

International Study of Heavy Drinking: Attitudes and Sociodemographic Factors in University Students

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Abstract. The authors studied the prevalence of heavy drinking among students in 21 developed and developing countries using an anonymous survey of 7,846 male and 9,892 female students aged 17 to 30 years. There were wide variations in the prevalence of drinking among countries, and the highest rates of heavy drinking (defined as 5 or more drinks for men and 4 or more drinks for women on at least 1 occasion over the past 2 weeks) were reported in Belgium, Colombia, Ireland, and Poland (men), and Ireland and England (women). Heavy drinking was associated with living away from home, having a wealthier family background, and having well-educated parents. Beliefs about the dangers to health of excessive consumption were negatively related to heavy drinking. Heavy drinking is a concern among students in several countries and is associated with greater affluence. Challenging beliefs concerning health risks is a crucial aspect of prevention in this population.

Key Words: alcohol, health beliefs, international, sociodemographic, students

Appropriate alcohol use among college students is a major public health concern,^{1,2} but researchers have investigated it extensively in only a few countries. O'Malley and Johnston³ reviewed findings from 5 large data sets in the United States. Results were consistent in showing that about 70% of students drank alcohol, and 40%

to 45% were heavy or "binge" drinkers, defined as drinking 5 or more drinks in a row for men, and 4 or more drinks for women, at least once in the past 2 weeks.⁴ Data from the United Kingdom using definitions of heavy drinking based on sensible levels of consumption over the week have produced estimates of 24% to 62% in male students and 14% to 63% in female students.⁵ Information on heavy drinking among university students in other countries is limited,^{6,7} in comparison with the extensive research on high school-aged samples.^{8,9} Very little is known about alcohol use among students in developing countries or in countries outside the European Union, North America, and Australia. Our first aim in this article was to describe the prevalence of alcohol consumption and heavy drinking in university students from 21 developed and developing countries. We did not collect data from a representative sample of universities in each country, so it should be emphasized that the study did not set out to provide a definitive comparison of students in different parts of the world. Rather, the purpose was to give a snapshot of alcohol consumption in similar groups of young adults in different countries over the same time period, using a standard questionnaire format so that direct comparisons could be made. We also evaluated relationships across countries between levels of alcohol consumption, alcohol purchasing laws, and the state of economic development of the nation.

Several factors have been associated with heavy drinking in US college student samples. Higher rates have been described in white compared with black students, individuals whose parents drink alcohol, sports fans, and students who live away from their families' homes and do not attend church.^{3, 10-13} Associations with nonconformist attitudes and the trait of sensation seeking have also been noted.¹⁴ The influence of socioeconomic background is poorly understood.¹⁵ Although heavier alcohol consumption per episode

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and death from alcohol-related causes are more common in lower socioeconomic status groups, studies of younger adults have shown inconsistent relationships between alcohol intake and social position.¹⁵⁻¹⁷ Our second aim was to evaluate associations between heavy drinking and family background and parental education.

Our third aim was to assess the relevance of health-related cognitions to heavy drinking in this population. Beliefs about the health consequences of behaviors, and knowledge about the impact of behavior on disease risk, are important components of social cognition models.¹⁸ However, health-related cognitions may play only a marginal role in alcohol consumption and heavy drinking in youth. Studies of motivation for drinking in student samples have identified drinking for social reasons, drinking to cope, and drinking to enhance mood as the key determinants of alcohol consumption.^{14,19,20} It is, therefore, uncertain whether associations between heavy drinking and health beliefs about alcohol would be identified. Finally, we assessed participants' knowledge about the influence of alcohol on heart disease and high blood pressure because students who are aware of these associations may be less likely to drink heavily than are their peers. We focused on knowledge about heart disease and high blood pressure because the larger survey from which we took these data was predominantly concerned with the impact of health behavior and lifestyle on major chronic diseases influencing the global burden of disease, and cardiovascular diseases feature prominently in this context.²¹

METHODS

We collected data as part of the International Health and Behaviour Survey (IHBS), a cross-sectional study of health behaviors and associated beliefs in university students in several countries. The rationale and background of the study have been described elsewhere,²² and the development and reliability of measures have been established.^{23,24} Results for several other health behaviors have been detailed in other publications.²⁵⁻²⁷ The anonymous, self-report questionnaire was developed in English, then translated and back-translated into 15 languages (Bulgarian, Dutch, Flemish, French, German, Greek, Hungarian, Icelandic, Italian, Polish, Portuguese, Romanian, Slovakian, Spanish, and Thai). The study was initiated through personal academic contacts of the principal investigators. These collaborators arranged for data to be collected between 1999 and 2001 in 1 or 2 universities in their respective countries. The universities involved were located in the capital cities of 12 of the participating countries and in other major cities in the remainder. All were full-time universities granting full honors degrees. According to the World Medical Association Declaration of Helsinki (5th revision), anonymous questionnaire surveys of this type in healthy populations do not require informed ethical consent from participants, but we obtained IRB approval from the medical ethics committee of St. George's Hospital Medical School, University of London. Collaborators collected data by administering the survey to large groups of students in

classes, and participation rates exceeded 90% (based on the number of completed forms compared with the number of students in each class). Classes were recruited according to timetable scheduling in a quasi-random fashion. We included no incentive for participation, and there were no penalties for refusing to complete the survey. The students who completed the survey were not all from the same year of study (eg, sophomore), so they varied in the number of years for which they had attended the university. None of the respondents was studying health-related topics because such individuals might have acquired specific knowledge of the role of behavior in health as part of their studies. A variety of majors were involved, including physical sciences, engineering, law, geography, history, psychology, and economics. We analyzed data from students aged 17 to 30 years, and a total of 7,846 men and 9,892 women participated. Total sample sizes in each country ranged from 471 (Ireland) to 2028 (Italy), depending on practical timing constraints and the local arrangements made by collaborators (eg, the use of graduate student assistants). Table 1 shows the number of respondents from each country providing data for these alcohol analyses.

Measures

The survey asked respondents if they were nondrinkers, very occasional drinkers (very special occasions only), or drank alcohol occasionally or regularly. They were also asked how many drinks they had consumed on average on those days on which they had drunk alcohol over the past 2 weeks. Following the categorization employed by previous researchers, men who stated that they had consumed 5 or more drinks and women who reported 4 or more drinks on a single occasion were classified as heavy drinkers.^{4,28} Individuals who drank less than this were classified as moderate drinkers.

The survey assessed with a 10-point scale beliefs in the importance of alcohol to health, asking students to rate the importance to health of not drinking too much alcohol with 1 = very low importance and 10 = very great importance. The survey assessed, using a binary response format, awareness of links between alcohol and specific health problems by asking students whether or not alcohol was associated with heart disease and high blood pressure.

We classified students according to whether they lived in their family home or in university accommodations. We assessed socioeconomic background with 2 measures. First, the survey asked respondents to rate their family background as wealthy (within the highest 25% in their country, in terms of wealth), quite well off (within the 50% to 75% range for their country), not very well off (within the 25% to 50% range for their country), or quite poor (within the lowest 25% in their country, in terms of wealth). We subsequently divided the population into poorer (not very well off and quite poor) and wealthier (wealthy, quite well off) categories. Second, participants provided information about the education of their mothers and fathers. We made a division between respondents whose parents had none or only

primary education and those whose parents had attended high school or university.

Country-Level Data

This study was based on self-report, so we were interested in whether the ranking of countries in terms of alcohol consumption matched that of other international datasets. The most appropriate comparison is with the 1999 European School Survey Project on Alcohol and other Drugs (ESPAD) because this involved assessments of alcohol use in representative samples of 15- and 16-year-old school students from 13 of the countries included in the current study.^{9,29} We computed correlations between the proportion of heavy drinkers in this survey in each country and the prevalence of drunkenness (3 times or more in the last 30 days) and binge drinking (5 or more drinks on at least 3 days in the last 30 days) from the ESPAD survey. In addition, we correlated the prevalence of alcohol consumption in each country with the per capita consumption of beer and wine,³⁰ and with national economic development, indexed by the per capita gross domestic product (GDP) in US\$ for 1998.³¹ We also tested associations between alcohol drinking, heavy drinking, and the legal age for buying alcohol in each country.³²

Statistical Methods

Since there was a small but positive association between alcohol drinking and age ($r = .05, p < .01$), we adjusted all

analyses for age. We computed separate prevalence rates of drinking and heavy drinking (as a proportion of the total population of each country sample) for men and women, and results are presented as percentages with 95% confidence intervals (CIs). Previous study results indicate that differences in alcohol consumption between students from different disciplines are relatively small,³³ so we did not include this factor in the analyses. We compared the mean belief ratings of nondrinkers, moderate and heavy drinkers in the importance of not drinking too much. We analyzed associations between heavy drinking, sociodemographic factors, beliefs, and risk awareness using multiple logistic regression. This study used a clustered design, so country was included as a clustering variable in the regression models, and CIs were adjusted accordingly. We carried out analyses using STATA 6.0. We compared aggregate levels of drinking and heavy drinking in each country with national consumption statistics, GDP, and the legal age for purchasing alcohol using product-moment correlations.

RESULTS

Prevalence of Drinking and Heavy Drinking in Students

Table 1 shows the age-adjusted prevalence of drinking (defined as any more than drinking alcohol on special occasions) and heavy drinking in men and women in the 21 country samples. Men were more likely to describe them-

TABLE 1. Age-Adjusted Alcohol-Consumption Prevalence With 95% Confidence Intervals (CI)

Country	Men					Women				
	N	Drinkers		Heavy drinkers		N	Drinkers		Heavy drinkers	
		n	95% CI	n	95% CI		n	95% CI	n	95% CI
Belgium	257	74	68-79	48	40-49	273	46	40-51	25	21-29
Bulgaria	376	68	62-72	12	8-15	421	54	49-58	6	2-9
Colombia	481	59	55-63	46	43-49	389	32	27-36	24	20-27
England	434	71	66-75	26	22-29	354	74	69-79	33	29-36
France	397	42	37-46	10	6-13	370	36	30-40	7	3-11
Germany	334	67	62-72	2	0-6	394	59	54-64	3	0-6
Greece	397	62	57-66	4	0-7	394	45	40-49	4	1-7
Hungary	238	52	45-57	9	4-13	354	33	27-37	7	3-11
Iceland	315	75	69-79	37	32-40	359	69	64-74	30	26-33
Ireland	102	95	85-100	49	41-55	335	93	87-97	57	52-60
Italy	773	71	67-74	6	3-8	1248	47	44-49	3	1-5
Netherlands	276	86	80-91	42	38-46	404	78	73-82	34	30-37
Poland	327	73	68-78	47	43-51	414	53	48-57	27	23-30
Portugal	479	65	61-69	18	14-21	468	29	24-33	9	6-12
Romania	390	52	47-56	7	3-10	386	25	20-29	1	0-4
Slovakia	558	75	71-79	44	41-47	697	59	55-62	29	26-31
South Africa	332	29	24-34	27	23-31	369	6	2-11	3	0-7
Spain	219	59	52-64	21	16-25	263	47	41-52	17	12-20
Thailand	307	43	38-48	32	27-35	522	11	6-14	7	3-10
United States	501	65	61-69	43	40-46	1134	54	51-57	27	24-28
Venezuela	353	50	44-54	32	27-35	344	26	21-31	15	10-18

selves as drinkers than were women, with nonoverlapping CIs in 14 countries. Prevalence ranged from 29% for men and 6% for women in South Africa to 95% and 93% for men and women, respectively, in Ireland. The prevalence of drinking across countries was highly correlated in men and women ($r = .89, p < .001$).

More than 40% of men stated that they had drunk heavily in the past 2 weeks in the United States, Belgium, Columbia, Ireland, the Netherlands, Poland, and Slovakia (Table 1). Women from England, Iceland, Ireland, and the Netherlands reported prevalence rates of 30% or more. Heavy drinking was infrequent (< 10%) in male students from Germany, Greece, Hungary, Italy, and Romania and in female students (< 5%) from Germany, Greece, Italy, Romania, and South Africa.

The proportion of heavy drinkers was positively correlated across countries with the prevalence of alcohol consumption in men ($r = .40, p = .07$) and women ($r = .74, p < .001$). Thus, countries in which a greater proportion of students drank tended to be those in which the prevalence of heavy drinking was higher.

Comparison With Other International Data and Macro-Economic Factors

Comparison with the ESPAD data from 12 of the countries in this study indicated that the reports from students correlated with those of 15- to 16-year-old representative samples of school-aged students in 1999. Thus, the proportion of heavy drinkers in each country correlated with rates of drunkenness and binge drinking among men ($r = .67$ and $r = .63$, respectively, $p < .05$) and among women ($r = .82$ and $r = .88, p < .001$) in the ESPAD survey.

The proportion of respondents who drank alcohol correlated positively with national per capita consumption of beer in men ($r = .49, p = .017$) and women ($r = .55, p = .006$). The correlation between per capita consumption of beer and the prevalence of heavy drinking was significant in women ($r = .64, p = .002$) and positive but not significant among men ($r = .39, p = .081$). In contrast, the prevalence of heavy drinking was negatively correlated with national per capita wine consumption in men ($r = -.60, p = .044$) and women ($r = -.35$).

The prevalence of drinking alcohol in each country sample was positively associated with national GDP in men ($r = 0.33, p = .059$), but was stronger in women ($r = 0.57, p = .005$). The legal age for purchase of alcoholic beverages ranged from 16 to 21 years in the countries included in this study, but it was not related to alcohol drinking or heavy drinking in either gender.

Sociodemographic Factors

Almost half (49.2%) of respondents lived in their family homes, with the remainder living in university accommodation, apartments, etc. The odds of heavy drinking (adjusted for age and gender) for those living away from home compared with those living at home were 1.63 (CI = 1.29–2.06, $p < .001$). More than half (64.1%) of the respondents described themselves as being from the wealthier half of the population of their countries, and heavy drinking was positively associated with a wealthier background (adjusted odds ratio [OR] = 1.44, CI = 1.27–1.63, $p < .001$). The majority of students (71.7%) reported that both their parents had been educated at least to high school level. The odds of heavy drinking were reduced among students whose parents were less well-educated (adjusted OR = 0.75, CI = 0.63–0.89, $p < .001$). We entered these sociodemographic factors simultaneously into a logistic regression on heavy drinking, along with age and gender, and the results are summarized in Table 2. It can be seen that heavy drinking was positively associated with living away from home and coming from a wealthier background and was less likely among students with less educated parents than among those with educated parents.

Health-Related Cognitions

Strength of beliefs in the importance to health of not drinking too much was greatest in non-drinkers, was intermediate in those who consumed alcohol moderately, and was lowest in heavy drinkers. Figure 1 shows the mean belief ratings of respondents in the 3 alcohol-consumption categories. The difference between consumption categories was highly significant ($p < .0001$), as was the gender difference, with women giving higher ratings than did men in all categories ($p < .0001$). When the population was divided

TABLE 2. Regression of Sociodemographic Variables on Heavy Drinking

Variable	Adjusted OR	95% CI†	<i>p</i>
Sex	0.57	0.49–0.65	.001
Age	0.96	0.90–1.02	.25
Living away from home	1.61	1.28–2.04	.001
Wealthy family background	1.42	1.24–1.63	.001
Lower parental education	0.82	0.69–0.97	.001

Note. OR = odds ratio; CI = confidence intervals.

†Confidence intervals are adjusted for data clustering by country.

into strong and weak belief-rating categories by median split, the odds of heavy drinking in those with weak health-belief ratings were 3.11 (CI = 2.73–3.54, $p < .001$), adjusted for age and gender.

Overall, 54.5% of men and 55.2% of women were aware of the association between alcohol consumption and heart disease. Levels of awareness of the influence of alcohol on high blood pressure were similar (58.1% men, 58.6% women). Awareness of the links between alcohol, heart disease, and high blood pressure were independently associated with increased odds of being a heavy drinker (Table 3). Heavy drinkers had greater, rather than less, knowledge of the health consequences of alcohol than had others. The inclusion of the risk awareness measures did not reduce the odds associated with weak health beliefs.

A further logistic regression included the sociodemographic and cognitive variables in a single model. All the effects

described in Tables 2 and 3 remained significant, except for the association of heavy drinking with parental education.

DISCUSSION

Heavy drinking, as defined in this study, is common among students not only in countries that have been extensively studied in the past such as the United States and the United Kingdom,^{3,5,34} but also in several Central and Eastern European countries, such as Poland and Slovakia, and in developing countries like Columbia and Venezuela (Table 1). The absolute prevalence of heavy drinking among students in the United States and the United Kingdom was comparable to that observed in previous larger student surveys of these countries.^{3,5} Some of the findings appear to go against popular stereotypes, such as high levels of alcohol consumption in France and Germany. In fact, there have been marked reductions of heavy alcohol consumption in both countries over the past 20 years,⁶ and only 37% of the French now consider themselves to be regular wine drinkers, compared with 61% in 1980. By contrast, the high levels of heavy drinking among female students in England and Ireland are consistent with recent national surveys that have highlighted binge drinking in this population. For example, the mean weekly alcohol-consumption of women aged 16 to 24 years in England increased by 32% between 1998 and 2001.³⁵

We observed a positive correlation across countries between the prevalence of alcohol consumption and the proportion of heavy drinkers. Rehm and coworkers in the USA and Europe have extensively studied this association, and they have argued that both average volume and patterns of drinking contribute to alcohol-related morbidity.^{36,37} Information was, unfortunately, not collected concerning the types of alcohol consumed. Student drinking in Western countries has changed over recent years, with the dominant role of beer being challenged by newer spirit-based mixed drinks. However, the positive association between the prevalence of heavy drinking and national per capita consumption of beer suggests that this continues to be the favored beverage among heavy drinkers. There were signif-

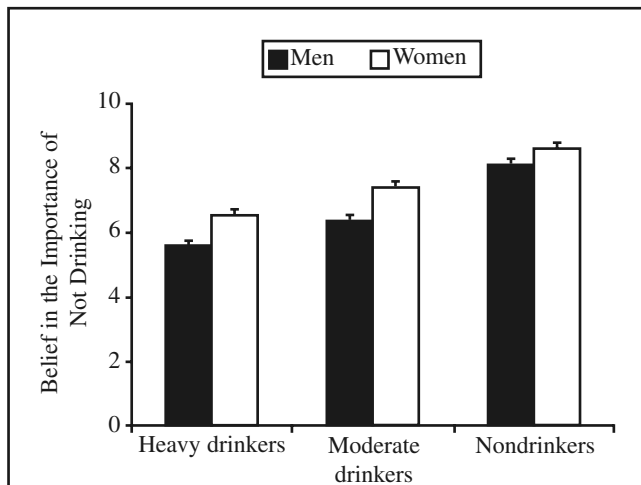


FIGURE 1. Mean ratings of the importance to health of not drinking too much alcohol in heavy drinkers, moderate drinkers, and nondrinkers. Higher scores indicate stronger beliefs in the importance to health of not drinking too much alcohol. Error bars are SEM.

TABLE 3. Regression of Cognitive Variables on Heavy Drinking

Variable	Adjusted OR	95% CI†	<i>p</i>
Sex	0.70	0.61–0.81	.001
Age	0.97	0.91–1.04	.47
Weak beliefs in importance of limiting alcohol	3.12	2.74–3.55	.001
Awareness of alcohol–heart disease link	1.26	1.13–1.40	.001
Awareness of alcohol–high blood pressure link	1.37	1.23–1.53	.001

Note. OR = odds ratio; CI = confidence intervals.
 †Confidence intervals are adjusted for data clustering by country.

icant negative correlations between per capita consumption of wine and heavy drinking across nations. Wine consumption is highest in countries like France, Italy, and Portugal, and cultural habits, such as drinking wine with meals, may result in alcohol drinking being common, without a high prevalence of heavy drinking.

Both individual and macro-level socioeconomic factors were associated with heavy drinking. Heavy drinking was more common in countries with a higher GDP, indicating that the state of national economic development may play a role. We did not observe any association between alcohol consumption and the legal age for purchasing alcohol. However, this does not imply that changing purchasing age would have no effect on drinking. At the individual level, heavy drinkers were more likely to live away from home and come from affluent and better-educated family backgrounds. Heavy drinking appears, therefore, to be more common among wealthier students with greater disposable income who live outside parental control. Our assessments of family wealth were relative rather than absolute. The use of absolute measures of individual wealth would be difficult to interpret in a study in which per capita GDP ranged from less than \$3,000 in Bulgaria, Columbia, Romania, and Thailand, to more than \$25,000 in Germany and the United States. Previous researchers have observed an association between higher socioeconomic position and overall alcohol consumption in several countries.^{16,17,38,39} The finding that heavy drinking was also related to socioeconomic background is apparently inconsistent with results showing that binge drinking is negatively related to socioeconomic position.^{40,41} But young adults from less affluent families who succeed in entering university may be more temperate than others from their social backgrounds, and there is substantial evidence that young adults who drop out of school are at higher risk of alcohol misuse.^{15,40}

Beliefs in the health benefits of limiting consumption were negatively correlated with intake (Figure 1), and likelihood of drinking heavily was substantially greater in individuals who had weak health beliefs (Table 3). These results are interesting because the major focus of research on attitudes and motives in youth has been on nonhealth factors, such as the social and mood enhancing effects of alcohol. Such motives may be difficult to dislodge. In contrast, efforts to augment health beliefs could pay dividends in terms of behavior change.⁴²

Heavy drinkers were more likely than were others to be aware of an association between alcohol and heart disease and high blood pressure (Table 3). This suggests that lack of knowledge about the specific long-term consequences of alcohol consumption may not be a determinant of heavy drinking in this privileged sector of society. Young people who drink heavily have more involvement with the purchase of alcoholic beverages and with bars, pubs, and clubs than do other students, so they may be exposed to health promotion messages to a greater extent, leading to increased risk awareness.

This study has a number of limitations. The university

students in this study were not representative, and different results might have been produced had other universities been involved. The inferences that can be drawn are also limited by the cross-sectional design. There may be error in the self-report measures. The positive associations across countries between data in this study and the findings from the ESPAD study are encouraging in suggesting that the ranking of countries was accurate, but absolute levels of consumption may not have been reliable. Another limitation is in the measures; we did not obtain information about the type of alcohol consumed, and we used a single rating to measure health beliefs. More elaborate assessments of attitudes would have been desirable. In addition, a fuller assessment of risk awareness would have been desirable; we assessed awareness of the association between heavy drinking and cardiovascular disease, but not other adverse effects such as impairment of cognitive function. Nonetheless, the study shows that there are wide variations across countries in heavy drinking in this single sector of society. The associations between heavy drinking and health beliefs suggest that challenging these attitudes may be a fruitful approach to prevention in this population. College authorities in many countries need to be aware of the problem of heavy drinking among students and its likely adverse consequences. At the same time, there are evidently countries in which alcohol drinking is maintained at acceptable levels despite minimal prohibition or sanction against drinking in the young. International studies of this type may be helpful in shedding light on the ways that Mediterranean and wine-drinking areas seem to have achieved a culture in which young adults use alcohol more responsibly than in some countries of Northwestern, Central, and Eastern Europe, and the United States.

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NOTE

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