









Examining the Drinking Motives Questionnaire-Revised Short Form among university students in Australia, New Zealand and Argentina

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Abstract

Introduction: The Drinking Motives Questionnaire-Revised Short Form (DMQ-R-SF) is widely used among alcohol researchers studying adolescents and young adults. The psychometric properties of the DMQ-R-SF have been examined among university students in many countries, but to our knowledge, not in Australia, New Zealand or Argentina. We sought to examine the reliability and endorsement of the items on the DMQ-R-SF, and test the associations between the DMQ-R-SF subscales and alcohol use, and negative alcohol consequences between university students from Australia, New Zealand and Argentina.

Method: University students ($N = 820$) in Australia ($n = 315$), New Zealand ($n = 265$) and Argentina ($n = 240$) completed a confidential online alcohol survey which included the DMQ-R-SF, the Daily Drinking Questionnaire and the Brief Young Adult Alcohol Consequences Questionnaire.

Results: Using the alignment method, support for the four-factor model on the DMQ-R-SF emerged and the factor loadings for 11 of the 12 items were invariant across sites. Most items (8 out of 12) on the DMQ-R-SF were fully invariant across all sites, but some small differences in item reliability for one item, and endorsement for three items emerged between the sites. Across the three countries, coping motives were positively correlated with negative alcohol consequences. Enhancement motives were positively associated with both alcohol use and negative alcohol consequences among students from Australia and New Zealand.

Discussion and Conclusions: Most items on the DMQ-R-SF were comparably reliable among the university students sampled from Australia, New Zealand and Argentina. Our preliminary findings suggest that the DMQ-R-SF can be reliably used with university students from these countries.

KEYWORDS

alcohol use, cross-country, DMQ-R Short Form, drinking motive, negative alcohol consequence, university student

1 | INTRODUCTION

Rates of alcohol use, participation in risky drinking practices (e.g. predrinking/drinking games) and severity of negative alcohol consequences among adults and university students from different countries can vary (e.g. [1–5]). For instance, based on data from the World Health Organization (2018) [5], ‘total alcohol per capita’ among alcohol users (15+ years) in Argentina was 14.6 L compared to 13.4 L in Australia and 14.3 L in New Zealand. Cultural drinking norms can also vary across different countries [6, 7]. Conceivably, such norms can influence drinking patterns and contribute to cross-country differences.

Certain experiences that come with being a university student can increase young adults’ risk for elevated drinking levels and negative alcohol consequences. These experiences include, but are not limited to, reductions in or no parental supervision, interaction with peers who imbibe and increased opportunities to drink at social events [8, 9]. Studies designed to advance understanding of university students’ drinking behaviours and their motivations to imbibe are needed, particularly among students outside of the US given that the majority of studies on drinking motives have been conducted with US students [10].

According to a motivational model of alcohol use, individuals may be motivated to drink because they seek to achieve a negatively (e.g. stress relief) or positively (e.g. pleasurable experience) reinforcing outcome [11, 12]. Moreover, motivation to drink in order to achieve a sought-after effect can come from internal (e.g. feel a buzz) or external (e.g. receive approval from others) sources. Cooper [13] applied this model to develop the Drinking Motives Questionnaire-Revised (DMQ-R; 20-items), which is widely used and measures four dimensions of drinking motivation. The enhancement (e.g. ‘to get high’) and social (e.g. ‘to be sociable’) motive components are positively reinforcing whereas coping (e.g. ‘to forget your worries’) and conformity (e.g. ‘to fit in’) motives are negatively reinforcing. The primary sources of enhancement and coping motives are internal while the primary sources of social and conformity motives are external. Each motive is also differentially related to drinking behaviours. For instance, results from a recent meta-analysis indicated that both coping and enhancement motives were more strongly related to problematic drinking compared to conformity motives [10]. Finally, a major tenet of the motivational model of drinking is that motives are proximal determinants of alcohol use; such associations have been supported in many studies with adolescent and young adult samples from the US and other countries [10–12].

Studies sampling adolescents and university students in the US (e.g. [14]) and other countries (e.g. [15–17])

have provided additional support for the four-factor model of the DMQ-R. Kuntsche and Kuntsche [18] highlighted the need for a short, valid and reliable measure of drinking motives and developed the 12-item DMQ-R-Short Form (DMQ-R-SF) with adolescents in Switzerland. The authors found that the four-factor model fit the data well, had better fit indices compared to other factor-structure models and was equivalent across genders. Since its development, psychometric studies on the DMQ-R-SF with adolescents in Italy [19] and Spain [17], young adults in Hungary [20] and adults in China [21] have also supported this four-factor model.

The factor structures of the DMQ-R-SF and endorsement of each motive among university students from several countries have also been examined. For example, Németh et al. [22] found that the four-factor model was equivalent between university students in Spain and Hungary, and students in both countries ranked their endorsement of each motive in a similar order (social > enhancement > coping > conformity). Mackinnon et al. [23] found that the four-factor model fit the data well and provided evidence of metric (factor loading) invariance across samples from 10 countries. Recently, Nehlin and Öster [24] found good model fit for the four-factor structure model among university students in Sweden. Taken together, research with adolescents, young and older adults, and university students in several countries has shown support for the four-factor model on the DMQ-R-SF.

Although the psychometric properties of the DMQ-R-SF have been widely examined among university students in North American, European and some South American countries, to our knowledge, its measurement properties among university students in Australia, New Zealand and Argentina have not yet been investigated. We focused specifically on university students from these countries for three reasons. First, Argentina is geographically and culturally (e.g. language, cultural customs) more distant than Australia is to New Zealand, and research indicates that heavy drinking and negative alcohol consequences are prevalent among students from Argentina [1, 25]. Thus, we sought to examine whether drinking motives among university students from Australia and New Zealand differ from students in Argentina. Second, while Australia and New Zealand are geographically close to each other, we remain open to the possibility that drinking motives may differ among students from these two countries. Finally, cross-country research conducted with university students from countries that are close or distant from each other has found support for the four-factor model on the DMQ-R-SF [22, 23] and we wanted to determine if that would be the case with these three countries that have yet to be examined.

The present study contributes to the alcohol literature by examining the suitability of the DMQ-R-SF for the purpose of carrying out large multisite research where survey space is limited, and the potential utility of this measure in identifying motives for high-risk drinking among university students. We applied the alignment method to responses on the DMQ-R-SF among university students from Australia, New Zealand and Argentina to assess measurement invariance across these groups. We were able to evaluate whether the reliability and endorsement of the items on the DMQ-R-SF differ meaningfully across the three sites, while allowing for a robust comparison of latent mean scores even in the presence of non-invariance. Finally, to ascertain the convergent validity,

we tested whether the associations between drinking motives and alcohol use and negative alcohol consequences were similar across sites.

2 | METHOD

2.1 | Participants and procedures

Students ($N = 820$) from Australia ($n = 315$), New Zealand ($n = 265$) and Argentina ($n = 240$), located at one public university in each country, completed a survey via Qualtrics (New Zealand/Australia sites) or LimeSurvey (Argentina site) (see Table 1 for descriptives; see

TABLE 1 Drinking Motives Questionnaire-Revised Short Form item summary and demographic characteristics

	Australia		New Zealand		Argentina		Invariant	
	Reliability	Endorse	Reliability	Endorse	Reliability	Endorse	Yes	No
Social								
Makes social gatherings fun	No DIF	No DIF	No DIF	No DIF	No DIF	Lower		×
Helps you enjoy a party	No DIF	No DIF	No DIF	No DIF	No DIF	Higher		×
Improves parties and celebrations	No DIF	No DIF	No DIF	No DIF	No DIF	No DIF	×	
Enhancement								
Because you like the feeling	No DIF	No DIF	No DIF	No DIF	Lower	No DIF		×
To get high	No DIF	No DIF	No DIF	No DIF	No DIF	No DIF	×	
It's fun	No DIF	No DIF	No DIF	No DIF	No DIF	No DIF	×	
Coping								
Helps you when you feel depressed	No DIF	No DIF	No DIF	No DIF	No DIF	No DIF	×	
Cheer you up when you are in a bad mood	No DIF	No DIF	No DIF	No DIF	No DIF	No DIF	×	
To forget your worries	No DIF	No DIF	No DIF	No DIF	No DIF	Higher		×
Conformity								
To fit in with a group you like	No DIF	No DIF	No DIF	No DIF	No DIF	No DIF	×	
To be liked	No DIF	No DIF	No DIF	No DIF	No DIF	No DIF	×	
So you won't feel left out	No DIF	No DIF	No DIF	No DIF	No DIF	No DIF	×	
<i>N</i> (% women)	315 (78.10%)		265 (64.91%)		240 (72.08%)			
Age (<i>M</i> / <i>SD</i> /range)	20.67/2.94/18–30		20.75/3.10/18–30		22.10/2.63/18–30			
Alcohol use ^a (<i>M</i> / <i>SD</i> /range)	11.47/11.75/1–91		15.20/14.08/1–107		8.46/7.30/1–40			
Negative alcohol consequences ^b (<i>M</i> / <i>SD</i> /range)	4.00/3.63/0–16		5.41/4.52/0–20		4.30/3.40/0–14			
Social (<i>M</i> / <i>SD</i> /range/ ω^c)	3.46/1.05/1–5/0.957		3.69/1.05/1–5/0.962		3.13/1.13/1–5/0.949			
Enhancement (<i>M</i> / <i>SD</i> /range/ ω^c)	2.91/0.92/1–5/0.831		3.02/0.99/1–5/0.878		2.80/1.04/1–5/0.881			
Coping (<i>M</i> / <i>SD</i> /range/ ω^c)	2.02/1.04/1–5/0.928		2.02/0.97/1–5/0.902		2.02/0.91/1–5/0.905			
Conformity (<i>M</i> / <i>SD</i> /range/ ω^c)	1.85/0.90/1–5/0.924		2.11/1.16/1–5/0.957		1.47/0.76/1–5/0.947			

Note: In all instances, **Higher** or **Lower** designation is relative to the mean estimate across the non-DIF groups.

Abbreviation: DIF, differential item functioning.

^aDaily Drinking Questionnaire.

^bBrief Young Adult Alcohol Consequences Questionnaire.

^cMcDonald's (ω) reliability coefficient.

[26] for participant recruitment information). The sample for this study was restricted to students who reported alcohol use at least once in the past month.* The protocols for this study were approved by the ethics review boards at each university.

2.2 | Measures

Students at the university sites in Australia/New Zealand and Argentina completed the measures in English and Spanish, respectively. For the Australia and New Zealand sites, one standard drink was defined as a 30 ml shot of spirit straight or in a cocktail, a 375 ml mid-strength beer or 100 ml wine† and in the Argentina site, one standard drink was defined as 14 g of alcohol.‡

2.2.1 | Drinking motives

Participants completed the DMQ-R-SF [18] or its Spanish version [17], which asked them to report how often they are motivated to drink for each reason using a 5-point scale (1 = *Almost never/Never*; 2 = *Some of the time*; 3 = *Half of the time*; 4 = *Most of the time*; 5 = *Almost always/Always*).

2.2.2 | Alcohol use

Students also reported the typical number of drinks they consumed on each day of the week within the past month on the Daily Drinking Questionnaire§ [29]. The Daily Drinking Questionnaire has been shown to have good test-retest reliability [30]. Total sum scores were used in our analysis.

2.2.3 | Negative alcohol consequences

Participants reported whether they had experienced negative drinking outcomes (e.g. passed out/became sick/drove a car after drinking) in the past month using the Brief Young Adult Alcohol Consequences Questionnaire (B-YAACQ; [31]) or its Spanish version [32]. Prior research with participants from a larger study, including participants from the present sample, indicated non-invariance for 3 ('Embarrassed'/'Hungover'/'Upset stomach'; Zamboanga et al., [26]¶) of the 24 items on the B-YAACQ across students in the countries analysed; thus, these items were omitted when composite B-YAACQ scores were computed. The psychometric properties of the B-YAACQ have been established for use

with university students in the USA [33], Argentina [32] and Australia [34].

2.3 | Analytic approach

We employed the alignment method [35, 36] for evaluating differential item functioning, which provides several advantages over traditional methods. The alignment method adopts a minimally constrained baseline model, the procedure for identifying differential item functioning parameters is conceptually similar to the rotation process in exploratory factor analysis. The model is initially identified by fixing the latent factor mean and variance for the reference group to 0 and 1 respectively, and freely estimating all remaining measurement model parameters (i.e. factor loadings, thresholds). A component loss function is optimised so that cross-group differences in similar parameter estimates are minimised and values of parameters that differ meaningfully across groups are maximised [35]. Once an aligned solution is obtained, an inflation-protected multiple comparisons procedure using $\alpha = 0.001$ provides insight into which measurement model parameters differ meaningfully from the (invariant) pooled estimate. Finally, latent factor means from the aligned solution can be directly compared to evaluate potential cross-group differences.

Marsh et al. [37] introduced an extension to basic alignment analysis known as the alignment-within-confirmatory factor analysis (AwC) model, which allows the researcher to embed the aligned solution into a standard multi-group structural equation model. This approach allows the researcher to evaluate the fit of the aligned solution to the sample data and offers the ability to incorporate structural regressions among the aligned latent factors and other relevant outcomes. Because the default maximum likelihood estimator used in the initial alignment analysis did not provide insight into potential violations of the local dependence assumption, the fit of the aligned solution was evaluated by fitting an AwC model using Bayesian (Markov Chain Monte Carlo) estimation, which provides posterior predictive check intervals (PPCI) that describe the degree of misfit present in the aligned solution [38]. Specifically, 95% PPCI values covering 0 suggest that violations of Item Response Theory assumptions are negligible and that the aligned solution provides a reasonable fit to the sample data. Additionally, the AwC model was used to evaluate the convergent validity of the DMQ-R-SF by evaluating the strength of the predictive relationship with alcohol use and negative consequences. All analyses were conducted using *Mplus* 8.6 [39].

3 | RESULTS

3.1 | Alignment model

Initial screening of item response frequencies revealed that the three items from the conformity factor had fewer than five responses in the highest response category for at least one country. To avoid estimation problems and provide comparability across countries, responses in the highest category (5 = *Almost always/Always*) for these items were recoded to the next highest category (4 = *Most of the time*). Pooled and group-specific estimates of factor loadings (λ), thresholds (τ_1 – τ_4), latent factor means (α) and variances (ψ) are provided in Table 2.||

The factor loadings for 11 of 12 items were invariant across country sites. Examination of country-specific parameters revealed that the factor loading for one enhancement item ('Because you like the feeling') was weaker in Argentina relative to the pooled estimate for Australia and New Zealand, suggesting that this item is a less reliable indicator of enhancement motives among Argentinian students. With respect to the threshold parameters, 8 of the remaining 11 items on the DMQ-R-SF were fully invariant (i.e. factor loading, threshold) across all country sites, suggesting comparable levels of endorsement across countries, after accounting for latent mean differences. More specifically, significant differences in threshold parameters emerged for 2 items on the social motives factor and 1 item on the coping motives factor. For example, on one of the social motive items ('Because it makes gatherings more fun'), Argentinean students were more likely to endorse the third (*Half of the time*) and fourth (*Most of the time*) response categories relative to students in Australia and New Zealand. For the other social motive item ('Helps you enjoy a party'), Argentinean students were more likely to endorse the upper-most response category (*Almost always/Always*) compared to students from other sites. Finally, relative to students in the other countries, Argentinean students were also more likely to endorse the second response category (*Some of the time*) for one of the items on the coping factor ('Forget about your worries').

Significant factor mean differences emerged across countries for the social motives factor, such that after accounting for differentially functioning items, students from New Zealand reported more socially based drinking motives compared to students from Australia and Argentina. Latent mean differences were also observed for the conformity factor, such that the students from Argentina reported lower levels of conformity-based drinking motives compared to students from Australia and New Zealand.

3.2 | Alignment-within-confirmatory factor analysis validity analysis: Convergent validity

An alignment-within-confirmatory factor analysis [37] model was specified using the final parameter estimates from the initial alignment analysis. Parameters were simulated via Markov Chain Monte Carlo estimation using a Gibbs sampler (2 chains; 40,000 iterations; 50% burn-in; 90% thinning) and potential scale reduction factor estimates, as well as visual inspection of trace plots which indicated good mixing and adequate coverage of the parameter space. The 95% confidence interval for the global model posterior predictive checking estimate did not capture 0 (PPCI_{Global} = 14.08, 146.78); however, each of the country-specific model PPCIs did contain 0 (PPCI_{Aus} = -8.77, 69.31; PPCI_{NZ} = -12.55, 66.19; PPCI_{Arg} = -15.22, 62.30). This pattern of PPCI estimates suggests that violations of the linearity and local independence assumptions of the primary analytic model are likely negligible, which provides evidence of the validity of the observed differential item functioning.

Group-specific standardised factor loading parameters were used to compute McDonald's ω [40, 41] reliability coefficients for each dimension; good to excellent internal consistency were evident across all sites (Table 1). Results from a pair of conditional AwC models (in which latent DMQ-R-SF Social, Enhancement, Coping and Conformity factors were entered as simultaneous predictors) indicated positive associations between alcohol use and the latent Enhancement factor for Australian and New Zealand students (Table 3). Additionally, latent Enhancement scores were positively related to negative alcohol consequences among students from Australia and New Zealand. Finally, latent Coping scores were positively associated with negative alcohol consequences among students from all three countries.††

4 | DISCUSSION

There are four key findings worth noting regarding the present study. First, consistent with prior studies with university students from other countries [22–24], we found support for the four-factor structure model on the DMQ-R-SF. The factor loadings for 11 items were invariant across Australia, New Zealand and Argentina, though the magnitude of the loading for one item on the enhancement dimension ('Because you like the feeling') was significantly weaker in the Argentina sample. Second, although endorsement of 9 of the 12 items on the DMQ-R-SF were fully invariant across all sites (see Table 1 for summary of findings), some modest differences in item

TABLE 2 Pooled and country-specific alignment Item Response Theory parameters

Factor	Item	Parm.	Australia	New Zealand	Argentina	Pooled est.
<i>Social</i>	Makes social gatherings fun	λ	1.641	2.147	1.688	1.818
		τ_1	−3.004	−3.842	−2.738	−3.197
		τ_2	−1.678	−1.907	−0.534*	−1.783
		τ_3	−0.579	−0.391	0.304*	−0.493
		τ_4	1.700	1.677	1.511	1.638
	Helps you enjoy a party	λ	2.041	1.705	1.663	1.822
		τ_1	−2.871	−2.944	−3.226	−2.998
		τ_2	−1.347	−1.308	−1.390	−1.347
		τ_3	−0.283	−0.460	−0.410	−0.377
		τ_4	2.118	1.873	1.215*	2.006
	Improves parties and celebrations	λ	2.367	2.336	2.591	2.423
		τ_1	−3.696	−3.016	−3.646	−3.462
		τ_2	−1.777	−1.332	−0.883	−1.372
		τ_3	−0.326	0.147	0.214	−0.015
		τ_4	2.212	2.226	2.179	2.207
	Because you like the feeling	α	0.000^a	0.303^{ab}	−0.191^b	–
		ψ	1.000	1.105	0.914	–
		λ	1.208	1.201	0.611*	1.205
		τ_1	−1.899	−1.950	−1.445	−1.783
		τ_2	−0.807	−0.700	−0.450	−0.668
<i>Enhancement</i>	To get high	τ_3	0.121	0.233	0.099	0.151
		τ_4	1.712	1.650	1.377	1.594
		λ	0.577	0.558	0.572	0.569
		τ_1	0.233	0.258	−0.127	0.135
		τ_2	0.784	0.814	0.774	0.791
	It's fun	τ_3	1.172	1.216	1.129	1.173
		τ_4	2.048	2.062	2.053	2.054
		λ	1.644	1.726	1.741	1.699
		τ_1	−3.130	−3.526	−4.720	−3.723
		τ_2	−1.698	−1.984	−1.420	−1.709
	Helps you when you feel depressed	τ_3	−0.786	−0.942	−0.067	−0.626
		τ_4	1.291	1.096	1.883	1.401
		α	0.000	0.152	−0.120	–
		ψ	1.000	1.431	2.353	–
		λ	1.530	1.450	2.331	1.739
	Cheer you up when you are in a bad mood	τ_1	−0.085	−0.033	−0.116	−0.077
		τ_2	1.062	0.987	1.812	1.257
		τ_3	1.740	1.747	2.567	1.984
		τ_4	2.885	2.897	3.985	3.211
		λ	1.540	1.782	1.654	1.652
	Cheer you up when you are in a bad mood	τ_1	−0.396	−0.417	−0.469	−0.424

(Continues)

TABLE 2 (Continued)

Factor	Item	Parm.	Australia	New Zealand	Argentina	Pooled est.
Coping	To forget your worries	τ_2	0.952	0.877	1.267	1.020
		τ_3	1.781	1.919	2.056	1.906
		τ_4	3.446	3.315	3.140	3.314
		λ	1.534	1.341	1.281	1.398
		τ_1	−0.035	−0.170	− 0.658*	−0.096
		τ_2	1.028	1.111	0.870	1.009
		τ_3	1.724	1.788	1.765	1.757
		τ_4	3.085	2.800	2.609	2.854
	To fit in with a group you like	α	0.000	0.043	0.045	−
		ψ	1.000	0.761	0.658	−
		λ	1.627	1.209	1.543	1.467
		τ_1	−0.115	−0.474	−0.497	− 0.343
		τ_2	1.380	0.713	1.386	1.166
		τ_3	2.398	1.465	2.064	1.999
To be liked		λ	1.453	1.625	1.312	1.467
		Conformity	τ_1	0.654	0.697	0.178
	τ_2		1.959	1.940	1.653	1.863
	τ_3		2.771	2.720	2.264	2.606
So you won't feel left out	λ		1.434	1.509	1.959	1.612
	τ_1		−0.559	−0.402	−0.341	− 0.444
	τ_2		0.877	1.982	1.621	1.129
	τ_3		1.779	2.165	2.749	2.188
α	0.000^c		0.076^d	− 0.764^{cd}	−	
ψ	1.000		1.952	1.355	−	

Note: λ , probit factor loading; τ , threshold; α , latent factor mean; ψ , latent factor variance. Fixed parameters in *italics*. Parameters identified as having strong evidence for differential item functioning based on follow-up AwC analysis in bold. Latent factor means with a common superscript denotes significant differences across countries at $p < 0.05$.

Abbreviation: AwC, alignment-within confirmatory factor analysis.

* $\alpha = 0.001$.

endorsement emerged across sites. Compared to students from Australia and New Zealand, students from Argentina were more likely to endorse the third and fourth response categories for one of the social motive items ('Because it makes gatherings more fun'). Conversely, relative to students from Australia and New Zealand, students from Argentina were more likely to endorse the upper-most response category for another social motive item ('Helps you enjoy a party'). Results also indicated that compared to students from Australia and New Zealand, those from Argentina were also more likely to endorse the second response category for one of the items on the coping motives factor ('Forget about your worries'). Perhaps when it comes to responding to specific socially- and coping-based drinking motive items, cultural differences in scale response tendencies between university students

in Argentina and those in Australia and New Zealand may be at work. Research with Argentinean adolescents suggests that, regardless of their expectations about the effects of alcohol, participants were more likely to select the extreme response choices while the intermediate response choices were the least selected response [42]. Perhaps when conducting alcohol survey studies with university students in Argentina, researchers should be mindful of the number of response options for each measure, and their influence on participants' response patterns (see [43]). However, given the greater cultural similarity of Australia and New Zealand with respect to drinking norms, some modest differences for the Argentinian sample were likely.

Third, after accounting for differences in item reliability and endorsement on the DMQ-R-SF, students from

TABLE 3 Aligned Drinking Motives Questionnaire latent factors predicting alcohol use and negative alcohol consequences

		Australia		New Zealand		Argentina	
		<i>b</i> [95% CI]	β	<i>b</i> [95% CI]	β	<i>b</i> [95% CI]	β
Alcohol use ^a	Social	−0.047 [−3.801, 3.450]	−0.004	1.382 [−2.213, 4.984]	0.100	1.777 [−3.700, 7.636]	0.230
	Enhancement	4.137 [0.577, 8.072]	0.342	4.128 [0.956, 7.538]	0.335	−0.357 [−3.946, 3.071]	−0.073
	Coping	0.303 [−1.724, 2.323]	0.025	−2.653 [−6.123, 0.583]	−0.157	1.041 [−0.663, 2.832]	0.111
	Conformity	−1.482 [−3.545, 0.502]	−0.119	0.404 [−1.617, 2.482]	0.037	−1.117 [−2.848, 0.436]	−0.161
Negative alcohol consequences ^b	Social	−0.382 [−1.459, 0.622]	−0.104	−0.012 [−0.931, 0.908]	−0.003	0.799 [−1.708, 3.418]	0.222
	Enhancement	1.097 [0.072, 2.218]	0.293	0.997 [0.126, 1.899]	0.251	−0.226 [−1.875, 1.322]	−0.100
	Coping	1.033 [0.442, 1.655]	0.272	1.937 [0.982, 2.996]	0.349	1.542 [0.807, 2.389]	0.352
	Conformity	0.434 [−0.122, 1.033]	0.112	0.505 [−0.058, 1.097]	0.143	−0.033 [−0.756, 0.652]	0.010

Note: Posterior parameter distributions with 95% credible intervals not containing 0 are indicated in **bold**; *b* = unstandardised regression coefficient; 95% credible intervals (CI) in brackets; β = fully standardised regression coefficient.

^aDaily Drinking Questionnaire.

^bBrief Young Adult Alcohol Consequences Questionnaire.

Argentina reported less conformity drinking motives compared to students from Australia and New Zealand, while students from New Zealand reported more social drinking motives compared to those from Australia and Argentina. In other cross-country work, mean conformity motives scores were also lower among students from Argentina compared to students from the USA [1]. Among university students in Argentina, Pilatti et al. [44] found lower mean conformity motives scores compared to other motives across different classes of drinkers. University students from Argentina who indicated that they mostly drink at home also had lower mean social drinking motive scores than students who drink in other contexts (e.g. nightclubs/parties/bars; [44]). Prior research has also documented increases in frequency of alcohol use in pubs/nightclubs among youth drinkers (ages 18–19) from New Zealand [45]. Further examination of the interplay between the drinking context and socially based drinking motives among university students from different countries is warranted.

Fourth, coping motives were positively related to negative alcohol consequences among students from all three countries. Although potential cross-country differences in the magnitude of these associations were not tested, enhancement motives were positively associated with both alcohol use and negative alcohol consequences among students from Australia and New Zealand, but this association was not present for students from Argentina. In general, these findings are consistent with prior research [10–12]. While the reasons for the non-significant association between enhancement motives and the alcohol outcome variables among students from Argentina is not clear, results from a cross-country study indicated that the association between enhancement

motives and alcohol use was lower among college students from Spain, South America (Argentina/Uruguay) and South Africa compared to students from the US, England and Canada [46].

In general, our findings support our second aim and highlight the potential utility of drinking motives in helping to identify high-risk drinking patterns. The DMQ-R-SF can be efficiently used in university settings to help identify students that may benefit from drinking-motive tailored interventions. Past research has identified profiles based on individual drinking motivations and provided healthier alternatives to regulate positive or negative emotional states [47]. Interventions tailored to drinking motives among university students have shown promising results in reducing drinking frequency and quantity among hazardous drinkers [48]. Moreover, given that specific drinking motives are proximal predictors of problematic drinking patterns, the DMQ-R-SF may assist in the identification of university students at increased risk of problematic drinking. Finally, the DMQ-R-SF is psychometrically sound and brief (which can reduce respondent burden).

In light of the novelty of the study and robust statistical approach, there are a few limitations worth noting. Data were derived from convenience samples of university students (most of whom were women) at each country site and as such, our findings may not be representative. Additionally, given the self-report nature of data, we cannot rule out the possibility that students may have under- or over-estimated their alcohol use and experiences with negative alcohol consequences. Moreover, as Flake and McCoach [49] noted, it is possible that the multiple-correction procedure applied to the cross-group tests for factor loading and threshold differences may be overly conservative ($\alpha = 0.001$), leading to the conclusion that

some smaller-magnitude differences across countries were not detected. Despite these limitations, the present study contributes to the large and continuously growing literature on drinking motives and psychometric studies on the DMQ-R-SF with young adults around the world. Our preliminary findings suggest that the DMQ-R-SF can be reliably used with university students in Australia, New Zealand and Argentina, given that the bulk of the items on the DMQ-R-SF are comparably reliable among the university students sampled across these three sites. We hope that researchers from many different countries will build on our findings and continue their work on the psychometric properties of the DMQ-R-SF so we can advance our universal and country-specific knowledge of drinking motives among adolescents and young adults throughout the world.

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CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

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ENDNOTES

* Participants from the larger sample who did not report at least one drink in the past month on the Daily Drinking Questionnaire and were between 18–30 years of age (Australia, $n = 71$; New Zealand, $n = 77$; Argentina, $n = 236$) were not included in the present study.

† <https://www.health.gov.au/health-topics/alcohol/about-alcohol/standard-drinks-guide>

‡ <https://iard.org/science-resources/detail/drinking-guidelines-general-population>

§ The investigator at the Argentina site used the same Daily Drinking Questionnaire items from past research that were adapted from English to Spanish [27, 28]. Three Spanish and Argentinian researchers proficient in English and with expertise in test adaptation translated the questions independently; versions were discussed until reaching agreement.

¶ The Australian, Argentinean and New Zealand data used for this investigation were collected as part of an international study, the

Alcohol Research Team on Cross-cultural Issues. University students from Canada were also sampled as part of this international study but were not included in the present study because the questionnaire that was administered at the Canadian site did not include the DMQ-R-SF. The US sample used in the Zamboanga et al. [26] investigation was not part of the Alcohol Research Team on Cross-cultural Issues study.

|| Mplus output files for the initial alignment and the alignment-within-confirmatory factor analysis analysis are provided on the OSF page for this project: <https://osf.io/pjq8f/>

†† Zero-order correlations among observed subscales (DMQ-SF: Social, Enhancement, Coping, Conformity) and criterion measures (Alcohol Use: Daily Drinking Questionnaire; Negative Alcohol Consequences: B-YAACQ) for each country are provided in Table S1 (Supporting Information), and aggregate item-level correlations are provided in Table S2 (Supporting Information).

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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