

EPIDEMIOLOGY

Cross-Cultural Patterns in College Student Drinking and its Consequences—A Comparison between the USA and Sweden

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Abstract — Aims: The aim of the study was to compare alcohol use, consequences and common risk factors between American and Swedish college students. **Methods:** A secondary comparative analysis from one American and two Swedish studies in college settings. **Results:** Swedish freshmen report higher alcohol use than US freshmen students. Swedish residence hall students report higher alcohol use than US residence hall students, but lower than American fraternity/sorority members. US students were less likely to be drinkers. Controlling for age, country moderated the relationship between family history and harmful drinking scores for women (stronger in the USA), and between expectancies and harmful drinking scores for men (stronger in Sweden), though in both cases this represented a small effect and patterns were similar overall. **Conclusions:** Swedish students are at higher risk for alcohol use than US students, but similar patterns between aetiological predictors and outcomes in both countries suggest that research from the USA is generalizable to Swedish students and vice versa. More research is needed to better understand unique relationships associated with age and family history.

INTRODUCTION

College drinking is a problem in today's society, and the governments of Sweden and the USA have been attentive to this issue (NIAAA, 2002; Alkoholinförelseutredningen, 2005). Comparing college-drinking habits between countries is important to gain more in-depth knowledge of drinking motives and habits, and determine the generalizability of the large body of research on US college drinking to other western countries and cultures. Some aspects of college drinking have been examined cross-nationally. Cox *et al.* (2002) found similar motivational bases for alcohol use in the Czech Republic, the Netherlands, Norway and the USA. Leavy and Alexander (1992) found that Scottish students were less likely than US students to perceive drinking problems, although participants' drinking habits influenced perceptions of drinking in both countries. Other studies have found that students in various European countries, not including Sweden, have higher alcohol consumption than US students (Engs *et al.* 1991; Delk and Meilman 1996; Cox *et al.*, 2001). Karam *et al.* (2007) reviewed studies of student drinking worldwide, with the exception of North America, and concluded that problematic alcohol use has similar prevalence and similar predictors: male gender, higher socioeconomic status, higher family education and excessive use of alcohol by family or peers. Although these studies contribute to our understanding of cross-national drinking behaviours and predictors of college drinking, prior research has had some limitations in sample sizes and methodology, and no studies comparing Swedish and American college students have been performed. With a growing body of Swedish research in the field (Berntsen *et al.*, 2006; Hansson *et al.*, 2006; Johnsson and Berglund 2006; Andersson *et al.*, 2007; Stahlbrandt *et al.*, 2007), it is important to assess the generalizability of previous American research to Swedish populations.

In order to identify similarities and differences, a short description of the two different countries will follow.

General consumption

Alcohol policies and drinking patterns differ between the USA and Sweden. In the USA, ~63% of the population are current drinkers (NIAAA, 2004), compared to ~87% in Sweden (Bergman and Källmén, 2002). In the USA, beer and wine can be purchased in grocery and convenience stores, whereas spirits are primarily available through state-controlled liquor outlets. The legal age for possession and purchase of alcohol is 21 years (Wagenaar and Toomey, 2002). In Sweden, alcoholic beverages containing 3.5 volume percent or more are to be sold through the state-controlled alcohol retail monopoly, Systembolaget, or through restaurants. The legal purchasing age at Systembolaget is 20 years and in restaurants 18 years.

School systems

In the USA, school attendance is not mandatory after the age of 15 years, but the majority (84–88%) complete 12th grade (US Department of Education, National Center for Education Statistics, 2001). Approximately 68% attend a college or university within 6 years, with 57% entering immediately (National Center for Higher Education Management Systems, 2002). First year college students in the USA are on average 19 years old.

In Sweden, school is mandatory to 15 years of age, and 93% then proceed to high-school until the age of 18 years. Forty-five percent attend college or university within 6 years, but only 18% go directly from high school to college (Statistiska Centralbyrån, 2004). The mean age of college freshmen was 22.5 years in 2005 (Högskoleverkets nyckeltal, 2000).

College student consumption

College students are recognized as a high-risk group for alcohol problems in both countries. In the USA, 44% of students report heavy episodic drinking (four or five drinks per occasion for women and men, respectively) at least once in the previous 2 weeks (Wechsler *et al.*, 2002). Men are more likely to drink

alcohol, drink more frequently and consume more alcohol when they drink than women (Wechsler *et al.*, 1999). However, sex differences are narrowing in recent cohorts (Wechsler *et al.*, 2002; Wallace *et al.*, 2003). In Sweden, 55% of college students report heavy episodic drinking (five or more drinks in one sitting) at least once a month, with men reporting twice as much binge drinking as females (Bullock, 2004).

Harm

In the USA, excessive drinking has been associated with property damage, academic problems, hangovers, legal problems, sexual and physical assault, injuries and fatalities (Wechsler and Isaac, 1992; Frintner and Rubinson, 1993; Koss, and Gaines, 1993; Wechsler *et al.*, 1994, 2000; Larimer *et al.*, 1999; Hingson *et al.*, 2002; Kaysen *et al.*, 2006). Similarly, Bullock (2004) found Swedish college students who reported harm in their physical health or financial situation due to drinking.

Risk factors for college drinking

Demographic risk factors for negative alcohol outcomes include living in residence halls (Baer, 2002; Bullock, 2004), as well as in a fraternity or sorority in the USA (Koss and Gaines, 1993; Baer, 2002), being a freshman (Baer, 2002; Bullock, 2004) or having parents with alcohol problems (Kaij, 1960; Sher, 1987; Wechsler and Isaac, 1992; Frintner and Rubinson, 1993; Koss and Gaines, 1993; Wechsler *et al.*, 1994, 2000; Larimer *et al.*, 1999; Baer, 2002; Hingson *et al.*, 2002; Bullock, 2004; Kaysen *et al.*, 2006).

Expectancies

Several studies report that positive alcohol expectancies (beliefs about positive effects of alcohol) are related to heavy drinking and have been found to be related alcohol-related consequences, positive and negative (Evans and Dunn, 1995; Park and Levenson, 2002; Park and Grant, 2005; Andersson *et al.*, 2007). Recent research suggests that beliefs about the effects resulting from heavy drinking may be an active mechanism underlying drinking behaviour (Read and O'Connor, 2006).

Mental health

Among college students, alcohol abuse and alcohol-related consequences are also correlated with symptoms of depression and general psychiatric symptoms (Miller *et al.*, 2002; Geisner *et al.*, 2004). Drinking as a means of coping with negative moods has been shown to be related to increased harm related to drinking among students (Cooper, 1994; Cooper *et al.*, 1995; Ham and Hope, 2003).

Family history of alcohol problems

Family history is a risk factor for problem drinking and development of alcohol problems, as has been shown both in American and Swedish studies (Kaij, 1960; Sher *et al.*, 1991; Dawson *et al.*, 1992; Hawkins *et al.*, 1992; Andersson *et al.*, 2007). However, results for young adults are mixed (Sher *et al.*, 1991; George *et al.*, 1999). Prospective studies indicate that individuals with a family history of alcoholism are less likely to mature out from heavy consumption in young adulthood (Jackson *et al.*, 2001; Chassin *et al.*, 2002).

Aim

The aim of this secondary analysis was to compare Swedish and US college populations to reach a further understanding of the comparability of drinking rates and factors related to alcohol use in these two countries. We expected similar patterns of relationships between drinking outcomes and demographic variables, alcohol outcome expectancies, mental health symptoms and family history in Sweden and the USA. Results of this research will provide important information about the generalizability of research conducted in those two countries. Though research has shown correlations between alcohol outcome expectancies, mental health symptoms and family history in Swedish studies, those studies are few in number, and being able to generalize the large body of American research to Swedish college students would greatly enhance the Swedish research.

METHOD

Three previously completed studies are included in this secondary analysis, one American and two Swedish. Data for the American sample (USA) were taken from the Motivating Campus Change study (Geisner *et al.*, 2004; Larimer *et al.*, 2004, 2007). Participants ($N = 14,233$) were randomly selected from all enrolled students at three campuses, with an oversample of freshmen students. Students were invited to participate in a web-based longitudinal study of alcohol programs. Data for the current study are from baseline assessment for four cohorts, gathered from 2000 to 2003. Women were slightly over-represented in the sample, which was otherwise representative of the campus.

The first Swedish study (Sweden 1) contained freshmen at two universities, originally selected for participation in an alcohol and stress intervention research project (Andersson *et al.*, 2007). In this secondary analysis the baseline assessments are presented, gathered prior to any intervention delivery. Freshmen in autumn 2002 were invited to participate, of which 72% accepted.

The third randomized controlled trial (Sweden 2) included students from residence halls in Lund, Sweden, and was initially performed to examine differences in alcohol patterns after completion of different alcohol prevention programs (Stahlbrandt *et al.*, 2007). Baseline data were collected in autumn of 2000, before any intervention. Students living in residence halls were approached by personal visits to their halls and informed about the study.

All studies were approved by the regional Ethics Committees, and all students provided informed consent.

Measures and measurement comparability

As is often the case with international comparison studies (World Health Organization, 2001; Bloomfield *et al.*, 2003), particularly those based on secondary analysis of data collected for a different purpose, different measures of alcohol use and psychosocial constructs were utilized in the different studies. Measures utilized in one or more of the studies is described below. Since no instrument was used in all three studies, survey items were compared to select comparable questions for analyses, and items were rescored (mostly dichotomized) to

enable more direct comparability. Comparable items and resulting new scales (harmful drinking scale, alcohol problems scale, expectancy scale and mental health scale) are presented below. Summary scores from each new scale were used in subsequent analyses.

Alcohol consumption and harmful consequences

The *Quantity/Frequency/Peak Alcohol Use Index* (Q/F; Baer, 1993; Marlatt *et al.*, 1995) is a self-report measure of past-month drinking. The Q/F includes two items on peak drinking occasion, two items on typical weekend drinking and one item on typical frequency (past month) and was used in the USA.

The *Daily Drinking Questionnaire* (DDQ; Collins *et al.*, 1985; Kivlahan *et al.*, 1990) assessed drinking on each day of a typical week, averaged over the past 3 months, and was utilized in the USA as a measure of alcohol consumption. Standard drink equivalents approximating 12 g of alcohol were provided on all US alcohol measures.

AUDIT (Alcohol Use Disorders Identification Test; Saunders, 1993, translated by Bergman *et al.*, 1998) is a 10-question test for early identification of hazardous and harmful alcohol use. One standard drink is defined as ~12 g of alcohol. This instrument is used in Sweden 1 and 2, giving Cronbach's alphas of 0.80 and 0.77, respectively.

SIP (Short Index of Problems; Miller *et al.*, 1995, translated by Clinical Alcohol Research, Lund University) is a 15-item brief version of the Drinker Inventory of Consequences (DrInC) designed to measure alcohol problems. Used in Sweden 2, Cronbach's alpha is 0.78 on standardized items.

The *Rutgers Alcohol Problem Index* (RAPI; White and Labouvie, 1989) is a 23-item measure of alcohol consequences, used in the USA. The RAPI has good internal consistency (Cronbach's alpha = 0.92).

The *Young Adult Alcohol Problems Screening Test* (YAAPST; Hurlbut and Sher, 1992) includes 27 alcohol-related consequences specific to college drinking, with a broader range of consequences than assessed on the RAPI. Only YAAPST items that were non-duplicative of those items already assessed on the RAPI were utilized in the USA.

Harmful drinking scale is a new scale constructed from the AUDIT, Q/F, DDQ, YAAPST and RAPI. For all AUDIT questions, except for number 9, similar questions were found. For example, AUDIT question 'How often during the last year have you found that you were not able to stop drinking once you had started?' was found equivalent to 'How often during the last three months have you kept drinking when you promised yourself not to?'. The answers on all but one question were dichotomized because of the different time scales; thus, the new scale uniformly measured consequences experienced within the previous year. The value of the new scale ranges from 0 to 13. Cronbach's alpha of the new scale was 0.73.

Alcohol problems scale is a new scale constructed from SIP, YAAPST and RAPI. Four different questions were found to match, for example 'I have felt guilty or ashamed because of my drinking' from SIP was found to match 'Have you ever felt guilty about your drinking?'. The answers were dichotomized because of the different time scales; thus, the new scale uniformly measured consequences experienced within the previous month. The value of the new scale ranged from 0 to 4, with Cronbach's alpha 0.50.

Outcome expectancies

Alcohol Expectancy Questionnaire (AEQ; Brown *et al.*, 1987, translated by Clinical Alcohol Research, Lund University) is an empirically derived self-report measure assessing anticipated experiences associated with alcohol use. AEQ originally consisted of 90 items but was reduced to 18 items in the Sweden 1 study (Cronbach's alpha 0.75), assessing the same domains of alcohol reinforcement expectancies.

A short form of the *Comprehensive Effects of Alcohol Questionnaire* (CEoA; Fromme *et al.*, 1993) was utilized in the USA. The CEoA assesses participants' perceptions of both likelihood and value of common expected alcohol outcome effects, with 15 items.

Expectancy scale is a new scale constructed from AEQ and CEoA. It matches five positive reinforcement items from the two scales, for example 'A few drinks make it easier to talk to people' was matched to 'If I were under the influence of alcohol it would be easier to talk to people'. The answers were dichotomized to reflect whether or not the participant expected that effect to occur. The values of the new scale ranged from 0 to 5, with Cronbach's alpha 0.55.

Family history of alcohol problems

Family history of alcohol was measured in the USA and Sweden 1 using the Family History Subscale of the Brief Drinker Profile (Miller and Marlatt, 1987). Participants who reported any first-degree relative (parents and/or sibling) with current or previous alcohol problems were scored as family history positive.

Mental health symptoms

The *Brief Symptom Inventory* (Derogatis and Melisaratos, 1982) is a 53-item measure of psychological symptoms derived from the Symptom Checklist (SCL-90; Derogatis *et al.*, 1974), used in the USA. BSI is a well-validated measure of psychological distress utilized in both community and college samples (Hayes, 1997; Derogatis and Savitz, 2000).

Symptom Checklist 8 (SCL-8; Fink *et al.*, 1995) is also a reduced version of SCL-90 (Derogatis *et al.*, 1974) and was used in Sweden 1.

Mental health scale is a new scale, constructed from BSI and SCL-8. All eight questions in SCL-8 were found to have an exact match in BSI. The answers were dichotomized to match in the time aspect. The maximum total score is 8. Cronbach's alpha of the new scale is 0.83.

ANALYTIC PLAN

SPSS 14.0 was used for analyses. Independent *t*-tests were used to compare means and chi-square to compare dichotomous data, with a *P*-value set at 0.05. Moderation analyses evaluating cross-cultural differences in the relation between predictors and alcohol outcomes were conducted utilizing regression (Aiken and West, 1991; Jaccard *et al.*, 1995). Country of origin was coded with 0 representing US students and 1 representing Swedish students. An interaction term was created by multiplying country of origin by the independent variable of interest. This term was entered in the final step of the regression analysis and provided a standardized regression coefficient, β , representing the deviation of the relationship between

Table 1. Baseline data from the different studies

	Number of students	Gender (% male)	Age (years) (mean \pm SD)	Number of binge drinkers (<i>n</i> , %)
USA	14,233	36.9	21.2 \pm 5.4	5024 (35.9%)
US freshmen	5,266	35.3	18.7 \pm 2.9	1802 (34.2%)
Sweden 1 (freshmen)	2,032	46.1	23.5 \pm 5.4	829 (40.8%)
US residence halls	5,682	36.9	18.8 \pm 1.5	1898 (34.1%)
US Greek houses	614	42.6	19.2 \pm 1.5	415 (68.7%)
Sweden 2 (residence halls)	1,161	64.2	23.4 \pm 2.7	688 (60.4%)

the independent and dependent variables by the group coded 1 (Sweden) compared to the group coded 0 (USA). Continuous predictors were mean centred to facilitate interpretation of interaction effects, and analyses were gender separated. Harmful drinking score was specified as the dependent variable. Individuals with missing values were omitted from the analysis.

RESULTS

A total of 17,426 students were included in the analyses, of which most (14,233) were from the US study. The mean age was 21.6 \pm 5.3 years, with 39.8% males and 38.1% heavy episodic drinkers. For baseline values in each study and for each subsample, see Table 1.

Harmful drinking

The total harmful drinking score amongst freshmen was higher in Sweden for both males (5.97 \pm 3.45 versus 3.67 \pm 3.74, $P < 0.01$, 95% CI -2.59, -2.01) and females (3.83 \pm 2.84 versus 3.33 \pm 3.48, $P < 0.01$, 95% CI -0.72, -0.27). American male freshmen were less likely to engage in heavy episodic drinking than Swedish male freshmen (43.6% versus 57.2%, $\chi^2 = 46.04$, $df = 1$, $P < 0.01$), but American female freshmen were significantly more likely to engage in heavy episodic drinking than Swedish female freshmen (30.2% versus 26.8%, $\chi^2 = 4.79$, $df = 1$, $P = 0.03$).

For both genders, the total harmful drinking score was lower in American residence halls than in Swedish residence halls (3.49 \pm 3.60 versus 5.35 \pm 2.99, $P < 0.01$, 95% CI -2.17, -1.55 for men, and 3.24 \pm 3.39 versus 3.75 \pm 2.53, $P = 0.01$, 95% CI -0.86, -0.16 for women). In contrast, both male and female students residing in the American fraternities and sororities reported higher scores on the harmful drinking scale than students in Swedish residence halls (7.45 \pm 3.89 versus 5.35 \pm 2.99, $P < 0.01$, 95% CI 1.61, 2.58 in males, and 5.58 \pm 3.36 versus 3.75 \pm 2.53, $P < 0.01$, 95% CI 1.39, 2.27 in females).

Both male and female freshmen in the USA were more likely to report that other people (friends, relatives, or physicians) had told them that their alcohol use was harmful to their health (US males 10.3%, Swedish males 7.0%, $\chi^2 = 7.88$, $df = 1$, $P = 0.01$; US females 8.3%, Swedish females 4.3%, $\chi^2 = 19.43$, $df = 1$, $P < 0.01$). There were no international differences regarding this consequence in residence halls (American males 10.2% versus Swedish males 7.9%, $\chi^2 = 0.80$, $df = 1$, $P = 0.37$, and American females 7.9% versus Swedish 5.3%, $\chi^2 = 3.31$, $df = 1$, $P = 0.07$). However, this consequence was reported to a higher extent in American fraternities and sororities than in Swedish residence halls (American males 17.9%, and females

11.3%; for Swedish figures, see above; χ^2 for males 6.89, $df = 1$, $P = 0.01$, and χ^2 for females 8.80, $df = 1$, $P < 0.01$).

Alcohol problems

The alcohol problems scale indicated a lower problem prevalence in US residence halls than in Swedish residence halls amongst males (0.57 \pm 0.87 versus 0.83 \pm 0.96, $P < 0.01$, 95% CI -0.34, -0.18), but about equal in females (0.62 \pm 0.87 versus 0.71 \pm 0.82, $P = 0.06$, 95% CI -0.18, 0.00). American fraternity and sorority members scored higher on the alcohol problems scale than men and women living in Swedish residence halls, with males scoring 1.20 \pm 1.08 and 0.83 \pm 0.96, $P < 0.01$, 95% CI 0.23, 0.52, and females scoring 0.94 \pm 0.91 versus 0.71 \pm 0.82, respectively, $P < 0.01$, 95% CI 0.11, 0.36).

Expectancies

Overall expectancy scores were similar amongst American and Swedish male freshmen (3.04 \pm 1.34 versus 2.95 \pm 1.31, $P = 0.12$, 95% CI -0.02, 0.19), but American female freshmen scored somewhat higher than their Swedish counterparts (2.86 \pm 1.34 versus 2.35 \pm 1.32, $P < 0.01$, 95% CI 0.42, 0.61). What notably differs is that American freshmen tend to expect more aggressive feelings after drinking, especially for US women (for males 37.9% versus 26.3%, $\chi^2 = 37.49$, $df = 1$, $P < 0.01$, for females 32.5% versus 14.2%, $\chi^2 = 136.70$, $df = 1$, $P < 0.01$).

Family history of alcohol problems

Despite slightly higher rates of alcohol use in Sweden, the American freshmen report a higher prevalence of a family history of alcohol disorder than the Swedish freshmen, irrespective of gender (for men, 22.6% versus 9.3%, $\chi^2 = 70.44$, $df = 1$, $P < 0.01$; for women 31.6% versus 14.3%, $\chi^2 = 125.91$, $df = 1$, $P < 0.01$).

Mental health symptoms

There was no significant difference between the countries regarding mental health symptoms reported by freshmen males (1.98 \pm 2.15 in the USA and 2.15 \pm 2.04 in Sweden; $P = 0.05$, 95% CI -0.35, 0.00). US female freshmen reported fewer mental health symptoms than Swedish: 2.28 \pm 2.36 versus 3.07 \pm 2.25; $P < 0.01$, 95% CI -0.95, -0.63).

Predictors of harmful drinking in Sweden and the USA

Regression results for country of residence as a moderator of the relationship between age and harmful drinking revealed that age was negatively related to harmful drinking for men ($\beta = 0.08$, $t(1, 2646) = 4.24$, $P < 0.001$, $\Delta R^2 = 0.007$) and women

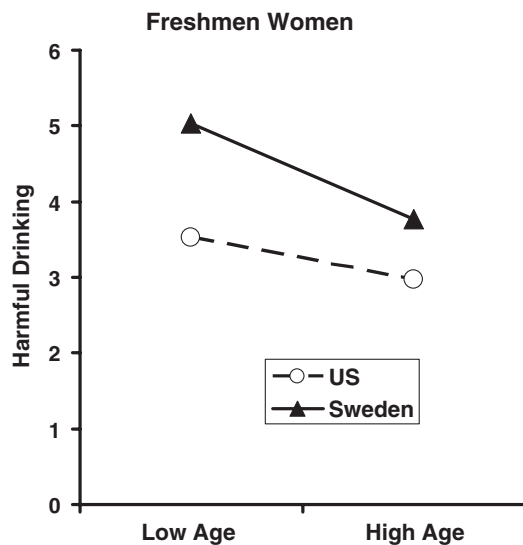


Fig. 1. The relationship between age and harmful drinking is moderated by country of residence among freshmen women. Circles: USA, triangles: Sweden.

($\beta = -0.07$, $t(1, 4209) = -4.78$, $P < 0.001$, $\Delta R^2 = 0.005$) in both countries (note: because men in the Swedish sample were older than men in the US sample, with age entered as the predictor in step 1, β is positive and equal to 0.08). When country of residence is entered into the model at step 2, $\beta = -0.08$ suggesting that, within each sample, drinking is negatively associated with age. Swedish origin was positively related to harmful drinking for both men ($\beta = 0.32$, $t(2, 2645) = 15.32$, $P < 0.001$, $\Delta R^2 = 0.081$) and women ($\beta = 0.15$, $t(2, 4208) = 8.05$, $P < 0.001$, $\Delta R^2 = 0.015$). For women ($\beta = -0.08$, $t(3, 4207) = 2.92$, $P = 0.004$, $\Delta R^2 = 0.002$), but not for men ($\beta = -0.06$, $t(3, 2644) = -1.94$, $P = 0.052$, $\Delta R^2 = 0.001$), country of residence moderated the relationship between age and harmful drinking outcomes. Figure 1 presents predicted harmful drinking scores from the regression equation for women where high and low values of age are specified as one standard deviation above and below the mean, respectively. Tests of simple slopes reveal that the relationship between age and harmful drinking has a stronger negative slope for Swedish freshmen females ($\beta = -0.19$) compared to US freshmen females ($\beta = -0.08$). A similar but non-significant trend was observed for men. As a result, age was entered as a covariate in Step 1 of all subsequent analyses.

To test whether the relation between alcohol expectancies and harmful drinking was moderated by country, expectancies were entered as a mean-centred variable on Step 2. Country was entered on Step 3, and the product term of expectancies and country was entered on Step 4. For both men ($\beta = 0.36$, $t(2, 2564) = 19.47$, $P < 0.001$, $\Delta R^2 = 0.128$) and women ($\beta = 0.32$, $t(2, 4090) = 21.14$, $P < 0.001$, $\Delta R^2 = 0.098$) in both countries, expectancies were positively and significantly related to harmful drinking. The impact of alcohol expectancies on harmful drinking was also moderated by country, but only for men ($\beta = 0.09$, $t(4, 2562) = 4.27$, $P < 0.001$, $\Delta R^2 = 0.006$). Tests of simple slopes indicated that the relationship of expectancies to harmful drinking was slightly stronger for Swedish men ($\beta = 0.46$) than American men ($\beta = 0.30$; Fig. 2).

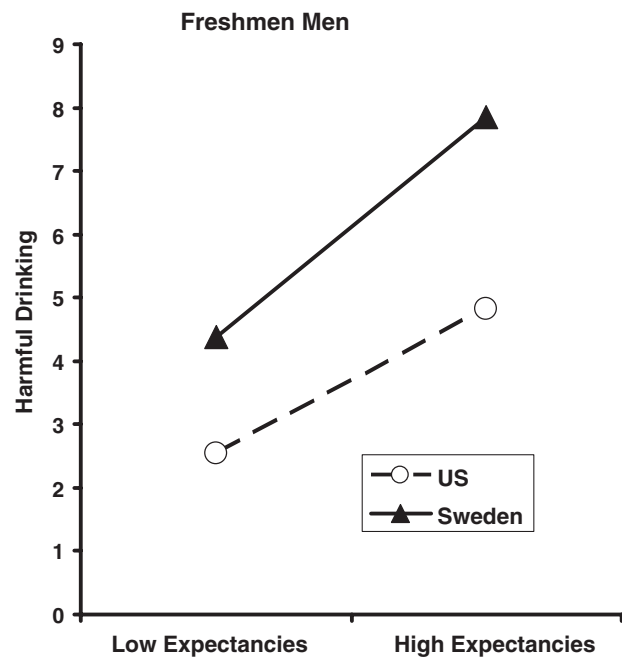


Fig. 2. Covarying for age, the relationship between alcohol expectancies and harmful drinking is moderated by country of residence for freshmen men. Circles: USA, triangles: Sweden.

A similar regression was conducted replacing mean-centred expectancy scores with mean-centred mental health symptom scores. Mental health symptoms were positively and significantly related to harmful drinking for both men ($\beta = 0.11$, $t(2, 2566) = 5.64$, $P < 0.001$, $\Delta R^2 = 0.012$) and women ($\beta = 0.13$, $t(2, 4102) = 8.34$, $P < 0.001$, $\Delta R^2 = 0.017$) in both countries, and this relationship was not moderated by country. Rather, mental health symptoms predicted a similar amount of variance in harmful drinking in both Swedish and US freshmen.

Finally, results indicated a significant positive relationship of family history to harmful drinking for women ($\beta = 0.08$, $t(2, 3630) = 4.68$, $P < 0.001$, $\Delta R^2 = 0.006$), but not for men ($\beta = 0.01$, $t(2, 2324) = 0.61$, $P = 0.541$, $\Delta R^2 = 0.000$). This relationship was moderated for women by country ($\beta = -0.04$, $t(4, 3628) = -2.09$, $P = 0.036$). While the family history of drinking problems was positively related to harmful drinking for women in both countries, tests of simple slopes revealed that this relationship was stronger for US women ($\beta = 0.13$) than for Swedish women ($\beta = 0.04$; Fig. 3).

DISCUSSION

Results indicate that Swedish students are, on average, at higher risk for alcohol use and harmful consequences than American students. Some of these differences might be attributed to the different school systems and general alcohol policies mentioned in the beginning of the paper. In addition, Swedish freshmen have a mean age of 23.5 years, putting them at both legal drinking age and purchasing age. The mean age of the American freshmen is 18.7 years, which is below the legal drinking age in the USA. Thus, American freshmen may have less access to alcohol, accounting for lower drinking rates

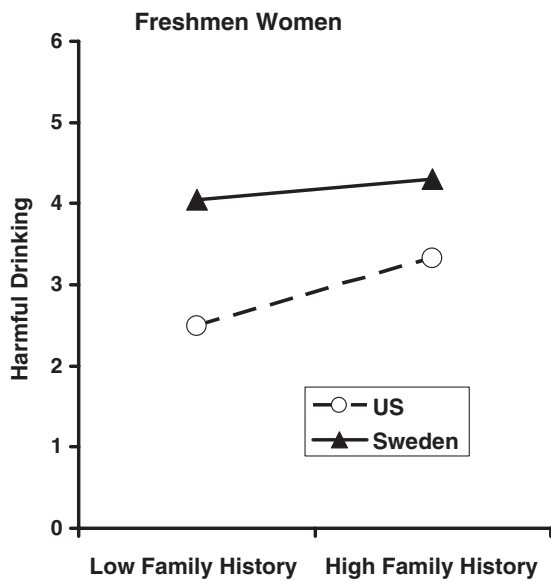


Fig. 3. Covarying for age, the relationship between family history of alcohol use and harmful drinking is moderated by country of residence for freshmen women. Circles: USA, triangles: Sweden.

and consequences. These findings are consistent with findings from other American–European research (Engs *et al.* 1991, Delk *et al.*, 1996, Cox *et al.*, 2001). However, there are exceptions to this general finding. American freshmen women were more likely to report heavy episodic drinking than Swedish women, consistent with recent research suggesting that gender differences in heavy episodic drinking are narrowing in the USA (Wechsler *et al.*, 2002; Wallace *et al.*, 2003). In addition, American students residing in fraternities and sororities report higher drinking rates and negative consequences than Swedish residence hall students (known to be among the heaviest drinkers in Swedish universities). Both Swedish residence halls and American fraternities and sororities share certain characteristics such as high group cohesion and identity, easy availability of alcohol and a historical culture of heavy drinking (Larimer *et al.*, 1997; Baer, 2002). It is possible that these effects are magnified in American fraternities and sororities due to the fact that they are single-gender rather than mixed-gender settings and have a specific focus on promoting social events at which alcohol is often served, providing significant opportunities for modelling of heavy drinking and inflation of group norms for consumption (Larimer *et al.*, 1997). More research evaluating these factors in Swedish residence halls may help elucidate similarities and differences between these settings and US residence halls and fraternities/sororities, in order to better explain observed differences in harmful drinking.

As noted in the results, Swedish and US students are significantly different from one another on several other dimensions. However, it is important to note that in many cases these differences are of relatively small magnitude, as demonstrated by inclusion of 95% confidence intervals demonstrating small separations between groups on many variables. Thus, while we conclude that Swedish students on average report both more drinking and consequences, we also

note substantial similarities between students in these two countries.

In contrast to the general pattern of more risk factors among Swedish students, we found that American students reported more family history of alcohol problems than Swedish students. We also found that the relationship between family history and harmful drinking was slightly stronger for American than Swedish women, though a family history of problems was related to greater levels of harmful drinking for women in both countries. It may be that the US population has a higher prevalence of alcohol problems (abuse and dependence) than the Swedish population, despite lower drinking rates overall, leading to higher rates of reported family history of alcohol problems in the US. However, it is also possible that alcohol problems are more easily recognized and identified at lower levels in the US, due to greater awareness or lower cultural acceptance of heavy drinking. This explanation is supported by the fact that American students also reported a greater likelihood that others had expressed concern that their drinking was harming their health. Additional cross-cultural research on this topic is needed.

The relation between age and harmful drinking was moderated for women by country. Specifically, though drinking declined with age for both men and women in both countries, this relationship was more pronounced for women in Sweden compared to women in the USA. It is possible that this finding relates to the capturing of different places in the drinking trajectory for these different samples, as Swedish freshmen women were on average more than 2 years older than US freshmen women. Thus, the bulk of the Swedish freshmen may have begun the developmental maturation out of heavy drinking, whereas US freshmen were experiencing the continuation of heavy drinking that occurs in the late teens and early 20s. Future research tracking drinking rates and harmful consequences for students in Sweden and the US using age-matched samples of individuals still enrolled in or just leaving high schools is needed, to better disentangle cultural, developmental and environmental (i.e. college setting) effects on drinking cross-culturally.

After controlling for age differences, results suggest that alcohol expectancies have a stronger effect on Swedish males' drinking than for American males, though again the overall direction of effect is the same and the moderation effect is not large. This result should be interpreted with some caution due to the low Cronbach's alpha value of the Alcohol Expectancy scale created. Finally, while Swedish women students reported more mental health symptoms than US women, the relationship between mental health symptoms and harmful drinking was significant and similar in both cultures and for both men and women. Future research is needed to better understand this relationship and to evaluate efficacy of interventions targeting improved coping and reduced mental health symptoms as mediators of drinking reductions for college students.

Strengths and limitations

The strength of this comparison includes the large individual study samples used, of which each also has a strong design on its own. This is one of the first attempts to compare populations in two different countries at this level of analysis and the first such study comparing the USA and Sweden. It includes many of the

known factors that predict drinking in this student population and uses country as a moderator of the relationship between these predictors and drinking outcomes.

However, the studies themselves were designed with no such comparison in mind, and there are known obstacles when analysing the data. Care has been taken to overcome such obstacles, but they cannot be eliminated. One such obstacle is the use of different drinking measures in the different studies, which has been taken into consideration by identifying and utilizing very similar items for comparison. The American study includes a larger population than the Swedish studies, and the studies have been carried out in different medias (web based versus paper based), as well as in different years. In addition, while several risk factors for heavy or harmful drinking were included, other important predictors such as perceived drinking norms or other peer influences could not be evaluated, as no measures of these constructs were included in the Swedish samples.

CONCLUSION

Regardless of limitations, this research has nonetheless provided important information about alcohol consumption and its predictors in US and Swedish college students. Despite some differences between the countries, results indicate that the overall pattern of relationships is quite similar. This finding suggests basic and applied research on college drinking and drinking prevention from one country can be generalizable to the other.

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