

Comparison of alcohol consumption in European countries, and some methodological thoughts (draft version)

Celine Wuyts, KU Leuven

Sara Barbier, KU Leuven

Geert Loosveldt, KU Leuven

Presented in session: “Health care: causes and consequences”

at the 3rd International ESS Conference, 13-15th July 2016, Lausanne, Switzerland

Abstract

Research on alcohol consumption across and within countries is complicated by measurement issues. Measurement error may result from sensitivity of the topic and difficulty of the questions. When the questionnaire is administered face-to-face, interviewers are likely to contribute to this measurement error. As a result, part of the variation across countries and across sociodemographic groups may be due to differences between countries in the way interviewers administer the questionnaires, rather than real differences in alcohol consumption.

This paper investigates how patterns of alcohol consumption, in terms of frequency and quantity consumed, vary across Europe, and how they relate to key sociodemographic background variables, age, gender, and education level. Data from the rotating module on health inequalities of the seventh round of the European Social Survey (ESS7) is used. Potential interviewer effects on the alcohol consumption variables are taken into account by allowing for random intercepts in a multilevel regression model.

The results show that European countries vary strongly in alcohol consumption patterns. Some evidence emerges for the ‘wet’ versus ‘dry’ drinking cultures distinction. In some countries, people drink frequently but relatively small amounts whereas in other countries, people drink less frequently but larger amounts. Both the frequency and amount of alcohol consumption are higher for men than women in all countries studied. The effects of age and education level are less consistent. Even though the interviewer effects on these questions about alcohol consumption are substantial in some countries, the overall conclusions about the effects of sociodemographic characteristics on alcohol consumption hold when interviewer effects are taken into account, but country-specific conclusions can be affected, especially for weaker effects and for outcome measures that are strongly affected by interviewer effects.

Keywords: Cross-country comparison, alcohol consumption, interviewer effects

Introduction

Alcohol is part of the culture in European countries and plays a non-ignorable role in most people's (social) lives. In many groups and contexts, drinking alcohol is socially accepted, and even encouraged (Paton-Simpson, 2001; Astudiollo et al., 2013). With Europe having the highest proportion of current drinkers, the highest prevalence of heavy episodic drinking, and consuming about a quarter of the total alcohol consumed worldwide (WHO, 2014), it can be regarded the heaviest drinking region in the world.

The prevalence of alcohol in many countries stands in sharp contrast with its harmful effects on health and general well-being. According to the WHO Global status report on alcohol and health 2014 (WHO, 2014), about 13% of deaths and 13% of the disease and injury burden in Europe can be attributed to alcohol consumption. Alcohol has been causally related to an increased risk of intentional and unintentional injuries, certain cancers, cardiovascular and gastrointestinal diseases, and neurological conditions (see Gutjahr, Gmel & Rehm, 2001 for an overview). In addition to negative health effects on drinkers themselves, other individuals are frequently harmed, psychologically as well as physically (Bellis et al., 2016). The harmful effects of alcohol are, at least superficially, common knowledge (European Commission, 2010).

Considerable variation in alcohol consumption patterns exists across countries and across sociodemographic groups within countries. In economically developed countries, abstinence rates are lower but risky drinking is not necessarily more common (Grittner, Kuntsche, Gmel & Bloomfield, 2012). A second country-level factor is drinking culture. Conventionally, a distinction has been made between 'wet' and 'dry' drinking cultures (Room, 1989). In 'wet' drinking culture countries, alcohol is widely available, drinking alcohol (especially wine) is part of daily life, abstinence rates are low and consumption frequencies high, but amounts consumed at any one occasion are moderate. Southern European countries such as France and Italy serve as typical examples. In 'dry' drinking cultures, availability of alcohol is much more restricted, and drinking is not so much a part of daily life, abstinence rates are higher and consumption frequencies low, but amounts consumed at any one occasion (commonly spirits) can be relatively heavy. Northern European countries such as Norway and Sweden serve as typical examples. Although volumes of consumed alcohol and beverage preferences in Europe appear to have been converging in the past decades (Simpura & Karlsson, 2001), important cross-country differences in drinking patterns remain (WHO, 2012).

The most robust finding at the individual level is that men consume more alcohol and do so more frequently (Mäkela et al., 2006), partially because of different drinking norms set for males (Lemle & Mishkind, 1989; Iwamoto, Cheng, Lee, Takamatsu & Gordon, 2011). The gender gap remains substantial even though some evidence for convergence has been observed (Holmila & Raitasalo, 2004). Associations of drinking patterns with other individual factors are less consistent. Younger people tend to drink less frequently, but larger amounts when they do whereas older people tend to drink small amounts of alcohol at a higher frequency (WHO, 2014). People who are educated are expected to engage less in unhealthy behaviours as they may know better (Kenkel, 1991) but studies have observed more drinkers and more drinking among people with a higher socioeconomic status (WHO, 2014).

Research on individual and societal factors affecting alcohol consumption and research to support health policy concerning alcohol consumption require accurate and relevant data on people's

alcohol consumption. Surveys are commonly used to gather this data. The main alternative is to rely on population-level sales or production figures to derive estimates of average per capita alcohol consumption. But such estimates only indicate average consumption volumes in a population and hide differences in consumption patterns (e.g. heavy episodic drinking) and differences across sociodemographic groups. Surveys are much better equipped to produce estimates of alcohol consumption patterns in general and alcohol consumption (volume and patterns) in different subgroups in the population. This information is, for example, valuable to develop an effective prevention policy. The survey approach has nonetheless not been without criticism. Indeed, many have long voiced concerns about the quality of self-reported alcohol consumption (see Midanik, 1988 for an early overview of validity studies). The data quality depends on the circumstances and procedures of the survey data collection (Del Boca & Noll, 2000).

An important class of survey errors results from measurement (see Johnson, 2014 for an overview of survey errors in substance use surveys). Poorly designed measurement instruments and respondents being unable or unwilling to provide accurate answers contribute to measurement errors. When the questionnaire is administered face-to-face, not only the measurement instrument and the respondents but also the interviewers are likely to contribute to measurement error. This may be particularly the case for difficult and sensitive questions. Difficult questions may implicitly entice interviewer interventions (e.g. simplifying the question, clarification of ambiguous concepts) or explicitly require them (e.g. probing incomplete or inadequate answers). Sensitive questions, on the other hand, are suspect of over- and underreporting certain behaviours on the basis of the prevailing social norms, especially in interviewer-administered surveys (Tourangeou & Yan, 2007). In addition to a possible overall effect of an interviewer's presence, particular interviewer interventions can signal the respondent which answers are supposed to be more acceptable. Such unintended interviewer interventions resulting from difficulty or sensitivity can have a damaging impact on data quality (Fowler, Mangione & Louis, 1992).

Each interviewer risks biasing the answers in one way or the other, by certain social norms being linked to his or her appearance, and by how he or she reads the questions and interacts with the respondent. On net, these specific interviewer biases increase the variability in survey estimates (O'Muircheartaigh & Campanelli, 1989). Large interviewer effects have been observed in the past rounds of the ESS (Beullens & Loosveldt, in press). Interviewer effects have been observed not only for attitudinal questions but also for factual questions (Groves & Magilavy, 1986), including health-related behaviours such as alcohol (Davis, Thake & Vilhena, 2010) and other substance use (e.g. Johnson, Fendrich, Shaligram, Garcy & Gillespie, 2000).

This paper investigates how patterns of alcohol consumption, in terms of frequency and amounts consumed, vary across Europe, and how they relate to key sociodemographic background variables, age, gender, and education level. In addition, this paper evaluates the extent to which these substantive results, drawn from the ESS round 7 health inequalities module, are affected by taking into account potential interviewer effects in measures of alcohol consumption. Such evaluations are rarely conducted for substantive research based on ESS data (Beullens & Loosveldt, in press).

The following section first elaborates on the operationalization of the different dimensions of alcohol consumption in the health inequality module of ESS round 7, drawing attention to particularities of the questions that may increase the risk of measurement error. The ESS measurement instrument for alcohol consumption was designed by a team of experts and the ESS Core Scientific Team (European Social Survey, 2015). It attempts to combine standardization

(essentially the same questions) with local adaptation (country-specific common beverages and quantities), thereby attempting to address some important concerns about the comparability of alcohol consumption across countries (Bloomfield, Stockwell, Gmel & Rehn, 2003). Although care has been taken in the design of the measurement instrument for alcohol consumption in the ESS, as described in the following section, questions on alcohol consumption still remain relatively difficult and sensitive, and therefore prone to unintended interviewer interventions.

Alcohol consumption measurement in the European Social Survey

Three dimensions of alcohol consumption are measured in ESS round 7, namely frequency of alcohol consumption, quantity of alcohol consumed, and frequency of binge drinking (European Social Survey, 2015). These three dimensions are derived from the AUDIT-C (Alcohol Use Disorders Identification Test – Consumption questions) screening instrument (Bush et al., 1998). The dimensions can be operationalized in different ways, ranging in complexity from single questions on ‘typical’ consumption to sets of within-location beverage- and container-specific frequency and quantity questions (Casswell, Huckle & Pledger, 2002). In ESS round 7, frequency of alcohol consumption and frequency of binge drinking are measured by single items. Quantity of alcohol consumption is measured by two items, one for weekdays (Monday to Thursday) and one for weekend days (Friday to Sunday). The following paragraphs further describe these four alcohol consumption items.

The frequency of alcohol consumption item asks how often the respondent had a drink containing alcohol in the last twelve months. Seven response options are provided, ranging from ‘Every day’ to ‘Never’. This typical drinking frequency question being closed-ended with response options indicating different rates of occurrence is in keeping with the recommendations developed at the Skarpö conference on alcohol consumption measurement (Dawson & Room, 2000). The closed-ended format is thought of as less burdensome than an open-ended format since people would not keep a running tally of having consumed alcohol over the year and would find it difficult to recall and count all events, unless there is only a small number of events to recall. Rates of occurrence are more naturally used for moderate to high frequency behaviours and relatively long time frames (Blair & Burton, 1987). They can be sufficiently accurate, at least for regular behaviours (Menon, 1993). However, alcohol consumption is not necessarily regular for most respondents (Alanko, 1984). This question on typical drinking frequency may therefore require a tough cognitive process, especially given the long (albeit certainly relevant; Dawson & Room, 2000) recall period. Respondents may not be able or willing to estimate typical drinking frequency and to consider the entire time frame.

The amount of alcohol consumed during weekdays item asks the respondent to think about the last day they were drinking alcohol on a Monday, Tuesday, Wednesday or Thursday, and to indicate how many of each beverage-quantity combination (e.g. a glass of wine, a bottle of wine, a can of beer) they had on that day. The amount of alcohol consumed during weekend days item similarly asks the respondent to consider the last time they were drinking alcohol on a Friday, Saturday or Sunday. Country-specific showcards were developed with examples of commonly consumed beverages in commonly consumed quantities. All countries’ showcards include at least a glass of beer and a glass of wine, but the quantities and average strengths may vary. For example, both the showcard in Spain and Czech Republic include a small glass of beer and a large glass of beer. For Spain a small glass of beer refers to one of 200 ml and a large glass to one of 330 ml (both with an estimated

average 5.0% alcohol). For Czech Republic a small glass of beer refers to one of 330 ml and a large glass to one of 500 ml (both with an estimated average 3.5% alcohol). In addition to country-specific quantities of beverages common in all countries, showcards include country-specific popular beverages. The showcard for Poland, for example, includes a shot (40 ml), a small bottle (200 ml) and a large bottle (500 ml) separately of flavoured vodka (36.0% alcohol) and of clear vodka (40.0%). These examples illustrate the challenges of collecting comparable data in countries with different drinking cultures.

Beverage-specific questions generate higher (and thus supposedly more accurate) amounts of alcohol consumed (Feunekens, van't Veer, van Staveren & Kok, 1999; Stockwell et al., 2004; Ekholm, Strandberg-Larsen & Grønbaek, 2011). Country-specific beverages and quantities to reflect individual countries' typical patterns are useful (Dawson & Room, 2000) but respondents may still experience some difficulty in matching what they drank to the (beverage-specific) 'standard drinks'. Standard quantities can diverge substantially from self-serving quantities (Banwell, 1999; White et al., 2003; Kaskutas & Graves, 2000) and so can 'standard' strengths, especially for mixed drinks. Even though questions on actual amounts consumed does not require respondents to summarize possibly very different quantities consumed over a certain period, such questions may remain quite difficult as recall ability diminishes rapidly already after a few days (Ekholm, 2004).

The frequency of 'binge drinking' (defined as heavy drinking occasions) item asks how often the respondent drank at least 48g (women) or 64g (men) of alcohol on a single occasion in the last 12 months. Five response options are provided, ranging from 'Daily or almost daily' to 'Never'. Country-specific and gender-specific showcards were developed with examples of beverage combinations that approximately contain this amount. For example, the showcard in Spain includes a picture of five large beers for men and a picture of three large beers and a small one for women. The showcard in Czech Republic includes a picture of four large beers and a small one for men and a picture of two large beers and two small ones for women. Similar remarks can be made as for the previous items. Respondents may find it difficult to specify a rate of occurrence because (heavy) alcohol consumptions is often not regular, the recall period is long (and may not be explicitly considered), and they have to match what they drink to the proposed example combinations of 'standard drinks'. In addition, 'an occasion' is not clearly defined (Dawson & Room, 2000).

The above evaluation of the alcohol consumption measurement approach in the ESS shows that questions on alcohol consumption are necessarily quite difficult for respondents if they are to produce valuable data. Question difficulty results mainly from poor recall, estimation of 'typical' frequency, and estimation of consumption in terms of standard drinks.

In addition to the questions being necessarily rather difficult, they are necessarily rather sensitive in the sense that prevailing social norms may determine which answers are socially acceptable and which are not (Tourangeau & Yan, 2007). The question format can partially alleviate the resulting risk of social desirability bias. The response options for the frequency of drinking item and the frequency of binge drinking item being presented in descending order of frequency (starting with 'Everyday' and 'Daily or almost daily', respectively) may invite less social desirability. Respondents who drink at a high frequency are thereby signalled that their response is within acceptable norms (Dawson & Room, 2000). However, the question format cannot entirely make up for the sensitive nature of their content.

This overview identified particular issues with the alcohol consumption questions included in ESS round 7. The questions are relatively difficult and sensitive, and may therefore be prone to unintended interviewer interventions that increase measurement errors.

The next section describes the measures that are derived from these alcohol consumption items in the health inequalities module of ESS round 7, and the modelling approach taken to estimate the effects of some key sociodemographic background variables with and without explicitly taking into account potential interviewer effects in the alcohol consumption measures.

Methods

We used data from 37,957 individuals in the 21 countries that participated in ESS round 7 and were included in the second data release (European Social Survey, 2014). The following five outcome measures of alcohol consumption patterns are derived from the four alcohol consumption items.

One-year abstinence is measured by a binary variable, set to 1 for respondents answering 'Never' in response to the frequency of alcohol consumption (in the last twelve months) item. The next four variables are calculated only for drinkers, i.e., those that did not abstain from any alcohol consumption in the past year.

Frequent drinking is also measured by a binary variable, set to 1 for non-abstaining respondents answering 'Daily' or 'Several times a week' in response to the frequency of alcohol consumption (in the last twelve months) item.

Amount consumed when last drinking on a weekday and *amount consumed when last drinking on a weekend day* are measured by continuous variables corresponding to the respective items for the amount of alcohol, consumed by non-abstaining respondents. The amounts are measured in grams of alcohol and are derived by adding over all beverages consumed the last time the respondent drank alcohol on a weekday and the last time he or she drank alcohol on a weekend day, respectively.

Frequent binge drinking is measured by a binary variable, set to 1 for non-abstaining respondents answering 'Daily or almost daily', 'Weekly' or 'Monthly' in response to the frequency of binge drinking (in the last twelve months) item.

Three respondent-level sociodemographic variables are included, namely gender, age and education level. Age is recoded into three broad categories to allow for a non-linear age effect. The 'young' age group consists of people aged up to 35 years (36% overall), the 'middle' age group of people aged between 36 and 55 (29% overall), and the 'older' age group of people more than 55 years (37% overall). The middle age group serves as the reference group. Education level was recoded into two broad categories, people with and people without a degree of higher education (overall 22% and 78%, respectively). The non-higher education group serves as the reference group.

Each alcohol consumption outcome measure is modelled in two steps. In a first step (model 1), a standard fixed effects regression model is estimated for each country. A linear regression model is estimated for the two continuous outcomes (amount consumed when last drinking on a weekday, amount consumed when last drinking on a weekend day); a logistic regression model is estimated for the three binary outcomes (one-year abstinence, frequent drinking, frequent binge drinking).

Respondents' gender, age category and education category are jointly included as explanatory variables. The results are used for a classic substantive analysis on the effects of key sociodemographic background variables on alcohol consumption.

In a second step (model 2), the hierarchical structure of the data resulting from respondents not being independently distributed but being clustered within different interviewers is explicitly taken into account by allowing random intercepts in the alcohol consumption outcome measures. The results are used to evaluate the extent to which the substantive results are 'contaminated' (O'Muircheartaigh, 1999) by interviewers affecting the measurement of alcohol consumption. The intra-interviewer correlations (ICC's) are also estimated from this model, as indications of the interviewer effect on the distribution of the alcohol consumption outcome measures.

Results

Before delving into the effects of the key sociodemographic background variables, the following two sections provide, first, a summary overview of the alcohol consumption measures in the 21 European countries and, second, the estimated interviewer effects for these measures.

Cross-country comparison of the alcohol consumption measures

Summary measures of the alcohol consumption measures are presented in Table 1. Strong variation can be observed across European countries with regard to one-year abstinence, drinking frequency, amounts consumed and binge drinking.

Table 1: Summary measures of alcohol consumption outcome measures

Country	One-year abstinence	Daily drinking	Frequent drinking (several times a week)	Amount consumed weekday	Amount consumed weekend	Frequent binge drinking (at least once a month)
	%	%	%	Mean	Mean	%
AT	22.78	9.39	34.89	28.13	43.45	34.41
BE	17.10	11.99	40.44	23.47	41.28	36.46
CH	14.38	11.56	35.63	20.65	34.49	28.44
CZ	24.65	5.53	20.19	45.49	68.90	43.84
DE	11.22	8.01	33.41	20.83	37.26	35.17
DK	8.74	12.13	44.08	28.79	63.91	42.27
EE	22.05	2.20	11.94	23.65	49.92	31.55
ES	25.59	21.00	39.46	14.01	32.31	23.68
FI	14.80	1.92	15.97	25.35	57.41	38.69
FR	18.80	16.44	37.15	16.42	31.28	23.60
GB	19.52	8.74	41.39	36.72	62.39	48.80
HU	48.44	6.28	21.50	35.58	78.51	23.19
IE	25.46	3.40	21.56	43.17	85.29	60.96
IL	70.91	5.73	26.14	32.69	43.32	39.44
LT	31.35	2.50	13.06	40.40	82.28	38.01
NL	19.71	15.93	47.43	18.67	35.08	30.58
NO	11.77	0.57	18.88	30.84	63.74	41.25
PL	27.11	3.17	13.19	29.11	55.41	26.04
PT	33.37	33.55	47.40	24.49	33.49	25.36
SE	12.46	1.99	19.93	28.94	53.38	48.34
SI	22.98	9.19	25.73	21.61	27.95	21.19

Abstinence

One-year abstinence rates vary strongly across countries, between 9% (Denmark) and 71% (Israel). In the Nordic countries in general, relatively few people (9-15%) did not have any alcoholic drink in the past year. Israel has the highest abstinence rate (71%) and appears to be a special case among the countries considered. It is the only country where a majority of the people abstained in the past year. Other countries with fairly high abstinence rates are Hungary, Portugal and Lithuania.

Frequent drinking

Among the drinking population, a considerable proportion in some countries drinks daily. This is particularly the case for Portugal, Spain and France (16-34%). In the Nordic countries (except Denmark), in contrast, up to 2.5% of the people drinks daily. The daily drinking rate in Denmark is closer to the rate in Belgium and the Czech Republic (about 12%). Still, with regard to this indicator of alcohol consumption, the traditional distinction between 'wet' drinking cultures and 'dry' drinking cultures appears to remain quite relevant.

Taking a closer look at the proportion that drinks at least several times a week (referred to as 'frequent drinking'), a slightly different pattern emerges. with rates in some Western European countries (the Netherlands, Belgium, the United Kingdom, 40-47%) and Denmark (44%) approximating and partially exceeding the rates in Portugal, Spain and France (37-47%).

Amounts consumed when last drinking

The amounts of alcohol consumed when last drinking also varies strongly across countries and between weekdays and weekend days. The amount consumed when last drinking on a weekend day, (28-79g) exceeds the amount consumed when last drinking on a weekday (14-45g) in all countries. The two tend to move together. In Spain and France, the amounts consumed when last drinking on a weekday (14-16g) and when last drinking on a weekend day (31-32g) are fairly small. The amounts for Portugal are only slightly higher (24g for weekdays, 33g for weekend days). The amounts consumed when last drinking on a weekday and when last drinking on a weekend day are fairly large in the Czech Republic, Lithuania, the United Kingdom and Ireland (36-45g for weekdays, 62-85g for weekend days).

Frequent binge drinking

In the countries where the largest amounts of alcohol were consumed when last drinking, the rates of frequent binge drinking (at least once a month) are also quite high. This is especially the case for Ireland, where the majority of the people binge drink at least once a month, and the United Kingdom, where almost half the people do. High rates are also observed for the Nordic countries (39-48%). The rates are relatively low in Portugal, Spain and France (24-25%), as well as Slovenia and Hungary. Remarkably, still one in five to one in four people drinks a large amount of alcohol corresponding to a 'binge' at least once a month in these countries.

The next section provides a first evaluation of the impact of the interviewers on these results. Intra-interviewer correlations are calculated as indications of the existence of systematic differences between interviewers in the registered alcohol consumption.

Interviewer effects on five alcohol consumption measures

The estimated intra-interviewer correlations (ICC's) for the five alcohol consumption measures in the 21 countries are presented in Table 2 (ICC's exceeding 0.10 bold-faced). For most countries, the interviewer effects in the five alcohol consumption measures are substantial, as expected. This is particularly the case for Israel, Lithuania, Hungary the Czech Republic, Estonia and Portugal, where the ICC exceeds 0.10 for each of the measures. Only in Finland are the ICC's nearly negligible (all between zero and 0.05).

Table 2: Estimated intra-interviewer correlations (ICC's) for the alcohol consumption outcome measures

Country	One-year abstinence	Frequent drinking	Amount consumed weekday	Amount consumed weekend	Frequent binge drinking
AT	0.16	0.06	0.16	0.15	0.19
BE	0.11	0.01	0.02	0.02	0.06
CH	0.12	0.01	0.08	0.10	0.10
CZ	0.16	0.22	0.24	0.28	0.24
DE	0.08	0.01	0.03	0.09	0.06
DK	0.14	0.00	0.04	0.03	0.03
EE	0.21	0.10	0.11	0.21	0.15
ES	0.09	0.02	0.08	0.11	0.09
FI	0.00	0.02	0.01	0.00	0.05
FR	0.21	0.05	0.06	0.13	0.06
GB	0.16	0.05	0.06	0.05	0.07
HU	0.22	0.36	0.20	0.13	0.25
IE	0.11	0.08	0.18	0.10	0.12
IL	0.48	0.13	0.16	0.26	0.44
LT	0.16	0.31	0.18	0.20	0.36
NL	0.14	0.05	0.06	0.05	0.08
NO	0.06	0.03	0.08	0.10	0.05
PL	0.19	0.00	0.13	0.14	0.15
PT	0.10	0.14	0.14	0.14	0.14
SE	0.04	0.01	0.10	0.09	0.06
SI	0.22	0.03	0.09	0.05	0.10

The ICC's for the one-year abstinence measure are the most substantial, ranging between zero (Finland) and a staggering 0.48 (Israel), with half of the ICC's exceeding 0.14. The large interviewer effects for this measure are somewhat surprising. Whether or not someone had any alcohol in the previous year may not appear a too daunting question. The long reference period (the past 12 months) may have contributed to the large observed interviewer effects. The ICC's for the amounts consumed when last drinking and for the frequent binge drinking measure are slightly lower. As expected on the basis of a relatively lower question difficulty level, the ICC's for the frequent (several times a week) drinking measure are the lowest, with 'only' half the countries' ICC exceeding 0.05.

The overview confirms earlier studies observing large interviewer effects and large country difference in interviewer effects in the ESS (e.g. Beullens & Loosveldt, in press), and suggests that, although the alcohol consumption measures are prone to elicit interviewer effects, some countries are systematically better at avoiding them.

Individual determinants of alcohol consumption

Gender

The estimated gender effects on one-year abstinence, drinking frequency, amounts consumed and binge drinking in the fixed effects model (model 1) and the random intercept model (model 2) are presented in Table 3 (estimates significant at the 5% significance level bold-faced).

Table 3: Estimated gender effects (women versus men) on the alcohol consumption outcome measures for the fixed effects model (model 1) and the random intercept model (model 2)

	One-year abstinence (odds ratio)		Frequent drinking (odds ratio)		Amount consumed weekday		Amount consumed weekend		Frequent binge drinking (odds ratio)	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
AT	2.61	3.03	0.32	0.31	-14.23	-13.42	-18.52	-17.62	0.32	0.28
BE	1.43	1.42	0.44	0.43	-13.68	-13.78	-20.60	-20.77	0.58	0.57
CH	2.14	2.29	0.41	0.41	-10.82	-11.26	-17.43	-18.10	0.52	0.48
CZ	1.11	1.13	0.22	0.17	-17.27	-16.15	-29.17	-28.93	0.48	0.41
DE	1.67	1.70	0.30	0.30	-10.14	-9.95	-18.09	-18.40	0.52	0.50
DK	2.27	2.36	0.47	0.47	-9.27	-9.50	-22.69	-22.57	0.63	0.63
EE	1.63	1.95	0.19	0.16	-16.63	-16.62	-41.15	-43.91	0.26	0.25
ES	2.44	2.59	0.32	0.32	-7.35	-7.39	-15.15	-15.21	0.43	0.41
FI	1.62	1.62	0.36	0.35	-12.58	-12.63	-29.65	-29.65	0.39	0.38
FR	2.23	2.61	0.34	0.34	-7.28	-7.29	-16.69	-16.71	0.40	0.38
GB	1.49	1.55	0.57	0.54	-16.43	-16.96	-24.59	-24.22	0.62	0.61
HU	4.14	5.75	0.16	0.08	-23.36	-24.03	-39.87	-42.15	0.17	0.14
IE	1.40	1.38	0.43	0.40	-20.94	-19.36	-42.85	-42.82	0.64	0.59
IL	3.29	4.90	0.50	0.43	-6.02	-5.43	-11.64	-8.45	0.29	0.21
LT	2.39	2.46	0.15	0.12	-29.26	-26.98	-71.81	-67.54	0.24	0.15
NL	1.48	1.65	0.52	0.51	-9.79	-9.46	-20.77	-20.62	0.41	0.39
NO	1.42	1.40	0.42	0.41	-13.58	-13.65	-28.88	-29.37	0.58	0.57
PL	3.10	3.46	0.23	0.23	-23.13	-23.66	-33.31	-34.01	0.30	0.26
PT	5.58	6.62	0.36	0.29	-15.02	-13.40	-17.81	-16.73	0.16	0.13
SE	1.58	1.62	0.53	0.53	-13.80	-14.47	-20.93	-20.93	0.65	0.64
SI	1.99	2.34	0.29	0.28	-11.15	-10.85	-16.29	-16.48	0.29	0.28

The fixed effects model estimates show that women's alcohol consumption is substantially lower in both frequency and quantity than men's. In all countries, women are more likely to have abstained from any alcohol consumption in the previous year. The women-men abstinence odds ratio ranges between 1.1 (the Czech Republic) and 5.6 (Portugal). The effect is significant in all but one country (the Czech Republic). In addition, women who do drink are less likely to drink very frequently (several times a week) in all countries. The men-women frequent drinking odds ratio ranges between $1/0.57 = 1.8$ (the United Kingdom) and $1/0.15 = 6.8$ (Lithuania). The effect is significant in all countries. Women also report smaller amounts of alcohol consumed both when last drinking on a weekday and when last drinking on a weekend day in all countries. The gender difference ranges between 6g (Israel) and 29g (Lithuania) for weekdays and between 12g (Israel) and 72g (Lithuania) for weekend days. The difference is significant in all countries. Women are also less likely to binge drink at least once a month in all countries. The men-women binge drinking odds ratio ranges between $1/0.65 = 1.5$ (Sweden) and $1/0.16 = 6.2$ (Portugal). The effect is significant in all countries. When potential interviewer effects are taken into account by allowing random intercepts (model 2), the observed gender effects do not change in direction or significance status for any of the alcohol consumption outcome measures.

Age

The estimated regression coefficients of age group on one-year abstinence, drinking frequency, amounts consumed and binge drinking in the fixed effects model (model 1) and the random intercept model (model 2) are presented in Table 4 (estimates significant at the 5% significance level bold-faced).

The association between age and the different dimensions of alcohol consumption patterns is not as consistent as for gender. In most countries, both people aged 35 or younger and people aged 55 or older tend to be more likely than the middle age group to have abstained from any alcohol consumption in the previous year. The young-middle age abstinence odds ratio ranges between 0.7 (Israel) and 3.9 (Lithuania). Only in two countries, Israel and Slovenia, young people are significantly *less* likely than middle-aged people to have abstained from any alcohol consumption. In eight countries, young people are significantly more likely than middle-aged people to have abstained. The old-middle age abstinence odds ratio ranges between 0.9 (Germany) and 3.3 (Poland). In 11 countries, older people are significantly more likely than middle-aged people to have abstained from any alcohol consumption. When potential interviewer effects are taken into account by allowing random intercepts (model 2), Austria is added to this list, adding somewhat to the evidence of abstinence being more common among the old.

In most countries, people aged 35 or younger tend to be less likely, and people aged 55 or older tend to be more likely, than the middle age group to drink alcohol several times a week. The young-middle age frequent drinking odds ratio ranges between 0.3 (Slovenia) and 1.2 (Israel). Israel is the only country where young people are more likely to drink several times a week but the effect is not significant. In 17 countries, young people are significantly less likely than middle-aged people to drink several times a week. The old-middle age frequent drinking odds ratio ranges between 0.7 (Estonia) and 2.6 (Portugal). Only in two countries, Estonia and Lithuania, older people are less likely to drink several times a week, but the effect is not significant. In 14 countries, older people are significantly more likely than middle-aged people to drink several times a week. These conclusions are unaffected by allowing random intercepts (model 2) to take into account potential interviewer effects.

In the majority of the countries, people aged 35 or younger tend to report larger, and people aged 55 or older tend to report smaller amounts of alcohol consumed, than the middle age group when last drinking on a weekday, but the differences are not very large. The young-middle age difference in alcohol consumption ranges between -7g (Lithuania) and 14g (Norway). In none of the few countries with a negative age difference this difference is statistically significant. In six countries, younger people report significantly larger amounts of alcohol consumed than middle-aged people when last drinking on a weekday. The old-middle age difference ranges between -10g (the Czech Republic) and 4g (Spain). In two countries, the Czech Republic and Estonia, older people report significantly smaller amounts of alcohol consumed when last drinking on a weekday. In one country, Spain, older people report significantly larger amounts of alcohol consumed when last drinking on a weekday. When potential interviewer effects are taken into account by allowing random intercepts (model 2), older people in Switzerland also report significantly larger amounts, adding to the mixed evidence of larger amounts being consumed by older people in some countries (Spain and Switzerland) but smaller amounts in others (the Czech Republic, Estonia).

Table 4: Estimated age effects on the alcohol consumption outcome measures for the fixed effects model (model 1) and the random intercept model (model 2)

Younger versus middle age group										
	One-year abstinence (odds ratio)		Frequent drinking (odds ratio)		Amount consumed weekday		Amount consumed weekend		Frequent binge drinking (odds ratio)	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
AT	1.40	1.49	0.63	0.59	-1.73	-1.54	6.02	6.52	1.01	1.03
BE	1.13	1.11	0.36	0.36	8.06	8.18	5.40	5.47	1.08	1.11
CH	1.12	1.19	0.49	0.49	0.54	0.70	14.76	15.16	1.75	1.90
CZ	2.92	3.29	0.56	0.53	3.79	3.76	10.49	5.88	0.63	0.55
DE	0.84	0.81	0.40	0.39	-0.29	-0.06	11.97	12.31	1.42	1.48
DK	1.03	1.07	0.37	0.37	3.35	2.52	39.88	39.15	1.55	1.55
EE	1.62	1.79	0.88	0.89	-1.97	-2.85	6.71	4.38	0.88	0.86
ES	1.00	1.01	0.41	0.40	-0.86	-1.23	11.24	11.09	1.48	1.51
FI	1.79	1.79	0.32	0.32	0.09	0.01	11.60	11.60	0.70	0.68
FR	1.90	1.80	0.53	0.48	0.51	0.62	4.66	4.39	1.12	1.07
GB	1.27	1.21	0.47	0.46	3.59	2.53	13.40	13.36	0.85	0.85
HU	1.08	1.02	0.37	0.38	-4.07	-3.57	20.49	18.98	0.95	0.95
IE	1.16	1.31	0.63	0.59	10.08	10.26	17.15	18.33	0.96	0.95
IL	0.65	0.50	1.22	1.17	8.52	8.38	16.07	16.58	1.90	2.36
LT	3.90	4.22	0.85	0.63	-6.72	-5.42	-18.70	-19.17	0.47	0.41
NL	1.27	1.09	0.42	0.40	4.42	3.97	13.12	13.19	1.38	1.51
NO	2.14	2.16	0.47	0.45	13.70	12.04	28.40	26.92	1.45	1.42
PL	1.07	1.08	0.75	0.75	-1.79	-2.20	2.55	2.57	1.17	1.20
PT	1.45	1.46	0.40	0.37	12.63	12.46	18.04	19.82	1.38	1.40
SE	1.95	1.95	0.36	0.36	7.33	6.29	16.89	16.07	0.80	0.78
SI	0.66	0.58	0.29	0.29	1.11	1.86	10.44	11.10	1.88	1.92
Older versus middle age group										
	One-year abstinence (odds ratio)		Frequent drinking (odds ratio)		Amount consumed weekday		Amount consumed weekend		Frequent binge drinking (odds ratio)	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
AT	1.30	1.43	1.52	1.57	-3.33	-2.42	-9.11	-7.84	0.68	0.75
BE	1.06	1.06	1.09	1.11	0.13	0.36	-10.20	-10.01	0.68	0.66
CH	0.92	0.96	2.20	2.23	3.64	3.66	-2.27	-2.05	0.91	0.89
CZ	1.97	2.36	2.34	2.61	-9.94	-8.55	-24.66	-22.75	0.44	0.33
DE	0.90	0.89	1.51	1.51	2.05	1.85	-5.48	-5.43	0.89	0.87
DK	1.05	1.01	2.34	2.34	-4.24	-3.84	-22.01	-22.09	0.77	0.79
EE	2.51	2.61	0.71	0.73	-6.54	-6.59	-17.62	-15.86	0.50	0.44
ES	1.93	2.03	2.44	2.46	3.68	3.41	-5.76	-5.95	0.42	0.41
FI	2.41	2.41	1.26	1.26	-3.58	-3.65	-24.55	-24.55	0.40	0.39
FR	1.04	0.87	2.14	2.27	1.78	1.69	-8.44	-8.58	0.47	0.49
GB	1.38	1.49	1.55	1.58	-2.42	-1.85	-20.89	-20.21	0.54	0.53
HU	1.70	2.10	1.54	2.08	-1.46	-1.15	-3.72	-2.33	0.77	0.69
IE	1.86	1.90	1.21	1.09	-1.63	-1.16	-25.11	-22.98	0.72	0.77
IL	1.11	1.17	1.26	1.30	-2.87	-2.12	-10.18	-8.58	0.70	0.59
LT	2.53	2.29	0.95	0.86	-2.96	-1.40	-24.46	-21.29	0.44	0.43
NL	0.94	0.95	1.99	2.03	0.54	0.32	-10.85	-11.28	0.51	0.50
NO	1.79	1.79	1.88	1.92	-2.43	-2.22	-22.32	-21.21	0.70	0.70
PL	3.29	3.78	1.04	1.04	-5.11	-4.19	-16.01	-13.80	0.35	0.33
PT	1.97	1.82	2.59	2.89	-0.31	-0.38	-4.08	-2.31	0.54	0.50
SE	1.31	1.34	1.68	1.68	-6.12	-4.15	-14.83	-13.10	0.76	0.77
SI	1.30	1.31	2.25	2.32	2.22	3.26	-4.63	-4.73	0.80	0.78

A similar but more distinct pattern emerges for amounts of alcohol consumed when last drinking on a weekend day. In most countries, people aged 35 or younger also tend to report larger, and people aged 55 or older report smaller, amounts of alcohol consumed when last drinking on a weekend day. The young-middle age difference ranges between -19g (Lithuania) and 40g (Denmark). Only in Lithuania young people report significantly smaller amounts of alcohol consumed than middle-aged people when last drinking on a weekend day. In 17 countries, young people report significantly larger amounts of alcohol consumed. When potential interviewer effects are taken into account by allowing random intercepts (model 2), younger people also report significantly larger amounts in Austria but no longer in the Czech Republic and France.

The old-middle age difference ranges between -25g (Ireland) and -2g (Switzerland). In 16 countries, older people report significantly smaller amounts of alcohol consumed than middle-aged people when last drinking on a weekend day. When potential interviewer effects are taken into account by allowing random intercepts (model 2), older people also report significantly smaller amounts in Sweden, adding to the evidence of smaller amounts being consumed by older people.

In the majority of the countries, people aged 35 or younger tend to be more likely than the middle age group to binge drink at least once a month. The young-middle age binge drinking odds ratio ranges between 0.5 (Lithuania) to 1.9 (Israel). In seven countries, young people are significantly more likely to binge drink than the middle age group. In three other countries, namely Lithuania, the Czech Republic and Finland, young people are significantly *less* likely to binge drink. In all countries, people aged 55 or older tend to be less likely than the middle age group to binge drink at least once a month. The old-middle age odds ratio ranges between 0.3 (Poland) and 0.9 (Switzerland). In 15 countries, older people are significantly less likely to binge drink than the middle age group. These conclusions are unaffected by allowing random intercepts (model 2) to take into account potential interviewer effects.

Education

The estimated regression coefficients of having achieved higher education on one-year abstinence, drinking frequency, amounts consumed and binge drinking in the fixed effects model (model 1) and the random intercept model (model 2) are presented in Table 5 (estimates significant at the 5% significance level bold-faced). Like age, education level is differently related to the different dimensions of alcohol consumption in different countries. In all countries, people with a degree of higher education are less likely to have abstained from any alcohol consumption in the previous year. The lower versus higher education abstinence odds ratio ranges between $1/0.7 = 1.4$ (the United Kingdom) and $1/0.2 = 5.0$ (France). The effect is significant in all countries. These conclusions are unaffected by allowing random intercepts (model 2) to take into account potential interviewer effects.

In most countries, people with a higher education are also more likely to drink several times a week. The higher versus lower education frequent drinking odds ratio ranges between 0.3 (Portugal) and 2.2 (Norway). Portugal is the only country where people with a higher education are significantly *less* likely to drink alcohol several times a week. In ten other countries, people with a higher education are significantly more likely to drink alcohol several times a week. When potential interviewer effects are taken into account by allowing random intercepts (model 2), people with a higher education are no longer significantly more likely to drink several times a week in Ireland, detracting

somewhat from the evidence for frequent drinking being more common among people with a higher education.

Table 5: Estimated education effects (higher education versus no higher education) on the alcohol consumption outcome measures for the fixed effects model (model 1) and the random intercept model (model 2)

	One-year abstinence (odds ratio)		Frequent drinking (odds ratio)		Amount consumed weekday		Amount consumed weekend		Frequent binge drinking (odds ratio)	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
AT	0.61	0.48	1.23	1.28	1.87	2.16	-9.95	-9.24	1.06	1.26
BE	0.30	0.30	1.51	1.52	0.82	1.45	-5.31	-4.72	1.51	1.48
CH	0.50	0.46	1.68	1.68	3.42	3.27	3.79	4.60	1.07	1.11
CZ	0.50	0.53	1.63	1.88	-2.81	0.13	2.31	6.22	1.28	1.12
DE	0.68	0.68	1.57	1.58	-0.27	-0.13	-3.53	-3.90	0.99	0.96
DK	0.48	0.48	1.67	1.67	-7.99	-8.42	-15.45	-14.99	0.95	0.94
EE	0.48	0.52	1.27	1.21	-3.49	-3.05	-11.43	-9.92	1.16	1.01
ES	0.33	0.34	1.20	1.20	-2.30	-2.43	-0.97	-0.82	1.52	1.51
FI	0.41	0.41	1.60	1.62	-1.44	-1.39	-14.23	-14.23	1.02	0.99
FR	0.20	0.17	1.73	1.77	3.28	3.44	-1.12	-1.49	0.98	0.93
GB	0.70	0.68	1.54	1.52	2.09	1.65	-13.05	-12.06	1.03	1.07
HU	0.57	0.58	0.96	1.06	4.25	4.06	-0.82	-2.96	0.59	0.63
IE	0.45	0.47	1.34	1.35	-8.14	-6.52	-16.48	-12.99	1.26	1.38
IL	0.38	0.37	1.01	0.94	-7.77	-8.34	-10.54	-12.76	1.08	0.91
LT	0.50	0.49	0.88	0.82	-15.05	-13.33	-10.44	-12.07	1.31	1.21
NL	0.41	0.42	1.21	1.20	-2.96	-2.95	-6.72	-6.35	0.94	0.92
NO	0.54	0.57	2.20	2.12	1.24	-0.62	-2.09	-2.23	1.52	1.43
PL	0.43	0.46	1.27	1.27	-4.16	-2.18	-7.20	-3.90	1.11	1.09
PT	0.33	0.25	0.32	0.30	-7.89	-6.39	-7.06	-5.00	1.04	1.31
SE	0.60	0.60	1.31	1.30	-3.78	-5.38	-4.34	-5.80	1.35	1.27
SI	0.34	0.33	1.14	1.15	-0.90	-0.71	-0.29	-0.56	0.70	0.66

In the majority of the countries, people with a higher education report smaller amounts of alcohol consumed when last drinking on a weekday. The higher education difference ranges between -15g (Lithuania) and 4g (Hungary). In 7 countries, people with a higher education report significantly smaller amounts whereas only in France people with a higher education significantly report larger amounts. When potential interviewer effects are taken into account by allowing random intercepts (model 2), people with a higher education no longer report significantly smaller amounts of alcohol consumed in Portugal, detracting somewhat from the evidence for smaller amounts being consumed by people with a higher education.

In most countries, people with a higher education also report smaller amounts of alcohol consumed when last drinking on a weekend day. The higher education difference ranges between -16g (Israel) and 4g (Switzerland). In none of the countries where people with a higher education reported larger amounts is this effect statistically significant. In ten countries, people with a higher education reported significantly smaller amounts when last drinking on a weekend day. When potential interviewer effects are taken into account by allowing random intercepts (model 2), Sweden is added to this list, adding to the evidence for smaller amounts being consumed by people with a higher education.

In almost all countries, people with a higher education are more likely to binge drink at least once a month. The higher versus lower education frequent binge drinking odds ratio ranges between 0.6

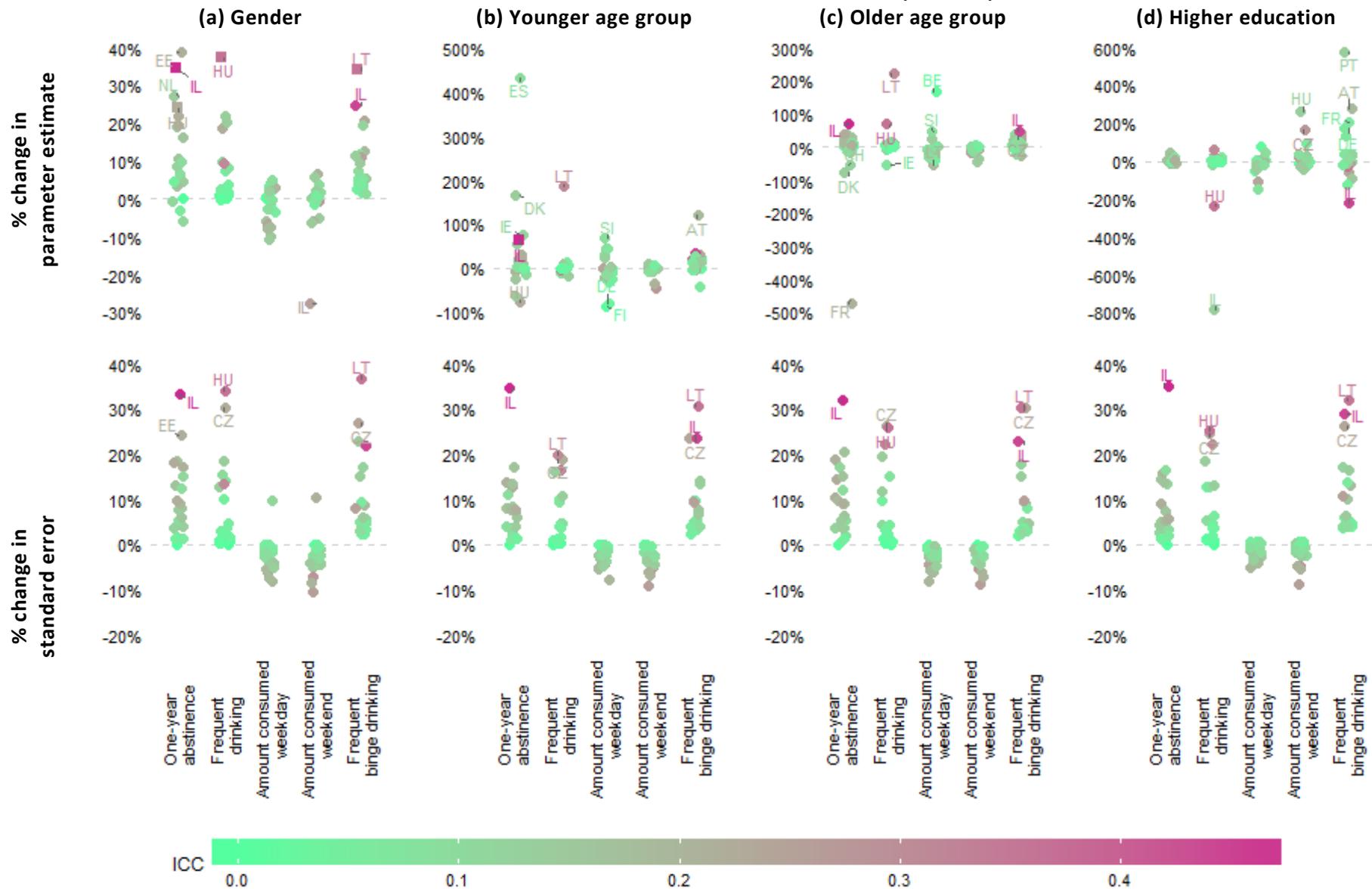
(Hungary) and 1.5 (Spain). Hungary is the only country where people with a higher education are significantly less likely to binge drink. In six other countries, people with a higher education are significantly *more* likely to binge drink. When potential interviewer effects are taken into account by allowing random intercepts (model 2), people with a higher education are no longer significantly less likely to binge drink at least once a month in Hungary and people with a higher education are no longer significantly *more* likely to binge drink at least once a month in Lithuania. This detracts somewhat from the (mixed) evidence for binge drinking being more frequent among highly educated.

The above results illustrate how some sociodemographic variables' effects change in direction and/or statistical significance status when potential interviewer effects are taken into account. Even if conclusions about the direction and statistical significance of an effect are not affected, the magnitudes of the effects and their standard errors may change dramatically. We take a closer look at this in the following paragraphs.

Figure 1 shows the relative changes in the parameter estimates and in the estimates' standard errors for gender (panel a), the younger age group (relative to the middle age group, panel b), the older age group (relative to the middle age group, panel c), and higher education (panel d) over the 21 countries for each alcohol consumption outcome measure. Each dot represents a country. A dot on the dotted horizontal line indicates a country for which the fixed effects model estimate (standard error) is equal to the random intercept model estimate (standard error) for a particular sociodemographic variable and alcohol consumption outcome measure. Dots further from the dotted horizontal line indicate a larger difference between the two estimates (standard errors) relative to the fixed effects model estimate (standard error). Squares are used instead of dots whenever the relative change is so large that the random intercept model estimate is not included in the confidence interval of the fixed effects model estimate, indicating that the two estimates are truly different. The fill colour indicates the interviewer effect in a particular alcohol consumption outcome measure for a particular country, ranging from zero (light green) to 0.5 (purple).

We observe that for most countries, the parameter estimates change only slightly but some changes are significant or substantial. Overall, relatively smaller changes are observed for countries with small interviewer effects (light green) whereas larger changes are observed for countries with larger interviewer effects (purple). A similar pattern is observed for the relative changes in the parameter estimates' standard errors.

Figure 1: Percentage change in parameter estimates and standard errors for the random intercept model (model 2) relative to the fixed effects model (model 1)



Conclusions

This paper investigated how patterns of alcohol consumption, in terms of frequency and amounts consumed, vary across Europe, and how they relate to some key sociodemographic background variables. This paper further evaluated to which extent these substantive results, drawn from the ESS round 7 health inequalities module, are affected by taking into account potential interviewer effects in the alcohol consumption measures.

The cross-country comparison of five alcohol consumption measures (one-year abstinence, frequent drinking, amount consumed when last drinking on a weekday and when last drinking on a weekend day, frequent binge drinking) showed substantial variation in alcohol consumption patterns among European countries. Some evidence emerged for the continuing, although partial, relevance of the 'wet' versus 'dry' drinking cultures distinction. In some countries such as France, abstinence rates are low, people drink quite frequently but relatively small amounts whereas in countries like Norway, people drink less frequently (although abstinence rates are also fairly low) but relatively larger amounts.

Several substantive conclusions can be drawn with regard to the effects of key sociodemographic background variables on alcohol consumption. First, both the frequency and amount of alcohol consumption are higher for men than women in all countries studied. This confirms other research suggesting that important gender differences remain despite some convergence (Holmila & Raitasalo, 2004). Second, both people aged 35 or younger and people aged 55 or older tend to be more likely than the middle age group to have abstained from any alcohol consumption in the previous year in most countries. Third, in many countries older people tend to drink more frequently (several times a week) but smaller amounts, consistent with the suggestion of the WHO Global status report on alcohol and health 2014 (WHO, 2014). There are some exceptions to this overall pattern, such as Spain, where older people report significantly *larger* amounts of alcohol consumed when last drinking on a weekday. Fourth, the association between binge drinking at least once a month and age is mixed, with several countries' younger people being more likely, and several countries' younger people being *less* likely, to binge drink so frequently. Fifth, in many countries people with a higher education are less likely to abstain from any alcohol consumption, are more likely to drink several times a week, more likely to binge drink at least once a month, but report smaller amounts of alcohol consumed.

For most countries, the interviewer effects in the five alcohol consumption measures are substantial, as expected. The interviewer effects vary strongly across countries, ranging from near-zero for Finland to in excess of 0.15 for countries such as Israel, Lithuania, Hungary and the Czech Republic. This is consistent with other research on interviewer effects in general and in the ESS in particular (Beullens & Loosveldt, in press). The main substantive conclusions described in the previous paragraphs continue to hold when potential interviewer effects are taken into account. The parameter estimates, standard errors and conclusions for particular countries can nonetheless change, especially for effects that are less strong (e.g. the effect of education on alcohol consumption versus gender on alcohol consumption) and for effects on outcome measures that are strongly affected by interviewer effects. Thus, for some countries (and for some outcome measures more than for others), the interviewers can have an impact on substantive conclusions. Comparative research could benefit from taking into account, or at least checking for, potential interviewer effects.

References

- Alanko, T. (1984). An overview of techniques and problems in the measurement of alcohol consumption. *Research Advances in Alcohol and Drug Problems*, 8, 209–226.
- Astudillo, M., Connor, J., Roiblatt, R. E., Ibanga, A. K. J., & Gmel, G. (2013). Influence from friends to drink more or drink less: A cross-national comparison. *Addictive Behaviors*, 38(11), 2675–2682.
- Banwell, C. (1999). How many standard drinks are there in a glass of wine? *Drug and Alcohol Review*, 18, 99–101.
- Bellis, M. A., Quigg, Z., Hughes, K., Ashton, K., Ferris, J., & Winstock, A. (2015). Harms from other people's drinking: an international survey of their occurrence, impacts on feeling safe and legislation relating to their control. *BMJ Open*, 5(12), e010112.
- Beullens, K., & Loosveldt, G. (in press). Interviewer effects in the European Social Survey. *Survey Research Methods*.
- Blair, E., & Burton, S. (1987). Cognitive processes used by survey respondents to answer behavioral frequency questions. *Journal of Consumer Research*, 14, 280–288.
- Bloomfield, K., Stockwell, T., Gmel, G., & Rehn, N. (2003). International comparisons of alcohol consumption. *Alcohol Research & Health*, 27(1), 95–109.
- Bush, K., Kivlahan, D. R., McDonell, M. B., Fihn, S. D., & Bradley, K. A. (1998). The AUDIT Alcohol Consumption Questions (AUDIT-C): An effective brief screening test for problem drinking. *Archives of Internal Medicine*, 158, 1789–1795.
- Casswell, S., Huckle, T., & Pledger, M. (2002). Survey data need not underestimate alcohol consumption. *Alcoholism: Clinical and Experimental Research*, 26(10), 1561–1567.
- Davis, C. G., Thake, J., & Vilhena, N. (2010). Social desirability biases in self-reported alcohol consumption and harms. *Addictive Behaviors*, 35(4), 302–311.
- Dawson, D. A., & Room, R. (2000). Towards agreement on ways to measure and report drinking patterns and alcohol-related problems in adult general population surveys: the Skarpo Conference overview. *Journal of Substance Abuse*, 12, 1–21.
- Del Boca, F. K., & Noll, J. A. (2000). Truth or consequences: the validity of self-report data in health services research on addictions. *Addiction*, 95(11), 347–360.
- Ekholm, O. (2004). Influence of recall period on self-reported alcohol intake. *European Journal of Clinical Nutrition*, 58, 60–63.
- Ekholm, O., Strandberg-Larsen, K., Christensen, K., & Grønbaek, M. (2008). Comparison of assessment methods for self-reported alcohol consumption in health interview surveys. *European Journal of Clinical Nutrition*, 62(2), 286–291.
- European Commission (2010). EU citizens' attitudes towards alcohol (Special Eurobarometer No. 331).

European Social Survey (2014). European Social Survey Round 7 Data (2014). Data file edition 2.0. NSD - Norwegian Centre for Research Data, Norway – Data Archive and distributor of ESS data for ESS ERIC.

European Social Survey (2015). Round 7 module on social inequalities in health and their determinants: Question design final module in template. London: Centre for Comparative Social Surveys, City University London.

Groves, R. M., & Magilavy, J. J. (1986). Measuring and explaining interviewer effects in centralized telephone surveys. *Public Opinion Quarterly*, *50*(2), 251–266.

Gutjahr, E., Gmel, G., & Rehm, J. (2001). Relation between average alcohol consumption and disease: an overview. *European Addiction Research*, *7*, 117–127.

Holmila, M., & Raitasalo, K. (2005). Gender differences in drinking: why do they still exist? *Addiction*, *100*(12), 1763–1769.

Iwamoto, D. K., Cheng, A., Lee, C. S., Takamatsu, S., & Gordon, D. (2011). “Man-ing” up and getting drunk: The role of masculine norms, alcohol intoxication and alcohol-related problems among college men. *Addictive Behaviors*, *36*(9), 906–911.

Kaskutas, L. A., & Graves, K. (2000). An alternative to standard drinks as a measure of alcohol consumption. *Journal of Substance Abuse*, *12*, 67–78.

Kenkel, D. S. (1991). Health behavior, health knowledge, and schooling. *Journal of Political Economy*, *99*(2), 287–305.

Lemle, R., & Mishkind, M. E. (1989). Alcohol and masculinity. *Journal of Substance Abuse Treatment*, *6*, 213–222.

Mäkelä, P., Gmel, G., Grittner, U., Kuendig, H., Kuntsche, S., Bloomfield, K., & Room, R. (2006). Drinking patterns and their gender differences in Europe. *Alcohol and Alcoholism*, *41*(Supplement 1), i8–i18.

Menon, G. (1993). The effects of accessibility of information in memory on judgements of behavioral frequencies. *Journal of Consumer Research*, *20*(3), 431–440.

Midanik, L. T. (1988). Validity of self-reported alcohol use: A literature review and assessment. *British Journal of Addicition*, *83*, 1019–1029.

Midanik, L. T., Hines, A. M., Greenfield, T. K., & Rogers, J. D. (1999). Face-to-face versus telephone interviews: Using cognitive methods to assess alcohol survey questions. *Contemporary Drug Problems*, *26*, 673–693.

O’Muircheartaigh, C. A. (1999). An investigation of response variance in sample surveys. London School of Economics and Political Science, London.

Paton-Simpson, G. (2001). Socially obligatory drinking: A sociological analysis of norms governing minimum drinking levels. *Contemporary Drug Problems*, *28*(1), 133–176.

Room, R. (1989). Responses to alcohol-related problems in an international perspective: characterizing and explaining cultural wetness and dryness. Presented at the La ricerca Italiana sulle bevande alcoliche nel confronto internazionale, Santo Stefano Belbo, Italy.

Simpura, J., & Karlsson, T. (2001). Trends in drinking patterns among adult population in 15 European countries, 1950 to 2000: A review. *Nordisk Alkohol & Narkotikatidskrift*, 18, 31–53.

Stockwell, T., Donath, S., Cooper-Stanbury, M., Chikritzhs, T., Catalano, P., & Mateo, C. (2004). Under-reporting of alcohol consumption in household surveys: a comparison of quantity-frequency, graduated-frequency and recent recall. *Addiction*, 99(8), 1024–1033.

Tourangeau, R., & Yan, T. (2007). Sensitive questions in surveys. *Psychological Bulletin*, 133(5), 859–883.

White, A. M., Kraus, C. L., McCracken, L. A., & Swartzwelder, H. S. (2003). Do College Students Drink More Than They Think? Use of a Free-Pour Paradigm to Determine How College Students Define Standard Drinks. *Alcoholism: Clinical & Experimental Research*, 27(11), 1750–1756.

World Health Organization. (2012). Alcohol in the European Union: Consumption, harm and policy approaches.

World Health Organization. (2014). Global status report on alcohol and health, 2014.