

Transportation Practices of College Students: Effects of Gender and Residential Status on Risk of Injury

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Abstract

This study examined selected transportation safety behaviors in a sample of college students. A subset of items (bicycle helmet use, motorcycle helmet use, seat belt use, drinking and driving) from the National College Health Risk Behavior Survey (NCHRBS) was analyzed for 483 undergraduate students aged 17 to 26 at a large urban university in the southeastern United States. There was a significant difference ($\alpha=.05$) between males and females for both seat belt use and drinking and driving, with males less likely to wear a seat belt and more likely to drink and drive. Students who lived off campus were significantly more likely to report wearing a seat belt, and to drive after drinking alcohol. In summary, both gender and residential status were associated with some transportation safety behavior for these college students.

Introduction

College students comprise a unique group of individuals placed in an environment often associated with risk-taking behavior. Some research indicates that health practices are influenced by peers, roommates, and place of residence (Harel & Levinson, 1992). College life may offer the first opportunity for many students to be away from home and experience newfound freedom (Sarvela, Holcomb, & Odulana, 1992). This new sense of independence may lead to an increase in risk-taking and other health-compromising behavior (Harel & Levinson, 1992). Unfortunately, some of this behavior results in unintentional injuries, the primary cause of death for young adults in the United States. According to the Centers for Disease Control and Prevention (CDC), approximately three-fourths of the deaths each year among adolescents and young adults, aged 10 to 24, are related to preventable causes (CDC, 1993). Motor vehicle crashes alone account for 37% of these deaths, and other injuries account for another 12% of deaths. A large proportion of undergraduate college students fit into the category of "young adults." This particular group of individuals

is at increased risk of unintentional injuries and fatalities (CDC, 1993; Harel & Levinson, 1992).

Among public health professionals, transportation safety is a concern for this population, and national priorities have been established. The priorities include increasing seat belt use to 85% of motor vehicle occupants, increasing helmet use of both motorcyclists and bicyclists to 50%, and decreasing the number of deaths from alcohol-related motor vehicle crashes to 8.5% or less (U.S. Department of Health and Human Services, 1991).

Safety devices clearly reduce injury and death rates. For instance, studies show that the use of motorcycle and bicycle helmets significantly decrease head, brain and facial injuries among riders (Lowenstein, Koziol-McLain, & Glanzer, 1997; Peek-Asa & Kraus, 1997; Rowland et al., 1996; Rivara, Thompson, & Thompson, 1997; Thompson, Nunn, Thompson, & Rivara, 1996; Thompson, Rivara, & Thompson, 1996). While motorcycles may not be common on all college campuses, bicycles provide a frequent source of transportation for many college students. One study indicated that 25% of student bicyclists had a "mishap" while riding their bike within a three-year period, and of those bike riders, 67% were

injured (Fullerton & Becker, 1991). Head trauma is the leading cause of bicycle-related deaths and injuries (Waters, 1986). Use of a bicycle helmet may decrease head trauma up to 85% of the time (Thompson & Rivara, 1989).

Other motor vehicles are also a source of transportation for many students. Studies have shown that seat belts save lives and protect motor vehicle occupants from serious injuries (Evans, 1996; Foss, Beirness, & Sprattler, 1994; Hendey & Votey, 1994; Robertson, 1996). On urban campuses, where commuting is frequently the norm, the use of motorcycles and automobiles places individuals at elevated risk of injury.

Drinking and driving is an additional transportation concern that is relevant to college students, particularly since alcohol use and abuse is endemic on college campuses (Wechsler, Davenport, Dowdall, Moeykens & Castillo, 1994). Prevention efforts to combat drinking and driving have been effective in changing behavior, and thus, reducing morbidity and mortality rates (Kuthy, Grap, Penn, & Henderson, 1997; Newcomb, Rabow, Hernandez, & Monto, 1997; Russell, Voas, Dejong, & Chaloupka, 1995; Cwikel, 1994; Grant, Lane, Janus, Okovita, 1995).

Purpose of the Study

The purpose of the study was to assess transportation safety behaviors in a sample of undergraduate students at a large urban university in the southeastern United States. This study also examined the relationship of gender and residential status with respect to these behaviors. The information can aid the development of appropriate injury control programs specifically targeted at students who place themselves at risk.

Methods

Instrument and Setting

The 96-item National College Health Risk Behavior Survey (NCHRBS) developed by the Centers for Disease Control and Prevention (CDC) measures selected health risk behaviors of college students (Kolbe, Kann, & Collins, 1993). A subset of these items was used along with a cluster sampling strategy to survey undergraduate students. Reliability for this instrument has been estimated from studies performed on the Youth Risk Behavior Surveillance Survey (YRBSS) that has several items in common with the NCHRBS (Brener, Collins, Kann, Warren, & Williams, 1995). Content validity of the NCHRBS results from vital statistics data that show the leading causes of

morbidity and mortality for persons up to age 24 years, and the behavioral antecedents of health problems in later life (Kolbe, Kann, & Collins, 1993). The absence of social desirability response bias on items used with college students has been reported by Gast, Caravella, Sarvela, and McDermott (1995) and thus, contributes to construct validity.

Figure 1 Survey Items

How old are you?

What is your sex? __ Female Male

- Where do you currently live?**
- College dorm/residence hall
 - Fraternity or sorority
 - Other university housing
 - Parent/guardian's home
 - Off campus house or apt.
 - Other

How often do you wear a seat belt when driving a car?

- I do not drive
- Never wear a seat belt
- Rarely
- Sometimes
- Most of the time
- Always

When you rode a motorcycle during the past 12 months, how often did you wear a helmet?

- I did not ride a motorcycle
- Never wore a helmet
- Rarely
- Sometimes
- Most of the time
- Always

When you rode a bicycle during the past 12 months, how often did you wear a helmet?

- I did not ride a bicycle
- Never wore a helmet
- Rarely
- Sometimes
- Most of the time
- Always

During the past 30 days, how many times did you drive a car or other vehicle when you had been drinking alcohol?

- 0 times
 - 1 time
 - 2 or 3 times
 - 4 or 5 times
 - 6 or more times
-

Instructors of required general studies courses (e.g., English, anthropology, sociology, psychology, biological science, etc.) with 75 or more undergraduate students per class were invited to participate. In compliance with institutional review board requirements, responses were confidential and no items identifying specific individuals were included. For the purpose of this paper only those behaviors related to transportation safety are reported including: 1) seat belt use, 2) motorcycle helmet use, 3) bicycle helmet use, and 4) drinking and driving. A list of the survey items used for the analysis can be found in Figure 1. Data were collected in November 1996.

Sample

The respondents were 483 undergraduate students. A summary of the sample’s demographic characteristics is provided in Table 1. Students aged 17 to 26 completed the survey. Among respondents, 78.7% were 21 years of age or younger. The mean age was 20.2 years. Of the participants, 298 students (61.7%) were female and 185 students (38.3%) were male. A total of 133 persons (27.5%) indicated an “on campus” living status. On campus included a college dormitory or residence hall, a fraternity or sorority house, or other university/college housing. Of the respondents, 349 (72.2%) indicated a residential status of “off campus.” These residences included an off campus house or apartment, a parent’s or guardian’s home, and other non-campus residences.

Statistical Analysis

Due to the uneven distribution of gender and residential status, weighting procedures were used (McDermott & Sarvela, 1999). Both males and students living on campus were underrepresented in the sample. Therefore, statistical adjustments were made to give both groups equal representation. A similar weighting procedure was performed in the NCHRBS sample (CDC, 1997).

Frequency data were computed and 2 x 2 chi-square analyses were performed to test for significance between gender and living status respectively for each health risk behavior. Living status was defined as living on or off campus. For purposes of analysis, subjects were divided into two categories: those who performed the desired behavior at least “sometimes,” and those persons who “rarely” or “never” performed the desired behavior. For example, seat belt was divided into: 1) those who never or rarely wore a seat belt, and 2) those who sometimes, most of the time, or always wore a seat belt. Motorcycle helmet use and bicycle helmet use was divided into: 1) those who

never or rarely wore a helmet, and 2) those who sometimes, most of the time, or always wore a helmet when riding. Finally, drinking and driving was divided into: 1) those who did not drive while under the influence of alcohol within the past 30 days, and 2) those who drove a car (or other vehicle) one or more times during the past 30 days when they had been drinking alcohol.

Table 1. Demographic Characteristics of the Sample

Age	Frequency	Percent
17	9	1.9
18	82	17.0
19	139	28.8
20	88	18.2
21	62	12.8
22	35	7.2
23	22	4.6
24	19	3.9
25	14	2.9
26	13	2.7
Total	483	100.0
Gender		
Female	298	61.7
Male	185	38.3
Total	483	100.0%
Residential Status		
On campus	133	27.5
Off campus	349	72.2
Total^a	482	99.7

^aOne missing response

Results

A compilation of the weighted and unweighted results by gender is shown in Table 2, and a compilation of weighted and unweighted results by residential status is reported in Table 3. A descriptive summary of the findings (by risk behavior category) is provided below.

Seat belt use

A total of 480 students reported experience in driving a motor vehicle. Based on weighted data, most students (89.8%) wore a seat belt some, most, or all of the time. Males (16.5%) were significantly more likely than females (4.0%) to rarely or never wear a seat belt

[$\chi^2=24.97$, $p=.0000$]. Students who lived on campus (12.7%) were also more likely than off campus students (7.2%) to report rarely or never wearing a seat belt [$\chi^2=5.80$, $p=.0160$].

Motorcycle helmet use

Sixty-five (13.8%) students reported riding a motorcycle within the past 30 days. A majority

(81.8%) of the motorcycle riders wore a helmet at least some of the time. Approximately 15.2% of males and 21.2% of females reported rarely or never wearing a helmet. No statistically significant relationship between gender and motorcycle helmet use was found. Among students living on campus 15.9% reported never or

Table 2 Weighted and Unweighted Safety Practices: Gender

	Weighted Sample Females (%)	Unweighted Sample Males (%)	Females (%)	Males (%)
Seat Belt Use				
Some, Most or All of the Time	285 (96.0)	248 (83.5)	285 (96.0)	153 (83.6)
Rarely or Never	12 (4.0)	49 (16.5)	12 (4.0)	30 (16.4)
Statistics	$\chi^2 = 24.97$, $p = .0000$	$\chi^2 = 21.64$, $p = .0000$		
Motorcycle Helmet Use				
Some, Most or All of the Time	26 (78.8)	28 (84.8)	25 (78.1)	28 (84.8)
Rarely or Never	7 (21.2)	5 (15.2)	7 (21.9)	5 (15.2)
Statistics	$\chi^2 = .40$, $p = .5265$	$\chi^2 = .49$, $p = .4849$		
Bicycle Helmet Use				
Some, Most or All of the Time	9 (4.9)	11 (5.9)	9 (4.9)	8 (5.9)
Rarely or Never	176 (95.1)	174 (94.1)	176 (95.1)	128 (94.1)
Statistics	$\chi^2 = .21$, $p = .6461$	$\chi^2 = .16$, $p = .6875$		
Drinking and Driving				
One or More Times in Past 30 Days	82 (27.6)	122 (41.1)	82 (27.6)	76 (41.1)
Zero Times in Past 30 Days	215 (72.4)	175 (58.9)	215 (72.4)	109 (58.9)
Statistics	$\chi^2 = 11.71$, $p = .0006$	$\chi^2 = 9.39$, $p = .0022$		

rarely wearing a helmet. Among off campus students, 22.7% reported rarely or never wearing a helmet. There was no statistically significant relationship for this sample of students between residential status and helmet use.

Bicycle helmet use

A total of 321 (66.5%) respondents reported riding a bicycle in the past 12 months. Based on weighted data, only 5.4% wore a bike helmet sometimes, most of the time, or always. Approximately 94.1% of males,

95.1% of females, 93.1% of off campus students, and 95.1% of on campus students reported rarely or never wearing a bicycle helmet. No significant difference was found for either gender or residential status.

Drinking and driving

Approximately one-third (34.4%) of the weighted sample indicated that within the past 30 days they drove after consuming alcohol. Males (41.1%) were significantly more likely than females (27.6%) to report drinking and driving on at least one occasion in the past

30 days [$\chi^2=11.71$, $p=.0006$]. Students who lived off campus (35.7%) also were significantly more likely than their on campus counterparts (25.1%) to report drinking and driving [$\chi^2=9.23$, $p=.0024$].

Discussion

Seat belt use

Other researchers also have reported that females wore seat belts more often than males (Tipton, Camp, Hsu, 1990). The 1995 NCHRS also confirms this point (Douglas, et al., 1997). In that survey, 12.3% of males and 6.6% of females rarely or never wore a seat belt. Therefore, it is logical to target males in

educational programs, perhaps by carefully tailoring messages that appeal to college age males. Audience segmentation in health message design is an important contributing element to successful behavior change (Forthofer & Bryant, 2000). This element, and other components of a social marketing program, are underutilized by many health educators (McDermott, 2000).

On campus students also were more likely to report rarely or never wearing a seat belt. Although this finding is unsubstantiated in other literature it deserves comment. These results suggest that those who live on campus may take fewer precautionary measures when

Table 3 Weighted and Unweighted Safety Practices: Residential Status

	Weighted Sample	Unweighted Sample	Campus (%)	Off Campus (%)
Seat Belt Use				
Some, Most or All of the Time	303 (87.3)	322 (92.8)	116 (87.2)	322 (92.8)
Rarely or Never	44 (12.7)	25 (7.2)	17 (12.8)	25 (7.2)
Statistics	$\chi^2 = 5.80$, $p = .0160$	$\chi^2 = 3.75$, $p = .0529$		
Motorcycle Helmet Use				
Some, Most or All of the Time	34 (77.3)	37 (84.1)	16 (76.2)	37 (84.1)
Rarely or Never	10 (22.7)	7 (15.9)	5 (23.8)	7 (15.9)
Statistics	$\chi^2 = .99$, $p = .3189$	$\chi^2 = .59$, $p = .4426$		
Bicycle Helmet Use				
Some, Most or All of the Time	12 (4.9)	17 (6.9)	4 (5.0)	17 (6.9)
Rarely or Never	233 (95.1)	28 (93.1)	76 (95.0)	228 (93.1)
Statistics	$\chi^2 = .91$, $p = .3389$	$\chi^2 = .38$, $p = .5403$		
Drinking and Driving				
One or More Times in Past 30 Days	88 (25.1)	125 (35.7)	33 (25.0)	125 (35.7)
Zero Times in Past 30 Days	262 (74.9)	225 (64.3)	99 (75.0)	225 (64.3)
Statistics	$\chi^2 = 9.23$, $p = .0024$	$\chi^2 = 4.99$, $p = .0254$		

driving compared to their off campus counterparts. Perhaps these students travel mostly on campus, and underestimate their risk due to such factors as lower

driving speed. Thus, they are less inclined to use a seat belt. Further investigation in this area could reveal reasons for noncompliance of seat belt use, and

determine whether or not the finding reported here is merely a statistical artifact.

Interestingly, in this study the percentage of students who reported that they “sometimes, most of the time, or always” wore a seat belt appeared to be high (89.8%). One study suggested that observed seat belt use for college students was approximately 61% (Clark, 1993). The nearly 30 percentage point difference in this case may be due to the fact that sometimes, most of the time, and always were grouped together. Also, the results were based on self-report rather than on observation which may have led to overreporting of seat belt use.

It is important to encourage and advocate the use of seat belts on a consistent basis. At the time of this study, there was no health education on seat belt use offered through the Student Health Service or the University Police. Despite the relatively high number of students who reported wearing their seat belt, efforts should be taken to promote the use of these safety devices at all times. Therefore, campus officials should seriously consider adopting a low cost program that reinforces the protective factors of seat belt use. Examples of such initiatives include educational seminars provided in residence hall and classroom settings, periodically placed short stories, briefs or ads in the campus newspaper, the posting of signs in parking lots, cafeterias, the library, the student health center, the student union, and other central locations on the campus, and the inclusion of printed cues to action when such items as parking decals, library cards, computer account passwords, and student identification cards are distributed. In addition, student organizations, including Greek and other societies may be approached to reinforce injury prevention awareness.

Motorcycle helmet use

Research in the area of motorcycle helmet use and college students is limited. The data in this case were surprising considering that a statewide mandatory motorcycle helmet law exists. While the number of students who rode a motorcycle was relatively low, there were individuals who reported never or rarely wearing a helmet. A combination of education, promotion, and enforcement would seem to be good adjuvants to the existing legislation. The NCHRBS (Douglas, et al., 1997) found that 17.6% of students rode a motorcycle during the previous 12 months, and that 34.0% rarely or never wore a helmet. As in the present study, no demographic differences regarding use were identified.

Bicycle helmet use

Studies show that bicycle helmet use among college students is low, usually below 25% (Fullerton & Becker, 1991; Weiss, 1996). The relatively low numbers make it difficult to determine significance and pinpoint high risk groups. The concern in this case is that over two-thirds (n= 321) of the students in this sample reported riding a bicycle, but only about five percent reported wearing a helmet sometimes, most of the time, or always.

Due to the large number of bicycle riders it would make sense to adopt a proactive approach and prevent the occurrence of serious injuries. Developing a university-wide policy mandating helmet use among all riders would probably not be well accepted. However, creating bicycle lanes on all university streets should be considered, particularly since the quantity of traffic is large, not unlike other urban campuses. While the creation of bicycle lanes may not influence the issue of trauma and injury directly, it does represent an environmental adaptation that may decrease the number of collisions between bicycles and motor vehicles. Finally, initiatives should be taken to promote bicycle helmet use. Such initiatives may include promotional programs offering cost-reduced helmets to all students at opportune times such as registration, residence hall check-in, sporting events, concerts, and other special events.

Drinking and driving

College-aged males consistently have been associated with alcohol use and drinking and driving (Mundt, Ross, & Harrington, 1992; Wechsler, et al., 1994; Wechsler, Dowdall, Davenport, & Castillo, 1995). Drinking and driving is highly correlated to binge drinking and binge drinkers often are college students, particularly males (Borges & Hansen, 1993). Therefore, it was no surprise that males were significantly more likely to drink and drive than females. This finding also corroborates the results of the NCHRBS (Douglas et al., 1997) where 22.8% of females and 33.2% of males drove at least once in the previous month after consuming alcohol. An important note is that males may have been more likely to drive than females. Unfortunately, this study did not take the likelihood of driving into account. More research in this area may provide additional evidence to support drinking and driving educational programs tailored for males.

It has been identified by several authors that young males are more likely than young females to take risks while driving (Courtenay, 1997). For instance, they are

more likely to tailgate and go through red lights (Farrow & Brissing, 1990), drive 20 mph or more over the speed limit, pass in “no-passing” zones, and pass two or more cars at a time on a two-lane road (CDC, 1994; Jessor, 1987). The addition to the equation of alcohol use and non-compliance with respect to seat belt use establishes a potentially lethal injury risk formula.

Driving while under the influence of alcohol was more prevalent among students living off campus. These findings could primarily be a risk-exposure phenomenon since campus residence students may not have to leave the campus in motor vehicles to consume alcohol, and in turn, use a motor vehicle to meet in social situations with friends and other peers. Although an existing university-wide program offers rides to students who have been drinking, specific drop-off and pick-up locations may not be convenient for all students, particularly those living off campus. A recommendation to the university includes consideration of diversifying its program to serve students living off campus, as well as to reduce overall risk. The program could involve an agreement with local taxi companies or other organizations that provide alternative transportation. Due both to the high level of alcohol use among college students, and the accompanying risk for motor vehicle mishaps, drinking and driving is not an issue that should be taken lightly by universities and the communities in which they exist. The issue is one that is common to most urban campuses where commuting by motor vehicle is typical. It also may be an issue on and around some non-urban campuses. These data warrant further investigation of existing programs that have been evaluated and shown to be effective.

The results of this study should be interpreted cautiously. As with all self-reports, recall bias can play a role in the actual validity of responses. The wording of response options (behavioral anchors) could have been interpreted differently by students. For example; some students may have marked “sometimes” when other students may have marked “rarely” to represent identical frequency or regularity of use. Such measurement errors are not uncommon in surveys of this nature, and represent an important limitation. Another area of concern is the sample itself. The survey was not randomly distributed to all undergraduate students, and therefore, it may not provide a precise representation of the undergraduate student body. This sample may not be representative of students at other universities and colleges, whether

public or private. Since the sample size was relatively small, no effort was made to profile risk-taking by age or race/ethnicity.

Despite these limitations, the results provide some insights. Gender and residential status may influence risk-taking behavior. Males are generally more predisposed to the unsafe transportation behaviors assessed here than their female peers, and both on and off campus students take certain transportation risks. There are limited programs offered through universities across the country that address these transportation issues, but there are fewer that provide a comprehensive safety strategy available to all students. Though the patterns of risk behavior identified in this study are similar to ones found in the NCHRBS, local variations are important, and may be indicators of noteworthy regional differences. For instance, this study found that 41.1% of males drove after drinking, compared to just 33.2% in the national sample. Regional variations such as ones found here may reflect the seasonality of the survey, or they may, in fact, identify certain local conditions (e.g., urbanicity) and real behavioral “epidemics” that should be investigated more thoroughly.

Moreover, whereas studies show bicycle helmet use to be as high as 25% among college students, (Fullerton & Becker, 1991; Weiss, 1996) this study revealed a considerably lower figure. In the southeastern U.S., where the climate can be prohibitively hot, the use of bicycle helmets may be negatively influenced. Thus, programmatic considerations, environmental conditions, and design engineering may need to be substantially different from other geographic locations.

There is a plethora of literature on college students and issues related to college-life. However, the transportation safety issues of college students have received less attention in the literature. Ongoing monitoring of interventions is essential if unsafe transportation behaviors in this age group are to be modified to reduce present levels of morbidity and mortality. College students’ attitudes and beliefs about transportation safety need to be understood. Barriers to greater acceptance of safety devices, moderation in drinking, and reduction in the drinking and driving combination are critical phenomena to understand. Finally, universities need to examine transportation safety as a priority for students.

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