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ABSTRACT

Measurement and interpretation of alcohol use self-reports is characterized by a general lack of consensus. This study represents an effort to clarify what constitutes alcohol misuse among U.S. youth. A self-administered questionnaire eliciting opinions about cut-off point for alcohol misuse was mailed to 10 experts (7 men, 3 women) in alcohol research and treatment. These experts were selected to be representative of alcohol investigators from universities and research institutions from across the U.S. Respondents were asked to provide input with respect to frequency-quantity of alcohol use, high-risk drinking, and negative consequences items. Results revealed considerable variability in opinion about the different indicators of alcohol misuse. Exact agreement between different alcohol-use experts was rare. Reliability estimates revealed highest agreement for indicators of high-risk drinking, followed by negative consequences, and then frequency-quantity. Comments from the experts indicated that most felt that frequency and quantity should be considered together rather than separately. As expected, recommended cut-off points for alcohol misuse varied by age of the drinker, with more leeway given to older than younger adolescents. Contains 21 references. (Author/LSR)

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WHAT IS ADOLESCENT ALCOHOL MISUSE IN THE UNITED STATES ACCORDING TO THE EXPERTS?

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Abstract — A self-administered 16-page questionnaire eliciting opinions about cut-off points for alcohol misuse was mailed to ten experts (seven men, three women) in alcohol research and treatment. These experts were selected to be representative of alcohol investigators from universities and research institutions from across the United States of America. Experts were asked to provide input with respect to frequency–quantity of alcohol use, high-risk drinking, and negative consequences items. Results revealed considerable variability in opinion about the different indicators of alcohol misuse. Exact agreement between different alcohol-use experts was rare. Reliability estimates revealed highest agreement for indicators of high-risk drinking, followed by negative consequences, and then frequency–quantity. Comments from the experts indicated that most felt that frequency and quantity should be considered together rather than separately. As expected, recommended cut-off points for alcohol misuse varied by age of the drinker, with more leeway given to older than younger adolescents.

INTRODUCTION

The literature on problematic alcohol use among adolescents in the USA shows noteworthy disagreement on how to define it (Dunn *et al.*, 1993). Studies vary in the type of items included, in cut-offs defining different forms of misuse (high consumption, high-risk use, negative consequences), and in the variety of misuse indicators required. Donovan and Jessor (1983) defined problem drinking in terms of one high-risk behaviour (having been 'drunk or very, very high' six or more times in the past year) and several drink-related problems (having experienced negative personal or social consequences as a result of drinking at least twice in the last year in at least three of five areas) in a national study of students in grades 7–12. Another study of high-school students defined problem drinking as four or more high-risk behaviours or three or more negative consequences (Hays *et al.*, 1987).

Ellickson and Hays (1991) used frequency of binge drinking (three or more drinks on a single occasion) as a measure of problematic use among seventh and eighth graders. In another study, Jessor (1987) defined problem drinking solely in terms of the number of times drunk in the past year. With a sample of young adolescents (grades 6 and 7), Dielman *et al.* (1989) assessed alcohol misuse using 10 negative consequences items reflecting overindulgence, trouble with peers (complaints from friends), and trouble with adults (parents, teachers, police). Similarly, Welte and Barnes (1988) measured problems from alcohol (such as trouble with teachers or friends due to drinking) and high-risk drinking, such as driving a car after having a lot to drink.

At least two reasons account for this variability: (1) criteria that apply to adults are not necessarily appropriate for adolescents; (2) criteria that are reasonable for older teenagers may not be appropriate for younger adolescents. Drinking levels that may cause little or no problem for adults can be dangerous for adolescents, who typically have lower body weight, less drinking experience and less well-defined judgment. Their coordination, reflexes, and thinking may be negatively affected by just one drink; they frequently lack experience in judging how alcohol affects them; and they may misinterpret prior experiences or label specific situations as harmless when they are not. While adults may do all of these things as well, US society deems that adolescents, who are still 'in process' developmentally, require greater protection from the consequences of poor decision-making.

In addition, adolescent patterns of alcohol use

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rarely approximate the severity of adult problem drinkers. Addiction is rare among adolescents, and measures of dependency or problem drinking that are typically used for older people may not capture drinking patterns that pose serious threats to young people (White and LaBouvie, 1989). Clinical definitions of alcohol abuse and dependence such as the DSM-IV criteria (*Diagnostic and Statistical Manual of Mental Disorders*) (Muthén *et al.*, 1993) exclude many youths whose drinking entails harmful consequences but fails to meet high tolerance or pathological criteria (evidenced by craving, inability to control drinking, black-outs, etc.). For example, fewer than 4% of the high school seniors included in Project ALERT, a multi-year smoking and drug prevention study in the United States (Ellickson and Bell, 1990), said they had ever 'wanted to stop drinking but couldn't' or 'needed a drink just after getting up'; in contrast, 10% became involved in a fight in the past year because of drinking alcohol, and 22% had passed out. Thus, definitions of problem drinking or alcohol misuse that hinge on meeting two criteria (symptoms of abuse *and* negative consequences) would exclude over 95% of these high school seniors and virtually all of them when they were in junior high school.

Frequency–quantity indices also have different meanings for adolescents and adults. The former typically drink less often than adults but may consume larger amounts when they drink (Harford and Mills, 1978). The 1988 United States National Health Interview Survey (Williams and DeBakey, 1992) estimated that 19% of adult (aged 18 and older) males and 7% of females were heavy drinkers (i.e. consumed more than 0.99 ounces of alcohol daily). However, only 1% of the seniors in Project ALERT were daily drinkers, whereas 7% consumed an *average* of two drinks per day during the last month. Among seventh graders, the proportion consuming two drinks per day during the last month was much lower, less than 1% (Ellickson *et al.*, 1996). Thus, frequency–quantity indices for adolescents are dominated by infrequent consumption of high quantities and are highly variable across age groups, with both frequency of use and amount of consumption increasing with age (Harford and Spiegler, 1983).

In an effort to reduce uncertainty about how to define alcohol misuse, we recruited ten experts with a wide range of expertise about adolescent and adult alcohol use in the USA to provide judgements about different misuse indicators. Each expert was asked to define misuse based on how frequently and how much alcohol an adolescent consumes as well as on items that tap different forms of high-risk drinking and negative consequences.

MATERIALS AND METHODS

Sample

All ten experts have published extensively in the alcohol field, and six of the ten have focused primarily on adolescents. The seven men and three women are representative of alcohol investigators from universities and research institutions from across the United States.

Measures

A 16-page (including cover page with instructions) expert panel questionnaire was constructed and mailed to the experts (available upon request). Experts self-administered the questionnaire and returned it by mail.

The first section of the questionnaire asked experts to indicate the criteria they recommend for classifying alcohol misuse using only information about frequency–quantity of alcohol use. Experts were asked to provide separate misuse ratings for younger and older adolescents. Ratings were obtained for frequency of drinking in the last year (1–2 times, 3–10 times, 11–20 times, 21 or more times) and the last 30 days (1–2 days, 3–5 days, 6–19 days, 20 or more days), quantity on days of use (less than 1 drink, 1 drink, 2 drinks, 3 drinks, 4 drinks, 5 or more drinks) and average quantity per day in the last 30 days (open-ended response format) separately for adolescents in grades 7–12 ($\sim$12–18 years old). For the close-ended items, experts were asked to circle one answer for each grade level representing alcohol misuse.

The second section of the questionnaire included eight indicators of high risk drinking. Seven had the same response choices: number of times during the last year (1–2, 3–5, 6–9, 10 or more) that the adolescent had become 'high' or intoxicated on alcohol, used alcohol and other drugs (downers, uppers, or marijuana) on the same occasion, drunk alcohol immediately before or during school, been drunk in a public place, and

driven a car, motorcycle or other vehicle after drinking. One item, binge drinking, was measured over the last 30 days: frequency of 3 or more drinks during one sitting for grades 7–11 and 5 or more drinks for grade 12 (1–2 days, 3–5 days, 6–19 days, 20 or more days). Experts were asked to provide separate ratings in this section for adolescents in grades 7–12.

The third and final section inquired about criteria for classifying alcohol misuse from nine negative consequences: number of times in the last year missed school or work, did something you later felt sorry for, felt really sick, got into a physical fight, got into trouble at school, had trouble concentrating on what you were doing, got arrested or held at a police station, and passed out (response options for each of the above: 1–2 times, 3–5 times, 6–9 times, 10–19 times, 20 or more times). For these negative consequences, experts were asked for separate estimates only for adolescents in grades 10 and 12, as these were the only grades for which this information was gathered in Project ALERT, the study for which these ratings were obtained. We also asked experts to specify misuse criteria for adolescents in grades 7–12 for the number of times in the last year that the adolescent became involved in an accident after drinking alcohol (1 time, 2 times, 3 times, 4 or more times). This section included comparatively more indicators that are similar to the DSM-IV diagnostic criteria (e.g. got arrested because of drinking) than the other two sections.

ANALYTICAL STRATEGY

We assigned a missing value to items when raters gave a response of 'other'. Kappa agreement statistics for each of the individual indicators of alcohol misuse (Fleiss and Cuzick, 1979) were computed. Kappa assesses exact agreement, correcting for agreement expected by chance (i.e. expected cell counts derived from marginal frequencies). The formula for kappa for the simple case of two raters is as follows:

$$\frac{(\text{observed agreement} - \text{chance agreement})}{(1 - \text{chance agreement})}$$

where observed agreement is the observed proportion of agreement, and chance agreement is the proportion of agreement expected by chance alone. We report percentage agreement and kappa statistics for specific aspects of frequency and quantity, high-risk drinking, and negative consequences of alcohol use. The grade level of the target adolescent served as the variable for each alcohol indicator, i.e. we estimated the extent to which the experts were in agreement about the level at which alcohol use was indicative of misuse for three indicators of frequency and quantity of use, eight indicators of high-risk drinking, and nine indicators of negative consequences. For each indicator, the different grade levels of the target adolescent served as between-subject variance.

We also estimated reliability of the expert judgements using a two-way fixed effects ANOVA model (Shrout and Fleiss, 1979; Hays *et al.*, 1995). In this approach, the reliability of the average of the multiple assessments is estimated by subtracting the mean square error from the mean square between, and then dividing by the

Table 1. Agreement between experts in defining alcohol misuse

	% agreement	Kappa
Frequency and quantity		
Frequency in last year	19%	−0.18
Frequency in last 30 days	26%	−0.08
Quantity	24%	−0.04
High-risk drinking		
Binge drinking	54%	0.01
High or intoxicated	43%	0.11
Alcohol with downers	53%	−0.02
Alcohol with uppers	50%	0.01
Alcohol with marijuana	45%	0.05
Drink before/during school	66%	−0.06
Drunk in public place	59%	0.04
Drove after drinking	74%	0.00
Negative consequences		
Missed school or work	71%	−0.09
Felt sorry for	40%	−0.03
Felt sick	44%	0.04
Physical fight	50%	−0.10
Trouble at school	72%	−0.09
Trouble concentrating	30%	−0.10
Was arrested	90%	−0.05
Passed out	67%	−0.04
Accident after drinking	70%	−0.09

Agreement among experts about alcohol misuse was estimated for each of the 20 indicators above. The grade level of the target adolescent (grades 7–12; see Table 2) defined the between-group variable and variability across experts defined the within-group variable.

Table 2. Mean, mode and range for expert ratings of alcohol misuse items

	Grade					
	7	8	9	10	11	12
Frequency and quantity:						
Frequency in last year[a]	2.33 2 (1–4)	2.50 2 (1–4)	2.60 2 (2–4)	2.80 2 (2–4)	3.00 3 (2–4)	3.00 3 (2–4)
Frequency in last 30 days[b]	2.00 2 (1–3)	2.14 2 (1–3)	2.29 2 (1–3)	2.57 2 (1–4)	2.71 2 (1–4)	2.71 2 (1–4)
Quantity[c]	2.89 3 (2–4)	2.89 3 (2–4)	3.33 3 (2–5)	3.78 3 (3–5)	4.22 4 (3–6)	4.33 4 (3–6)
Frequency–quantity[d]	0.27 0.1 (0.1–1)	0.28 0.1 (0.1–1)	0.38 0.25 (0.1–1.2)	0.52 0.25 (0.1–1.8)	0.66 0.25 (0.1–2.2)	0.82 1.00 (0.2–2.2)
High-risk drinking:						
Binge drinking[b]	1.11 1 (1–2)	1.11 1 (1–2)	1.33 1 (1–2)	1.56 1 (1–3)	2.11 1 (1–4)	1.33* 1 (1–2)
High or intoxicated[e,f]	1.33 1 (1–2)	1.33 1 (1–2)	1.56 1 (1–3)	2.22 2 (1–4)	2.56 2 (2–4)	2.80 2 (2–5)
Alcohol and downers[g]	1.10 1 (1–2)	1.10 1 (1–2)	1.40 1 (1–2)	1.50 1 (1–3)	1.70 1 (1–4)	1.70 1 (1–4)
Alcohol and uppers[g]	1.11 1 (1–2)	1.11 1 (1–2)	1.44 1 (1–2)	1.56 1 (1–3)	1.89 1 (1–4)	1.89 1 (1–4)
Alcohol and marijuana[g]	1.11 1 (1–2)	1.11 1 (1–2)	1.44 1 (1–2)	1.89 1 (1–2)	2.00 1 (1–4)	2.22 1 (1–4)
Drink before/during school[g]	1.10 1 (1–2)	1.10 1 (1–2)	1.20 1 (1–2)	1.20 1 (1–2)	1.30 1 (1–2)	1.30 1 (1–2)
Drunk in public place[h]	1.10 1 (1–2)	1.10 1 (1–2)	1.20 1 (1–2)	1.40 1 (1–2)	1.50 1 (1–2)	1.60 1 (1–3)
Drove after drinking[h]	1.00 1 (1–1)	1.00 1 (1–1)	1.10 1 (1–2)	1.20 1 (1–2)	1.40 1 (1–3)	1.40 1 (1–3)
Negative consequences:						
Missed school or work[h]				1.10 1 (1–2)		1.30 1 (1–3)
Did something which later felt sorry for[h]				1.50 1 (1–3)		1.80 2 (1–3)
Felt sick[h]				1.40 1 (1–3)		1.80 2 (1–3)

Table 2. *(continued)*

Physical fight[h]				1.30 1 (1–2)		1.40 1 (1–2)
Trouble at school[h]				1.10 1 (1–2)		1.20 1 (1–2)
Trouble concentrating[h]				1.62 1 (1–3)		2.00 2 (1–3)
Was arrested[h]				1.00 1 (1–1)		1.10 1 (1–2)
Passed out[h]				1.10 1 (1–2)		1.30 1 (1–2)
Accident after drinking[i]	1.10 1 (1–2)	1.10 1 (1–2)	1.20 1 (1–2)	1.20 1 (1–2)	1.20 1 (1–2)	1.20 1 (1–2)

* For grade 12, this item was 5 or more drinks during one sitting, whereas for grades 7–11 it was 3 or more drinks.
[a] 1 = 1–2 times, 2 = 3–10 times, 3 = 11–20 times, 4 = 21 or more times.
[b] 1 = 1–2 days, 2 = 3–5 days, 3 = 6–19 days, 4 = 20 or more days.
[c] 1 = less than 1 drink, 2 = 1 drink, 3 = 2 drinks, 4 = 3 drinks, 5 = 4 drinks, 6 = 5 or more drinks.
[d] Average number of drinks per day.
[e] 1 = 1–2 times, 2 = 3–5 times, 3 = 6–9 times, 4 = 10 or more times (grade 7–11).
[f] 1 = 1–2 times, 2 = 3–5 times, 3 = 6–9 times, 4 = 10–19 times, 5 = 20–39 times, 40 or more times (grade 12).
[g] 1 = 1–2 times, 2 = 3–5 times, 3 = 6–9 times, 4 = 10 or more times.
[h] 1 = 1–2 times, 2 = 3–5 times, 3 = 6–9 times, 4 = 10–19 times; 5 = 20 or more times.
[i] 1 = 1 time, 2 = 2 times, 3 = 3 times, 4 = 4 or more times.

mean square between. The mean square error is estimated by the interaction between respondents and the multiple assessments (the main effect of multiple assessments is excluded from the error term). We obtained separate reliability estimates for frequency–quantity, high-risk drinking, and negative consequences. The grade level rated and the individual indicators within each of these three areas of alcohol misuse were treated as between-group variance.

RESULTS

The experts' opinions about the different indicators of alcohol misuse showed considerable variability. Percentage agreement ranged from 19% to 90%, and kappa statistics (which adjust for agreement due to chance) ranged from −0.18 to 0.11 (Table 1). The reliability and intra-class correlation estimates for the three areas of alcohol misuse were as follows: frequency–quantity (0.56, 0.12), high-risk drinking (0.88, 0.42), and negative consequences (0.74, 0.22). Thus, agreement was better for judgments about high-risk drinking and negative consequences than for frequency–quantity. Consistent with the above, missing data (either rating not provided or 'other' response given) was highest for frequency items, ranging from 40 to 60% for frequency in the last year. Item missing rates were 1% or lower for high-risk drinking and negative consequences.

Comments from the experts indicated that most felt that frequency and quantity should be considered together rather than separately. Most also made significant distinctions between the frequency–quantity levels that constituted misuse for seventh grade, as opposed to grade ten or higher. As seen in Table 2, the average ratings of misuse for frequency and quantity indicators of misuse increased for ratings of older versus younger students. The mean frequency–quantity values indicate that experts considered from 1.9 to 2.7 drinks per week to be indicative of alcohol misuse for students in grades 7–9, 3.6 drinks per

week for those in grade 10, 4.6 drinks a week for grade 11, and 5.7 drinks a week for grade 12. However, the modal choices tended to be much lower: less than a drink per week for grades 7 and 8, 1.75 drinks per week for grades 9–11, and 7 drinks per week for grade 12.

For high-risk behaviours involving use of alcohol with pills (uppers or downers) and drinking before or during school, there was agreement that experiencing the problem once or twice in the last year was sufficient to constitute misuse for twelfth graders and all younger adolescents. But for binge drinking, becoming 'high' or intoxicated, and using alcohol with marijuana, the experts gave high school juniors and seniors more leeway than younger adolescents: raising the misuse cut-off score for all three behaviours to three or more times. These differences are reflected in the mean ratings shown in Table 2.

For each negative consequence, except doing something you later felt sorry for, feeling sick, and having trouble concentrating because of drinking, the experts deemed one or two times in the last year enough to represent misuse for all ages. For the exceptions, the average rating corresponded to a cut-off score of 3–5 times in the last year.

DISCUSSION

Measurement and interpretation of alcohol use self-reports is characterized by a general lack of consensus (Hesselbrock *et al.*, 1983). For adolescents, the distinction between alcohol use and misuse is especially complicated (Newcomb and Bentler, 1989). The present study is one of only a few that have examined expert opinion of what constitutes alcohol misuse for adolescents (O'Gorman *et al.*, 1977).

The level of agreement observed for the alcohol misuse indicators here (intra-class correlations ranging from 0.12 to 0.42) was equal to or better than that obtained in a study with 14 experts who rated the adequacy of 87 drug-use quantity and frequency items (Huba *et al.*, 1981 as cited by Huba and Bentler, 1982). In that study, an average product–moment correlation among pairs of experts of 0.12 was reported. Although exact agreement was rare in our study as well, agreement between experts was reasonable for misuse indicators representing high-risk drinking and negative consequences of alcohol use. However, agreement regarding frequency–quantity of alcohol use was much lower.

The experts in the present study made it clear that frequency and quantity of alcohol use need to be considered together in defining levels of misuse. For high school seniors, an average of less than one drink a day was rated to be indicative of alcohol misuse. This result alone points out the dramatic difference in perception of misuse for adolescents compared to adults. Over twice this level of drinking is necessary to be classified as a heavy adult drinker (Williams and DeBakey, 1992).

For some high-risk indicators and negative consequences, our experts required persistence before defining alcohol misuse for older adolescents. These indicators included binge drinking, getting high or intoxicated, using alcohol with marijuana, doing something you later felt sorry for, feeling sick, and having trouble concentrating because of drinking. However, the experts considered alcohol misuse to be present if students reported any use of alcohol with pills, drinking before or during school, and any of the following consequences of drinking: missing school or work, physical fights, trouble at school, getting arrested, passing out, or having an accident after drinking. In contrast, some previous definitions require multiple occurrences of negative consequences before classifying an adolescent as a problem drinker (Donovan and Jessor, 1983).

This study represents one step towards clarification of what constitutes alcohol misuse among young people. Our group of experts clearly distinguished between young and older adolescents in defining alcohol misuse. For most of the negative consequences items and for some of the high-risk behaviours, the average group opinion was that a single occurrence was indicative of alcohol misuse. There was, however, considerable variation in the precise levels of high consumption, high-risk drinking and alcohol-related problems that they labelled misuse within specific grade (age) levels. Given this variation, it is important for alcohol researchers to conduct sensitivity analyses that provide lower and upper bound estimates of alcohol misuse when documenting its prevalence or examining antecedents. This paper contributes to that end by providing expert-based information for deriving liberal and

stringent definitions of three important dimensions of alcohol misuse.

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