinking and driving or riding with a drinking driver.

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