

## EPIDEMIOLOGY

### Social Inequalities and Gender Differences in the Experience of Alcohol-Related Problems

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**Abstract** — **Aims:** To examine the influence of country-level characteristics and individual socio-economic status (SES) on individual alcohol-related consequences. **Methods:** Data from 42,655 men and women collected by cross-sectional surveys in 25 countries of the Gender, Alcohol and Culture: An International Study were used. The individual SES was measured by the highest attained educational level. Alcohol-related consequences were defined as the self-report of at least one internal or one external consequence in the last year. The relationship between individuals' education and alcohol-related consequences was examined by meta-analysis. In a second step, the individual level data and country data were combined in multilevel models. As country-level indicators, we used the purchasing power parity of the gross national income (GNI), the Gini coefficient and the Gender Gap Index. **Results:** Lower educated men and women were more likely to report consequences than higher educated men and women even after controlling for drinking patterns. For men, this relation was significant for both internal and external problems. For women, it was only significant for external problems. The GNI was significantly associated with reporting external consequences for men such that in lower income countries men were more likely to report social problems. **Conclusion:** The fact that problems accrue more quickly for lower educated persons even if they drink in the same manner can be linked to the social or environmental dimension surrounding problems. That is, those of fewer resources are less protected from the experience of a problem or the impact of a stressful life event.

## INTRODUCTION

A variety of factors besides alcohol consumption can account for differences in prevalence rates of alcohol problems. These include: the social norms of alcohol use (Room and Mäkelä, 2000), the level of case-finding and structural factors such as availability of public transportation (which could serve to reduce drinking and driving). An additional influence on the identification of alcohol-related problems and mental health problems in general is socio-economic status (SES). It is well known that those of lower SES are more likely to receive a psychiatric diagnosis than those of higher SES (Dohrenwend *et al.*, 1992).

In high-income countries, drinking patterns tend to vary by SES. Those of higher SES are more likely to consume alcohol and tend to drink more frequently than those of lower status, but those of lower status who do drink consume more alcohol in total (e.g. Marmot, 1997; Van Oers *et al.*, 1999; Bloomfield *et al.*, 2000). Moreover, there is recent evidence from the USA that those with higher incomes are more likely to engage in hazardous drinking according to DSM-IV criteria (Keyes and Hasin, 2008). But when it comes to alcohol-related problems, drinkers of lower status consistently have a higher prevalence of problems than those of higher status (e.g. van Oers *et al.*, 1999; Hasin *et al.*, 2007). Furthermore, previous research has shown that given the same level of consumption, drinkers of lower SES experience more alcohol-related consequences than those of higher status (e.g. Mäkelä *et al.*, 2003; Mäkelä and Paljärvi, 2008).

Others have focused on differences with respect to gender in alcohol problems (e.g. Plant *et al.*, 2000; Wilsnack *et al.*, 2000), variations in how society reacts to drinking and

alcohol-related harms (Olafsdóttir *et al.*, 2009), drinking patterns (Bobak *et al.*, 2004) and/or country development (e.g. Graham *et al.*, 2011). Some have examined the relationship between the SES and alcohol-related problems internationally. A Brazilian study (Almeida-Filho *et al.*, 2005) found that higher SES was associated with higher rates of dependence as well as consumption among both men and women. Among outpatients screened for alcohol dependence at a primary health-care clinic in Kampala, Uganda, differences by SES were found (Kullgren *et al.*, 2009). And a recent study investigating alcohol use in Beijing found that those with lower education were more likely to receive a diagnosis of alcohol dependence than were those of higher education (Xiang *et al.*, 2009).

Cook *et al.* (2011) examined scores on the Alcohol Use Disorders Identification Test (AUDIT) questionnaire in a representative sample of men in a Russian city. They found that the level of education, scores on an amenity index (having a car and/or central heating) and being employed were inversely associated with scores on the problem dimension of the AUDIT. Batty *et al.* (2011) investigated socio-economic disadvantage in relation to alcohol-related problems in a population-representative cohort in Western Scotland. They found that employment status, income, occupational class and car ownership were negatively associated with CAGE scores (Mayfield *et al.*, 1974; Ewing, 1984) among men. Among women, the only significant result was that a higher CAGE score was associated with being employed. Bloomfield *et al.* (2006) examined social inequalities in scores on the AUDIT problem items in five European countries (Sweden, Finland, Switzerland, Czech Republic and Hungary). In Finland, the Czech Republic and Hungary, men of lower education were more likely to report problems than

men of higher education. Among women only those of lower education in Finland reported a higher prevalence of problems.

Given these mixed results and the general lack of international comparative studies, it is a relevant question for the international alcohol health policy to examine the relationship of social inequalities to the prevalence of self-reported alcohol-related consequences among low- and middle-income countries as well as high-income countries. It is also important to examine social inequalities by gender since previous research suggests that the link between social status and alcohol-related problems differs between men and women. The present study examines the relationship between social status (measured as the relative educational attainment) and alcohol-related problems in 25 countries on the basis of surveys collected through the GENACIS project (Wilsnack *et al.*, 2009).

Based on the literature to date and its complex and mixed evidence, we pose the following hypotheses:

- (1) Drinkers of lower SES will have a higher prevalence of alcohol-related problems than those of higher SES;
  - (a) this relationship will persist even after controlling for alcohol consumption levels, and
  - (b) this relationship will hold across genders.
- (2) When taking country development into account, social inequalities in the prevalence of alcohol-related problems will be greater in higher-income countries.

## METHODS

Survey data from 42,655 individuals in 25 countries participating in the GENACIS project were used ([www.genacis.org](http://www.genacis.org)). About 3.5% ( $n=1642$ ) of individuals had to be excluded from the analysis because of missing information on education or missing information about alcohol problems.

In 16 of the countries, the data come from national representative survey samples. In nine countries only regional data were available (Table 1). Additional details about the surveys and samples are reported elsewhere (Wilsnack *et al.*, 2009). The age range was restricted to 25–69 years. For this study, we analysed data from drinkers, meaning only those who had consumed any alcohol in the past year. Data were collected between the years 1997 and 2007. The mean age of the respondents was 43.4 years (SD: 11.6) and 53.2% of the respondents were male.

### *Individual-level indicators*

As a measure of the individual's SES, we used the highest educational level the person achieved. The education variable from each country was recoded into a three-category variable based on years of schooling (low:  $\leq 10$  years; middle:  $> 10$  years and  $\leq 13$  years; high: bachelor, masters or equivalent). For the present analysis, these three categories were employed in the multilevel analyses. For the meta-analyses, the three groups were collapsed into two (low:  $\leq 10$  years of education and high: more than 10 years).

Table 1. Study countries by year of survey, number of individuals surveyed and GNI (in international USD)

Country (ordered according to GNI)	Survey year	$n^b$	GNI per capita, (2000)
Uganda <sup>a</sup>	2003	546	670
Nigeria <sup>a</sup>	2003	608	1130
India <sup>a</sup>	2003	407	1500
Nicaragua <sup>a</sup>	2005	274	1780
Sri Lanka <sup>a</sup>	2002	306	2660
Kazakhstan <sup>a</sup>	2002/3	682	4480
Belize	2005	1040	4630
Costa Rica	2003	458	6810
Brazil <sup>a</sup>	2001/2	387	7730
Argentina	2003	656	8950
Uruguay	2004	535	8860
Hungary	2001	1435	14,640
Czech Republic	2002	1813	19,430
New Zealand	2007	1529	21,120
Spain <sup>a</sup>	2003	785	21,480
Australia <sup>a</sup>	2007	869	24,920
Finland	2000	1148	25,470
UK	2000	1330	25,590
Japan	2001	1713	25,910
Sweden	2002	3531	27,500
Canada	2004	7783	27,630
Iceland	2001	1503	28,030
Denmark	2003	1490	28,180
Switzerland	1997	8187	34,020
USA	2000	3640	35,190

<sup>a</sup>Regional sampling frame employed.

<sup>b</sup>Sample size based on drinkers with information about education and information about at least one of the consequence areas.

We used two versions of problem consequences scales constructed by Graham *et al.* (2011) which were based on a longer list of questions regarding alcohol-related problems in the GENACIS-study. We selected the five most commonly asked items from the first set of Graham *et al.* (2011). These represent consequences experienced by the individual including dependence symptoms. These items, asked in 25 countries, included questions on 'guilt or remorse; unable to remember the night before; failing to do what was normally expected; unable to stop drinking once started; and needing a drink in the morning to get going after a heavy drinking session'.

The second grouping is composed of eight items that reflect the social or external problems related to drinking. The grouping includes harmful effects of drinking on: 'finances; housework or chores around the house; work, studies or employment; marriage/intimate relationship; family relationships including children; and friendships or social life'. It also includes: 'getting into a fight while drinking; the drinker himself/herself or someone else injured as a result of drinking'.

Regarding the latter item set, all eight questions were asked in 17 countries (Denmark, Canada, Japan, Australia, Spain, New Zealand, Czech Republic, Argentina, Uruguay, Costa Rica, Belize, Kazakhstan, Sri Lanka, Nicaragua, India, Nigeria and Uganda); seven of the eight items were asked in Brazil, UK and Sweden; six were asked in the USA. For each set, we constructed prevalence scores of one or more reported alcohol problems to be used in the analyses. In this paper, we refer to the first set of problems as 'internal' consequences and the latter set of problems as 'external' consequences (Bloomfield *et al.*, 2010).

To control for alcohol consumption we created a drinking pattern variable to distinguish between four different groups of alcohol consumers:

- (1) moderate drinkers: those who are not monthly risky single occasion drinkers (RSOD) and not heavy drinkers ( $\leq 10/20$  g of pure alcohol per day for women/men);
- (2) heavier drinkers ( $>10/20$  g of pure alcohol for women/men per day);
- (3) monthly RSO drinkers and
- (4) those who are both: heavy drinkers and monthly RSO drinkers.

RSOD was defined differently for the different countries. For most countries, it is consuming 60 g or more of pure alcohol on one occasion. However, the range extends from 50 to 90 g of pure alcohol.

Additional control variables were gender and age.

#### *Indicators on country level*

To describe the socio-economic development of the countries, we chose purchasing power parity, a measure of gross national income (GNI) per capita in current international dollars (World Bank, 2008a, b), and the Gini coefficient, an indicator of income disparity within a country (United Nations Development Programme, 2002, 2007). With regard to gender equality, the Gender Gap Index (Hausmann *et al.*, 2006) was chosen. To examine the relationship of each country-level indicator to drinking behaviour, we analysed each indicator separately, controlling for individual level factors. Later analyses tested all three country-level variables simultaneously in multivariate models.

#### *Statistical analysis*

In a first step, we calculated age-adjusted odds ratios (ORs) for the probability of reporting a problem for middle-or higher-level educated versus lower-level educated men or women by country. We combined the country-specific estimates according to the DerSimonian-Laird procedure (DerSimonian and Laird, 1986) (Figs. 1 and 2). The  $I^2$  statistic is the proportion of the total variation in the relation of alcohol-related problems and the SES that is due to heterogeneity between studies (Higgins *et al.*, 2003; Higgins and Thompson, 2004). Although there can be no absolute rule for when heterogeneity becomes important, Higgins *et al.* (2003) suggest categories of 'low' for  $I^2$  values between 25 and 50%, 'moderate' for 50 and 75% and 'high' for  $\geq 75\%$ .

In a second step, we combined individual-level and country-level analyses in a multilevel logistic model. In separate models, we first tested the relationship of the GNI, the Gini Index and the Gender Gap Index to alcohol-related consequences after adjusting for individual characteristics. In later models, we included all significant individual characteristics and the GNI simultaneously and tested also an interaction term for individual education and the GNI.

## RESULTS

Table 1 displays survey characteristics and the GNI per capita for each country. Table 2 displays the percentages of people who reported at least one internal consequence or one external consequence by sex and educational level. When looking at external consequences, the prevalence tends to decrease as the GNI increases. The trend appears also for internal consequences, but is not as striking. For almost all countries, compared with their female counterparts with the same educational achievement, men are more likely than women to experience both types of problems.

Figure 1 illustrates for each country the ORs of reporting at least one internal problem for higher educated men or women (compared with lower educated men or women). Lower educated men are more likely to report internal alcohol-related problems than men of higher education. The summary ORs for both low- to middle-income countries and high-income countries as well as the overall OR lie around 0.80. However, there is more variation in the relationship between education and alcohol problems among the low- to middle-income countries than in the high-income countries as indicated by the  $I^2$  statistic (63% for low- to upper-middle-income countries, 54% for higher-income countries). For women, educational status was not significantly associated with internal problems, although this relationship approached significance for high-income countries with a lower risk for women with higher education [OR: 0.87, 95% confidence interval (CI): 0.73–1.03].

Figure 2 displays ORs for the prevalence of external consequences among higher educated versus lower educated men and women, respectively. Again, lower educated men were significantly more likely to report external consequences than higher educated men. The summary ORs are 0.65 (95% CI: 0.47–0.90) for lower-income countries and 0.63 (95% CI: 0.52–0.77) for higher-income countries. Among the high-income countries, this result is relatively consistent ( $I^2$ : 50%). Among the low- to middle-income countries, there is more variation in the relation between consequences and education ( $I^2$ : 74%). For women, the results are in the same direction but the summary estimate in lower-income countries is not significant (OR: 0.92, 95% CI: 0.65–1.30). In high-income countries, it is more apparent that higher educated women reported less often external consequences than lower educated women (OR: 0.66, 95% CI: 0.52–0.84).

Table 3 displays the results of multilevel logistic regression when simultaneously examining individual and country-level predictors of reported internal or external problems. For internal problems, none of the country-level indicators was significant after adjusting for individual characteristics in the separate models. Even after adjusting for drinking patterns, lower educated men were more likely to report internal problems than higher educated men. At highest risk were men and women who were heavy consumers and monthly RSO drinkers. But those who were either 'only' heavy drinkers or monthly RSO drinkers were also at high risk. Younger persons were more likely overall to report internal problems. There was no interaction between individual education and country GNI with regard to internal alcohol-related problems.

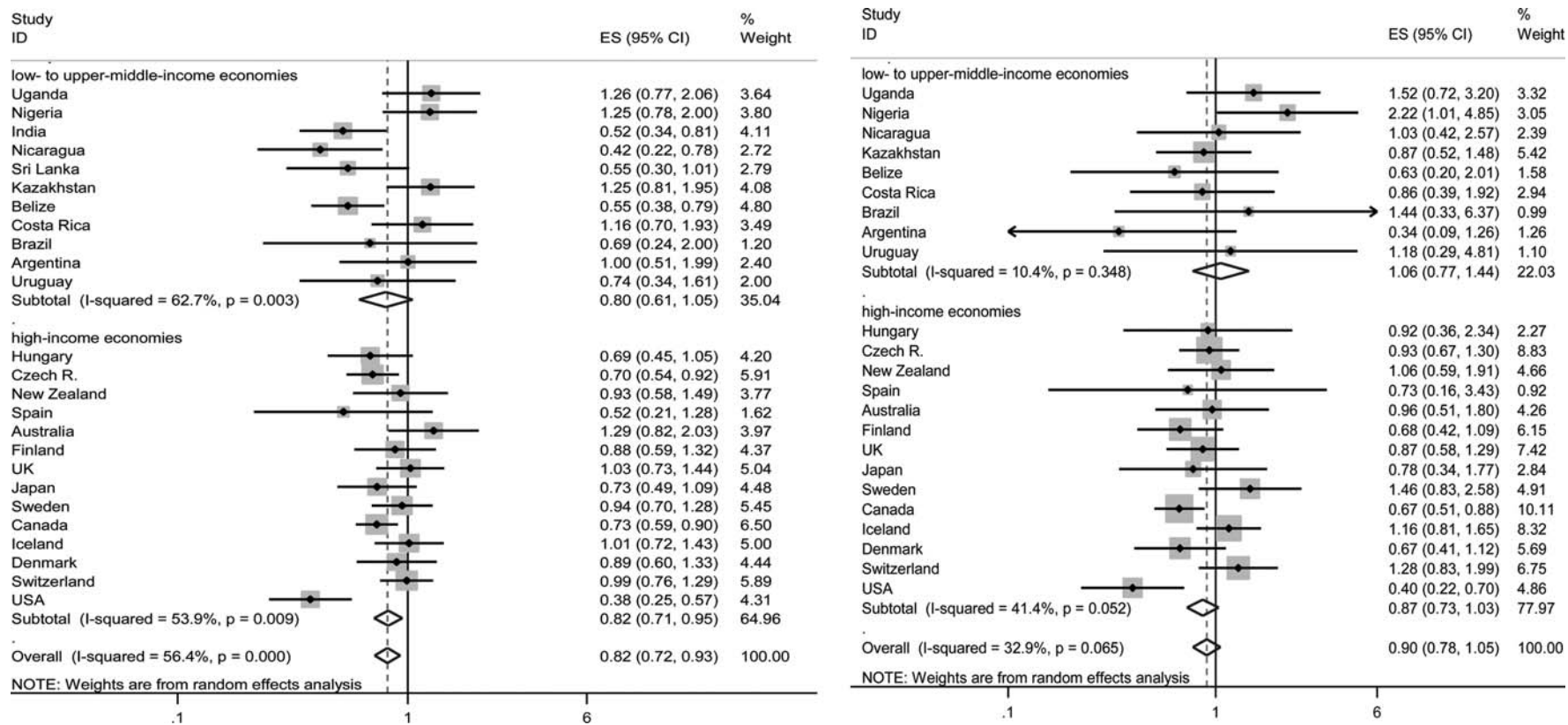


Fig. 1. Age-adjusted ORs for middle and higher education versus lower education (drinkers only) men (left), women (right). Outcome: one or more internal consequences at least once in the past year.

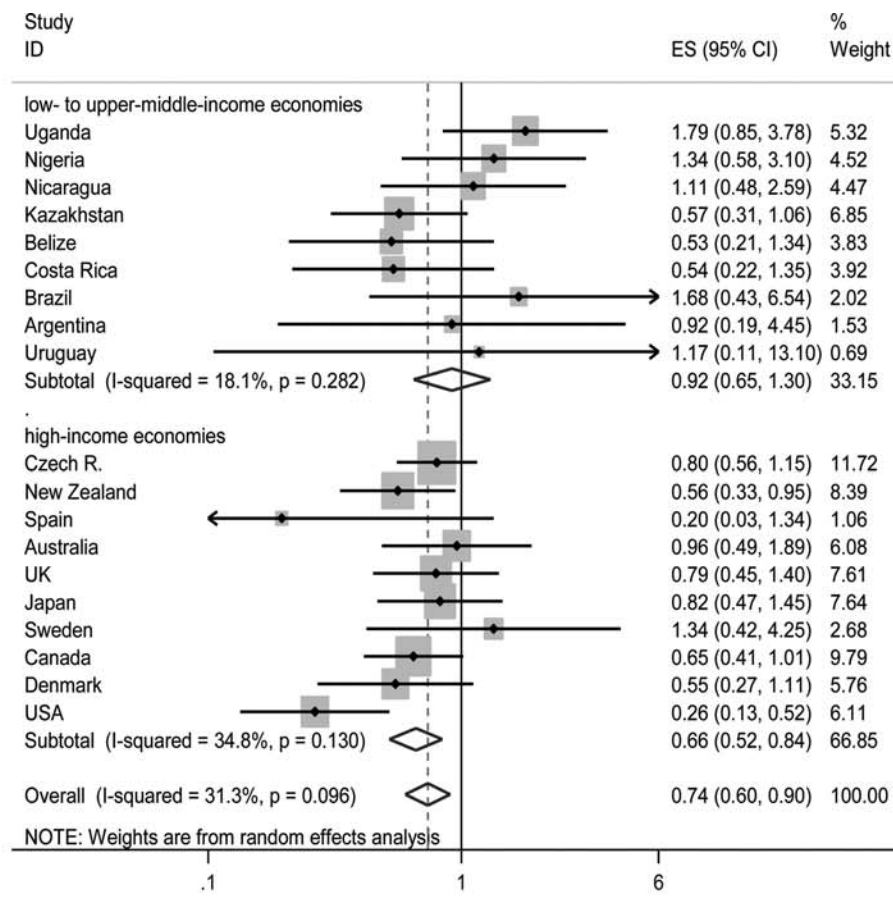
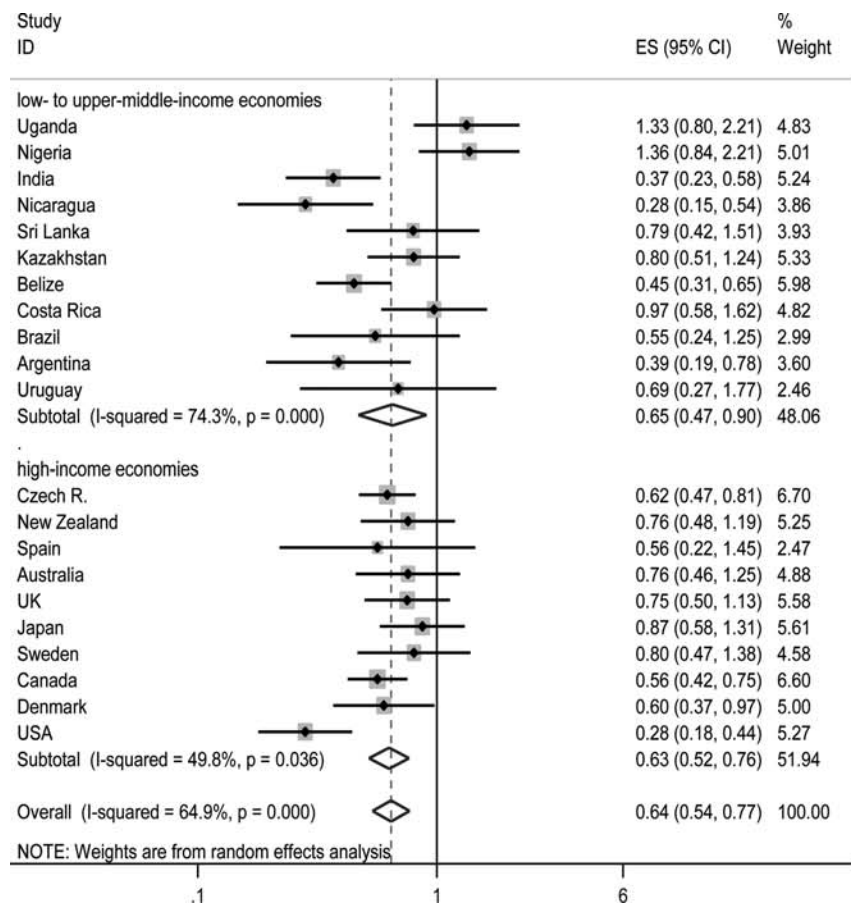
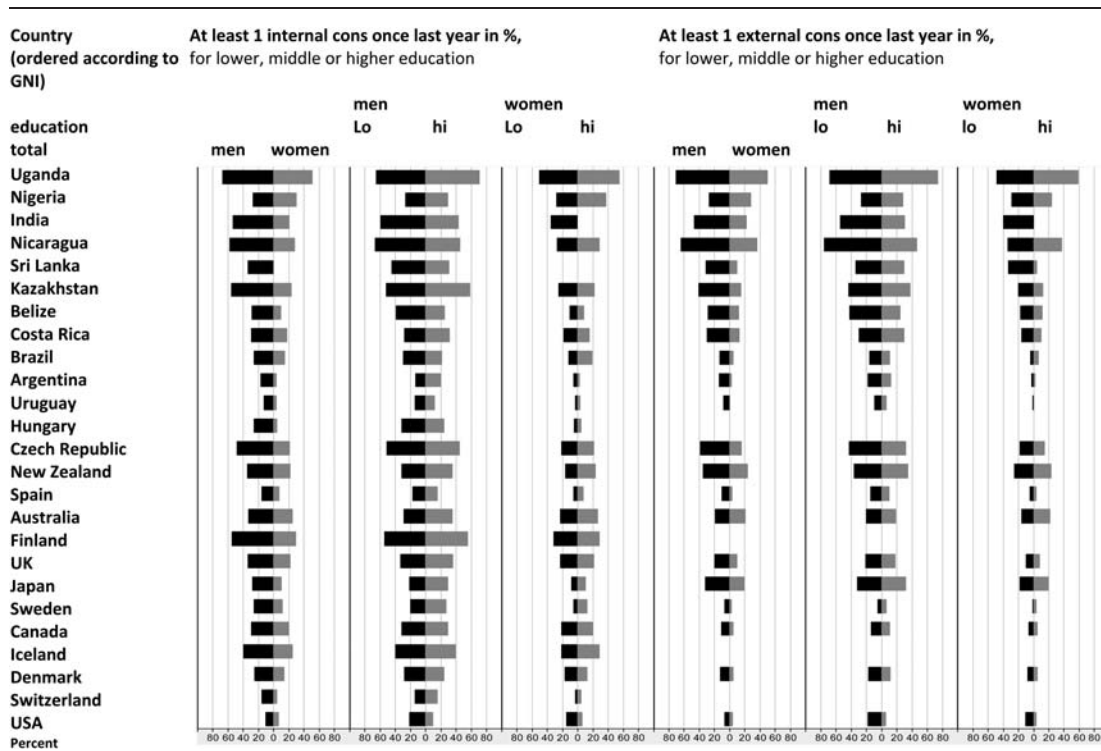


Fig. 2. Age-adjusted ORs for middle and higher education versus lower education (drinkers only) men (left), women (right). Outcome: one or more external consequences at least once in the past year.

Table 2. Prevalences of at least one internal or one external consequence last year by gender, education and country



In countries of higher economic power men reported less often external consequences than men in countries of lower economic power even after adjusting for individual characteristics (as indicated by the significant coefficient of the GNI). For women this relation was not significant. After controlling for age and drinking patterns, both men and women of lower educational attainment were more likely to report external consequences than their higher educated counterparts. As in the regression for internal problems, those who engaged in both monthly RSOD and heavy drinking were at greatest risk followed by those who 'only' engage in monthly RSO drinking or 'only' in heavy drinking. Moderate drinkers had the lowest prevalence of reporting at least one external consequence. Younger persons were more likely to report external problems. There was no interaction between individual education and country GNI with regard to external alcohol-related problems.

## DISCUSSION

This paper has examined social inequalities in the prevalence of self-reported alcohol consequences from a gender and international perspective. We have separately examined 'internal' and 'external' consequences of alcohol.

The fact that more men report problems than women given similar drinking patterns has been established in previous work of this study group (Bond *et al.*, 2010; Graham *et al.*, 2011). With specific regard to our first hypothesis, multilevel analyses revealed that in relation to internal problems, lower educated men were more likely to report internal problems than higher educated men even if they drank in the same manner. Likewise with external problems, lower

educated men and also lower educated women were more likely to report consequences than higher educated men and women, even if they drank similarly. After adjusting for drinking patterns, the GNI was significantly associated with reporting external consequences for men such that, in countries with a lower GNI, men in general were more likely to report external problems than men in countries of higher GNI. Thus, our findings support our first hypothesis and sub-hypotheses to a large extent, that is, that those of a lower SES will report more alcohol-related problems even after controlling for level of consumption and that this holds for both genders (except reporting of internal problems among women).

The fact that problems accrue more quickly for lower educated persons could be linked to the social or environmental dimension surrounding both categories of problems, especially for external problems which, by definition, include interactions with the social environment. Previous research has demonstrated that those of fewer resources are less protected from the experience of a problem or the impact of a stressful life event (Thoits, 1982, 2010). Further, it has been shown that those of a lower SES are more likely to be exposed to sources of chronic stress which can accumulate over the life course (Baum *et al.*, 1999; Hatch and Dohrenwend, 2007; Kopp *et al.*, 2007). This, in turn, can lead to the increased likelihood of substance abuse and addiction (Cleck and Blendy, 2008; Hyman and Sinha, 2009; Enoch, 2010).

Our second hypothesis predicting that a social gradient would be stronger in higher income countries was not supported. Cross-level interactions of individual education and country-level economic indicators were not significantly associated with the reporting of problems. Moreover, it was

Table 3. Multilevel logistic models (random intercept) for at least one internal/external consequence item at least once in the past year, men and women separately, drinkers only, countries not included because of missing information about RSOD: Spain, UK, Sri Lanka

Individual level	Internal problems				External problems			
	Men (22 countries/20,364 cases)		Women (22 countries/19,714 cases)		Men (19 countries/15,195 cases)		Women (19 countries/14,431 cases)	
	Separate models <sup>a</sup> OR (95% CI)	OR (95% CI)	Separate models <sup>a</sup> OR (95% CI)	OR (95% CI)	Separate models <sup>a</sup> OR (95% CI)	OR (95% CI)	Separate models <sup>a</sup> OR (95% CI)	OR (95% CI)
Education (ref: high education)								
Low		1.13 (1.02–1.26)		1.11 (0.96–1.28)		1.77 (1.54–2.04)		1.45 (1.19–1.77)
Middle		1.07 (0.98–1.17)		1.04 (0.93–1.17)		1.32 (1.16–1.50)		1.19 (1.01–1.41)
Drinking pattern (ref: moderate)								
Monthly RSOD, not heavy drinking		3.85 (3.51–4.23)		4.30 (3.62–5.11)		3.23 (2.86–3.66)		3.95 (3.15–4.97)
Heavy drinking (more than 10/20 g pure alcohol per day for women/men)		3.02 (2.69–3.38)		3.25 (2.87–3.68)		2.87 (2.43–3.39)		3.20 (2.67–3.82)
Both: monthly RSOD and heavy drinking		9.61 (8.70–10.60)		13.41 (11.49–15.64)		7.65 (6.80–8.61)		12.08 (10.06–14.50)
Age								
In decades (centred)		0.75 (0.72–0.77)		0.64 (0.62–0.67)		0.79 (0.75–0.82)		0.73 (0.69–0.78)
Age squared		—		—		—		—
Country level								
GNI (in 10,000\$)	0.88 (0.69–1.13)	0.88 (0.69–1.13)	0.96 (0.70–1.31)	0.96 (0.70–1.31)	0.66 (0.48–0.90)	0.66 (0.48–0.90)	0.73 (0.49–1.09)	0.73 (0.49–1.09)
Gini Index (in 10)	0.82 (0.61–1.09)	—	0.81 (0.57–1.16)	—	1.08 (0.70–1.64)	—	0.92 (0.56–1.50)	—
Gender Gap Index	1.39 (0.83–2.34)	—	1.74 (0.94–3.22)	—	0.95 (0.88–1.02)	—	0.96 (0.87–1.04)	—
Cross-level interaction								
Low education × GNI (in 10,000\$)		—		—		—		—
Variance between countries		Beta (SE) 0.47 (0.15)		Beta (SE) 0.70 (0.23)		Beta (SE) 0.63 (0.22)		Beta (SE) 1.00 (0.37)

<sup>a</sup>Adjusted for individual characteristics.

countries of lower GNI that were more likely to report a higher prevalence of external problems among men after adjusting for drinking patterns. This finding, again, may well be related to a lack of resources that buffer a person from the negative external consequences of alcohol use.

The present study provides information about the relationship between educational achievement, alcohol consumption and negative consequences among drinkers from a diverse group of countries around the world. However, there are also some limitations. Firstly, some countries employed only regional samples; therefore, these results cannot necessarily be considered representative of countries (see [http://www.genacis.org/overviews/overview\\_sampling\\_design.pdf](http://www.genacis.org/overviews/overview_sampling_design.pdf) for details). Secondly, all survey sampling methods have some selection bias, e.g. women were more likely than men to participate. For telephone surveys, persons who were institutionalized or did not feel comfortable speaking the language(s) of the country were generally not included. For the prevalence of external problems, we also included countries that had not included all questions from the complete item set. The overall estimates should be interpreted with caution in the light of the heterogeneity among the country-specific ORs regarding the relationship of education to problems (Fig. 2:  $I^2$  statistics). This is especially the case for men in lower-income countries.

In sum, our analyses reveal that those of lower educational achievement—especially men—appear to be more at risk of reporting negative alcohol consequences and this appears to occur generally regardless of drinking patterns. Additionally, our results point to a higher prevalence of external problems among men in lower-income countries. Policy-makers should take this information into account when formulating and specifying future national and international alcohol policy strategies.

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