

## Different drinking motives, different adverse consequences? Evidence among adolescents from 10 European countries

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### Abstract

**Introduction and Aim.** This study, which builds on previous research demonstrating that drinking motives are associated with adverse consequences, investigates the associations between drinking motives and non-alcohol-attributed adverse consequences and disentangles alcohol-related and direct effects. **Design and Method.** On the basis of a sample of 22 841 alcohol-using 13- to 16-year-olds (50.6% female) from Belgium, Denmark, Estonia, Finland, Ireland, Portugal, Scotland, Slovakia, Switzerland and Wales, structural equation models were used to estimate direct and indirect effects. Additionally, differences across countries were tested in a multigroup analysis. **Results.** The indirect effect (via alcohol use) was greater for injuries and academic problems than for more general outcomes such as life dissatisfaction and negative body image. For social, enhancement and coping motives, we found positive indirect effects (via alcohol use) on injuries and academic problems; the association was negative for conformity motives. The direct effect, that is, the effect above and beyond alcohol use, indicated more negative consequences among those who tended to drink more frequently for coping motives. More negative consequences, such as injuries and negative body image, were also found among those who drink for conformity motives. The pattern of association was largely comparable across countries. **Discussion and Conclusion.** While the actual mean level of drinking motives, alcohol use and adverse consequence varied across countries, the consistency of association patterns implies that drinking motive-inspired health promotion efforts are likely to be beneficial across Europe. This is particularly important for coping drinkers because they are especially prone to adverse consequences over and above their alcohol use. [Wicki M, Kuntsche E, Eichenberger Y, Aasvee K, Bendtsen P, Dankulinová Veselská Z, Demetrovics Z, Dzielska A, Farkas J, de Matos MG, Roberts C, Tynjälä J, Välimaa R, Vieno A. Different drinking motives, different adverse consequences? Evidence among adolescents from 10 European countries. *Drug Alcohol Rev* 2017;36:731–741]

**Key words:** drinking motive, alcohol use, adverse consequence, adolescence, cross-cultural study.

### Introduction

The concept of ‘drinking motives’ has been shown to be particularly helpful in explaining why young people

engage in alcohol use. They predict not only the pattern of alcohol use but also the adverse consequences, including those that are above and beyond the direct effects of alcohol use *per se*; for a review, see [1]. Drinking

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motives have been conceptualised and empirically found to be a final pathway to alcohol use, that is, a gateway that mediates proximal factors like alcohol expectancies and more distal influences, such as personality factors, genetic dispositions, parental drinking habits and cultural differences (e.g. [2–9]). Based on the motivational model of alcohol use [10,11], Cooper [12] developed the Drinking Motives Questionnaire Revised (DMQ-R) to measure four motive categories: social (e.g. ‘because it improves parties and celebrations’); enhancement (e.g. ‘because one likes the feeling’); coping (e.g. ‘to forget about one’s problems’); and conformity (e.g. ‘so one won’t feel left out’). These motive dimensions are characterised by two factors: (i) whether alcohol use is motivated by a desire to avoid a negative incentive (i.e. conformity and coping) or to achieve a positive outcome (i.e. social and enhancement); and (ii) whether the focus is internal and directed towards the pharmacological effects (i.e. coping and enhancement) or is external and directed towards social outcomes, that is, social and conformity [10,11].

The Drinking Motive Questionnaire Revised Short Form (DMQ-R SF) [13] has been validated and used across Europe and North America (e.g. [14–19]). Although mean levels of motives [20] and alcohol use (European School Survey Project on Alcohol and Other Drugs [21]; Health Behaviour in School-aged Children study, HBSC [22]) vary considerably across countries and drinking cultures (e.g. southern vs. northern European drinking culture [23,24]), the actual association between motives and alcohol use patterns has been shown to be relatively comparable: social motives are strongly positively related to drinking frequency, as are enhancement motives to frequency of drunkenness; conformity motives are negatively related to both indicators of alcohol use [1,25].

The associations between drinking motives and adverse consequences are especially pronounced for the two internal motives; for a review, see [1]. Enhancement motives are associated with negative consequences mainly through excessive drinking. In contrast, coping motives exert their effect on adverse consequences both indirectly—via alcohol use—and directly (i.e. independent of the effect via alcohol use). It is argued that drinking to cope may be effective in the short term, but the associated negative attention bias and lack of problem-focused coping lead to adverse long-term consequences [26–28]. A similar but weaker pattern can be found for conformity motives: even though they are correlated with lower alcohol use, they present an elevated risk for adverse consequences that cannot be directly attributed to alcohol use [1]. For social motives, the review [1] could not find a clear pattern across studies.

However, the current literature on drinking motives and adverse consequences suffers from two methodological

limitations that restrict the sound interpretation of findings and comparisons across studies. First, unlike the general epidemiological tradition where consequences are measured independently from exposure [29], almost all studies on the associations between drinking motives and consequences (e.g. [30–36]) measure the extent of alcohol-related adverse consequences by asking respondents about their subjective self-attribution, for example, ‘Have you had a fight or an argument because of your drinking?’ [37]. This predictor-criterion contamination leads to an attribution bias and a clear underestimation of the prevalence of adverse consequences [37]. The second flaw concerns the fact that quantity and frequency of alcohol use are often not taken into account when studying the link between motives and possible consequences [38–40]. Consequently, it is impossible to determine whether a particular motive dimension increases alcohol use and is thus indirectly associated with a consequence, or whether it directly explains problem behaviours and other consequences [41,42].

In addition to these methodological flaws, comparisons across studies are difficult due to the fact that the instruments used (e.g. [43]) are many and cover consequences that vary in their strength of association with drinking motives [31]. Furthermore, cross-cultural studies are rare and have included only two countries [44,45]. Moreover, some studies conducted *post hoc* comparisons using existing datasets with different sample selection and data collection methods [2].

The present study seeks to deepen the understanding of the association between drinking motives, alcohol use and adverse consequences. To overcome the methodological limitations, we analyse: (i) non-alcohol-attributed consequences; take (ii) indirect effects via alcohol use into account and investigate unique associations with negative consequences. From this, we will: (iii) investigate not only consequences that have already been explored in multiple studies (i.e. alcohol-attributed injuries and academic problems [2,31,45]) but also more general indicators, that is, life dissatisfaction and negative body image, which longitudinal studies have found to be associated with alcohol use (e.g. [46]). To enhance the external validity, the analyses are based on a large multi-national sample from the HBSC study that uses the same methodology across all sub-samples [47]. This makes it possible to test whether: (iv) the same pattern of indirect and direct effects can be found across Europe, and this independently of northern versus southern European drinking cultures.

We hypothesise that: (i) associations between drinking motives and negative consequences can even be found when consequences are not attributed to alcohol use [37]; (ii) internal motives (enhancement and coping) are positively associated with adverse consequence related to alcohol use (i.e. indirect effects) and that motives that have an element of negative reinforcement

(coping and conformity) are positively associated with adverse consequences above and beyond alcohol use (i.e. direct effects) [1]; (iii) the extent of alcohol use is more relevant for specific injuries and academic problems (both closely linked to alcohol use in previous research [2,31,45,48]) than for general indicators of adolescent health and well-being (which are clearly linked to alcohol use but are influenced by a wide range of factors [46,49]); and (iv) the aforementioned pattern of association between drinking motives and adverse consequences can be found across all 10 countries included in the present study because the scientific evidence shows that the association between motives and alcohol use is consistent across countries [1,20].

## Methods

### Study design

Ten countries participating in the 2009/2010 HBSC survey included the DMQ-R SF, [13,20] in their questionnaire. The present study is based on data from Belgium, Denmark, Estonia, Finland, Ireland, Portugal, Scotland, Slovakia, Switzerland and Wales. Nationally representative surveys for the eight/ninth grade were conducted in all countries, with the exception of Belgium (only Flanders was included in the survey). Students were selected using a clustered sampling design with either classes or schools constituting the primary sampling units. Each study was approved by the appropriate ethics review board. In accordance with the Helsinki Declaration [50], the data were collected with anonymous self-report questionnaires distributed in the classroom. The overall response rate (including drop-outs and non-response at individual, class and school levels) was 60% or higher for all HBSC countries, except Denmark (46%) and Belgium (29%).

### Sample

After excluding participants with missing values for gender and/or age (approximately 1% in total, ranging from 0% in Portugal to 6% in Denmark), the gross sample for this study consisted of 40 059 students aged 13–16 years. Because only students who had consumed alcohol can answer questions on drinking motives, we excluded the 16 804 students (41.9%) who had not consumed alcohol in the last 12 months. Additionally, 414 cases (1%) were excluded because they had missing values on all three items on at least one of the four different motive dimensions. The remaining analytic sample consisted of 22 841 students (female = 50.6%;  $M_{\text{age}} = 14.65$ ;  $SD_{\text{age}} = 0.95$ ).

## Measures

**Drinking motives.** In the DMQ-R SF [13], enhancement, coping, conformity and social motives were assessed with three items per motive dimension. Participants were asked to recall the times they had drunk alcohol in the past 12 months and indicate for each item the relative frequency of their drinking. In Belgium, Finland, Portugal, Scotland, Slovakia and Switzerland, the 5-point scale from the original DMQ-R [12] was used: ‘(almost) never’ (1), ‘some of the time’ (2), ‘about half of the time’ (3), ‘most of the time’ (4) and ‘(almost) always’ (5). In Denmark, Estonia, Ireland, Italy and Wales, the original 3-point scale of the DMQ-R SF was used [20]. It should be noted that the DMQ-R SF has been developed and validated in its French, German and Italian language versions [13]. For the Danish, Dutch, English, Estonian, Finnish, Portuguese, Slovakian and Welsh language versions, the factor structure and concurrent validity with alcohol use patterns have been shown in an earlier study based on the same dataset we use here [3,20]. Furthermore, in a stepwise examination of measurement invariance [51], configural invariance (i.e. the same confirmatory factor analysis is valid in each country) and metric invariance (i.e. respondents across countries attribute the same meaning to the latent constructs of drinking motives) can be assumed across the 10 countries (results available as Supporting Information, Table S1).

**Alcohol use.** Adolescents were asked how often during the past 30 days they had drunk alcohol (*frequency*) or had been intoxicated (*drunkenness*); the seven answer categories ranged from ‘0’, ‘1–2’ up to ‘40 or more’. In the statistical analysis, *frequency* and *drunkenness* were treated as ordinal scaled variables. In the descriptive analyses, midpoints of categories were used (for the highest category, the category plus the range to midpoint of adjacent category was used [20,52]).

**Adverse consequences.** Four ordinal scaled variables from the HBSC study were used compare with also [23,47,53,54] and coded so that a higher value represented more adverse consequences. Young people were asked how many times during the past 12 months they had had an injury and had to be treated by a doctor or nurse; answers for the *injury* variable ranged from ‘never’ (coded as 0) to ‘four times or more often’ (4). To assess *academic problems*, young people were asked what, in their opinion, their class teacher thought about their school performance compared with that of their classmates; possible response options ranged from ‘very good’ (0) to ‘below average’ (3). Life dissatisfaction was based on young people rating their life satisfaction on a visual analogue scale, the ‘Cantril ladder’: the top of the

ladder indicates the best possible life (0) and the bottom, the worst (10). Response categories were recoded as follows: ‘best possible’ (0–1), ‘good’ (2), ‘neutral’ (3), ‘bad’ (4–6) and ‘worst possible’ (7–10). The young people were asked about their subjective *negative body image*; response options were ‘about the optimal weight’ (0), ‘a bit too fat/thin’ (1) and ‘much too fat/thin’ (2).

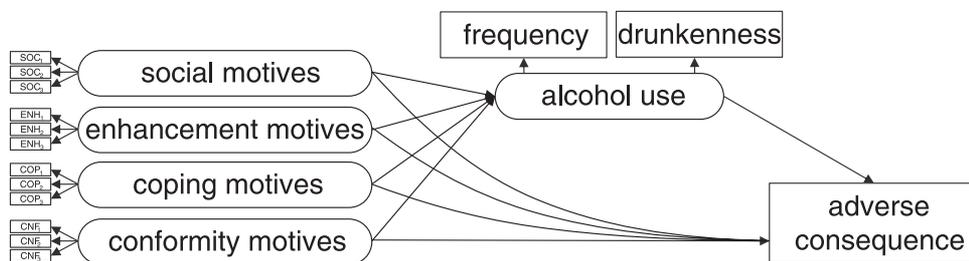
**Sociodemographic variables.** Gender was coded 0 for girls and 1 for boys. Year and month of birth together with the date of the data collection were used to calculate participants’ exact age. A dummy variable was created for each country. To investigate possible differences between southern and northern European *drinking cultures* [24], consistent with the classification of the United Nations Statistics Division [55] and a previous publication [20], countries were classified as either ‘northern Europe’ (Denmark, Estonia, Finland, Ireland, Scotland and Wales, coded as 1) or as non-northern, central and southern countries, but mostly as ‘southern Europe’ (Belgium, Portugal, Slovakia and Switzerland, coded as 0).

#### Analytic strategy

To test hypotheses i–iii, structural equation modelling (SEM) was used to disentangle the associations between drinking motives and each of the four adverse consequences into direct or indirect effects (cf. Figure 1). The four drinking motives have been treated as latent variables and each based on three items; alcohol use has been treated as latent variable based on frequency and drunkenness. The indirect effects that are mediated via alcohol use and their significance level were estimated with the delta method in the Mplus 7 statistical software [56]. Alcohol use was regressed in a linear regression model on gender, age and the four motive dimensions;

the adverse consequences were regressed in an ordinal logistic regression model on gender, age, alcohol use and the four drinking motives. The SEM was estimated separately for each country, and the resulting estimates (standardised coefficients and standardised error) were subsequently pooled using METAN [57] in STATA 13 [58]. The separate estimation for each country minimised possible bias owing to differences in response categories (e.g. as for drinking motives, see [2,20]) or the distribution of the variables (e.g. mean life dissatisfaction [47]) across countries. To enable a direct comparison of effects across the outcome variables (i.e. independent of the number of outcome levels), odds ratios based on standardised effects are reported [59]. The Mplus complex procedure accounted for the cluster sampling design [56]. As standard errors for the estimated indirect effect may be biased, bootstrapping is recommended in order to minimise the bias [60]. However, Mplus cannot simultaneously account for the cluster sampling design and bootstrap resampling. Because the possible bias due to the cluster sampling design is estimated to be more important than the possible use of bootstrapping (which is more pronounced in small samples [61]), the analyses presented in the results section only take account of the cluster sampling design. Additionally, the models have been re-estimated based on 1000 bootstrap samples (results available as Supporting Information). Furthermore, to allow direct comparisons to other studies using the mean scores of drinking motives instead of latent variables (e.g. [20,62]), the SEM has been re-estimated using mean scores for drinking and estimating the total mediated effect due to alcohol use (i.e. via frequency and/or drunkenness; results available as Supporting Information).

To test hypothesis iv, a multigroup approach was applied in which constraints and Wald tests were used to identify differences in direct and indirect effects across



**Remarks:** Each of the four latent drinking motives is based on three items; the latent variable alcohol use is based on frequency (frequency of alcohol use, past 30 days) and drunkenness (frequency of drunkenness, past 30 days). Adverse consequence = injuries, academic problems, life dissatisfaction and negative body image. Alcohol use and adverse consequences are additionally adjusted for gender and age (not illustrated) and estimated in ordinal regression models adjusting for the cluster sampling design. The model was estimated separately for each adverse consequence.

**Figure 1.** Structural equation model to estimate direct and indirect effects of drinking motives on adverse consequences.

countries and to ascertain whether drinking culture (southern vs. northern Europe) could explain potential differences across countries.

## Results

### *Sample description and non-alcohol-attributed adverse consequences*

Adolescents most often reported drinking for social motives, followed by enhancement, coping and conformity, in this order (Table 1). Mean levels of drinking motives, alcohol use and adverse consequences varied considerably across countries (for details, see Tables S2 and S3 [47]). On average, the samples of non-abstaining adolescents had drunk alcoholic beverages three to four times and were drunk once or twice over the previous 30 days. Drinking motives were positively associated with alcohol use and adverse, non-alcohol-attributed consequences.

### *Indirect and direct effect of motives on adverse consequences*

For social, enhancement and coping motives, positive indirect effects (via alcohol use) on injuries and academic problems were found, whereas the association was negative for conformity motives (Table 2). The fit indices were adequate for all four dependent variables (root mean square error of approximation  $<0.05$ ,  $P < 0.05$ ; Comparative Fit Index and Tucker–Lewis Index  $>0.90$ ) [63]. For the two more general indicators, that is, life dissatisfaction and negative body image, indirect effects were marginal and not significant. Meanwhile, the direct effect, that is, the effect above and beyond alcohol use, indicated more negative consequences among those who tended to drink more for avoidance motives (coping and conformity). However, this was not significant for conformity motives and life dissatisfaction and was even negative as regards academic problems. In contrast, approach motives (social and enhancement) had either no significant direct effects or were associated with less negative consequences (exception social motives in relation to injuries).

The findings from the re-estimated SEM based on bootstrap sampling (but not taking into consideration the cluster sampling design) or based on mean scores for motives (instead of latent variables) were largely comparable with the results described previously (for a comparison, see Tables S4 and S5).

### *Size of indirect effects by adverse consequences*

As shown by non-overlapping confidence intervals (Table 2), the indirect effects (via alcohol) of drinking

motives on specific consequences, injuries and academic problems were stronger than their effects on more general consequences (life dissatisfaction and negative body image). Direct effects, for their part, did not differ systematically between the four adverse consequences.

### *Differences across countries*

To test for differences in direct and indirect effects across countries, constraints and Wald tests were used (cf. Table 3). Significant differences between countries could be found for about a third of the effects (13 of 32). This was generally due to a difference in the size, not the direction, of the effect. However, in two cases (social and conformity motives on academic problems; for details, see Table S6), direct effects varied in terms of not only the size but also the direction of the effect. None of the differences in the effects could be explained by drinking culture differences between southern and northern European countries.

## Discussion

The present study, which overcomes some of the methodological limitations (see later) of previous research, sought to deepen the understanding of the association between drinking motives, alcohol use and adverse consequences.

### *Non-alcohol-attributed adverse consequences*

In accordance with hypothesis I, drinking motives were found to be associated with adverse, non-alcohol-attributed consequences. Compared with previous research [1], the effects found were relatively small because being asked to subjectively interpret and attribute a consequence as alcohol-related usually led to an overestimation of effect [37], and thus to a biased association. This was not the case in the present study.

### *Indirect and direct effects of motives on adverse consequences*

The finding that drinking for social and enhancement motives is simultaneously positively (indirect effect) and negatively (direct effect) associated with adverse consequences may seem contradictory. However, they are in line with the literature and indicate two separate processes: (i) literature reviews [1,25] as well as an earlier study based on the same dataset as the present study [20] showed that social, enhancement and coping motives are associated with greater alcohol use and conformity motives with lower alcohol consumption. In turn, higher alcohol use is associated with more adverse consequences [cf. also [23], [47], [53], [54]]; and (ii) the findings for

**Table 1.** Descriptive for the study sample and the variables (means, SDs and correlations)

	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
<i>Drinking motives</i>																			
1. Social <sub>item 1</sub>	2.88	1.20																	
2. Social <sub>item 2</sub>	2.50	1.16	0.55*																
3. Social <sub>item 3</sub>	1.87	1.09	0.64*	0.61*															
4. Enhancement <sub>item 1</sub>	2.88	1.20	0.47*	0.54*	0.46*														
5. Enhancement <sub>item 2</sub>	2.50	1.16	0.38*	0.41*	0.38*	0.52*													
6. Enhancement <sub>item 3</sub>	1.87	1.09	0.50*	0.55*	0.53*	0.56*	0.42*												
7. Coping <sub>item 1</sub>	2.88	1.20	0.30*	0.25*	0.26*	0.35*	0.33*	0.24*											
8. Coping <sub>item 2</sub>	2.50	1.16	0.33*	0.31*	0.32*	0.44*	0.40*	0.31*	0.66*										
9. Coping <sub>item 3</sub>	1.87	1.09	0.26*	0.24*	0.29*	0.34*	0.34*	0.27*	0.64*	0.62*									
10. Conformity <sub>item 1</sub>	2.88	1.20	0.23*	0.29*	0.31*	0.25*	0.31*	0.23*	0.31*	0.33*	0.34*								
11. Conformity <sub>item 2</sub>	2.50	1.16	0.18*	0.21*	0.22*	0.22*	0.28*	0.22*	0.31*	0.31*	0.34*	0.56*							
12. Conformity <sub>item 3</sub>	1.87	1.09	0.16*	0.20*	0.20*	0.18*	0.23*	0.18*	0.30*	0.28*	0.32*	0.56*	0.64*						
<i>Alcohol use</i>																			
13. Frequency	3.62	5.81	0.25*	0.24*	0.25*	0.25*	0.17*	0.26*	0.18*	0.20*	0.20*	0.16*	0.05*	0.05*	0.01***				
14. Drunkenness	1.50	4.03	0.34*	0.33*	0.32*	0.33*	0.29*	0.34*	0.22*	0.25*	0.21*	0.08*	0.09*	0.06*	0.56*				
<i>Adverse consequences</i>																			
15. Injuries	0.83	1.13	0.06*	0.06*	0.06*	0.05*	0.02*	0.04*	0.06	0.06*	0.06*	0.03*	0.03*	0.03*	0.10*	0.09*			
16. Academic problems	1.35	0.82	0.05*	0.05*	0.05*	0.07*	0.07*	0.07*	0.08*	0.08*	0.10*	0.03*	0.04*	0.01***	0.09*	0.11*	0.03*		
17. Life dissatisfaction	1.13	0.80	0.02*	0.03*	0.03*	0.04*	0.02*	0.02*	0.15*	0.12*	0.16*	0.04*	0.04*	0.05*	0.06*	0.05*	0.03*	0.15*	
18. Negative body image	0.58	0.62	0.01	0.02**	0.01***	0.03*	0.00	0.03*	0.07*	0.05*	0.07*	0.03*	0.03*	0.04*	0.03*	0.02*	0.02**	0.06*	0.17*

\* $P < 0.001$ ; \*\* $P < 0.01$ ; \*\*\* $P < 0.05$ .  $N = 22\ 117-22\ 715$ . For the correlations between drinking motive items, Pearson's  $r$  is reported; for the correlations with the ordinal scaled alcohol use and adverse consequences, Kendall's  $\tau_{au}$  is reported.  $M$ (SD), mean, standard deviation (for alcohol use and adverse consequences,  $M$  and  $SD$  are reported only for descriptive purposes).

**Table 2.** Indirect, direct and total standardised effects of drinking motives on adverse consequences

	Indirect effect via alcohol use		Direct effect		Total effect	
<i>Injuries</i>						
Social	1.04***	(1.02–1.05)	1.06*	(1.00–1.12)	1.10**	(1.04–1.16)
Enhancement	1.05***	(1.03–1.08)	0.87***	(0.82–0.93)	0.93*	(0.87–0.98)
Coping	1.03***	(1.02–1.04)	1.10***	(1.08–1.13)	1.14***	(1.11–1.17)
Conformity	0.98***	(0.97–0.99)	1.03**	(1.01–1.05)	1.01	(0.99–1.03)
<i>Academic problems</i>						
Social	1.02***	(1.01–1.04)	1.02	(0.95–1.10)	1.05	(0.97–1.13)
Enhancement	1.03***	(1.02–1.05)	0.99	(0.91–1.08)	1.03	(0.94–1.12)
Coping	1.02***	(1.01–1.03)	1.14***	(1.10–1.19)	1.17***	(1.13–1.21)
Conformity	0.99***	(0.98–0.99)	0.96**	(0.93–0.98)	0.94***	(0.92–0.97)
<i>Life dissatisfaction</i>						
Social	1.00	(1.00–1.01)	0.99	(0.93–1.05)	1.00	(0.94–1.05)
Enhancement	1.01	(1.00–1.01)	0.93**	(0.88–0.98)	0.93*	(0.89–0.98)
Coping	1.00	(1.00–1.01)	1.32***	(1.28–1.37)	1.33***	(1.28–1.37)
Conformity	1.00	(0.99–1.00)	0.98	(0.95–1.02)	0.98	(0.95–1.01)
<i>Negative body image</i>						
Social	1.00	(1.00–1.01)	0.96	(0.91–1.02)	0.97	(0.91–1.03)
Enhancement	1.00	(1.00–1.01)	1.00	(0.95–1.06)	1.00	(0.95–1.05)
Coping	1.00	(1.00–1.01)	1.12***	(1.09–1.15)	1.12***	(1.09–1.15)
Conformity	1.00	(1.00–1.00)	1.06***	(1.03–1.08)	1.05***	(1.03–1.07)

\*\*\**P* < 0.001; \*\**P* < 0.01; \**P* < 0.05. Shown are odds ratios and their 95% confidence intervals (in brackets). Associations are estimated in ordinal logistic regression models stratified by country and adjusted for gender and age. Fit indices for ‘injuries’:  $\chi^2_{(1236)} = 7616.4$ ,  $RMSEA_{(90\%CIB)} = 0.048$  (0.047–0.049), CFI = 0.911, TLI = 0.903; ‘academic problems’:  $\chi^2_{(1236)} = 7620.9$ ,  $RMSEA_{(90\%CIB)} = 0.048$  (0.047–0.049), CFI = 0.911, TLI = 0.903; ‘life dissatisfaction’:  $\chi^2_{(1236)} = 7680.1$ ,  $RMSEA_{(90\%CIB)} = 0.048$  (0.047–0.049), CFI = 0.911, TLI = 0.902; ‘negative body image’:  $\chi^2_{(1236)} = 7644.4$ ,  $RMSEA_{(90\%CIB)} = 0.048$  (0.047–0.049), CFI = 0.911, TLI = 0.902. CFI, Comparative Fit Index; RMSEA, root mean square error of approximation; TLI, Tucker–Lewis Index.

the direct effect, that is, associations above and beyond alcohol use, correspond to previous research on approach and avoidance motives: while individuals with more pronounced approach motives and goals report higher subjective well-being and less physical symptoms, the opposite was found for those with more pronounced avoidance motives and goals [64,65]. In the motivational model of alcohol use [10,11] and the DMQ-R [12], social and enhancement motives are conceptualised as approach motives, while coping and conformity motives are defined as avoidance motives. The total effect of motives on adverse consequences was consistent for coping motives, indicating that individuals drinking for coping motives did not only indicate a higher level of adverse consequences because of their higher alcohol use *per se* but also due to more general maladaptive coping strategies [26–28,66]. For the other three drinking motive dimensions, findings varied depending on the analysed consequence, as a function of the effect sizes of opposing indirect effects.

*Size of indirect effects on adverse consequences*

As hypothesised, the direct effects for specific consequences (i.e. injuries and academic problems) were greater than for the general indicators, life dissatisfaction and

body dissatisfaction. In the case of the latter two consequence indicators, the direct effects were marginal and in most cases not significant. Of course, as regards general health and well-being indicators, many other factors besides alcohol use such as happiness or rewarding social relationships are important [47,67]. However, upon examination of the total effect (direct and indirect taken together), the effect size for coping motives on life dissatisfaction was, in fact, significantly greater than all other effects reported here. In this way, the present study provides further evidence for the argument that coping motives are an indicator of a more general lack of problem-focused coping strategies, which in turn leads to adverse long-term consequences besides those attributable to alcohol use. This is because the discrepancies that foster negative affect have never been adequately addressed [26–28].

*Differences across countries*

In spite of the considerable difference in mean levels of drinking motives, alcohol use and adverse consequences found across countries as also reported in other studies [1,2,20,22,68,69], the pattern of association between drinking motives and adverse consequences varied slightly in effect size but was nonetheless generally

**Table 3.** Multigroup comparisons for differences across countries and drinking cultures

	Differences across countries				Differences between southern and northern Europe							
	Indirect effect		Direct effect		OR <sub>South</sub>	Indirect effect				Direct effect		
	Wald	dir	Wald	dir		OR <sub>North</sub>	Wald	dir	OR <sub>South</sub>	OR <sub>North</sub>	Wald	dir
<i>Injuries</i>												
Social	32.5*	=	13.1 <sup>ns</sup>	<sup>ns</sup>	1.05*	1.03**	1.6 <sup>ns</sup>	<sup>ns</sup>	1.02	1.08***	0.3 <sup>ns</sup>	<sup>ns</sup>
Enhancement	39.6*	=	13.3 <sup>ns</sup>	<sup>ns</sup>	1.07***	1.05**	2.7 <sup>ns</sup>	<sup>ns</sup>	0.89**	0.86**	0.4 <sup>ns</sup>	<sup>ns</sup>
Coping	29.8*	=	5.6 <sup>ns</sup>	<sup>ns</sup>	1.02***	1.03*	1.7 <sup>ns</sup>	<sup>ns</sup>	1.09*	1.11*	0.2 <sup>ns</sup>	<sup>ns</sup>
Conformity	29.1*	=	7.2 <sup>ns</sup>	<sup>ns</sup>	0.98**	0.98*	1.6 <sup>ns</sup>	<sup>ns</sup>	1.03***	1.03	0.0 <sup>ns</sup>	<sup>ns</sup>
<i>Academic problems</i>												
Social	42.2*	=	21.1***	≠	1.03*	1.02**	0.4 <sup>ns</sup>	<sup>ns</sup>	1.11***	0.97	2.7 <sup>ns</sup>	<sup>ns</sup>
Enhancement	34.6*	=	24.4**	≠	1.03**	1.03**	0.5 <sup>ns</sup>	<sup>ns</sup>	0.90	1.05	2.9 <sup>ns</sup>	<sup>ns</sup>
Coping	22.9**	=	19.0***	=	1.01***	1.02*	1.1 <sup>ns</sup>	<sup>ns</sup>	1.12*	1.16*	2.0 <sup>ns</sup>	<sup>ns</sup>
Conformity	14.7 <sup>ns</sup>	<sup>ns</sup>	18.4***	=	0.99*	0.99*	0.2 <sup>ns</sup>	<sup>ns</sup>	0.95	0.96**	0.5 <sup>ns</sup>	<sup>ns</sup>
<i>Life dissatisfaction</i>												
Social	10.5 <sup>ns</sup>	<sup>ns</sup>	15.7 <sup>ns</sup>	<sup>ns</sup>	1.01	1.00	2.4 <sup>ns</sup>	<sup>ns</sup>	1.02	0.97	1.5 <sup>ns</sup>	<sup>ns</sup>
Enhancement	15.2 <sup>ns</sup>	<sup>ns</sup>	10.3 <sup>ns</sup>	<sup>ns</sup>	1.00	1.01	2.1 <sup>ns</sup>	<sup>ns</sup>	0.90**	0.95	2.2 <sup>ns</sup>	<sup>ns</sup>
Coping	7.0 <sup>ns</sup>	<sup>ns</sup>	29.7*	=	1.00	1.01	0.9 <sup>ns</sup>	<sup>ns</sup>	1.29*	1.34*	0.5 <sup>ns</sup>	<sup>ns</sup>
Conformity	14.9 <sup>ns</sup>	<sup>ns</sup>	23.9**	=	1.00	1.00	1.2 <sup>ns</sup>	<sup>ns</sup>	0.97	0.99	0.7 <sup>ns</sup>	<sup>ns</sup>
<i>Negative body image</i>												
Social	10.7 <sup>ns</sup>	<sup>ns</sup>	15.0 <sup>ns</sup>	<sup>ns</sup>	1.01	1.00	0.4 <sup>ns</sup>	<sup>ns</sup>	0.96	0.96	0.9 <sup>ns</sup>	<sup>ns</sup>
Enhancement	10.1 <sup>ns</sup>	<sup>ns</sup>	9.8 <sup>ns</sup>	<sup>ns</sup>	1.01	1.00	0.0 <sup>ns</sup>	<sup>ns</sup>	0.98	1.01	0.5 <sup>ns</sup>	<sup>ns</sup>
Coping	7.7 <sup>ns</sup>	<sup>ns</sup>	12.9 <sup>ns</sup>	<sup>ns</sup>	1.00	1.00	1.3 <sup>ns</sup>	<sup>ns</sup>	1.09*	1.13*	1.7 <sup>ns</sup>	<sup>ns</sup>
Conformity	9.3 <sup>ns</sup>	<sup>ns</sup>	9.3 <sup>ns</sup>	<sup>ns</sup>	1.00	1.00	0.1 <sup>ns</sup>	<sup>ns</sup>	1.04	1.06*	0.6 <sup>ns</sup>	<sup>ns</sup>

\* $P < 0.001$ ; \*\* $P < 0.01$ ; \*\*\* $P < 0.05$ ; <sup>ns</sup> $P \geq 0.05$ . Wald, Wald test; dir, direction; superscript (<sup>ns</sup>), Wald test or difference between the effects from southern and northern Europe is not significant; =, same sign for all significant effects (i.e. all are either positive or negative); ≠, various signs among significant effects (i.e. some are positive; others are negative); OR, odds ratio; south/north, southern/northern European countries.

comparable across all 10 countries under consideration. This finding is in line with hypothesis iv and implies that health promotion efforts that are based on or incorporate drinking motives are likely to be applicable across Europe.

#### Limitations and strengths

Among the limitations is the cross-sectional nature of the data. This means that the observed associations cannot be interpreted causally. Nonetheless, this study is, to our knowledge, the first to overcome previous methodological limitations (i.e. using non-alcohol-attributed adverse consequences and including effects mediated by alcohol use) and to use a comparable methodology across a variety of countries, thereby enabling a direct comparison of associations between drinking motives and both alcohol-related and more general adverse consequences.

#### Conclusion

The present findings confirmed the hypothesised association between drinking motives and non-alcohol-attributed consequences. More adverse consequences were observed either among individuals with higher alcohol use (linked to social, enhancement and coping

motives) or among those who report avoidance motives (coping and conformity) rather than approach motives (social and enhancement). Thus, the results indicate that drinking for coping motives puts adolescents at risk of adverse consequences that are not exclusively and directly attributable to alcohol use.

While the actual mean level of drinking motives, alcohol use and adverse consequence varied across countries, the pattern of association between motives and consequences revealed striking cross-cultural consistency. The heterogeneity of findings across countries from different drinking cultures implies that, in spite of the difference in mean levels, the basic mechanisms behind drinking motives, alcohol use and consequences are comparable. This means that health promotion efforts that are based on or incorporate drinking motives are likely to be applicable across Europe. As recommended in previous research [70–72], the findings of this study also imply that prevention programs might be more effective if they take better account of specific drinking motives. For example, prevention programs targeted at enhancement social drinkers, who use alcohol more frequently and get drunk more often (i.e. for whom the indirect effect via alcohol use is more problematic), might concentrate on exercises relating to productive ways of spending

leisure time or alternative sensation-seeking activities compare with [72]. Coping drinkers, in contrast, are more likely to benefit from strategies that focus on reducing levels of stress, providing alternative ways of coping and enhancing self-esteem and competencies through life skills training [71,73]. This is due to the fact that coping drinkers are especially at risk of adverse consequences: not only are they more likely to experience negative consequences due to their risky alcohol use (i.e. indirect effect), but also drinking for coping motives is an indicator of a negative attention bias and a lack of problem-focused coping, which in turn leads to adverse other non-alcohol-related long-term consequences (i.e. direct effect) [26–28].

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### Conflict of interest

All authors declare that they have no conflicts of interest, including specific financial interests and relationships and affiliations (other than those affiliations listed in the title page of the manuscript) relevant to the subject of this manuscript. The corresponding author had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

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## **Supporting Information**

Additional Supporting Information may be found online in the supporting information tab for this article.

Table S1. Stepwise examination of measurement invariance of drinking motives across countries

Table S2. Descriptive for the study sample (n) and the variables (M/SD)

Table S3. Correlation between drinking motives, alcohol use and adverse consequences by drinking culture

Table S4. Indirect, direct and total standardised effects of drinking motives on adverse consequences: considering cluster sampling structure vs. bootstrapping

Table S5. Indirect, direct and total standardised effects of drinking motives on adverse consequences: drinking motives as latent variables vs. as mean scores

Table S6. Indirect and direct, standardised effects between drinking motives and adverse consequences, stratified by country