

Research Article

Driving after Consuming Alcohol or Illicit Drugs among Students at Commuter Colleges in the United States and Spain

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Abstract Alcohol and illicit drug use and abuse are widespread on university campuses in many industrialized nations. In the present study, we collected survey data on driving under the influence of alcohol and drugs from students ($N = 555$) from 18 to 20 years of age, attending commuter college campuses in the United States and Spain. Compared to U.S. students, Spanish students reported higher rates of lifetime alcohol and marijuana use, but lower rates of binge drinking in the past month. Among those with driver's licenses, U.S. students were more likely to report ever driving a vehicle after consuming alcohol or marijuana compared to Spanish students. In both countries, being male predicted driving after consuming alcohol and sensation seeking predicted driving after consumption of marijuana. Findings suggest that preventive interventions to reduce drunk and drugged driving are needed among U.S. and Spanish young adults at commuter college campuses.

Keywords alcohol; drugs; risky driving; college students; cross-cultural

1. Introduction

Road traffic injuries (RTI) are an enormous global public health problem, ranked as the 11th leading cause of death worldwide; RTI kill almost 1.2 million people a year and injure up to 50 million more [14]. Several risk factors contribute to RTI, including the sharing of roadways by cyclists, pedestrians, and motor vehicles, as well as driver fatigue and the use of handheld mobile devices [14]. Epidemiologic research demonstrates that RTI and motor vehicle crashes are highly prevalent among young people. The highest number of RTI deaths globally occurs among those who are 15 to 29 years of age [13]. Teenagers are at particularly high risk because of their relative lack of driving experience, a tendency to drive at excessive or inappropriate speeds, the presence of psychological factors such as thrill-seeking and over-confidence, and a lower tolerance of alcohol relative to older adults [14].

Driving among young people can be significantly compromised due to the high rates of both alcohol and drug

use in this age group. Prevalence rates of substance use escalate rapidly over the course of adolescence and peak among young people in their early 20s [8]. Furthermore, alcohol and drug abuse among college students—especially college drinking—is recognized as an important public health problem in many areas of the world. A recent study in the United States found that from 1998 to 2005, there was a 7% increase in prevalence (to 44.7%) of heavy episodic drinking among U.S. college students aged 18 to 24 [9]. A review of international studies found that the prevalence of hazardous drinking among college students in Europe, South America, and Australia are similar to rates in the United States, although prevalence rates are generally lower throughout Asia and Africa [11]. Drugged driving, or driving under the influence of illicit drugs or prescription medications, is increasingly recognized as an important contributor to traffic accidents among young people [7].

Much of the research on alcohol and drug use among college students has focused on samples of students who reside in university dormitories, in part because these youth tend to consume more alcohol than those who do not live in dormitories [5]. However, living arrangements among university students differ from country to country, and residing in an on-campus dormitory is more typical of students in the United States relative to many other countries. Furthermore, student enrollment at community colleges and other “commuter colleges” has increased substantially both in the United States and elsewhere. Many students attending commuter college campuses operate a vehicle on a daily or regular basis; thus, it is important to understand the scope of the problem of driving after alcohol or drug use among these young people. At universities where the majority of students commute rather than live in dormitories, driving under the influence of alcohol may be a particularly dangerous consequence of alcohol consumption.

There has been little cross-cultural research on driving after the consumption of alcohol or other drugs among college students, and we are aware of no international studies conducted on commuter college campuses. The present study examined patterns and predictors of driving under the influence of alcohol and other drugs among commuter college students 18 to 20 years of age in the United States and Spain. There are a number of differences between these countries that may affect availability and opportunity to drive under the influence. The minimum legal drinking age (MLDA) in Spain is 18, and in the United States, it is 21; the legal age for obtaining a driver's license in most areas of the United States is age of 16, whereas young people in Spain can obtain a driver's license at age 18. Thus, the objective of the present study was to examine how a variety of individual, social, environmental, and cultural factors may affect patterns of driving after drinking or consuming drugs among college students and to determine whether patterns and profiles of risk are similar or different across students from the United States and Europe.

2. Methods

2.1. Participants

Participants in the present study were from 18 to 20 years of age, with an average age of 18.8 ($SD = 0.72$). All participants were either first year (62.7%) or second year college students (37.3%). The majority of students (77.3%) were psychology majors, and most participants were women (71.7%). There were no differences across samples in terms of age or gender composition.

2.2. Procedures

We collected survey data from 555 college students from the United States ($n = 309$) and Spain ($n = 246$) on behaviors and intentions related to alcohol and drug use, driving after consuming alcohol or drugs, riding with a driver who had consumed alcohol or drugs, and several psychosocial risk and protective factors these behaviors. Participants were recruited from a variety of undergraduate classrooms, and some students received course credit for participation. Data were collected using questionnaires distributed in classrooms on campus and administered by graduate students who emphasized that the surveys were anonymous and responses could not be linked to participants' names.

2.3. Measures

The English survey was translated into Spanish by two independent translators, a professional translator and an expert in the psychology of addictions. Then a back-translation was conducted, and items were reviewed to ensure that the English and Spanish items were equivalent in meaning.

2.3.1. Demographic information

Age, gender, major in school, and year in college were collected using standard survey items.

2.3.2. Vehicle use

Participants were asked a series of yes or no questions regarding whether they had a driver's license, whether they have their own car, and whether they have a car that they can use on a regular basis. They were also asked the age that they obtained their driver's license.

2.3.3. Substance use

Participants were asked "Have you ever used this substance?" with yes and no response options for the following substances, with examples in parentheses for some substances, as shown: alcohol, marijuana, tranquilizers (e.g., Librium, Valium, Xanax, BuSpar), sedatives (e.g., downers or downers, phenobarbital, Tuinal, Nembutal, Seconal), sleeping pills (e.g., Ambien, Lunesta), amphetamines (uppers, ups, speed, bennies, dexies, pep pills, and diet pills), hallucinogens (LSD, mescaline, peyote, shrooms, psilocybin, PCP), Ecstasy, and cocaine. For alcohol and marijuana, participants were also asked about the last time they had used each substance, with six possible response options: "Never Used" (1), "Past Week" (2), "Past Month" (3), "Past Year" (4), "Past 2 Years" (5), or "> 2 Years Ago" (6).

2.3.4. Vehicle use and substance use

For each substance listed above, participants were asked the following three questions with yes or no response options: "Have you ever driven a car after consuming this substance?" "Have you ever rode in a car with someone after they had consumed this substance?" and "Have you ever been in an accident after you or another driver had consumed this substance?"

2.3.5. Perceived risks

The following questions were asked to assess perceived risks, using the following stem: "How much risk do you think there is in the following activities:" followed by "Driving a vehicle after drinking alcohol," "Riding in a car with a driver who has drunk alcohol," "Driving a vehicle after using marijuana," and "Riding in a car with a driver who has used marijuana." Response options were: "None" (1), "A little" (2), "Some" (3), and "A lot" (4).

2.3.6. Perceived norms

The following items were used to assess perceived norms: "How many of your peers do you think have ever driven a car after drinking?" and "How many adults do you think have ever driven a car after drinking?" And participants were provided with possible responses from 0% to 100% in increments of 10%.

2.3.7. Sensation seeking

We used the Brief Sensation Seeking Scale [10] to assess sensation seeking. The scale is comprised of eight items such as “I would like to explore strange places;” “I would like to take off on a trip with no pre-planned routes or timetables;” “I get restless when I spend too much time at home;” and “I prefer friends who are excitingly unpredictable.” Response options were on a 5-point scale from “Strongly Disagree” (1) to “Strongly Agree” (5).

2.3.8. Evenings out

Participants were asked about their patterns of evenings out in a typical week, using items from the Monitoring the Future Study [2]. They were asked “During a typical week, on how many evenings do you go out for fun and recreation?” and “During a typical week, on how many evenings do you go out to a bar or club with your friends and/or a partner?” Response options ranged from “Less than One” (1) to “Six or Seven” (6).

2.3.9. Perceptions of minimum legal drinking age

U.S. participants were asked “Currently the legal age to drink alcohol is 21. If the drinking age was changed to 18, do you think:” with three response options: “People would be less likely to drink and drive” (1), “People would be more likely to drink and drive” (2), and “There would be no changes” (3). Spanish students were asked “Currently the legal age to drink alcohol is 18. If the drinking age was changed to 21, do you think:” with the same three response options.

2.4. Data analysis

We tested for differences between the Spanish and U.S. college student samples in terms of vehicle use and driving histories, patterns of substance use, driving after the consumption of substances, and related risk and protective factors using chi-square analysis for categorical variables and *t*-tests for continuous variables. In a series of logistic regression analyses, we tested for significant predictors of driving after alcohol or drug consumption and examined whether patterns of prediction differ across the two college student samples.

3. Results

3.1. Vehicle use

There were different patterns of vehicle use across the Spanish and U.S. students (Table 1). A higher proportion of U.S. participants had obtained their driver’s licenses (90% vs. 50%), and they did so at a younger age relative to Spanish participants, at 16.5 vs. 18.1 years of age, $t(387) = 24.7$, $P < .001$. U.S. participants were more likely to have their own car (85.3% vs. 50.4%). However, the frequency

Table 1: Vehicle use of participants by country.

| | U.S. | Spain | χ^2 (1 df) |
|---|-------|-------|-----------------|
| Have driver’s license | 90.0% | 50.0% | 109.13*** |
| Have own car [†] | 85.3% | 50.4% | 54.59*** |
| Have regular access to a car [†] | 88.0% | 85.4% | 1.12 |
| Drive on a daily basis [†] | 63.7% | 53.7% | 3.58 |

Note: Fisher’s exact test (two-sided): *** $P < .001$; [†]Analysis of licensed drivers only.

Table 2: Perceived risk, perceived norms, evenings out, and sensation seeking by country.

| | U.S. | Spain | <i>t</i> (df) |
|--|------|-------|---------------|
| <i>Perceived risk</i> | | | |
| Driving a vehicle after drinking alcohol | 3.77 | 3.62 | 3.2 (540)** |
| Riding in a car with a driver who has drunk alcohol | 3.83 | 3.68 | 3.5 (518)*** |
| Driving a vehicle after using marijuana | 3.30 | 3.23 | 0.6 (414) |
| Riding in a car with a driver who has consumed marijuana alcohol | 3.26 | 3.29 | 0.4 (550) |
| <i>Perceived norms</i> | | | |
| Lifetime driving after drinking among peers (%) | 48.7 | 50.7 | 5.1 (550)*** |
| Lifetime driving after drinking among adults (%) | 63.1 | 62.1 | 0.6 (552) |
| <i>Evenings out in a typical week</i> | | | |
| For fun and recreation | 2.2 | 1.9 | 3.6 (552)*** |
| To a bar or club with friends or partner | 0.6 | 1.5 | 12.0 (553)*** |
| Sensation seeking | 3.03 | 3.36 | 5.1 (550)*** |

* $P < .05$, ** $P < .01$, *** $P < .001$.

of driving a vehicle was similar across samples. The majority of both samples reported having regular access to a car (>85%) and driving on a daily basis.

3.2. Psychosocial risk and protective factors

We compared Spanish students and U.S. students on several potential risk and protective factors for driving after drinking or drug use (Table 2). While U.S. students spent more evenings out for fun and recreation on average than Spanish students (2.2 vs. 1.9 evenings per week), Spanish students spent more nights out with friends at clubs or bars on average, compared to U.S. students (1.5 vs. 0.6 nights per week). More Spanish students (82%) reported any nights out at bars or clubs compared to U.S. students (64%, $\chi^2(1) = 119.4$, $P < .001$). Spanish students reported significantly lower perceived risk for driving a vehicle after drinking and for riding in a car with a driver who had consumed alcohol. Spanish students reported higher perceived norms for peer driving after drinking, relative to U.S. students. Overall, when differences were observed, the Spanish sample typically reported elevated scores on these risk factors compared to U.S. students.

Table 3: Alcohol and drug use and driving or riding with driver after consumption by country.

| | U.S. | Spain | χ^2 (1 df) |
|--|------|-------|-----------------|
| <i>Alcohol use</i> | | | |
| Lifetime use | 86.4 | 97.6 | 21.44*** |
| Ever drove a vehicle after consumption (lifetime) [†] | 43.5 | 30.1 | 6.46* |
| Ever rode in vehicle w/driver who had consumed | 64.4 | 82.9 | 23.64*** |
| Ever in accident involving consumption | 3.9 | 4.1 | 0.01 |
| <i>Marijuana use</i> | | | |
| Lifetime use | 43.0 | 54.1 | 6.67** |
| Ever drove a vehicle after consumption (lifetime) [†] | 25.2 | 12.2 | 8.61** |
| Ever rode in vehicle w/driver who had consumed | 48.2 | 54.5 | 2.14 |
| Ever in accident involving consumption | 0.3 | 2.0 | 3.74 |
| <i>Non-medical pill use (tranquilizers, sedatives, sleeping pills, amphetamines)</i> | | | |
| Lifetime use | 18.8 | 22.8 | 1.34 |
| Ever drove a vehicle after consumption (lifetime) [†] | 7.9 | 4.1 | 2.01 |
| Ever rode in vehicle w/driver who had consumed | 11.3 | 11.0 | 0.02 |
| Ever in accident involving consumption | 0.3 | 0.4 | 0.03 |
| <i>Other illicit drug use (cocaine, hallucinogens, ecstasy)</i> | | | |
| Lifetime use | 9.3 | 7.1 | 0.91 |
| Ever drove a vehicle after consumption (lifetime) [†] | 2.2 | 2.4 | 0.03 |
| Ever rode in vehicle w/driver who had consumed | 7.8 | 17.5 | 12.17*** |
| Ever in accident involving consumption | 0.3 | 0.0 | 0.80 |

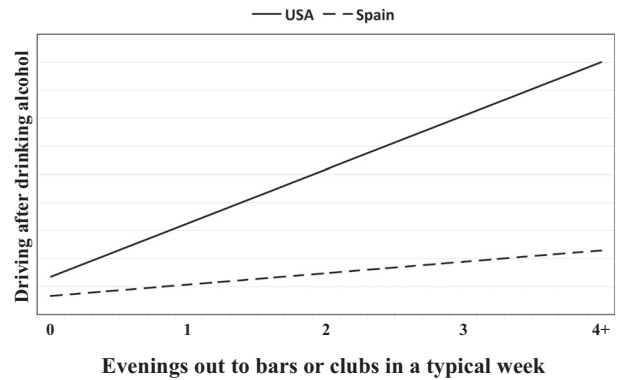
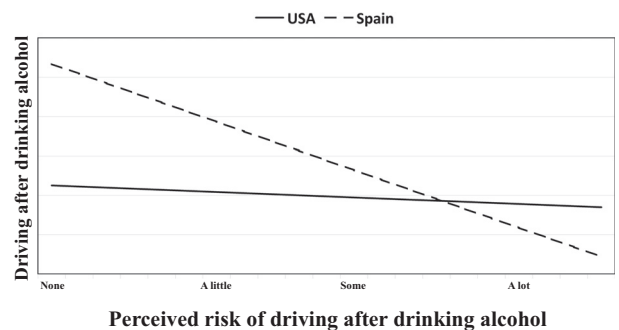
Note: Fisher's exact test (two-tailed): ** $P < .01$, *** $P < .001$;
[†]Analysis of licensed drivers only.

3.3. Substance use

As shown in Table 3, a higher proportion of Spanish students reported ever drinking alcohol compared to U.S. students (97.6% vs. 86.4%) and ever using marijuana (54.1% vs. 43.0%); however, there were no differences across samples in lifetime non-medical pill use or other illicit drug use. In terms of more frequent alcohol use, a higher proportion of Spanish students reported current (past month) drinking, 91.9% vs. 71.8%, $\chi^2(1) = 35.2$, $P < .001$, as well as drinking in the past week (77.6% vs. 43.7%), $\chi^2(1) = 65.2$, $P < .001$, relative to U.S. youth. However, more U.S. students engaged in binge drinking in the past month compared to Spanish students (31.8% vs. 19.6%), $\chi^2(1) = 10.5$, $P < .001$. In terms of more frequent marijuana use, a slightly higher proportion of Spanish students reported current (past month) marijuana use (23.4% vs. 20.7%) as well as marijuana use in the past week (13.0% vs. 11.3%) relative to U.S. youth, but these differences were not statistically significant.

3.4. Alcohol consumption and vehicle use

Among students with their driver's license, U.S. students were more likely to report lifetime driving after alcohol

**Figure 1:** Driving after drinking and evenings out to bars or clubs by country.**Figure 2:** Driving after drinking and perceived risk by country.

consumption (43.5% vs. 30.1%), as shown in Table 3. Spanish participants were more likely to report lifetime riding with a driver who had consumed alcohol (82.9% vs. 64.4%). We ran a logistic regression analysis to examine predictors of driving after drinking alcohol, with the goal of identifying significant predictors of this behavior and whether the prediction differed across participants from each country. Predictors in the regression model included gender, country, sensation seeking, perceived risk of driving after consuming alcohol, perceived norms for peer and adult driving after consuming alcohol, number of evenings out for recreation, and number of evenings out to bars or clubs. In addition, interaction terms of these predictors with country were entered. Findings indicated that significant predictors of driving after consuming alcohol were being male (OR = 2.86, 95% CI = 1.10, 7.41), and two interaction terms were significant: country by nights out per week to bars (OR = 2.26, 95% CI = 1.12, 4.56), and country by perceived risk of driving after alcohol consumption (OR = 5.03, 95% CI = 1.84, 13.74). The proportion of variance explained (Nagelkerke R^2) was 37.1%. The significant interactions are plotted in Figures 1 and 2. Figure 1 shows that evenings out to bars and clubs was associated with driving after drinking alcohol primarily for U.S. students

but only weakly associated for Spanish students. Figure 2 shows that the perceived risk was strongly associated with less driving after drinking alcohol for Spanish students but only weakly associated for U.S. students.

3.5. Marijuana consumption and vehicle use

Among students with their driver's license, U.S. students were more likely to report lifetime driving after marijuana consumption (25.2% vs. 12.2%), as shown in Table 3. A logistic regression analyses was conducted to examine predictors of driving after consuming marijuana, with the goal of identifying significant predictors of this behavior and whether the predictors had a similar effect across countries. Predictors in the model included gender, country, sensation seeking, perceived risk of driving after consuming marijuana, number of evenings out for recreation, and number of evenings out to bars or clubs. In addition to these predictors, interaction terms with country were entered. Findings indicated that sensation seeking significantly predicted driving after consuming marijuana (OR = 3.04, 95% CI = 1.29, 7.19). No other main effects or interactions were statistically significant.

3.6. Perceptions of the impact of changing minimum legal drinking age

U.S. students in our sample (who were not yet of legal drinking age) were asked what they thought the impact of changing the legal drinking age in the United States from 21 to 18 would have on drinking and driving. Most U.S. students thought either that less restrictive laws would either not increase drinking and driving (36.7%) or would decrease it (22.1%). However, a substantial minority (41.2%) of U.S. students thought that less restrictive laws would increase drinking and driving. Spanish students in our sample (who were of legal drinking age) were asked what they thought the impact of changing the legal drinking age in Spain from 18 to 21 would have on drinking and driving. The vast majority thought there would be no changes in drinking and driving (86.9%), and the rest were split, with 6.5% reporting that they thought more restrictive laws people would reduce drinking and driving and 6.5% reporting that they thought more restrictive laws people would increase drinking and driving. These differences were statistically significant $\chi^2(2) = 143.7, P < .001$. Similar patterns were observed when the analysis was limited to those who had drivers' licenses.

4. Discussion

In this study of university students at commuter colleges, we examined behaviors related to alcohol and illicit drug use, driving under the influence of alcohol and illicit drugs, and several relevant psychosocial risk and protective factors for these outcomes. Findings indicated that Spanish students spent more nights out per week with friends at clubs and

bars, were more likely to engage in alcohol and marijuana use on a regular basis, reported less perceived risk and higher perceived peer norms regarding driving after alcohol or drug use, and higher sensation-seeking, relative to U.S. students. Furthermore, because participants in the present study were between 18 and 20 years of age, alcohol use was legal for all Spanish participants (where the legal drinking age is 18) but illegal for all U.S. participants (where the legal drinking age is 21). Despite this pattern in which Spanish youth generally had scores indicative of higher potential risk for driving after alcohol use relative to U.S. youth, we found that U.S. college students actually engaged in more binge drinking and driving after alcohol consumption.

4.1. Cross-cultural factors in alcohol use and driving

Other than binge drinking, our findings indicated that Spanish youth reported higher lifetime and current rates of drinking alcohol relative to U.S. youth. This finding may reflect the fact that Spain is in the European Union, which remains the heaviest drinking region of the world [1]. Certain types of alcohol consumption, such as moderate drinking of wine at meals, is embedded in the cultures of Spain and other southern European countries [1], which is not the case in the United States. Thus, low levels of alcohol use may be a part of everyday life for many Spanish young people. The findings also indicated that U.S. students engaged in more binge drinking in this study. This is consistent with research on college drinking in the United States, which has shown that alcohol is widely available in many college social settings and drinking is viewed as socially acceptable and even integral to the college student experience for some students [4]. First year U.S. college students use alcohol at levels of consumption that often reach or exceed criteria for heavy episodic drinking [6, 15, 16]. This pattern, in combination with the higher proportion and earlier age of obtaining drivers' licenses in the U.S. relative to Spain, may explain the higher rates of driving after alcohol use in the U.S. participants. The increased prevalence of mass transit use in Spain may also be a factor in explaining the finding that Spanish students were less likely to drive after having consumed alcohol.

U.S. students in the present study reported fewer evenings out to bars and clubs than Spanish students. This likely reflects the fact that in the U.S. one can legally enter the vast majority of clubs and bars only if age 21 (the legal drinking age) or older. It may be expected that those young U.S. college students who illegally enter bars and clubs are the same individuals who tend to drive after drinking alcohol. Indeed, spending evenings out at bars and clubs was strongly associated with driving after drinking alcohol but only among U.S. students. Both of these behaviors are illegal in the U.S. for this age group, and engaging in them may indicate a predisposition to engage in risky behavior.

The present study has a number of strengths and limitations. A strength of the study is the collection of survey data in a population of young people—first and second year students at commuter college campuses—that may be at elevated risk for driving after consuming alcohol or drugs. A limitation of the study is that we did not collect information on the type of alcohol typically consumed, limiting our ability to examine how differences in beer, wine, and spirits may affect driving after alcohol consumption in the two countries. Nor did we ask participants about the number of drinks typically consumed prior to driving under the influence of alcohol. Recall bias is also a limitation of the research.

4.2. Conclusions

Findings suggest that preventive interventions to reduce drunk and drugged driving are needed among U.S. and Spanish young adults at commuter college campuses. There are several strategies for preventing and reducing college drinking with proven effectiveness that may provide insight into promising approaches for reducing driving after the consumption of alcohol or drugs. Reviews of the literature indicate that the most effective college alcohol prevention approaches involve screening and brief intervention [12]. An entire student body of first year students could be screened for heavy alcohol use and negative consequences of use, such as drunk driving or drinking interfering with academics. For those identified, a more thorough assessment of alcohol consumption, history, problems, and symptoms of alcohol abuse is then completed; dysfunctional beliefs about alcohol are measured; and instructions for self-monitoring drinking behavior may be provided. This initial screening may then followed by a brief intervention—either in person, in groups, or via electronic communications—in which students receive feedback delivered in an empathetic, non-confrontational manner [3]. Students are encouraged to evaluate discrepancies between their risky drinking behavior and their stated academic, social, or other life goals and values in an attempt to increase their intrinsic motivation to change behavior to reduce drinking and decrease negative consequences of drinking. Programs that help young people understand that driving under the influence of alcohol or drugs is inconsistent with their future academic, social, or other life goals may further prevent these behaviors. Future studies should test these approaches to prevention among students on commuter college campuses in addition to residential campuses.

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