One rule for one, and a different rule for another: The case of the Parental Rules about Alcohol Questionnaire

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Abstract

Background. The parental rules about alcohol questionnaire (Van der Vorst et al., 2005, 2006) uses 10 items to assess how strictly adolescents believe the rules set by their parents about drinking are. An increasing body of literature has attested to the importance of rule setting in the prevention of problematic alcohol use among adolescents. A recent study proposed a two-factor solution in place of the hypothesized unidimensional one, with factors assessing non-normative, and normative rules. Methods. The present study used five waves of data to examine the structure of the scale, and how well it relates to a measure of heavy episodic drinking (HED). Participants in Waves one to four (N = 10,954–9,383) were substantively more numerous than those at wave five (N = 2,332). Results. Confirmatory Factor Analyses did not support either the ten-item hypothesized model, nor the proposed two-factor solution. Results of exploratory factor analyses all pointed to a one factor solution. Using Modification Indices, we obtained a good-fitting, five-item unidimensional model in Waves one to four. At wave five, a good fitting unidimensional model was obtained with the dropping of a further item. Scores on this shortened scale were internally consistent, correlated highly with scores on the original ten-item version, and correlated to a similar degree as the original 10-item measure, with scores on a HED measure. Conclusion. Further work is required in assessing the properties of this scale across cultures and samples before definitively determining that two factors best represent parental rules.

1. Introduction

Prevention efforts targeting underage drinking have increasingly begun to include parent-based interventions, and these efforts have been somewhat efficacious (Bo et al., 2018). One particularly important element of parenting is setting clear and consistent rules about alcohol use (Sharmin et al., 2017; Van der Vorst et al., 2005, 2006).

In 2005, Van der Vorst et al. introduced a ten-item scale to measure adolescent's perception of the strictness of parental rules about alcohol, an important variable in the development of adolescent alcohol use behaviors (e.g., Koning et al., 2009; Mares et al., 2012; Percy et al., 2019; Wadolowski et al., 2016). Recently, others have proposed a seven-item, two-factor solution for this scale, wherein four items are suggested to measure non-normative rules (items 2, 4, 5, and 10), and three items are suggested to measure normative rules (items 1, 6, and 9; Trager et al., 2021).

Given the dimensionality concerns about the Parental Rules Questionnaire raised by Trager et al. (2021), the present study used five waves of data from a longitudinal study to examine one- and two-factor solutions, and where necessary, exploratory analyses on the dimensionality of the scale.

2. Method

2.1 Design and procedures

At waves one to four, participants were pupils in 105 mixed-sex High Schools in Northern Ireland and Scotland (McKay et al., 2018).

Participants at wave five were pupils in schools in Northern Ireland only. The reduction in numbers at wave five is attributable mainly to the cessation of the statutory requirement to attend school from that point forward. A large proportion of schools involved did not therefore offer provision for Sixth Form attendance. All participating schools had been recruited to participate in a cluster Randomized Controlled Trial (Trial registration number: ISRCTN47028486) of the efficacy of a combined classroom-community intervention to reduce alcohol use behaviors.

2.2 Participants

Participant numbers at each of the five waves were as follows: Wave 1, N = 10,954, M_{age} = 12.5; Wave 2, N = 9,942, M_{age} = 13.5; Wave 3, N = 9,710, M_{age} = 14.5; Wave 4, N = 9,383, M_{age} = 15.3; Wave 5 = 4,850, M_{age} = 16.3. Wave one data were collected in the first year of High school, and Wave five data were gathered in the sixth year of High school, with data not collected in High School year five.

2.3 Measures

The 10-item parental rules about alcohol questionnaire (Van der Vorst et al., 2005, 2006) was administered. These items assess adolesents' perception about the strictness of alcohol-specific parental rules (e.g., "*I am allowed to drink alcohol at a party with my friends*", or, "*I am allowed to drink alcohol at the weekend*". Responses were given on a 5-point scale ranging from 1 Completely acceptable, to 5 Completely unacceptable, with a higher score indicative of stricter rules.

Past 30-day Heavy Episodic Drinking (HED) was also self-reported. The original HED measure (waves one to three) was frequency of consumption of >5 'drinks' in a single drinking episode. However, concerns arose because it became clear that >5 'drinks' could refer to drinks of different alcohol strength and volume. For clarity, this measure was changed to consumption of 6 units for males and 4.5 units for females from wave four onwards (see McKay et al., 2018).

2.4 Statistical analyses

Confirmatory Factor Analysis was used to examine the fit of the original unidimensional 10-item scale, as well as the proposed two- factor alternative of Trager et al. (2010; both depicted in Supplementary Figs. 1 and 2). All models used the asymptotic distribution free (ADF) estimator in Stata, version 16. ADF estimation is used to estimate parameters or test models without a normal distribution assumption on variables, both in covariance structure analysis and in correlation structure analysis (Huang and Bentler, 2015). Model fit was adjudged using the following metrics: root-mean square error of approximation (RMSEA), standardized root mean square residual (SRMR), comparative fit index (CFI), and Tucker-Lewis index (TLI). Following the recommendations of Perry et al. (2015), no arbitrary value was identified as a cut-off. Rather, the adequacy of model fit was determined as RMSEA and SRMR being close to zero (i.e., < .06), and CFI and TLI being close to .90.

Further, additional exploratory factor analyses were used to examine the fit of data at all waves, and convergent validity was assessed by examining how scores on the rules questionnaire related to the HED measure.

3. Results

3.1 Confirmatory factor analysis

Results of CFA at each wave are displayed in Table 1. Results show that fit for both solutions was suboptimal at all time points. Notably, the incremental fit indices and the SRMR values were particularly problematic. While fit indices did not support a unidimensional model satisfactorily, the high correlation coefficients between factors did not appear to support a two-factor hypothesis. To examine the data further, exploratory factor analyses were conducted, and results are displayed in Table 2. The Kaiser-Meyer-Olkin and Bartlett's Test of Sphericity were adequate or in the close range at all waves. However, only at wave five were there two Eigenvalues >1, and loadings (and in particular secondary loadings in parentheses) do not support a second factor at any time point.

3.2 Exploratory analyses

Given these results, we explored the viability of a shortened unidimensional model, and chose items based on an amalgam of loadings and theory. Regarding scale items, we deliberately chose more extreme contexts for an exploratory model. For example, items one through four examine alcohol use in the context of the family home (Item #1, one drink with parents present; #2 one drink with parents absent; #3, multiple drinks with parents present; and #4, multiple drinks with parents absent). In our view these are essentially graduated versions of the same item. Item seven (allowed to come home tipsy/drunk) and item eight (allowed to get tipsy/drunk when out with friends) greatly over- lap, but whereas item seven involves some necessary degree of parental engagement, item eight does not. We chose item ten (allowed to drink during the week) over nine (allowed to drink at weekends) as a more extreme option. Items five (allowed to drink as much as I like outside of home), and six (allowed to drink alcohol at parties with friends) assess unique matters (quantity and context respectively), and both were retained.

In tandem with these theoretical considerations, item four tended to load highest (of items one to four) in all waves of data, and item eight tended to load higher than item seven. However, while item nine loaded less well than item ten across waves, it did load satisfactorily. Further, the goodness of fit indices for a five-item scale inclusive of item ten, rather than nine at wave one were better (respectively RMSEA .04/.06; CFI .93/.88; TLI .86/.77; SRMR .04/.05), therefore we

retained item ten over nine. Of note, fit indices for a model retaining both items nine and ten was poor. In the shortened scale (items #4, #5, #6, #8, #10) fit indices at Wave one were as follows: CFI = .929; TLI = .859; RMSEA = .041; and SRMR = .038. Item loadings were all >.69.

Acceptable fit (CFI > .950; TLI > .900; RMSEA < .053; and SRMR < .025) was observed at Waves two, three, and four (See Supplementary Table 1 for details). At Wave 5 the fit indices for these items was sub- optimal. MIs suggested a problem with Item 6. With the removal of item 6 to yield a four-item scale, fit indices were acceptable: CFI .985; TLI .956; RMSEA .068; and SRMR .017. In terms of gender invariance, we randomly chose waves one (detailed in Supplementary materials) and four, and found that in both cases the five-item scale demonstrated configural invariance, but not scalar nor metric invariance.

Pearson's correlations between mean scores on the original 10-item scale, and scores on the reduced five, and four item versions were high, and as follows at all time points (Waves one to five respectively): r = .94; .94; .95; .96; and .92. Cronbach's alpha values for the full ten-item scale and the shortened five-item scale at each time point were as follows (ten- items/shortened version): α .91/.88; .92/.89; .93/.90; .94/.90; and .94/.87. Finally, correlations between the HED measure and scores on the ten-item and five-item shortened version respectively at each wave were as follows: r = -.36/-.36; -.34/-.35; -.41/-.41; -.40/-.39

In further and final exploratory analyses, we used MIs to examine what would be required to achieve a good fitting two-factor model at Wave one (selected randomly). In order to achieve a model with fit as follows: CFI .964; TLI .915; RMSEA .031; and SRMR .026, we had to fit four correlated error terms, two of which were between items in different factors (see Supplementary Fig. 3).

Discussion

The results of the present analyses do not support the two-factor solution proposed by Trager et al. (2021). While CFA did not support the hypothesized one-factor of van der Vorst et al. (2005), exploratory factor loadings, Eigenvalues >1, factor correlations in two-factor models, and the CFA results for the proposed two-factor solution point towards a form of one-factor solution being optimal, if not that proposed by van der Vorst et al. (2005). The final exploratory modelling at Wave one to test what was necessary to achieve a good-fitting two-factor model was just that, exploratory. This is not an approach that we would recommend, as this atheoretical, arbitrary approach, typically results in sample-specific model fits (Perry et al., 2015).

The findings from this study may reflect a cultural impact on parental rules around drinking, as may the findings of Trager et al. (2021). Pointedly, this issue recognizes the importance of replicating findings and the use of independent samples before drawing definitive conclusions regarding the utility of a measure. It is not immediately apparent why the results in these two studies ought to be so different. One possibility is the nature and manner of rule implementation across cultures. It is possible that items developed in the Netherlands operate differently in a UK context. Further, and relatedly, it is possible that the nature of adolescent alcohol use differs in terms of pattern and intensity across cultures. Going back over past European School Survey Project on Alcohol and Other Drugs (ESPAD) reports, it becomes apparent that the simultaneous participation of the UK and the Netherlands predates the 2011 report, making comparison of drinking behaviors in these countries difficult.

In exploratory analyses we proposed a brief, unidimensional version of the scale. However, gender variance (metric and scalar) shows that even this scale is not a definitive solution to the conceptual and measurement issues of parental rules on adolescent drinking. Additionally, with any measure of this kind, there is likely an age restriction on its utility. This is possibly because the scale is an assessment of the respondent's interpretation of parental rules rather than an objective reflection of them. Moral development teaches us that early to mid- adolescence is a prime time when individuals move from following rules as set by others to avoid consequences, to a broader interpretation and questioning of the consequences (Killen and Smetana, 2006). By age 15, it is reasonable to expect that many individuals interpret the rules with a much broader sense of what is right than someone at the beginning of adolescence. It is perhaps unrealistic to expect the same measure to continue to work for adolescents beyond this age. Further, the fit of this model will need to be tested and proven in other studies, in order that its use can be fully recommended.

Strengths of this study include the sample size at multiple waves of data. Conversely, the sample is drawn from just two countries. Further and on-going analyses are required to definitively determine the fit for this scale, and to understand the interpretation of parental rule setting. In the interim we would suggest that researchers present results for a range of factor solutions including a 10-item, one factor solution, the two factor solution proposed by Trager and colleagues (2021), and the shortened version proposed herein, in the hope that a consensus on the use of this useful measure can be reached.

CRediT authorship contribution statement

Michael McKay: Conceptualization, Data curation, Methodology, wrote first draft, review and editing. John Perry: Formal analysis, re- view and editing. Jon Cole: Conceptualization, funding acquisition, Investigation, project review and editing. Andrew Percy: Funding acquisition, review and editing. Harry Sumnall: Methodology, writing, review, and editing.

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Author contributions

Authors MMK, JLP, & JCC designed the study. Authors MMK and JLP performed analyses, literature searches and provided summaries of previous research studies. Authors MMK, AP, and JLP conducted the statistical analysis. Authors MMK and HRS wrote the first draft of the manuscript and all authors contributed to and have approved the final manuscript.
Declaration of Competing Interest

The authors report no declarations of interest.

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TABLE 1 Fit indices for the hypothesized one- and two-factor solutions for waves one to five.

Wave; numbers; factor correlations		Factor Solution	X^2 CFI	TLI	RMSEA (95 % CI)	SRMR
One; *N* = 10,954	One	1417.74, *p* < .001	.607	.494	.060 (.057, .063)	.427
One; *r* = .89	Two	724.93, *p* < .001	.733	.568	.071 (.066, .075)	.136
Two; *N* = 9,942	One	1350.08, *p* < .001	.636	.532	.061 (.059, .064)	.441
Two; *r* = .89	Two	612.16, *p* < .001	.748	.593	.068 (.063, .072)	.138
Three; *N* = 9,710	One	1604.32, *p* < .001	.669	.574	.068 (.065, .071)	.470
Three; *r* = .88	Two	649.10, *p* < .001	.796	.670	.071 (.066, .075)	.119
Four; *N* = 9,383	One	2438.84, *p* < .001	.699	.613	.086 (.083, .088)	.448
Four; *r* = .87	Two	705.65, *p* < .001	.862	.778	.075 (.070, .080)	.060
Five; *N* = 4,850	One	2409.54, *p* < .001	.812	.758	.118 (.114, .122)	.178
Five; *r* = .80	Two	406.45, *p* < .001	.916	.865	.112 (.106, .119)	.081

Note: CFI = Comparative Fit Index; TLI = Tucker Lewis Index; RMSEA = Root Mean Square Error of Approximation; SRMR = Standardized Root Mean Square Residual.