My cup runneth over: Young people’s lack of knowledge of low-risk drinking guidelines

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Abstract

Introduction and Aims. If young people are to consume alcohol in accordance with government guidelines, they must possess the relevant knowledge and skills. No previous research has examined correlations between different forms of knowledge of alcohol guidelines or how they are related to personality variables and beliefs. Design and Methods. Two samples were recruited in South-East England: 309 secondary school students aged 16–18, and 125 university students aged 18–25. All participants completed a computer-administered survey of knowledge and beliefs. University students also reported their alcohol consumption and completed tasks in which they poured their ‘usual’ drinks, and what they believed to be ‘units’ of alcohol. Results. Most respondents lacked the knowledge and skills required to drink in accordance with government guidelines. Participants’ usual drinks were substantially larger than one unit, and participants tended to underestimate the unit content of drinks. There was little evidence that possession of accurate knowledge of one aspect of alcohol units and guidelines was related to accurate knowledge in other domains. Discussion and Conclusions. Many young people may lack the knowledge required to monitor their alcohol consumption or give accurate self-reports in research. Future research should evaluate using a drink-pouring task as part of interventions designed to improve knowledge and skills and encourage moderate consumption of alcohol. [de Visser RO, Birch JD. My cup runneth over: Young people’s lack of knowledge of low-risk drinking guidelines. Drug Alcohol Rev 2011]

Key words: guideline, knowledge, drink volume, personality.

Introduction

There is widespread concern about the health and social consequences of excessive alcohol consumption, particularly among young people. Many countries have developed guidelines to encourage moderate alcohol consumption [1–3]. The UK government has issued guidelines for ‘sensible drinking’ expressed in terms of ‘units’ of 10 mL 8 g⁻¹ of ethanol [1]. If individuals are to adhere to low-risk alcohol consumption guidelines, it is important that they possess accurate knowledge and appropriate attitudes and skills. However, research suggests that these attributes are lacking in most drinkers.

A recent national survey of drinking-related knowledge and behaviour in the UK revealed that although 90% of adults had heard of alcohol units, accurate knowledge of consumption guidelines was uncommon, and only 13% of drinkers used government guidelines to monitor their own drinking [4]. Surveys of opportunistic samples of younger and older adults also show that very few could accurately recall guidelines for safe drinking, and that few people monitored their own alcohol consumption using knowledge of ‘units’ [5,6]. Few people possess accurate knowledge of what a unit of different drinks looks like, or of the alcohol unit content of various servings of wine, beer and spirits [4,7]. Most people also misperceive the alcohol content of the drinks they pour for themselves [8–10]. Self-poured drinks are typically larger than ‘units’ or ‘standard drinks’, and commonly contain twice as much alcohol. When people are asked to pour what they believe to be one ‘unit’ or ‘standard drink’ they tend to pour significantly larger drinks [8,11,12]. Whether people are asked to pour ‘usual drinks’ or ‘units’, when they are given larger glasses they pour bigger drinks. The latter
point is important given that glasses used at home and in bars often have a capacity to contain considerably more than one ‘unit’ or ‘standard drink’ [13].

To summarise: many people overestimate safe levels of alcohol consumption; few believe that alcohol consumption guidelines are useful in theory and few use them in practice; few members of the drinking public have accurate knowledge of the alcohol content of the drinks they purchase; and few have accurate knowledge of the alcohol content of drinks that they pour for themselves. Studies of young people suggest that those with better knowledge of guidelines may be those who consume more alcohol [7], and there does not appear to be a simple association between knowledge of units and accuracy of pouring [12]. The biases identified in the research referred to above indicate that inaccuracies in knowledge generally result in people underestimating how much they drink and drinking in excess of guidelines for safe consumption.

No previous research has examined correlations between the different forms of knowledge about alcohol units. The aim of this study was to examine the extent to which different forms of knowledge of alcohol guidelines are related to each other.

**Materials and methods**

**Samples**

Sample one consisted of 309 secondary school students aged 16–18 (173 girls, 136 boys) recruited with the assistance of three government secondary schools. Students were provided with the URL for an online survey. Sample two consisted of 125 university students aged 18–25 (71 women, 54 men) who drank alcohol. They were recruited via email messages and requests in lectures. All participants resided in South-East England.

**Procedure**

Ethical approval was granted by the appropriate University research governance committee. At the request of schools, students were not asked to give self-reports of alcohol consumption or complete the drink-pouring activity. All participants read and completed an information and consent form. Secondary school students then completed a computer-administered questionnaire. University students completed the drink-pouring task before completing the questionnaire.

**Computer-administered questionnaire**

Seven questions assessed knowledge of alcohol units and guidelines for safe alcohol consumption. Participants indicated what they believed to be: the volume (in mL) of pure ethanol in a ‘unit’; and government guidelines (in units) for maximum weekly intake for men and women, maximum daily intake for men and women, and binge drinking for men and women. The number of correct responses was recorded as a total knowledge score. Respondents used 5-point Likert scales anchored with the end-points ‘not at all’ and ‘extremely’ to indicate: how familiar they were with the concept of ‘units’; how useful they believed the concept of ‘units’ to be; and how useful it would be to have more information about ‘units’.

Respondents estimated the alcohol unit content of 10 drinks selected to cover different sized servings of three types of alcoholic drinks consumed by young people. Colour pictures of each drink were accompanied by brief descriptions: red wine: 250 mL large glass; red wine: 175 mL standard glass; regular strength beer: pint (568 mL); Stella Artois lager: 330 mL bottle; Stella Artois lager: 500 mL can; Carling lager: 440 mL can; Carlsberg lager: 275 mL bottle; mixed drink—for example vodka and tonic: pub measure; Smirnoff Ice mixed vodka drink: 275 mL bottle; spirit—for example whisky: 25 mL pub measure. Estimates were dichotomised as outside or within ±10% of the actual alcohol unit content [9]. Participants were given a score denoting the proportion of estimates within this range.

Reports of alcohol consumption in units for each day of the preceding week were summed and divided by sex-specific guidelines to indicate the extent to which participants exceeded weekly consumption guidelines [1]. Reports of the number of days in the preceding month on which respondents had consumed: (a) more than six units; (b) more than eight units were coded in accordance with sex-specific guidelines for binge drinking [1].

**Drink-pouring activity**

Data collection for the drink-pouring activity entailed the use of five types of clear shatterproof plastic glasses: 250 mL wine glass; 150 mL wine glass; 570 mL beer glass; 340 mL beer glass; 255 mL tumbler. Three types of bottles were used: 750 mL green glass red wine bottle; 660 mL brown glass beer bottle; 375 mL clear glass vodka bottle. Bottles were emptied of their alcoholic contents and refilled with red coloured water (‘red wine’), ginger beer (‘beer’) and water (‘vodka’). Participants were informed that bottle contents were not genuine, but were asked to pour drinks as if they were ‘regular strength’ wine, beer and vodka. If they asked, participants were instructed to assume the following alcohol content by volume (ABV): wine = 12%, beer = 4%, vodka = 40%.

Two sets of five glasses were used, always in the order described above. After each drink had been poured it
was removed from the participant’s sight. First, they were instructed to use one set of five glasses and to pour their ‘usual’ drink of wine, beer and vodka (or the amount they would pour for a friend). Participants were then instructed to use the second set of five glasses to pour ‘units’ of wine, beer and vodka. Rather than randomising the order, the same ‘usual’ then ‘unit’ order was used for all participants, as past research has identified reactivity to drink-pouring tasks that may enhance social desirability effects arising from pouring ‘usual’ drinks after pouring ‘units’ [12]. Drink volumes were measured to the nearest mL and converted to units using the ABVs reported earlier. Drinks poured for the ‘unit’ task were coded as within ±10% of the actual alcohol unit content, and summed to give a score out of 5. When they had completed the questionnaire, university students were provided with the results of their drink-pouring task and debriefed.

Data analysis

Analyses were conducted using SPSS 16.0 [14]. Due to the large number of between- and within-subjects comparisons, the significance level was set at \( P < 0.01 \). Means and proportions are displayed with 99% confidence intervals. Inclusion of the 30 18-year-olds in the school sample affected neither the patterns of results nor the strength of statistical associations, so they were retained to maximise the power of the analyses. Comparisons between the samples of 309 school students and 125 university students provided statistical power of 79% to detect moderate effect sizes (\( d = 0.5 \)) at \( P < 0.05 \).

Results

All university students drank alcohol in the month prior to participation, and 90% had done so in the last week. In the last month, 85% had at least one episode of binge drinking, with a mean of 4.9 times for men and 5.5 times for women. Although there were no significant sex differences in these measures, and few sex differences in knowledge and beliefs, the relatively small sample of university students meant that separate analyses of women’s and men’s data were likely to lack sufficient statistical power. Therefore, the data from women and men were combined, with analyses adjusted with sex as a covariate. Sex-specific data are available from the corresponding author.

Knowledge of alcohol units and guidelines was generally poor (Table 1). For five of the seven items fewer than half of the respondents gave correct responses. The exceptions were the two questions about daily guidelines; however, these are expressed in two-unit ranges (2–3 for women; 3–4 for men) and either of these responses was deemed a correct response. For all but one item, there were significant differences between the samples. However, the pattern of differences was not consistent. University students were more likely than school students to know the volume of a unit, but school students were more likely than university students to know the definitions of binge drinking for men and women. There was no significant difference between the school and university samples in knowledge of sex-specific daily or weekly guidelines, or total knowledge scores.

<table>
<thead>
<tr>
<th>Table 1. Knowledge of alcohol units and guidelines</th>
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</thead>
<tbody>
<tr>
<td>Knowledge of units and guidelines</td>
</tr>
<tr>
<td>Unit is 10 mL of ethanol</td>
</tr>
<tr>
<td>Weekly guideline—men</td>
</tr>
<tr>
<td>Weekly guideline—women</td>
</tr>
<tr>
<td>Daily guideline—men</td>
</tr>
<tr>
<td>Daily guideline—women</td>
</tr>
<tr>
<td>Binge drinking definition—men</td>
</tr>
<tr>
<td>Binge drinking definition—women</td>
</tr>
<tr>
<td>Total knowledge of units/guidelines(^{a})</td>
</tr>
<tr>
<td>Opinion of units and guidelines</td>
</tr>
<tr>
<td>Familiarity(^{a})</td>
</tr>
<tr>
<td>Usefulness(^{a})</td>
</tr>
<tr>
<td>Want more information(^{a})</td>
</tr>
<tr>
<td>Knowledge of unit content of drinks</td>
</tr>
<tr>
<td>proportion of unit estimates ±10%</td>
</tr>
<tr>
<td>proportion of units poured ±10%</td>
</tr>
</tbody>
</table>

\(^{a}\)Analyses controlled for sex. \(^{b}\)Score out of 7. \(^{c}\)Measured on 5-point scale.
Respondents felt moderately familiar with the concept of alcohol units, but did not find this concept particularly useful (Table 1). They tended to want more information about alcohol units. There were no significant differences between the two samples in familiarity with alcohol units, perceived usefulness of this concept, or desire for more information.

In general, participants’ estimates of the alcohol unit content of different drinks were inaccurate. Although university students gave a significantly greater number of accurate estimates than did school students, only one-quarter of their estimates were within ±10% of the actual content. The majority of estimates were underestimates: 52.0% among school students; 65.3% among university students.

The final row of Table 1 indicates that when university students were asked to pour a ‘unit’ of five different alcoholic drinks, only one-quarter were poured within ±10% of one unit. The majority (52.0%) of all ‘units’ poured were greater than one unit.

Table 2 reports the unit content of the 10 drinks poured by the university students. For both the ‘usual’ and ‘unit’ activities, participants poured bigger drinks when they were given bigger glasses. The 99% confidence intervals show that with the exception of the small glass of beer, the average alcohol content of ‘usual’ drinks was significantly larger than one unit. Overall, 85.9% of ‘usual’ drinks contained more than one unit, and only 21% were within ±10% of one unit.

Although students’ ‘units’ were smaller than ‘usual’ drinks, they tended to pour ‘units’ of wine and vodka which contained more than one unit of alcohol. For this task there was only one significant sex difference: men poured significantly larger ‘units’ of vodka. As noted above, only 26.4% of ‘units’ were accurate within ±10%, and 52% contained more than one unit. Within-subjects repeated measures ANOVAs revealed that for four individual tasks, and for the sum of the five tasks, usual drinks were significantly larger than ‘units’.

Students who poured larger ‘usual’ drinks tended to pour larger ‘units’: the association was significant for wine in a large glass ($r = 0.24, P < 0.01$), beer in a small glass ($r = 0.24, P < 0.01$), and vodka ($r = 0.27, P < 0.01$), but not wine in a small glass ($r = 0.05, P = 0.56$), or beer in a large glass ($r = 0.03, P = 0.74$).

Table 3 shows that among university students, there were few significant correlations between different measures of knowledge. Greater familiarity with units and guidelines was related to better knowledge of alcohol units and guidelines and a greater perceived utility of such guidelines. Students gave a greater number of accurate estimates of the unit content of different drinks if they had better knowledge of alcohol units. However, actual or self-reported familiarity with units and guidelines was unrelated to whether university students could pour units of alcohol, or the unit content of their usual drinks. The two right-hand columns in the lower part of Table 3 show that although ability to pour units was not related to weekly alcohol consumption, students poured larger usual drinks if they were more frequent binge drinkers.

Table 3 also shows that among school students, greater self-reported familiarity with units and guidelines was related to a greater perceived utility of such guidelines. However, actual or self-reported familiarity with units and guidelines was unrelated to whether school students could accurately estimate the unit content of different drinks.

### Discussion

The results reported here indicate that young people tend not to possess the knowledge and/or skills required to drink alcohol in accordance with government guidelines for alcohol consumption. As expected, participants had poor knowledge of government guidelines; did not perceive such guidelines to be particularly useful; had poor knowledge of the alcohol content of drinks they may purchase in licensed premises or for home consumption; poured ‘units’ of alcohol that contained more than one unit of alcohol; and poured ‘usual’ drinks that contained sub-

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**Table 2. Unit content of drinks poured by university students ($n = 125$)**

<table>
<thead>
<tr>
<th>Usual drink (99% CI)</th>
<th>Unit (99% CI)</th>
<th>Difference*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red wine—large glass</td>
<td>1.76 (1.66–1.85)</td>
<td>1.17 (1.07–1.25)</td>
</tr>
<tr>
<td>Red wine—small glass</td>
<td>1.24 (1.18–1.29)</td>
<td>1.13 (1.06–1.20)</td>
</tr>
<tr>
<td>Beer—large glass</td>
<td>1.57 (1.50–1.68)</td>
<td>0.94 (0.88–1.02)</td>
</tr>
<tr>
<td>Beer—small glass</td>
<td>1.01 (0.97–1.06)</td>
<td>0.86 (0.81–0.91)</td>
</tr>
<tr>
<td>Vodka</td>
<td>1.77 (1.61–1.93)</td>
<td>1.17 (1.11–1.26)</td>
</tr>
<tr>
<td>Unit content of five ‘usual’ drinks</td>
<td>7.35 (7.08–7.65)</td>
<td>5.27 (5.02–5.53)</td>
</tr>
</tbody>
</table>

*Within-subjects repeated measures ANOVA controlled for sex. CI, confidence interval.
Young people’s knowledge of alcohol guidelines

Table 3. Correlations between knowledge and use of alcohol guidelines and cognitive measures among university students (n = 125, below diagonal) and school students (n = 309, above diagonal)

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Knowledge of units/guidelines</td>
<td>—</td>
<td>$r = 0.04$</td>
<td>$r = -0.05$</td>
<td>$r = 0.11$</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>2. Familiarity with units/guidelines</td>
<td>$r = 0.21$</td>
<td>$r = 0.40$</td>
<td>$r = 0.07$</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>3. Usefulness of units/guidelines</td>
<td>$P = 0.01$</td>
<td>$P &lt; 0.01$</td>
<td>$P = 0.11$</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>4. Proportion of unit estimates within ±10% of actual content</td>
<td>$r = 0.26$</td>
<td>$r = 0.13$</td>
<td>$r = 0.03$</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>5. Proportion of ‘units’ poured within ±10% of a unit</td>
<td>$P &lt; 0.01$</td>
<td>$P = 0.08$</td>
<td>$P = 0.39$</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>6. Total unit content of five ‘usual’ drinks</td>
<td>$r = -0.05$</td>
<td>$r = -0.04$</td>
<td>$r = -0.06$</td>
<td>$r = 0.13$</td>
<td>$r = -0.10$</td>
<td>—</td>
</tr>
<tr>
<td>7. Weekly unit consumption as proportion of recommended maximum</td>
<td>$P = 0.28$</td>
<td>$P = 0.34$</td>
<td>$P = 0.24$</td>
<td>$P = 0.08$</td>
<td>$P = 0.14$</td>
<td>—</td>
</tr>
<tr>
<td>8. Frequency of binge drinking in last month</td>
<td>$r = 0.12$</td>
<td>$r = -0.02$</td>
<td>$r = -0.15$</td>
<td>$r = 0.13$</td>
<td>$r = 0.09$</td>
<td>$r = 0.20$</td>
</tr>
</tbody>
</table>

*One-tailed partial correlations controlled for sex.*

Substantially more than one unit of alcohol. As in previous research [4–12], inaccurate knowledge and lack of skill meant that participants would tend to underestimate how much they drink and to drink in excess of guidelines for safe consumption.

Accurate knowledge in one domain (e.g. knowledge of guidelines) was not necessarily associated with accurate knowledge in any other domain. Furthermore, self-reported familiarity with units was not a good predictor of capacity to use unit-based guidelines.

The data from the ‘unit’ pouring exercise reveal that on many occasions, people who thought that they had not exceeded the guideline for daily intake would have actually exceeded it. For example, on average, a woman who reported drinking two glasses of wine would have actually consumed 3.5 units, and a man who reported drinking three usual measures of vodka would have consumed 5.4 units. People who reported consuming more drinks tended to pour bigger drinks, and tended to overestimate the size of alcohol ‘units’. These findings indicate that the underestimation of alcohol consumption based on self-reports found in previous studies may be particularly pronounced among heavy drinkers [4,7,8].

It has been suggested that one reason that students pour large ‘units’ or ‘standard’ drinks is that they know the correct volumes, but lack the skill to pour drinks accurately [12]. However, if this were the case, then participants should be as likely to pour drinks that are too small as drinks that are too large. In the two samples recruited for the current study, knowledge of units and capacity to pour units were both poor, and there was no significant association between these two forms of knowledge. Thus, inaccurate drink pouring does not appear to be solely the result of a skill deficit, but a reflection of a broader lack of practical knowledge of alcohol consumption guidelines. Additionally, or alternatively, ‘over-pouring’ may reflect a lack of motivation to adhere to guidelines for sensible drinking, but to drink to fulfil alternative motives, such as fun and excitement [15,16].

There was little evidence that possession of accurate knowledge of one aspect of alcohol units and guidelines was related to accurate knowledge of other domains. This finding can be read in two ways: first, people with more accurate knowledge do not necessarily feel more familiar with units and guidelines; second, people who feel more confident in relation to units and guidelines do not necessarily possess more accurate knowledge.

There may be a need to find alternative ways of thinking about and recording alcohol use in clinical and research settings [6,17]. For example, in research that relies on self-reports of alcohol consumption, it may be safest not to ask respondents to report alcohol consumption in terms of ‘units’ or ‘standard drinks’. It may be better to ask people to indicate the number of drinks of various kinds that they consumed within a given time period—perhaps using pictures, such as those used in this study—and then calculate the total unit content of these drinks. A related strategy using photographs and models of various drink containers and vessels was successfully employed in a study of pregnant women’s alcohol consumption [10]. It is notable that although such strategies may provide more accurate measures of alcohol consumption, they can be considerably more labour- and resource-intensive than simple self-reports.
Although this study has made some important contributions, it does have some limitations. One limitation relates to the size of the sample of university students, which reflects the time- and resource-intensity of the study. Useful data would have been generated if respondents had been asked to give their own unit-based definitions of excessive alcohol consumption and to estimate the unit content of the ‘usual’ drinks that they poured. Such data would have furthered our understanding of practical or applied knowledge of alcohol units and how this relates to definitions of sensible drinking in government guidelines. It was also disappointing not to have been able to collect data on drink pouring from the school students. There is some evidence that school-based education about alcohol may help to reduce alcohol-related harm [18]. There would also be value in replicating this study with broader samples of young people and older adults to determine whether the findings observed in the convenience samples recruited for this study apply to the broader drinking population [19].

The results of studies using drink-pouring methods suggest that feedback from such activities may be an important part of interventions to promote better understanding of alcohol units, more accurate reporting of alcohol consumption, and enhanced capacity to monitor alcohol consumption [6,12]. This suggestion is supported by anecdotal evidence from participants in this study, and from other studies using drink-pouring tasks. For example, students given feedback about the inaccuracy of their knowledge of standard drinks have been observed to revise upwards estimates of their alcohol consumption [12], and many drinkers report that feedback of pouring test results would influence them to reduce their usual drink size [9].

Although it may be important to increase knowledge, it is important to note that other cognitive factors—including motivation to get drunk—may be more proximal, or more important predictors of alcohol consumption [15]. For example, qualitative studies of young people have provided little evidence that the health concerns underlying moderate consumption guidelines exert a significant influence on young people’s drinking [20,21]. In contrast, pleasure and concerns about reputation appear to be more potent influences on patterns of alcohol consumption. Attempts to use health-related messages to encourage moderate alcohol consumption are likely to have limited success, because they do not address these motives for heavy drinking. Indeed, it has been noted that encouragement of moderation and restraint run counter to the contemporary cultural emphasis of excessive and conspicuous consumption [22].

It is also important to note that the possession of more accurate information about alcohol units could facilitate more harmful consumption. For example, a recent Australian study revealed that young people may use alcohol unit labelling to help them to select the most potent drinks [23]. There is not, therefore, a simple link between increased information provision and reduced alcohol-related harm.

This study has revealed poor knowledge of alcohol units and guidelines—however these are conceptualised and assessed. It is therefore important to identify techniques that may better enable people to monitor their alcohol consumption and to drink according to government guidelines. Future research should evaluate the potential utility of drink-pouring tasks as part of interventions designed to encourage moderate consumption of alcohol.

Acknowledgement

This research received support from the Wellcome Trust.

References

[12] White AM, Kraus CL, McCracken LA, Swartzwelder HS. Do college students drink more than they think? Use of a free-pour paradigm to determine how college students...


