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Validation of the Drinking Motives Questionnaire - Revised in six European countries

Maria Fernandes-Jesus [a,1], Franca Beccaria [b], Jakob Demant [c], Lena Fleig [d], Isabel Menezes [e], Urte Scholz [f], Richard de Visser [g], Richard Cooke [h]

[a] Department of Psychology, School of Life & Health Sciences, Aston University, Birmingham B4, 7ET, UK
[b] Eclectica, Institute for Training and Research, via Silvio Pellico, 1 10125, Torino, Italy
[c] Department of Sociology, University of Copenhagen, Øster Farimagsgade 5, 1014 Copenhagen K, Denmark
[d] Department of Education and Psychology, Freie Universität Berlin, AB Gesundheitspsychologie, PF 10, Habelschwerdter Allee 45, D-14195 Berlin, Germany
[e] Centro de Investigação e Intervenção Educativas (CIIE), Faculdade de Psicologia e Ciências da Educação, Universidade do Porto, Rua Alfredo Allen, 4200-135 Porto, Portugal
[f] Department of Psychology, University of Zurich, Binzmühlestrasse 14, Box 14, CH-8050 Zürich, Switzerland
[g] School of Psychology, University of Sussex, Pevensey 1, Falmer BN1 9QH, UK
[h] Department of Psychology, School of Life & Health Sciences, Aston University, Birmingham, B4, 7ET, UK

HIGHLIGHTS

- This paper assesses the validity of the DMQ-R (Cooper, 1994) among university students in six different European countries.
- Results provide support for similar DMQ-R factor structures across countries.
- Drinking motives have similar meanings among European university students.

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1. Introduction

Alcohol consumption above recommended limits has been associated with increased risk of suffering adverse physical, psychological, and social health outcomes (Anderson & Baumberg, 2006; WHO, 2012). There is particular concern about alcohol use among university students, with research highlighting that drinking more than recommended limits is particularly common in this group (Lorant, Nicaise, Soto, & d'Hoore, 2013). Studies have shown that people drink alcohol for many different social and psychological goals (e.g. Cooper, Kuntsche, Levitt, Barber, & Wolf, in press; Ham & Hope, 2003) and drinking motives represent the functions that alcohol use serves for individuals (Gmel, Labhart, Fallu, & Kuntsche, 2012). To date, there has been a lack of cross-cultural studies comparing university students' motives to consume more than recommended limits (Lorant et al., 2013), so it is unclear if motives vary between university students in different countries. Prevention efforts must be based on knowledge of motives and functions that drinking serves for young people if we are to reduce the likelihood of university students suffering negative outcomes from their alcohol consumption (Kuntsche & Kuntsche, 2009).

Inspired by Cox and Klinger's (1988, 1990) Motivational Model, Cooper (1994), proposed an instrument to measure the motives for alcohol use - the Drinking Motives Questionnaire Revised (DMQ-R).

E-mail addresses: maria.jesus@iscte.pt (M. Fernandes-Jesus), beccaria@eclectica.it (F. Beccaria), jd@soc.ku.dk (J. Demant), lena.fleig@fu-berlin.de (L. Fleig), imenezes@fpce.up.pt (I. Menezes), urte.scholz@psychologie.uzh.ch (U. Scholz), rd48@sussex.ac.uk (R. de Visser), r.cooke@aston.ac.uk (R. Cooke).
[1] Present address: Centro de Investigação e Intervenção Social (CIS-IUL), Instituto Universitário de Lisboa, ISCTE – IUL, Edifício ISCTE, Av. das Forças Armadas, 1649-026 Lisboa, Portugal.

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Table 1
Sample and subsamples characteristics.

Countries	Gender (%)			Ethnic group (%)					Age	
	Female	Male	Other	White	Mixed	Middle/Near Eastern	Asian	Black	Mean	SD
Denmark	68.0	32.0	–	97.3	2.7	–	–	–	21.97	1.66
England	73.5	26.2	0.3	72.2	5.7	0.3	17.7	3.1	19.58	1.52
Germany	75.0	23.9	1.1	92.5	3.8	1.1	1.9	0.8	21.66	2.18
Italy	74.1	25.9	–	89.4	6.1	2.7	0.4	–	21.93	1.81
Portugal	71.3	28.7	–	99.7	–	–	–	0.3	20.70	1.83
Switzerland	72.4	27.0	0.6	92.0	3.0	0.3	3.6	–	21.76	1.98
Total	72.3	27.3	0.4	90.0	3.5	0.6	4.5	0.8	21.16	2.04

Specifically, Cooper's model crossed the dimensions proposed by Cox and Klinger (1988, 1990), valence and source, creating four motives for alcohol use: (a) internally generated, positive reinforcement motives (drinking to *enhance* positive mood or well-being), (b) externally generated, positive reinforcement motives (drinking to obtain positive *social* rewards), (c) internally generated, negative reinforcement motives (drinking to *cope* with negative emotions), and (d) externally generated, negative reinforcement motives (drinking to *conform* or avoid social censure and rejection). Since then, the DMQ-R has been widely tested and validated in different age groups: adolescents (e.g. Cooper, 1994; Hauck-Filho, Teixeira, & Cooper, 2012; Kuntsche, Knibbe, Gmel, & Engels, 2006; Kuntsche, Stewart, & Cooper, 2008); university students (e.g. Martens, Rocha, Martin, & Serrao, 2008; Simons, Correia, & Carey, 2000) and adults (e.g. Cooper, Frone, Russell, & Mudar, 1995; Mezquita et al., 2011). With only a few exceptions (e.g. Martens, Cox, Beck, & Heppner, 2003; Mezquita et al., 2011), the four-factor model proposed by Cooper has consistently shown the best fit to the data. As regards the predictive power of the motivational model, several studies have shown the link between drinking motives and alcohol behaviour (e.g. Foster & Neighbors, 2013; Foster, Neighbors, & Prokhorov, 2014) and the predictive power of each motive for different patterns of drinking behaviour (e.g. Cooper, 1994; MacLean & Lecci, 2000; Simons et al., 2000). For example, Cooper (1994) found those who drink for internal motives (coping or enhancement) drink more and more often than those how drink for external motives (social and conformity). Alternatively, Simons et al. (2000) found that enhancement and social factors correlated with alcohol use, and that coping motives were positively linked with drinking problems. Similarly, a more recent study has shown that coping motives were related to alcohol problems (Kuntsche et al., 2008). This study also found that enhancement and coping motives are positively correlated to risky drinking.

In spite of the increasing number of studies using the DMQ-R, a literature review indicated that most studies were conducted in the USA (Kuntsche, Knibbe, Gmel, & Engels, 2005). In response, researchers have validated the DMQ-R in Brazil (Hauck-Filho et al., 2012) and Switzerland (see Kuntsche et al., 2006; Kuntsche et al., 2008). However, additional studies are needed to demonstrate the validity and reliability of the instrument across other languages and countries. Indeed, even if there is strong evidence that the DMQ-R is a valid and reliable instrument to assess adolescents' and young adults' drinking motives widely, there is a need to check if results from the four-factor model are consistent across countries in order to acquire meaningful knowledge on the significance of the cultural embedding of drinking motives. Thus, the aim of this study was to assess the validity of the DMQ-R among university students in six different European countries.

2. Method and materials

2.1. Participants

University students in six European countries – Denmark, England, Germany, Italy, Portugal, and Switzerland – participated in the present study, which aimed to assess their patterns of alcohol use. In total, 1903 university students (72% female, age range 18–25, M = 21.16; SD = 2.04), who reported drinking alcohol, completed the DMQ-R. There were 297 students from Denmark, 385 from England, 268 from Germany, 264 from Italy, 352 from Portugal, and 337 from Switzerland.

Table 1 contains data on the study characteristics of the subsamples. Most participants were female; male participants accounted for between 26% and 32% of each subsample. The vast majority of participants described themselves as white (over 90% in all subsamples except the English, where 72% described themselves as white). Participants from Portugal and England were significantly younger than participants from the others countries (F (5, 1894) = 94.020; $p \leq 0.001$). No other significant differences between the samples were found.

2.2. Procedures

Data for this study were collected as part of a larger study comparing university student drinking behaviour across Europe.[2] Responses were collected through a self-administered questionnaire hosted on a secure server, containing a standardized set of questions on the following topics: demographics; alcohol-related beliefs; drinking motives; awareness and knowledge of government guidelines on alcohol consumption; perceptions of local and national drinking culture; perceptions of portrayals of alcohol use in marketing and mass media; and past and current alcohol use.

The survey was presented to participants in their "home" language, permitting a naturalistic comparison between countries. Students were recruited via several methods including e-mail, face-to-face invitations and advertisements on social media sites (Facebook and Twitter). To aid recruitment, a lottery prize draw was offered as an incentive in each country, except Portugal. In Germany, Switzerland and England, research participation credits were offered to psychology students. The success of each recruitment strategy varied across countries. In Germany, Switzerland, Portugal and Italy recruitment was primarily done in response to emails sent to students by administrators in each university. In contrast, in Denmark and England recruitment was essentially conducted through social media (Facebook and Twitter).

2.3. Measure

The DMQ-R (Cooper, 1994) is a 20-item measure of motives for alcohol consumption. The structure proposes four motives for alcohol consumption: conformity (e.g., "so you won't feel left out"); coping (e.g., "drinking to forget your problems"); enhancement (e.g., "to have fun"); and social (e.g., "because it helps you enjoy a party"). Instructions were made asking participants to consider 20 motives why people might be inclined to consume alcoholic beverages. Then, using the five-point Likert scale (ranging from almost never/never to almost always/always) students were invited to decide to what extent their drinking behaviour was motivated by each of the motives.

[2] More details (e.g. procedures, results etc.) are available contacting on the study by contacting the authors.

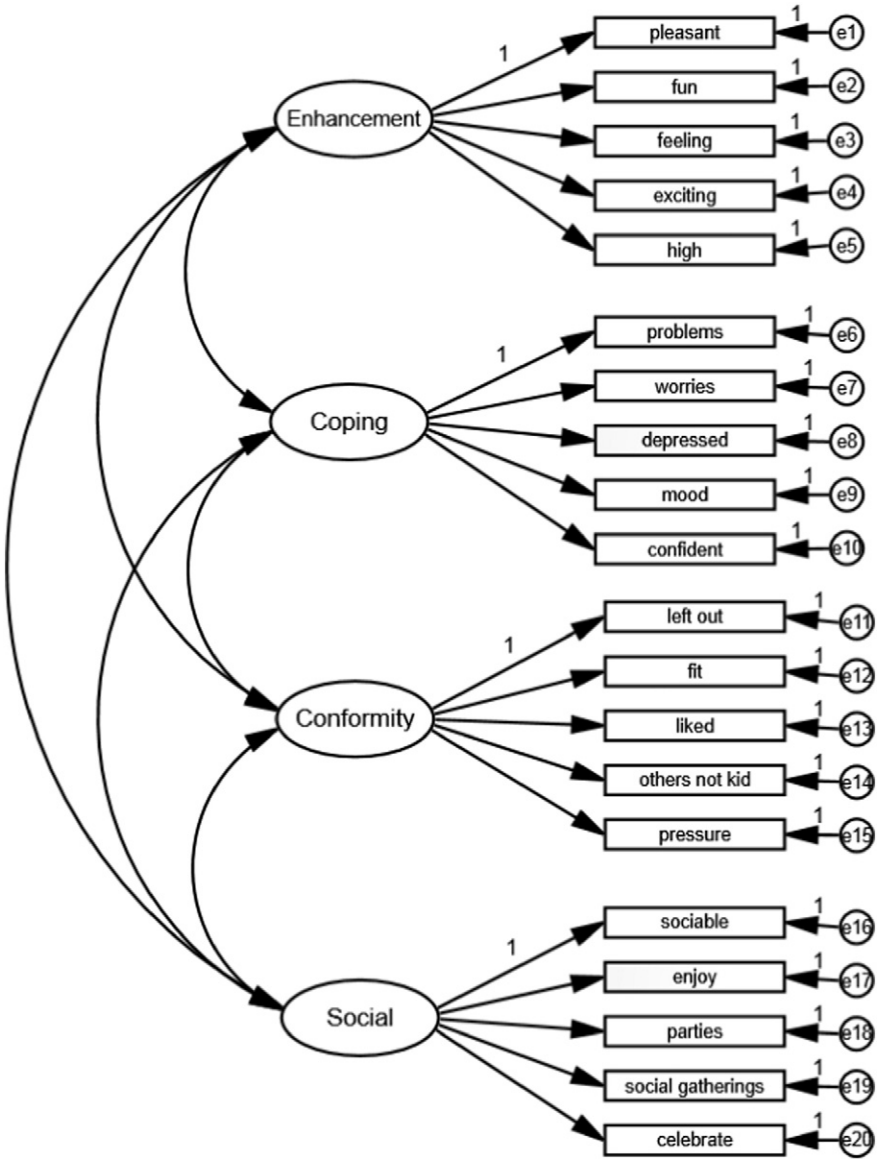

Fig. 1. Hypothesized model of four-factorial structure for the Drinking Motives Questionnaire – Revised (Cooper, 1994).

The DMQ-R was administered as follows in each of the six countries. In the UK, Cooper's (1994) validated version of the instrument was used, while in Switzerland Kuntsche et al.'s (2006) validated German and Italian versions were used. In other countries some subtle grammatical and language changes were necessary; in Germany, Kuntsche et al.'s (2006) validated German version was used, and in Italy, Kuntsche et al.'s (2006) validated Italian version was used, but in both cases language adaptations were made by the researchers working in the project in the respective countries. These were mainly grammatical revisions and adaptations to expression as both versions were validated in Switzerland. A similar process happened in Portugal, where Hauck-Filho et al.'s (2012) validated Portuguese version (previously tested in Brazil), was adapted by the first author who is a native Portuguese speaker before it was administered. As a Danish version of DMQ-R could not be found, the instrument was translated by professional translators and then checked by the Danish partner involved in the research project.

2.4. Data analysis

The main purpose of the study was to test multigroup equivalence related to the CFA model of the DMQ-R to show the structure of the model is consistent across countries. Testing for equivalence of a model requires a hierarchical set of steps that usually begins with the determination of a well-fitting multigroup baseline/configural model (Byrne, 2008). Our first step was to perform six separate CFA on the a priori model - four factors with their five respective items - of drinking motives (see Fig. 1 for the factor structure of the DMQ-R).

CFA was performed using Maximum Likelihood Estimation (IMB SPSS Amos 21). Data preparation included the screening of major violations of normality and the identification of multivariate outliers (Kline, 2011). No missing data imputation procedure was needed, as the online survey did not allowed partial responses to the measure.

The overall fit of the model was evaluated considering the values for an acceptable fit on absolute, relative and parsimony fit indices. Selection of these indices was based on their statistical power and widespread use in Structural Equation Modelling (SEM) (Kline, 2011). As indicative of absolute fit we considered the values of the Standardized Chi-square X2/df < 5; the Root Mean Square Error of Approximation – RMSEA <0.08 and the Standardized Root Mean Square Residual – SRMR < 0.08. As a relative fit index we used the values of the Comparative fit index – CFI > 0.90. Finally, as an index of parsimonious fit we considered the Parsimony Goodness-of-Fit Index - PGFI > 0.60.

Table 2
Fit indices.

	df	X^2/df	CFI	PGFI	RMSEA	SRMR	AIC
Denmark							
Model 1 – four correlated factors (20 items)	164	3.542	0.864	0.647	0.093	0.1191	672.947
Model 2 – three correlated factors (one of second order)	165	3.664	0.857	0.646	0.095	0.1473	694.485
Model 3 – four correlated factors (18 items)	129	2.799	0.915	0.664	0.078	0.0800	445.015
Model 4 – four correlated factors (18 items + error covariances 1<-->3; 16<-->17 and 7<-->9)	126	2.371	0.937	0.663	0.068	0.0769	388.688
England							
Model 1 – four correlated factors (20 items)	164	4.197	0.892	0.667	0.091	0.1137	780.267
Model 2 – three correlated factors (one of second order)	165	4.230	0.890	0.670	0.092	0.1185	787.968
Model 3 – four correlated factors (18 items)	129	2.444	0.957	0.692	0.061	0.0578	399.264
Model 4 - four correlated factors (18 items + error covariances 1<-->3; 16<-->17)	127	2.187	0.965	0.687	0.056	0.0575	365.765
Germany							
Model 1 – four correlated factors (20 items)	164	3.739	0.862	0.643	0.101	1190	705.151
Model 2 – three correlated factors (one of second order)	165	3.725	0.861	0.645	0.102	0.1200	709.132
Model 3 – four correlated factors (18 items)	129	2.883	0.917	0.655	0.084	0.0681	455.963
Model 4 – four correlated factors (18 items + error covariances 1<-->3; 4<-->5 and 16<-->19)	126	2.540	0.933	0.655	0.077	0.0650	410.052
Italy							
Model 1 – four correlated factors (20 items)	164	3.343	0.900	0.650	0.094	0.0995	640.229
Model 2 – three correlated factors (one of second order)	165	3.370	0.898	0.651	0.095	0.1002	646.082
Model 3 – four correlated factors (18 items)	129	2.891	0.929	0.651	0.085	0.0764	456.976
Model 4 – four correlated factors (18 items + error covariances 1<-->3; 4<-->5)	127	2.401	0.948	0.657	0.073	0.0740	392.929
Portugal							
Model 1 – four correlated factors (20 items)	164	6.450	0.860	0.597	0.125	0.0988	1149.722
Model 2 – three correlated factors (one of second order)	165	6.451	0.860	0.599	0.125	0.0997	1154.337
Model 3 – four correlated factors (18 items)	129	5.773	0.894	0.605	0.117	0.0751	828.725
Model 4 – four correlated factors (18 items + error covariances 1<-->3; 4<-->5; 13<-->15; 16<-->17)	125	3.432	0.948	0.643	0.083	0.0718	520.948
Switzerland							
Model 1 – four correlated factors (20 items)	164	4.182	0.875	0.651	0.097	0.1150	777.805
Model 2 – three correlated factors (one of second order)	165	4.260	0.872	0.654	0.098	0.1263	792.840
Model 3 – four correlated factors (18 items)	139	2.635	0.943	0.674	0.070	0.0634	423.908
Model 4 – four correlated factors (18 items + error covariances 8<-->9)	128	2.329	0.954	0.679	0.063	0.0637	383.921

Considering that assessments of model-fitting should be based on multiple criteria, items' standardized factor loadings were assumed to be adequate if higher than 0.5 (Marôco, 2010) and model adjustments were made based on the Modification Indices (MIs) considering paths and correlations higher than 11 ($p \leq 0.0001$) (Marôco, 2010).

After establishing the CFA model for each group separately, a simultaneous Multigroup Confirmatory Factor Analysis was conducted to compare the structure of the model across cultures. The comparison of structure of the model/latent means across cultures requires that three levels of invariance are fulfilled: configural, metric and scalar (Brown, 2006; Byrne, 2010; Comşa, 2010). In sum, meaningful comparison of construct means across countries requires these three levels of invariance, and only if all the three are supported can it be assumed that scores are not biased and that it is appropriate to carry out mean comparisons (Davidov, Schmidt, & Schwartz, 2008). Differences between fit models were checked by considering a decrease in the CFI values – that could not be higher than 0.010 - and increases in RMSEA values – which could not be higher than 0.015 (Chen, 2007; Cheung & Rensvold, 2002). The values of Modified Expected cross-validation index (MECVI) and Akaike's Information Criterion (AIC) were also considered.

3. Results

3.1. Testing Cooper's model

Table 2 provides the fit statistics of the hypothesized model (Model 1 Cooper's (1994) "four-factor structure with 20 items"; see Fig. 1) in each country. Fit was poor from a statistical perspective, as can be seen by the high levels of RMSEA and SRMR, as well by the low level of CFI index. One explanation for the poor fit of Model 1 was that the correlation between the social and enhancement factors was high in all the countries (>0.79), undermining the four-factor structure. To address this issue, a hierarchical model (Model 2, three-factor structure), with a second-order factors composed of both, enhancement and social motives, was tested. Results suggested that this model fit data even worse than the initial model (see Table 2). Thus, instead of changing the factorial structure of the model proposed by Cooper, the initial structural was retained, but with the introduction of some model specifications to improve fit.

3.2. Model specifications to improve fit

Analysis suggested that the observed variable "So that others won't kid you about not drinking" from the conformity factor, presented strong evidence of kurtosis in most of the samples, suggesting little variability in terms of responses for this observed variable. Furthermore, the standardized factor loading for the observed variable "Because you feel more self-confident and sure of yourself" was a weak contributor to the coping factor. As both items were problematic, they were deleted, leaving a four-factor structure with 18-items (Model 3, see Fig. 2).[3]

3.3. Testing a revision of Cooper's model - four-factors with 18 items

Results show that Model 3 – four correlated factors composed of 18 items – achieved satisfactory fit indices in all countries but Portugal (cf. Table 2). Overall, values of CFI were higher than 0.90 and values of RMSEA and SMRM were lower than 0.080, suggesting good fit to the data. Decreases on AIC values also show that this model was the best fit to the data. However, in the Portuguese sample CFI was 0.894 and RMSEA was.117, suggesting only a marginal fit to the data. Finally, RMSEA values were higher than the recommended value in Germany

[3] The observed variable "Because your friends pressure you to drink" also presents a low factor loading in the sample collected in Switzerland ($\lambda = 0.371$). However, as MIs did not indicate any serious problems with this item, and the model without it presented even a poor model fit it was decided to keep this item in the model.

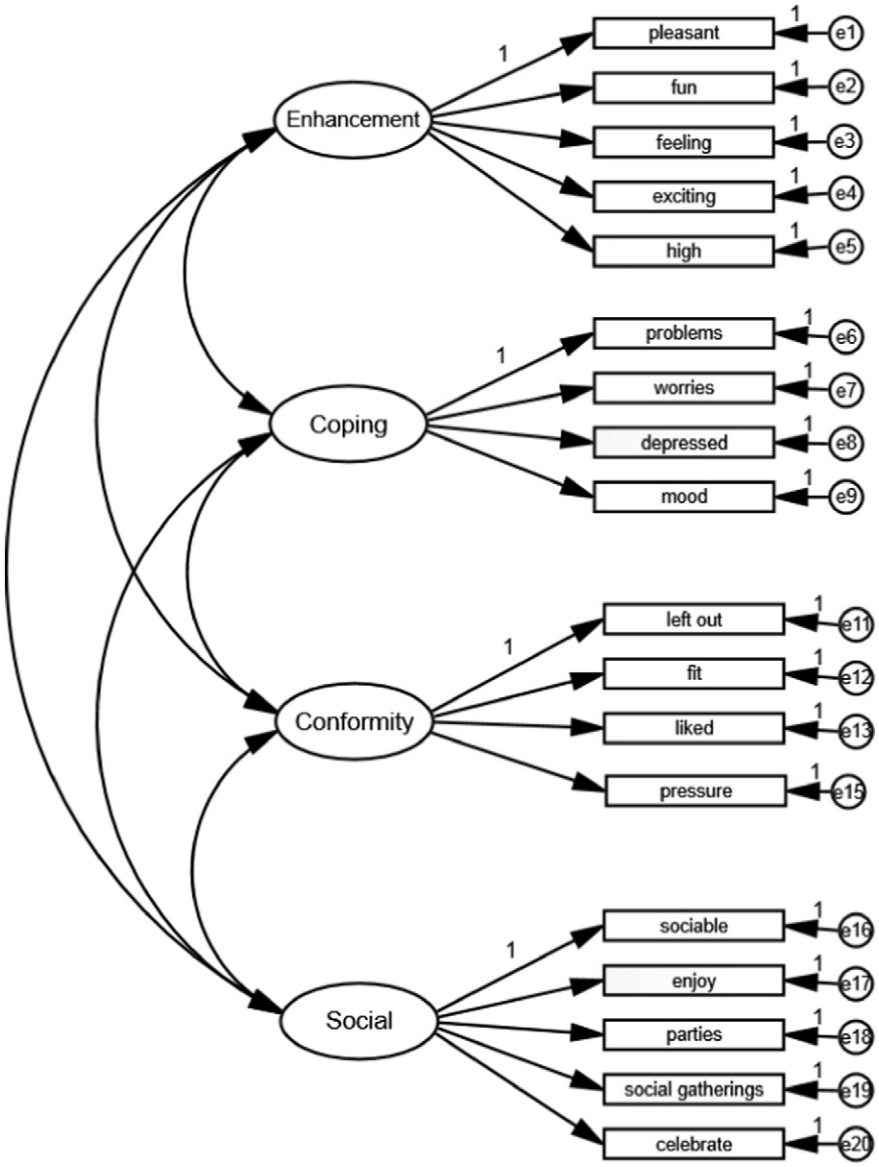

Fig. 2. Configural/Baseline Model – four-factors with 18 items (Model 3).

(0.084) and in Italy (0.085), suggesting the need to analyse the Modification Indices (MIs).

Examinations of the MIs in Model 3 suggest that best-fitting indices could be achieved by including some error covariances across factors and even cross-loadings. However, given that they are indicators of different factors it was decided not to incorporate these correlations in the model, correlating only covariance errors in the same factors, and first the most significant modification indices estimated. Concerning the German, Italian and Portuguese samples, it was expected that adding some error covariances the values of RMSEA would decrease. MIs for the Danish, English and Swiss samples were also analysed, in order to check for misspecifications. Table 3 reports significant error covariances (<–>) for each sample. After introducing the model modifications as suggested by MIs, the analyses were repeated. Results shown that the best model to the data in all the subsamples is achieved with an 18-item, four-factor model (cf. Table 2, Model 4).

Regarding the reliability analyses of the final model, results also showed acceptable internal consistency of the scale across the samples, as Cronbach's α values ranged from $\alpha = 0.701$ to $\alpha = 0.912$ (Table 4).

3.4. Testing measurement invariance of the DMQ-R

After establishing the configural model for each sample the next step was to conduct a Multigroup Confirmatory Factory Analysis (MGCFA), that enabled sequential comparison of the 1) initial model (configural) with two constrained models: 2) the metric invariance ('measurement weights', item responses load on the same constructs across groups, and if the factor loadings do not significantly differ) 3) scalar invariance ('measurement intercepts', the same value on the factor have equal values on the items).

Results for configural invariance revealed a good fit to the model. The CFI and RMSEA values of 0.917 and 0.034, respectively, were satisfactory. From this information, it can be concluded that the hypothesized Multigroup model of the 18-item DMQ-R structure had satisfactory fit across the six countries. Hence, the configural invariance of the four-factor model was accepted and it was possible to treat the factors composition as invariant across the six countries.

As regards the metric invariance, the ΔCFI value indicated that the measurement model is invariant as this value is less than the 0.01 and

Table 3
Standardized item loadings and factor and error covariances.

	Denmark	England	Germany	Italy	Portugal	Switzerland
F1 - Enhancement						
Item 1 (Because it gives you a pleasant feeling)	0.842	0.848	0.800	0.920	0.914	0.790
Item 2 (Because it's fun)	0.870	0.898	0.888	0.840	0.768	0.882
Item 3 (Because you like the feeling)	0.584	0.830	0.849	0.739	0.895	0.897
Item 4 (Because it's exciting)	0.623	0.764	0.644	0.736	0.908	0.779
Item 5 (To get high)	0.816	0.555	0.725	0.900	0.911	0.841
e1 <--> e3		0.147	−0.184	0.197	0.478	
e1 <--> e5				−0.163		
e4 <--> e5			0.190		0.123	
F2 – Coping						
Item 6 (To forget about your problems)	0.816	0.910	0.877	0.859	0.813	0.935
Item 7 (To forget your worries)	0.639	0.785	0.774	0.877	0.804	0.877
Item 8 (Because it helps you when you feel depressed or nervous)	0.720	0.727	0.804	0.791	0.668	0.559
Item 9 (To cheer up when you are in a bad mood)	0.865	0.628	0.750	0.800	0.824	0.685
e7 <--> e9	−0.128					
e8 <--> e9						0.126
F3 - Conformity						
Item 11 (So you won't feel left out)	0.702	0.856	0.824	0.826	0.706	0.715
Item 12 (To fit in with a group you like	0.615	0.790	0.780	0.793	0.888	0.761
Item 13 (To be liked)	0.554	0.876	0.788	0.505	0.602	0.783
Item 15 (Because your friends pressure you to drink)	0.664	0.550	0.500	0.613	0.730	0.371
e13 <--> e15					−0.052	
F4 – Social						
Item 16 (To be sociable)	0.744	0.678	0.718	0.887	0.880	0.651
Item 17 (Because it helps you enjoy a party)	0.908	0.799	0.889	0.847	0.948	0.852
Item 18 (Because it improves parties and celebrations)	0.805	0.920	0.923	0.873	0.950	0.900
Item 19 (Because it makes social gatherings more fun)	0.663	0.876	0.772	0.651	0.659	0.838
Item 20 (To celebrate a special occasion with friends)	0.842	0.664	0.559	0.920	0.914	0.466
e16 <--> e17	0.187	0.117			0.163	
e16 <--> e19			0.172			
e17 <--> e20	−0.169					
Factors covariances						
Enhancement <--> Coping	0.219	0.245	0.170	0.529	0.437	0.141
Coping <--> Conformity	0.063	0.272	0.047	0.212	0.091	0.030
Conformity <--> Social	0.135	0.290	0.132	0.141	0.097	0.092
Enhancement <--> Social	0.698	0.632	0.639	0.712	0.973	0.606
Coping <--> Social	0.107	0.223	0.120	0.372	0.357	0.100
Enhancement <--> Conformity	−0.021	0.198	0.100	0.141	0.098	0.049

value of RMSEA increase less than 0.015. Thus, results indicated that the metric model also fit the data, which suggest that difference scores on the item can be meaningfully compared across groups.

The final set of the MGCFA tests for scalar invariance. Results revealed that when constraining item weights and intercepts partial invariance was observed given that only change on CFI were above the adopted criteria (see Table 5). This result suggests that the meaning of each factor (e.g. enhancement) is similar, but the size of the relations between the items assessed in the DMQ-R may vary as a function of country.

Table 4
Cronbach's alpha (α) four-factor model (18 items).

	Enhancement α	Coping α	Conformity α	Social α
Denmark	0.866	0.798	0.767	0.869
England	0.890	0.840	0.849	0.894
Germany	0.887	0.871	0.788	0.882
Italy	0.912	0.916	0.795	0.879
Portugal	0.944	0.861	0.783	0.918
Switzerland	0.920	0.859	0.701	0.854
Total	0.902	0.879	0.815	0.898

4. Discussion

The present study examined how well the DMQ-R fit independent samples of university students in six different European countries. Results support the four-factor structure of the DMQ-R as invariant across countries, providing evidence of equivalence of the meanings of the drinking motives. However, the 20-item model was not supported by the data. There were issues with items on the negative motives (coping and conformity). The data supported an 18-item model, which demonstrated configural and metric invariance across countries. Scalar invariance was not found across countries.

After removing two of the 20 items from Cooper's (1994) model the four-factor structure of the DMQ-R fit the six subsamples. First, the item "Because you feel more self-confident and sure of yourself" indicated ambiguity, as suggested by the low factor loadings to its factor (coping) and also by the error covariances across factors and cross-loadings. A

Table 5
Invariance tests for the six countries.

Countries	X^2	df	χ^2/df	CFI	RMSEA	MECVI	Comparison	ΔCFI	ΔRMSEA
1. Unconstrained (configural invariance)	2764.255	867	3.188	0.917	0.034	1.636	–	–	–
2. Measurement weights (metric invariance)	2769.366	872	3.176	0.917	0.034	1.633	2 vs. 1	0.00	0.000
3. Structural covariance (scalar invariance)	3238.390	887	3.651	0.897	0.037	1.863	3 vs. 2	−0.02	0.003

previous study conducted in Brazil also found that this item failed to load on its intended factor (Hauck-Filho et al., 2012). Moreover, Cooper (1994) also reported a low factor loading of this item to its factor ($\lambda = 0.42$). From a theoretical point of view this item seems to address a different dimension (e.g. self-efficacy; Bandura, 1997) when compared with the other items and this likely explains the failure of this item to load with the remaining four items, which seem to be clearly related to negative emotions. Second, the item "So that others won't kid me about not drinking", from the "conformity" factor, had little variability in terms of responses in most of the samples. Besides, results from the separate CFAs, suggested that content between some of the item pairs may be overlapping (Byrne, 2010).

In addition, our results also suggested some common findings on factors'relationship across countries (Milfont & Fischer, 2010). Consistent with previous literature (e.g., Cooper, 1994; Hauck-Filho et al., 2012) the factors "enhancement" and "social" had the highest covariance in all the countries. Despite this covariance a model that replaced the two factors with a second order factor (i.e., Model 2) did not fit the data well. Thus, although we found covariance between the positive factors the model was not improved by combining them into one factor. In turn, the weakest covariance between factors varied between countries. It is interesting to note that the weakest relationships in each country always involved the conformity motive: conformity having the lowest covariance with coping in Germany, Portugal, and Switzerland, while conformity had the lowest covariance with enhancement in Denmark, Italy, and the UK.

Overall, results from the multigroup analysis supported configural and metric invariance of the 18-item model across countries, although the strength of the relationship between each item and its underlying construct seems to vary between countries. Thus, in spite of cultural differences, university students appeared to understand the motive items in a similar manner.

5. Conclusions

Overall, the study assured comparable item translations, response sets, sampling procedures and similar data collection techniques. Indeed, data were collected in all countries during the same period, with the same instrument, and care was taken with issues that could have affected the way students interpreted the questionnaire. However, this study also has some limitations. First, university samples from each country were sampled from one or two universities, and it is possible that alcohol consumption variables could be influenced by university context. Future research should expand the data collection to include more universities. Furthermore, as we could not find a Danish version of the DMQ-R, we had to create a version ourselves by translating the items into Danish, using professional translation services, and then checking the meaning with our Danish collaborator. However, as the indices for this sample showed adequate values, it can reasonably be argued that the scale fits the Danish sample. Also, it should be noted that apart from the English version (which has been used in numerous studies), all other versions of the instrument were checked by native speakers and small language adaptations were made in order to adapt to the country context.

In spite of such limitations, the present study provides evidence for the invariance of the DMQ-R across six European countries and indicates that one can confidently test the predictive value of drinking motives on alcohol consumption on university students across Europe. Further research should test the invariance of the meanings in other countries and languages, and even compare the structure across continents.

Finally, as previous literature have shown that drinking motives are a relevant predictor of alcohol consumption particularly for university students (Foster & Neighbors, 2013; Foster et al., 2014; Gmel et al., 2012), findings from the current study significantly contribute to the field of addictive behaviours, as lay the basis for future studies aimed at comparing the predictive models on university students alcohol across countries.

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Contributors

We confirm that the manuscript has been read and approved by all named authors and that there are no other persons who satisfied the criteria for authorship but are not listed. Richard Cooke designed the study and wrote the protocol. Maria Fernandes-Jesus conducted the statistical analysis and wrote the first draft of the manuscript. All authors participated in the data collection, contributed to and have approved the final manuscript. There are no other persons who satisfied the criteria for authorship but are not listed.

Conflict of interest

There are no known conflicts of interest associated with this publication.

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