

Drunkenness among Young People: A Cross-National Comparison*

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ABSTRACT. *Objective:* International studies show a rise in drunkenness among young people in recent years. In this study the number of drunkenness occasions among 15-year old students in 22 countries is reported. The cross-national association between drunkenness, on the one hand, and the frequency of alcohol intake and the preference for distilled spirits, on the other, is described. Variation between countries is examined on the basis of national characteristics, including national prevention policies. *Method:* Data on alcohol use were taken from the 1998 World Health Organization (WHO) collaborative, cross-national survey on Health Behaviour of School-Aged Children. The multinational representative sample consisted of 10,951 male and 11,451 female (drinking) students. Country characteristics were derived from the WHO Global Alcohol Database. Hierarchical Generalized Linear Model was used to analyze the effects of country characteristics on individual drunk-

ness. *Results:* The lifetime prevalence of drunkenness was 57.1% for males and 50.4% for females. The number of drunkenness occasions showed a significant variation in the 22 countries. The correlation between drunkenness and preference for distilled spirits was positive in 21 countries and strong (Spearman's $\rho > 0.40$) in some eastern countries. Geographic location turned out to be an important country-level association with drunkenness and its predictors. Southern European countries showed moderate associations, whereas strong associations were found in Scandinavia, the Baltic countries and Russia. *Conclusions:* Cultural differences in alcohol use exist, and frequency of alcohol intake and use of spirits influence drunkenness. Despite the potential influence of preventive policy measures on drunkenness, no preventive effect of the measures included in this study was found. (*J. Stud. Alcohol* 64: 650-661, 2003)

THE THREE MOST FREQUENT forms of mortality among adolescents, accidental death, homicide and suicide, are associated with alcohol use (Edwards et al., 1994; Sells and Blum, 1996; World Health Organization [WHO],

2000; Zador et al., 2000). Nearly 9 out of 10 teenage automobile accidents, for example, point to the use of alcohol (Windle et al., 1996). When the purpose of alcohol consumption is to achieve intoxication, strong health effects can be expected for young people. Intoxication implies a loss of motor control, judgment ability and reduced inhibition that can easily occur in young adolescents with the intake of even a relatively small amount of alcohol (Midanik, 1999; Windle et al., 1996).

Epidemiological data describing trends in the prevalence of drunkenness show a considerable rise in drunkenness and a high prevalence of drunkenness in general. The Monitoring the Future Study reports that over 50% of high school seniors have been drunk at least once in the past year, 31% have recently engaged in heavy episodic drinking and nearly 4% drink daily (Johnston et al., 1998). The Health Behavior in School-Aged Children (HBSC) study allows an international comparison. When the surveys of 1993/1994 and 1997/1998 are compared, 9 out of 12 participating countries show an increase in the proportion of 15 year olds having been drunk two or more times (Nic Gabhainn and François, 2000). The European School Survey Project on Alcohol and Other Drugs (ESPAD) reports that in the large majority of the 30 included countries, more than half of the 15-year-old students have been drunk at least once in their life (Hibell et al., 2000). Moreover, when looking at changes between the survey years 1995 and 1999, in none of the included countries have figures decreased, and in about one

Received: December 13, 2002. Revision: April 10, 2003.

*Health Behavior in School-Aged Children (HBSC) is a World Health Organization/EURO collaborative study. International coordinator of the 1997/98 study: Candace Currie, University of Edinburgh, Edinburgh, Scotland; data bank manager: Bente Wold, University of Bergen, Bergen, Norway. This publication on the 1997/98 HBSC reports on data from the following countries (principal investigator[s] at that time): Austria (Wolfgang Dür); Belgium (Flanders) (Lea Maes); Canada (Will Boyce, Alan King); Czech Republic (Ladislav Csémy); Denmark (Pernille Due, Bjørn E. Holstein); Estonia (Mai Maser); Finland (Jorma Tynjälä); France (Christiane Dressen); Germany (Klaus Hurrelmann); Greece (Anna Kokkevi); Greenland (Michael Pedersen); Hungary (Anna Aszmann); Latvia (Ieva Ranka); Lithuania (Apolinaras Zaborskis); Norway (Bente Wold); Poland (Barbara Woynarowska); Republic of Ireland (Saoirse Nic Gabhainn); Russia (Alexander Komkov); Slovak Republic (Miro Bronis); Sweden (Ulla Marklund); Switzerland (Béatrice Janin Jacquat); United States (Mary Overpeck).

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third figures have risen. The high prevalence of drunkenness and the tendency towards more drunkenness obtain for many countries and may be indicators of a global trend.

Young people show a clear preference for certain types of beverage. Alcohol consumption among adolescent boys and girls is largely dominated by beer (Hibell et al., 2000; Nic Gabhainn and François, 2000). Wine and distilled spirits (hereafter spirits) are less likely to be drunk. However, girls have inclined recently to drinking alcohols and premixed drinks in which spirits are mixed with lemonade (Hibell et al., 2000; Janin Jacquat et al., 2001).

The most effective way of getting drunk is by the intake of spirits. High prevalence of drunkenness may therefore be hypothesized to covary with a preference for spirits. Unfortunately, little is known about the link between a preference for spirits and drunkenness, despite the fact that many studies exist on the association between frequency of drinking and drunkenness (Gmel and Schmid, 1996), as well as on the correlation between spirits intake and problem behavior (Kilty, 1990; Smart and Walsh, 1995).

In the adult population, the preference for specific alcoholic beverages seems to homogenize within Europe (Edwards et al., 1994). Analyzing the period from 1970 to 1990, Edwards et al. postulate that in the countries they studied in 1990 about 50% of the drinkers preferred beer, 35% wine and 15% spirits. In young people, this distribution of beverage preference over different countries has, to our knowledge, never been described.

Despite homogenization, however, significant differences between the countries remain (Simpura and Karlsson, 2000), and studies underline that alcohol consumption is not cross-culturally stable and that patterns of drinking differ (Rehm and Gmel, 2000). Across countries one may expect a considerable variation in the number of occasions in which drunkenness occurs; a high variation in the frequency of beer, wine and spirits intake; and a high variation in the extent to which drunkenness is determined by a specific beverage.

An important question is therefore: Can the variation between countries be explained by different national characteristics? The cultural climate concerning alcohol, often expressed in terms of per capita consumption (Edwards et al., 1994; WHO, 2000), may make a difference. Even more interesting are the possible effects of policy and preventive measures aimed at reducing alcohol consumption, which may vary between countries. Other factors producing variation may include: education and prevention activity, such as the use of mass media campaigns dealing with alcohol consumption (Bochner, 1994); deterrence policy, such as a blood alcohol concentration (BAC) limit for driving (Hingson, 1993); regulation of alcohol promotion, such as advertising restrictions concerning alcohol (Grube, 1993); and regulation of availability to youth, such as the legal age limit for buying or drinking alcohol—including the rigor

with which the law is enforced (Klitzner et al., 1993). Other country characteristics such as unemployment (Claussen, 1999), gross domestic product (Castro and Gutierrez, 1997) and population density (Greenblatt, 2000) have also been shown to covary with alcohol use and misuse.

The behaviors of young people living within the same country may be more alike than the behaviors of those living in different countries. Individuals do live in different cultures—here the countries—and are therefore also influenced by contexts that vary. To analyze the effects of these contexts hierarchical models can be used (e.g., Hierarchical Linear Models [HLM], see Bryk and Raudenbush, 1992; Hox, 1995, for descriptions). The application of hierarchical modeling is possible in different fields (Snijders, 1996) and recommended within modern epidemiology (Rehm and Gmel, 2000).

The research question can be broken down into four parts: (1) Does the number of adolescent drunkenness occasions differ between countries? (2) What is the distribution of the adolescent beverage preference for beer, wine and spirits in different countries? (3) Is there a link between a specific beverage preference of adolescents and drunkenness independent of the frequency of alcohol intake, and does this link vary between countries? (4) What national characteristics can help us to understand the variation in adolescent drunkenness and the variation in the relation between beverage preference and drunkenness?

Our study focuses on 15 year olds and examines the relation between alcohol consumption characteristics and drunkenness in male and female students separately. Males and females differ substantially in their use of alcohol and in their attitudes towards alcohol (Schmid, 1998; Shope et al., 1996), and early adolescence is a critical time for acquiring new patterns of behavior, particularly in the field of alcohol use (Lintonen et al., 2000). If these patterns develop more and more in terms of young people's search for drunkenness, especially by the use of spirits, detrimental effects on health can be expected and effective policy initiatives should be taken.

Method

Sample

The 1998 HBSC is a study of nationally representative samples of adolescents in 29 countries and regions (Currie, 1998). In each country, a cluster sample design was used with school classes as sampling units. Schools and classes within schools were selected to be representative by age level and regional geography. Three age groups of young people were sampled. Age group levels were "designed to represent the onset of adolescence—age 11; the challenge of physical and emotional changes—age 13; and the middle years when very important life and career decisions are

beginning to be made—age 15” (Currie, 1998). Recommended sample sizes for each country were 1,536 students per age group. Sample sizes assured a 95% confidence interval of $\pm 3\%$ for prevalence estimates, with a design effect of no more than 1.44 in any country (Currie, 1998).

The present analysis is based on 10,951 male and 11,451 female (drinking) students aged 15 years from 22 countries. We restricted our analysis to 15 year olds because the prevalence of drinking in this group is high (81% of male and 79% of female students drink alcohol) and because this may be a critical time in a human life for intervention programs addressing the use of substances in general (Evans et al., 1978). The 22 countries included were Austria, Belgium (Flemish sample), Canada, Czech Republic, Denmark, Estonia, Finland, France (Regions: Toulouse Midi-Pyrénées, Nancy-Metz Lorraine), Germany (Federal state of Nordrhein-Westfalen), Greece, Greenland (total population), Hungary, Latvia, Lithuania, Norway, Poland, Republic of Ireland, Russia, Slovak Republic, Sweden, Switzerland and the United States. Countries excluded were Israel, because it did not have a self-weighting national sample; England, because another question format was used for the frequency of alcohol intake in that country; Belgium (French sample), Northern Ireland, Scotland and Wales because data were missing on the characteristics of these countries; and Portugal because of outliers in spirits consumption.

Measures

Data were collected on two levels. At the individual level, data include students' indications of their own alcohol use. Second level data comprise information on the participating countries gathered through the Global Alcohol Database (WHO, 1999b).

For the individual level data, full descriptions of the questionnaire items assessed during 1998 and their development were published elsewhere (Currie, 1998; Delgrande et al., 1999a,b; King et al., 1999). National questionnaires are translations and adaptations of the international standard version, with independent retranslation to English to guarantee comparability. The overall goal of the HBSC is to “gain insights into and to increase our understanding of health behaviors, lifestyles and context in young people” (Currie, 1998). This is achieved, in part, by identifying characteristics of youth that influence its health and well-being. Major categories of variables addressed in the survey are demographics, general health and well-being, family and peer relationships, school environments, exercise and leisure time activities, diet, substance use and sexual behavior. This study describes alcohol use, with a special focus on drunkenness.

Data on alcohol use. Self-reports on alcohol use were collected through questions about the frequency of alcohol intake and the frequency of drunkenness derived from a

previous version of the HBSC questionnaire (King et al., 1996).

Frequency of alcohol intake was addressed by three questions about the frequency of the consumption of beer, wine and spirits separately: “At present, how often do you drink anything alcoholic, such as beer, wine or liquors? Try to include even those times when you only drink a small amount,” with the possible answers: “never” (0), “less than once a month” (1), “every month but not every week” (2), “every week but not every day” (3), “every day” (4). Students who never drank any alcoholic beverages were excluded from further analysis. For the drinking students, we took the mean of their frequency of beer, wine or spirits consumption as combined measure for the frequency of alcohol intake.

To calculate the extent to which alcohol intake involved a specific beverage, we divided the frequency of beer intake by the combined measure for the frequency of alcohol intake. The same procedure was used for wine and for spirits. We thus obtained an estimation of the extent to which alcohol intake came from beer, wine or spirits.

Self-reports on drunkenness were gathered through the question: “Have you ever had so much alcohol that you were really drunk?” with the possible answers: “No, never” (0), “Yes, once” (1), “Yes, 2-3 times” (2), “Yes, 4-10 times” (3), “Yes, more than 10 times” (4).

Country characteristics. Country characteristics were taken from the Global Alcohol Database (WHO, 1999b). The validity of the characteristics was checked individually by the relevant principal investigator in each of the 22 countries. Nine different national characteristics could be collected: (1) per capita consumption of alcohol in liters of pure alcohol in 1998; (2) percentage of per capita alcohol intake in the form of spirits in 1998; (3) population density (inhabitants/km²); (4) gross domestic product per capita in U.S. dollars; (5) unemployment rate in percentage; (6) mass media campaigns dealing with alcohol (no, 0; yes, 1); (7) BAC limit for driving in pro mille; (8) advertising restrictions concerning alcohol (no restriction, 0; voluntary, 1; restricted by law, 2); (9) regulation of alcohol availability to youth with a legal limit for buying or drinking alcohol including the enforcement of the law (no age limit for buying and drinking, 0; age limit but not effectively enforced, 1; age limit quite effectively enforced, 2).

We also included the geographic location in order to combine geographic regions where alcohol consumption may be seen as cross-culturally stable. Countries were arranged according to their location from south to north. Southern European countries comprised France and Greece (coded as 1); Germanic countries comprised Germany, Belgium (Flanders), Austria and Switzerland (coded as 2); Central European countries comprised Poland, Czech Republic, Slovak Republic and Hungary (coded as 3); and Baltic countries and Russia comprised Russia, Estonia, Latvia and

Lithuania (coded as 4). Subsequently, North American countries, comprising Canada and the United States, were coded as 5; the Republic of Ireland was coded as 6; and Scandinavian countries, comprising Greenland, Finland, Sweden, Norway and Denmark, were coded as 7.

Statistical analysis

To validate the reports on drunkenness from the 1998 HBSC study, lifetime prevalence between countries was compared to results from the 1999 ESPAD study (Hibell et al., 2000) by means of Spearman correlation coefficients.

Further analyses was restricted to drinking students only. Descriptive statistics were given by gender and country. The percentages of lifetime prevalence of drunkenness were computed next to the ordered number of drunkenness occasions, after checking for the distribution. In addition, the mean relative frequency of alcohol intake due to beer, wine and spirits in percentage was calculated. As a measure of association between drunkenness and preference for beer, wine and spirits, respectively, we computed Spearman correlation coefficients.

The data were structured hierarchically with variables at both the individual and the country level. To account for this structure, we applied the multilevel regression model (Hox, 1998), which assumes hierarchical data, with one criterion measured at the lowest level and predictors at all existing levels. In our study, the criterion was the frequency of drunkenness measured through an ordered number of categories and tested through an ordinal hierarchical model estimated by means of restricted penalized quasilielihood. Its predictors were frequency of alcohol intake and alcohol intake from spirits at the individual level, and different national characteristics at the country level. Level 1 units were the adolescents; Level 2 units were the countries. Conceptually, the model is often viewed as a hierarchical system of regression equations. In each country we have a separate regression equation for a different number of individuals. The coefficients of the regression equation at the individual level (here, the regression of the frequency of alcohol intake on drunkenness and the extent to which alcohol intake is from spirits on drunkenness) may vary between Level 2 units (here, countries). The Level 2 equations attempt to explain these Level 1 variations in coefficients by Level 2 characteristics.

The software used was HLM Version 5.04 (Bryk and Raudenbush, 1992; Raudenbush, 1999). The program is able to analyze a sequence of several models. Here we present the results of three models.

1. *The intercept only model.* This is the simplest possible hierarchical model as it includes no predictor. In this model the outcome varies randomly across Level 2 units. It is equivalent to a random effects one-way analysis of vari-

ance of drunkenness in which the independent variable consists of an identification of the different countries.

$$\text{Drunkenness} = \beta_0 + \delta_{(2)} \text{ (Threshold 2)} + \delta_{(3)} \text{ (Threshold 3)} + \delta_{(4)} \text{ (Threshold 4)},$$

where β_0 is the intercept and $\delta_{(2)-(4)}$ are the differences in the thresholds separating the categories of drunkenness.

The parameters are modeled at group level (countries):

$$\begin{aligned} \beta_0 &= \gamma_{00} + u_0 \\ &\delta_{(2)} \\ &\delta_{(3)} \\ &\delta_{(4)}, \end{aligned}$$

where γ_{00} is the intercept for the parameter β_0 and u_0 is the residual error term for the parameter β_0 .

2. *The random coefficient model.* This model includes Level 1 predictors and tests if the intercepts and the slopes in Level 1 equations vary across the Level 2 units. The relationship between drunkenness and frequency of alcohol intake and the percentage of intake due to spirits may have different intercepts and slopes for each country.

$$\begin{aligned} \text{Drunkenness} &= \beta_0 + \beta_1 * \text{(Frequency of alcohol intake)} \\ &+ \beta_2 * \text{(Percentage due to spirits)} + \delta_{(2)} \text{ (Threshold 2)} \\ &+ \delta_{(3)} \text{ (Threshold 3)} + \delta_{(4)} \text{ (Threshold 4)}, \end{aligned}$$

where β_0 is the intercept, β_1 is the slope for frequency of alcohol intake, β_2 is the slope for percentage due to spirits and $\delta_{(2)-(4)}$ are the differences in the thresholds separating the categories of drunkenness.

The β are modeled at group level (countries):

$$\begin{aligned} \beta_0 &= \gamma_{00} + u_0 \\ \beta_1 &= \gamma_{10} + u_1 \\ \beta_2 &= \gamma_{20} + u_2 \\ &\delta_{(2)} \\ &\delta_{(3)} \\ &\delta_{(4)}, \end{aligned}$$

where γ_{00-20} are the intercepts for the parameters β and u_{0-2} are the residual error terms for the parameters β .

3. *The full multilevel model.* This model is an extension of the previous models in the sense that Level 2 variables are used to predict the random variation of both intercepts and slopes. The regression slopes of the frequency of alcohol intake associated with drunkenness and the percentage of intake of spirits associated with drunkenness, both on the respondent level, are seen to depend on the corresponding characteristics of the countries. For the different characteristics of the countries, we analyzed the full multilevel

models separately and included a final full multilevel of significant second level variables.

$$\text{Drunkness} = \beta_0 + \beta_1 * (\text{Frequency of alcohol intake}) + \beta_2 * (\text{Percentage due to spirits}) + \delta_{(2)} (\text{Threshold 2}) + \delta_{(3)} (\text{Threshold 3}) + \delta_{(4)} (\text{Threshold 4}).$$

The β are modeled by predictors at group level (countries):

$$\begin{aligned} \beta_0 &= \gamma_{00} + \gamma_{01} * (\text{country characteristics}) + u_0 \\ \beta_1 &= \gamma_{10} + \gamma_{11} * (\text{country characteristics}) + u_1 \\ \beta_2 &= \gamma_{20} + \gamma_{21} * (\text{country characteristics}) + u_2 \\ &\quad \delta_{(2)} \\ &\quad \delta_{(3)} \\ &\quad \delta_{(4)}, \end{aligned}$$

where $\gamma_{00} - 20$ are the intercepts for the parameters β , $\gamma_{01} - 21$ are the slopes for the parameters β and $u_0 - 2$ are the residual error terms for the parameters β .

Results

Descriptive results

A total of 30,247 students in 22 countries, 15,562 females (51.4%) and 14,685 males (48.6%), received the questionnaires, and 28,181 (93.2%; 14,596 females) completed all questions about alcohol use. The comparison of the prevalence of lifetime drunkenness shows that the ESPAD estimates of prevalence are higher than the HBSC estimates, except for Greenland (cf., Table 1a). The order of the 17 countries common to both studies, however, is roughly the same, with a Spearman correlation coefficient of 0.76 for female and 0.67 for male students.

All further analysis on drunkenness was restricted to drinking students: 10,951 (80.8%) of the males and 11,451 (78.6%) of the females were drinkers.

Table 1a presents the individual-level data by country. The mean lifetime prevalence of drunkenness was 57.1% for males and 50.4% for females. The relative number of drinking students varies from 66.2% in the United States to

TABLE 1a. Prevalence of drunkenness from the 1999 European School Survey Project on Alcohol and Other Drugs (ESPAD) and description of individual level data for 15 year olds from the 1998 Health Behavior in School-Aged Children (HBSC) study

Geographic location/country	Prevalence of ever had been drunk (ESPAD)		Prevalence of ever had been drunk (HBSC)		Prevalence of drinkers		Prevalence of ever had been drunk (nondrinkers excluded)		Number of drinkers	
	Males (%)	Females (%)	Males (%)	Females (%)	Males (%)	Females (%)	Males (%)	Females (%)	Males (N)	Females (N)
Scandinavia										
Greenland	73.0	80.0	78.1	81.8	76.1	81.2	84.6	92.5	149	147
Finland	75.0	76.0	61.0	69.1	79.2	79.6	74.5	83.9	553	578
Sweden	70.0	68.0	50.3	52.7	70.4	73.3	65.3	67.5	334	320
Norway	61.0	66.0	46.9	54.4	66.4	73.0	66.1	69.6	516	546
Denmark	91.0	88.0	79.7	75.1	92.3	91.2	85.1	81.1	643	688
North America										
Canada			55.2	55.4	79.8	78.6	67.8	68.1	882	978
United States	49.0	48.0	47.1	44.2	66.2	65.7	66.3	61.3	516	635
Ireland										
Rep. of Ireland	73.0	72.0	54.0	42.8	81.3	71.2	63.3	53.9	528	466
Baltic countries and Russia										
Russia	68.0	63.0	51.3	46.1	84.8	89.7	58.4	50.2	519	637
Estonia	75.0	61.0	60.0	39.7	83.6	83.6	70.2	46.0	188	250
Latvia	74.0	66.0	70.5	45.7	91.5	86.9	75.4	52.1	422	601
Lithuania	81.0	65.0	58.8	45.7	85.5	86.5	65.1	50.4	464	601
Central Europe										
Poland	65.0	53.0	57.5	41.5	84.3	79.1	66.4	50.6	737	575
Czech Republic	81.0	70.0	55.6	42.0	90.0	83.9	59.6	46.0	502	494
Slovak Republic	67.0	59.0	62.2	49.9	81.6	75.0	72.1	60.7	387	239
Hungary	58.0	45.0	57.2	40.3	73.4	64.5	73.7	54.3	232	258
Germanic countries										
Germany			54.1	49.2	84.2	85.2	61.7	56.5	639	646
Belgium (Flanders)			49.0	37.5	86.0	82.7	54.6	42.3	641	605
Austria			62.4	58.1	83.1	79.2	72.4	68.6	492	583
Switzerland			39.2	31.5	73.1	64.3	50.1	45.3	647	572
Southern Europe										
France	51.0	42.0	41.1	35.5	76.8	68.6	53.0	48.8	413	408
Greece	61.0	56.0	44.6	42.8	92.2	88.0	47.5	47.9	547	624
Total			57.1	50.4	80.8	78.6	65.0	58.6	10,951	11,451

TABLE 1b. Frequency of drunkenness, alcohol intake from beer, wine, spirits and correlation between drunkenness and preference for beer, wine, spirits, by country

Geographic location/country	Frequency of drunkenness (nondrinkers excluded) ^a												Alcohol intake (nondrinkers excluded)						Correlation between drunkenness and preference for (nondrinkers excluded), Spearman ρ										
	Males						Females						Males			Females			Males			Females							
	0 (%)		1 (%)		2 (%)		3 (%)		4 (%)		0 (%)		1 (%)		2 (%)		3 (%)		4 (%)		Beer (%)	Wine (%)	Spirits (%)	Beer	Wine	Spirits	Beer	Wine	Spirits
	0	1	2	3	4	0	1	2	3	4	Beer	Wine	Spirits	Beer	Wine	Spirits	Beer	Wine	Spirits	Beer	Wine	Spirits	Beer	Wine	Spirits	Beer	Wine	Spirits	
Scandinavia	15.4	18.1	24.2	16.1	26.2	7.5	21.8	26.5	19.7	24.5	53.0	14.0	33.0	48.3	15.8	35.9	-0.14	0.06	0.23	0.12	-0.08	-0.01	0.12	-0.08	-0.01	0.12	-0.08	-0.01	
Greenland	25.5	9.6	23.0	17.4	24.6	16.1	12.5	23.9	24.7	22.8	43.7	27.0	29.2	32.2	35.4	32.4	0.10	-0.21	0.24	0.13	-0.25	0.24	0.10	-0.21	0.24	0.13	-0.25	0.24	
Finland	34.7	12.3	20.1	13.8	19.2	32.5	13.4	19.4	19.1	15.6	49.6	21.1	29.2	41.1	27.0	31.9	-0.15	0.07	0.29	-0.14	-0.01	0.26	-0.15	0.07	0.29	-0.14	-0.01	0.26	
Sweden	33.9	13.4	19.6	14.3	18.8	30.4	15.6	20.9	17.4	15.8	46.6	24.2	29.1	42.3	27.1	30.6	-0.02	-0.11	0.27	0.02	-0.16	0.26	-0.02	-0.11	0.27	0.02	-0.16	0.26	
Norway	14.9	9.5	20.2	21.6	33.7	18.9	12.5	21.8	20.2	26.6	49.4	16.7	33.9	41.1	21.8	37.2	-0.07	0.07	0.14	0.13	-0.10	0.03	-0.07	0.07	0.14	0.13	-0.10	0.03	
Denmark	North America	32.2	15.4	18.3	13.4	20.7	31.9	15.4	20.7	15.1	16.9	43.8	23.9	32.3	37.7	27.7	34.6	0.15	-0.21	0.23	0.21	-0.29	0.24	0.15	-0.21	0.23	0.21	-0.29	0.24
Canada	33.7	17.2	18.0	11.8	19.2	38.7	21.3	18.4	10.1	11.5	37.6	30.5	31.9	26.3	43.9	29.8	0.17	-0.26	0.31	0.30	-0.38	0.25	0.17	-0.26	0.31	0.30	-0.38	0.25	
United States	Ireland	36.7	13.6	16.3	14.2	19.1	46.1	15.9	19.3	11.6	7.1	48.6	24.9	26.6	31.9	36.4	31.6	0.06	-0.21	0.32	0.14	-0.28	0.32	0.06	-0.21	0.32	0.14	-0.28	0.32
Rep. of Ireland	Baltic countries	41.6	20.6	22.5	7.7	7.5	49.8	22.6	17.1	6.9	3.6	48.9	36.2	15.0	43.0	45.9	11.1	-0.07	-0.30	0.50	0.03	-0.39	0.48	-0.07	-0.30	0.50	0.03	-0.39	0.48
and Russia	Russia	29.8	18.6	23.4	14.9	13.3	54.0	19.2	18.4	5.2	3.2	47.8	29.5	22.7	33.1	47.8	19.1	-0.15	-0.18	0.39	0.12	-0.26	0.37	-0.15	-0.18	0.39	0.12	-0.26	0.37
Estonia	Latvia	24.6	23.9	23.2	13.7	14.5	47.9	25.8	19.5	3.7	3.2	47.6	29.3	23.2	35.3	40.6	24.1	-0.06	-0.13	0.25	-0.03	-0.10	0.20	-0.06	-0.13	0.25	-0.03	-0.10	0.20
Lithuania	Central Europe	34.9	25.9	24.4	9.3	5.6	49.6	26.0	17.8	3.7	3.0	52.5	36.2	11.4	40.1	52.6	7.3	-0.02	-0.23	0.46	0.12	-0.33	0.43	-0.02	-0.23	0.46	0.12	-0.33	0.43
Poland	Poland	33.6	20.4	23.3	10.3	12.3	49.4	25.4	17.2	4.9	3.1	61.9	19.5	18.6	61.1	25.8	13.0	-0.34	0.10	0.49	-0.16	-0.09	0.51	-0.34	0.10	0.49	-0.16	-0.09	0.51
Czech Rep.	Czech Rep.	40.4	19.5	24.1	9.2	6.8	54.0	20.9	17.4	4.9	2.8	48.5	30.0	21.5	36.9	43.7	19.4	0.04	-0.11	0.22	0.07	-0.19	0.28	0.04	-0.11	0.22	0.07	-0.19	0.28
Slovak Rep.	Slovak Rep.	27.9	13.7	20.7	26.4	11.4	39.3	20.5	22.6	15.5	2.1	40.9	37.1	22.0	25.9	50.7	23.4	0.09	-0.25	0.29	0.19	-0.22	0.22	0.09	-0.25	0.29	0.19	-0.22	0.22
Hungary	Hungary	26.3	15.9	28.0	11.2	18.5	45.7	21.3	20.5	7.0	5.4	36.3	31.4	32.3	25.3	35.6	39.1	0.06	-0.23	0.28	0.08	-0.15	0.24	0.06	-0.23	0.28	0.08	-0.15	0.24
Germanic countries	Germany	38.3	20.7	18.6	9.9	12.5	43.5	20.3	21.1	7.6	7.6	47.0	30.5	22.5	33.0	44.6	22.4	0.03	-0.20	0.30	0.26	-0.37	0.25	0.03	-0.20	0.30	0.26	-0.37	0.25
Germany	Belgium (Fland.)	45.4	17.6	20.0	8.9	8.1	57.7	16.7	18.5	5.1	2.0	52.1	27.0	20.9	48.2	34.6	17.2	-0.03	-0.14	0.32	0.04	-0.18	0.27	-0.03	-0.14	0.32	0.04	-0.18	0.27
Belgium (Fland.)	Austria	27.6	14.4	24.2	16.7	17.1	31.4	24.2	20.1	13.7	10.6	42.0	31.4	26.6	22.3	44.2	33.5	0.10	-0.02	0.09	0.30	-0.10	0.03	0.10	-0.02	0.09	0.30	-0.10	0.03
Austria	Switzerland	49.9	16.7	15.5	9.4	8.5	54.7	21.5	13.8	6.3	3.7	49.5	24.4	26.1	48.4	28.3	23.3	-0.02	-0.02	0.21	0.11	-0.13	0.16	-0.02	-0.02	0.21	0.11	-0.13	0.16
Switzerland	Southern Europe	47.0	15.7	18.6	10.4	8.2	51.2	20.8	16.9	8.1	2.9	45.2	30.3	24.5	43.9	25.1	31.0	0.03	-0.17	0.37	0.08	-0.16	0.23	0.03	-0.17	0.37	0.08	-0.16	0.23
Southern Europe	France	52.5	21.9	15.7	4.9	4.9	52.1	24.4	17.5	3.8	2.2	46.7	29.0	24.2	46.2	25.4	28.4	-0.10	-0.12	0.28	-0.05	-0.12	0.26	-0.10	-0.12	0.28	-0.05	-0.12	0.26
France	Greece	35.0	17.0	20.5	12.6	14.9	41.4	19.8	19.3	10.4	9.1	47.6	27.2	25.1	38.7	35.4	25.8	-0.02	-0.13	0.31	0.09	-0.20	0.26	-0.02	-0.13	0.31	0.09	-0.20	0.26
Greece	Total																												

^a0 = never; 1 = once; 2 = 2-3 times; 3 = 4-10 times; 4 = more.

92.3% in Denmark for males, and from 64.3% in Switzerland to 91.2% in Denmark for females. For male drinking students, the prevalence of drunkenness is 65.0%, and for female students, it is 58.6%. This prevalence again shows important variation between the countries, with 47.5% in Greece up to 85.1% in Denmark among males, and 42.3% in Belgium (Flanders) up to 92.5% in Greenland among females.

The frequency of drunkenness, measured on a 5-point scale, provides more information than the lifetime prevalence itself (e.g., more than 10 drunkenness occasions occur for 4.9% of male students in Greece and for 33.7% in Denmark) (Table 1b). For female students this category varies between 2.0% in Belgium and 26.6% in Denmark. The distribution of drunkenness does significantly vary from a normal distribution (males [Kolmogorov-Smirnov Test] 0.209, 10,951 df, $p < .001$; females [Kolmogorov-Smirnov Test] 0.242, 11,451 df, $p < .001$).

The frequency of beer intake divided by the combined measure for the frequency of alcohol intake gives the extent to which beer consumption contributes to intake. In the majority of the countries, beer is the preferred beverage among young people. In Greenland, Sweden, Lithuania, Poland, Belgium (Flanders) and Switzerland, 50% or more of the alcohol intake among males is from beer. Only Poland

has a comparable large dominance of beer among females. There are remarkable differences between male and female students in the beverage they prefer. In every country, beer is the preferred beverage among males. In Finland, United States, Republic of Ireland, Russia, Estonia, Latvia, Lithuania, Czech Republic, Slovak Republic, Hungary, Germany and Austria, female students prefer wine to beer. In Greenland, Denmark, Canada and Hungary, we find one third or more of the alcohol intake attributable to the consumption of spirits among males and females. Spirits also have a high dominance among males in the United States and among females in Austria.

After Fisher's z transformation, the mean correlation between drunkenness and the preference for beer, wine or spirits is near zero for beer, negative for wine and positive for spirits dominance. Countries with a high correlation (Spearman's $\rho > 0.40$) between drunkenness and the dominance of spirits are Russia, Lithuania and Poland for both genders.

Table 2 shows a description of characteristics found for the different participating countries, derived from the Global Alcohol Database (WHO, 1999b).

The per capita consumption in liters of pure alcohol in 1998 by population level varies considerably between the countries. In Norway, the estimation is 5.28 liters and in

TABLE 2. Description of second level data for country characteristics from the WHO Global Alcohol Database (World Health Organization, 1999)

Country	Per capita consumption of alcohol in 1998 (liters pure alcohol)	Percent of per capita alcohol intake due to spirits in 1998 (%)	Population density (inhabitants/km ²)	Gross domestic product per capita (U.S. \$)	Unemployment rate (%)	Mass media campaigns dealing with alcohol (0 no, 1 yes)	Blood alcohol concentration (BAC) limit for driving (‰)	Advertising restriction concerning alcohol ^a	Regulation of availability to youth ^b
Greenland	12.34	11	0.03	28,300	5.2	1	0.8	2	1
Finland	9.44	23	15.3	24,900	9.8	1	0.5	2	2
Sweden	7.05	18	19.6	24,400	4.7	1	0.2	2	2
Norway	5.28	18	13.8	29,400	3.4	1	0.5	2	2
Denmark	12.34	11	123.7	28,300	5.2	1	0.8	2	1
Canada	8.41	26	3.1	28,100	6.8	1	0.8	2	2
United States	8.29	29	28.7	36,000	4.0	1	1.0	0	2
Rep. of Ireland	16.01	15	54.7	28,500	4.3	0	0.8	1	2
Russia	10.05	74	8.5	6,800	9.6	0	0.1	2	1
Estonia	12.92	67	30.4	8,355	14.8	0	0.0	2	2
Latvia	9.21	66	37.3	6,264	14.5	1	0.5	0	1
Lithuania	6.01	41	56.6	2,906	14.1	0	0.4	2	1
Poland	7.71	33	123.4	9,300	16.7	1	0.3	2	1
Czech Republic	14.93	23	130.0	14,000	8.7	1	0.0	1	1
Slovak Republic	12.15	43	110.2	11,400	18.9	0	0.0	1	1
Hungary	13.54	27	106.6	12,200	6.9	0	0.0	0	2
Germany	13.30	22	528.0	24,900	11.1	1	0.8	1	1
Belgium (Flanders)	12.02	13	336.2	26,300	7.0	0	0.5	1	1
Austria	12.91	13	96.3	26,000	3.3	0	0.5	1	0
Switzerland	12.46	14	174.5	30,100	1.6	0	0.8	2	1
France	15.78	19	109.3	23,200	11.6	1	0.8	2	1
Greece	9.13	26	80.5	16,000	11.1	0	0.8	0	1

Notes: ^a0 = no restriction; 1 = voluntary; 2 = restricted by law. ^b0 = no age limit for buying and drinking; 1 = age limit but not effectively enforced; 2 = age limit quite effectively enforced.

the Republic of Ireland, 16.01 liters. The relative rate of per capita alcohol consumption attributable to spirits lies between 11% in Greenland and Denmark and 74% in Russia. Population density is lowest in Greenland, with 0.03 inhabitants per square kilometer, and highest in Germany, with 528 inhabitants per square kilometer. The per capita gross domestic product is estimated at \$2,906 U.S. in Lithuania and \$36,000 U.S. in the United States. The unemployment rate is low in Switzerland (1.6%) and high in the Slovak Republic (18.9%). Mass media campaigns dealing with alcohol were applied in Greenland, Finland, Sweden, Norway, Denmark, Canada, United States, Latvia, Poland, Czech Republic, Germany and France but not in the Republic of Ireland, Russia, Estonia, Lithuania, Slovak Republic, Hungary, Belgium (Flanders), Austria, Switzerland and Greece. The BAC limit for driving also shows considerable variation between the participating countries. The range in limits goes from 0.0 pro mille in Estonia, Czech Republic, Slovak Republic and Hungary up to 0.8 or more pro mille in Greenland, Denmark, Canada, Republic of Ireland, United States, Germany, Switzerland, France and Greece. Four countries reported no advertising restriction concerning alcohol (United States, Latvia, Hungary, Greece), another six countries had voluntary restrictions (Republic of Ireland, Czech Republic, Slovak Republic, Germany, Belgium [Flanders], Austria), and the remaining twelve countries (Greenland, Finland, Sweden, Norway, Denmark, Canada, Russia, Estonia, Lithuania, Poland, Switzerland, France) had legal restrictions. In Austria there was no regulation or law enforcement regarding alcohol availability to youth by legal age limit for buying or drinking. The age limit for buying and drinking alcohol was not effectively enforced in Greenland, Denmark, Russia, Latvia, Lithuania, Poland, Czech Republic, Slovak Republic, Germany, Belgium (Flanders), Switzerland, France and Greece. Countries with an effectively enforced regulation are Finland, Sweden, Norway, Canada, United States, Republic of Ireland, Estonia and Hungary.

Results of multilevel modeling

The intercept only model (containing only the intercept and the corresponding error terms) for males yielded a significant log-odds for never having been drunk relative to having been drunk 1 time, 2-3 times, 4-10 times, or more than 10 times (males: $\beta_0 = -0.694$; $\delta_{(2)} = 0.731$; $\delta_{(3)} = 1.670$; $\delta_{(4)} = 2.482$; females: $\beta_0 = -0.422$; $\delta_{(2)} = 0.874$; $\delta_{(3)} = 1.938$; $\delta_{(4)} = 2.896$ with all parameters $p < .001$). For the residual error term u_0 , the residual variance is statistically different from zero (males: $T_{00} = 0.23$; $\chi^2 = 786.10$, 21 df, $p < .001$; females: $T_{00} = 0.47$; $\chi^2 = 1,534.23$, 21 df, $p < .001$), which means that the intercepts, and therefore drunkenness, varied significantly across countries.

The random coefficient model (random intercept, random slopes) showed significant intercepts of drunkenness

as well as slopes for the frequency of alcohol intake and slopes for the alcohol intake due to spirits (males: $\beta_0 = -1.009$; $\beta_1 = -1.666$; $\beta_2 = -1.308$; $\delta_{(2)} = 0.972$; $\delta_{(3)} = 2.250$; $\delta_{(4)} = 3.319$; females: $\beta_0 = -0.643$; $\beta_1 = -1.760$; $\beta_2 = -1.153$; $\delta_{(2)} = 1.118$; $\delta_{(3)} = 2.495$; $\delta_{(4)} = 3.693$ with all parameters $p < .001$). It is more likely for students to have never been drunk when the frequency of alcohol intake is low and when the alcohol intake was less from spirits. The variation in the intercepts (males: $T_{00} = 0.38$; $\chi^2 = 862.09$, 21 df, $p < .001$; females: $T_{00} = 0.47$; $\chi^2 = 1,092.25$, 21 df, $p < .001$), the variation in the slopes for the frequency of alcohol intake (males: $T_{10} = 0.07$; $\chi^2 = 109.69$, 22 df, $p < .001$; females: $T_{10} = 0.05$; $\chi^2 = 87.13$, 22 df, $p < .001$) and the variation in the slopes for the intake due to spirits (males: $T_{20} = 0.50$; $\chi^2 = 80.47$, 22 df, $p < .001$; females: $T_{20} = 0.37$; $\chi^2 = 90.98$, 22 df, $p < .001$) was significant. As slopes vary considerably across countries the hypothesis that the same kind of association between drunkenness and the predictors prevailed across countries could be rejected.

The full multilevel model also analyzed the impact of country characteristics on the variation in the intercepts and in the slopes. Table 3 shows the results among male and female students for 10 full multilevel models separately, as well as for one final model of significant second level variables.

The full multilevel models showed estimates of parameters similar to those of the preceding model for the explanatory variables at the respondent level. All second level variables entered were grand mean centered. Therefore, the intercept of the frequency of alcohol intake reflects the mean relation between frequency and drunkenness, and the intercept for the percentage of intake from spirits indicates the mean regression for spirits percentage on drunkenness. This model also allows testing of the impact of country characteristics on variation in intercepts and slopes. Ten different full multilevel models with one country level predictor at a time were estimated. A final full multilevel model containing significant variables was added in order to evaluate their impact in a multivariate model.

The intercepts of drunkenness varied significantly across countries and were influenced by geographic location for both genders. They were also influenced by population density for males and by advertisement restriction for females (regression coefficients γ_{01}). The more Nordic the countries are, the less important are the log-odds for never having been drunk relative to having been drunk. In other words, drunkenness in these countries is more common. In areas with high population density, drunkenness is less likely for males. Advertising restriction relates to drunkenness in an unexpected way for females: More drunkenness occasions can be observed in countries with highly restrictive policies on alcohol advertising. This unexpected relation remains also in the final full multilevel model that incorporates significant univariate predictors. In the males' final full multilevel model, population density is no longer significant.

TABLE 3. Parameter estimates for 10 full multilevel models with one predictor at a time and a final full multilevel model with significant predictors by gender

Model	Country level predictor		Males		Females	
			Coefficient	<i>p</i>	Coefficient	<i>p</i>
1	Per capita consumption	γ_{01}	0.029	NS	0.059	NS
		γ_{11}	0.016	NS	0.025	NS
		γ_{21}	0.067	NS	0.113	.023
2	Percentage spirits per capita	γ_{01}	0.036	NS	1.092	NS
		γ_{11}	0.575	NS	-0.022	NS
		γ_{21}	-2.325	.025	-1.060	NS
3	Population density	γ_{01}	0.002	.021	0.002	NS
		γ_{11}	0.000	NS	0.001	NS
		γ_{21}	0.003	.004	0.002	NS
4	Gross domestic product	γ_{01}	0.000	NS	0.000	NS
		γ_{11}	0.000	NS	0.000	NS
		γ_{21}	0.000	NS	0.000	NS
5	Unemployment rate	γ_{01}	-0.001	NS	0.029	NS
		γ_{11}	0.030	.023	0.007	NS
		γ_{21}	-0.060	NS	-0.035	NS
6	Mass media campaigns	γ_{01}	-0.436	NS	-0.567	NS
		γ_{11}	-0.217	NS	-0.236	.038
		γ_{21}	-0.177	NS	-0.141	NS
7	BAC limit	γ_{01}	0.202	NS	-0.228	NS
		γ_{11}	-0.249	NS	0.077	NS
		γ_{21}	0.704	NS	0.572	NS
8	Advertising restrictions	γ_{01}	-0.302	NS	-0.414	.026
		γ_{11}	-0.122	NS	-0.113	NS
		γ_{21}	-0.391	NS	-0.287	NS
9	Regulation	γ_{01}	-0.231	NS	-0.264	NS
		γ_{11}	-0.160	NS	-0.216	.033
		γ_{21}	-0.654	.035	-0.597	.020
10	Geographic location	γ_{01}	-0.225	.000	-0.251	.000
		γ_{11}	-0.079	.009	-0.080	.003
		γ_{21}	-0.116	NS	-0.136	NS
Males' final model	Population density	γ_{01}	0.000	NS		
	Geographic location	γ_{01}	-0.229	.001		
	Unemployment rate	γ_{11}	0.026	.028		
	Geographic location	γ_{11}	-0.062	.033		
	Percentage spirits per capita	γ_{21}	-2.089	.033		
	Regulation	γ_{21}	-0.596	NS		
Females' final model	Advertising restrictions	γ_{01}			-0.243	.011
	Geographic location	γ_{01}			-0.221	.000
	Mass media campaigns	γ_{11}			-0.104	NS
	Regulation	γ_{11}			-0.099	NS
	Geographic location	γ_{11}			-0.050	NS
	Per capita consumption	γ_{21}			0.093	.037
	Regulation	γ_{21}			-0.403	.035

Note: All country level variances reached significance $p < .001$; all second level variables are grand mean centered.

The variation in the slopes for the regression of the frequency of alcohol intake on drunkenness by country was predicted by geographic location for both genders, by unemployment rate for males, by mass media campaigns and regulation of availability of alcohol to youth for females (regression coefficients γ_{11}). The more Nordic countries are, the more important is the regression of alcohol intake on drunkenness (note that the negative parameter describes the relation of the log-odds for never having been drunk relative to having been drunk in relation to the frequency of alcohol intake). The unemployment rate, however, predicts less pronounced relations. Mass media campaigns and the regulation of availability of alcohol to youth show rather

unexpected significant associations with a more important regression of frequency of alcohol intake on drunkenness for female students. In the females' final full multilevel model, however, these unexpected relations are no longer significant, whereas all significant univariate predictors for males remain in the final full multilevel model.

The regression of alcohol intake from spirits on drunkenness varies across countries. Predictors for this variation (regression coefficients γ_{21}) are regulation of availability of alcohol to youth for both genders, per capita consumption for females, and per capita alcohol intake from spirits and population density for males. The higher the spirits intake in the population, and the more rural the countries are, the

stronger is the relation between spirits intake and drunkenness in males. In females, high per capita consumption in the population predicts weaker relations. The regulation of availability of alcohol to youth is significantly associated with a more important regression of spirits intake on drunkenness. In the males' full multilevel model, only the per capita alcohol intake from spirits remains significant, whereas for females, both predictors, per capita consumption and regulation, remain significant.

Discussion

Drunkenness among young people is a major public health concern. Epidemiological studies show dramatic increases in the prevalence of drunkenness since at least the mid nineties. On the basis of a representative sample from 22 countries with 10,951 male and 11,451 female drinking students aged 15 years, the present study shows a high prevalence of drunkenness, with a mean value of 65.0% in males and 58.6% in females for drinking students only and of 57.1% in males and 50.4% in females for the whole sample. Countries vary considerably in the prevalence of adolescent drunkenness (Research Question 1), and this variance seems to be consistent with the findings of ESPAD, another large cross-national study. In every country, beer is the preferred beverage for males, whereas females prefer wine over beer in 12 out of 22 countries. In Greenland, Denmark, Canada and Hungary more than one third of the alcohol intake by both genders is attributable to the consumption of spirits (Research Question 2). The association between drunkenness and the dominance of spirits is positive, underlining the fact that spirits play an important role in the occurrence of drunkenness.

The frequency of alcohol intake and the extent to which intake is from spirits relate to drunkenness. It is more likely for students to have been drunk when the frequency of alcohol intake was high and when the alcohol intake was largely in the form of spirits. This relation between preference for spirits and drunkenness is independent of the frequency of alcohol intake (Research Question 3). The link between drunkenness and both predictors varies considerably between countries, and differences in drunkenness between countries are apparent when these predictors are included in the HLM examination of drunkenness. Drunkenness varies between countries, and our analysis indicates that it is relevant to explore how alcohol intake and a preference for spirits are moderated by each country.

One important national characteristic that predicts differences between countries was geographical location (Research Question 4). For both genders, lower numbers of drunkenness occasions were observed in southern European countries, whereas higher numbers were found in Scandinavia, the Baltic countries and Russia. These countries also show strong relations between frequency of alco-

hol intake and drunkenness in male students. Geographical location, in fact, may be a proxy for the different drinking cultures found in Nordic and southern European countries. Countries with important per capita alcohol intake from spirits show high correlations between the percentage of alcohol intake from spirits and drunkenness in male adolescents, and countries with marked unemployment rates have lower correlations between the frequency of alcohol intake and drunkenness in this group.

Other country characteristics such as population density, gross domestic product, mass media campaigns and BAC limit for driving show no significant relation to the prevalence of drunkenness in our final model. Unexpected results were found in the females' final model: More drunkenness occasions can be observed in countries where alcohol advertising is more restricted. High per capita consumption in a country's population is associated with low correlations between spirits intake and drunkenness. Regulating availability of alcohol to youth, on the other hand, is significantly associated with a more important regression of spirits intake on drunkenness. These unexpected results may be seen against the background evidence that the gender gap in adolescent drinking practices is diminishing (Johnston et al., 1991), and increases in drinking may be expected among females, as is already true in the case of smoking (WHO, 1999a). In male-dominated drinking cultures, especially in alcohol-permissive countries, classic gender roles and sex stereotyping may compel female students to drink less in conformity with the culture's expectations.

The frequency of alcohol intake and the extent to which this intake can be attributed to spirits are important mediators for the prevention of drunkenness. Drunkenness itself can be addressed by preventive action (e.g., by mass media campaigns). In finding that frequency and, even more so, preference for spirits, are significantly related to drunkenness, we may have identified variables that may prove sensible and well defined targets for preventive action and policy measures.

Given the differences between countries, however, there is no "one size fits all" measure. According to our results, one may expect higher effects from preventive action and policy measures in countries where a significant association of frequency of alcohol intake with drunkenness exists (e.g., in Scandinavian countries, the Baltic countries and Russia).

On the other hand, we cannot conclude from our study which preventive actions and policy measures really work. Advertising restriction and the regulation of availability of alcohol to youth may be expected to reduce drunkenness or its precursors. However, for females, the covariation was found to be in the opposite direction. It may well be that in countries with major problems linked to patterns of alcohol use, more regulation and prevention is already applied to address them. In analyzing cross-sectional data, however, it

is difficult to establish a causal relationship between intervention and outcome.

Another problem lies in the reliability, validity and relevance of the included country-level variables. They were taken from the Global Alcohol Database (WHO, 1999b), which holds information provided directly by WHO Member States and key informants, as well as from published articles and reviews. This database represents a tremendous work, given the fact that different sources sometimes provided inconsistent and conflicting information, thereby challenging its reliability and validity. "Despite the efforts made by WHO to obtain and validate data and information, many gaps in, and uncertainties about, the actual alcohol and health situation in WHO Member States remain" (WHO, 1999b, p. 5). In the present study we also tried to validate the WHO information through the feedback of the principal investigators of 22 countries involved in the HBSC study. Furthermore, the relevance of the country-level variables to the individual behavior in young people may be questionable. For example, BAC limit for driving is an important national policy response to alcohol misuse, but is this legislative control relevant for reducing drunkenness of 15 year olds?

In addition, we have to deal with omitted-variable bias. Education and health promotion addressing the use of alcohol among young people are usually presented at schools and local community and health centers. Programs tended to vary in content, quality and quantity, and not much information on this variation was available (Rehn, 2001). All of the included countries reported that school-based programs preventing alcohol misuse were applied and that therefore no variation for the analysis was left. Cross-national differences in the prominence of advertising were not taken into account, although these persuasional messages may be effective for selling alcohol (Wyllie et al., 1998a,b). Regulation of alcohol availability to youth via a policy for outlets (number of outlets, opening hours, training of managers and servers, etc.) as well as the licensing system for alcohol production and sale should also be considered in conjunction with a system of applying warning labels on alcoholic beverages. Alcohol taxes may be a potent tool of prevention policy, particularly for price sensitive young drinkers. Because affordability affects the behavior of young people in particular, charging a duty on spirits could be a potentially important deterrent (Guindon et al., 2002). Defining a unit measure by which to compare the prices of spirits is difficult, however, because more than half of the distilled spirits worldwide are local products (Impact Databank, 1995) that vary considerably in alcohol percentage.

The high prevalence of drunkenness as well as the trend towards more drunkenness—especially that involving the use of spirits—can be observed in many countries. Detrimental effects on health can be expected and effective policy initiatives should be taken. Knowledge of the variation in

policy and preventive measures that exist between countries combined with data on alcohol use, health and health behavior of national representative samples of young people represent a unique possibility to research effective measures to curb drunkenness. Future research should bring together more, and more reliable and valid, data on the individual and the structural level.

Acknowledgments

The authors would like to thank Jim Ross (United States) and Wolfgang Settertobulte (Germany) for their helpful comments on an earlier draft of this article.

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TITLE: Drunkenness among Young People: A Cross-National
Comparison

SOURCE: J Stud Alcohol 64 no5 S 2003

WN: 0324402128008

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