ALCOHOL USE IN YOUTH

Gareth Hagger-Johnson (University of Leeds)

1. Why measure young people's alcohol use?

There is considerable interest in moderating young people's alcohol use, and mitigating potential adverse consequences. The Alcohol Harm Reduction Strategy for England (2004) aimed to reduce alcohol-related harm, although it did not refer to those under 18. The updated Strategy (2007) explicitly mentioned young people under 18 as a high risk group. The World Health Organisation considers children and young people who consume alcohol to be a high risk group[1]. Young people who misuse alcohol are at increased risk of adverse outcomes, including motor vehicle accidents, morbidity and mortality – including suicide and murder [2]. Alcohol is also a risk factor for other behaviours which are often considered problematic, such as smoking and drug use, although whether alcohol us causally related to the onset and development of other behaviours remains uncertain. Alcohol use before the age of 14 is considered a strong risk factor for later alcohol disorder [2] (see below), with commentators suggesting that interventions should be targeted at 11 to 14 year olds[3]. Adolescents may have increased susceptibility to addiction [2]. Typically, studies find that the risk of alcohol dependence is greater, the younger the age of onset [4].

In the United Kingdom (UK), 51% of English pupils (age 11 to 15) in 2008 reported ever having an alcoholic drink, an increase from 2003 when the figure was 39%[5]. This figure is considered the prevalence of young people 'ever' drinking alcohol (see below). Alcohol use is more prevalent than smoking (29% ever smoked) or drug use (22% ever used drugs). Pupils who are older, or White (vs. Mixed or Asian), are more likely to report using alcohol in the last seven days. Pupils who smoke or use drugs are also more likely to report usage in the last week. About 48-49% of drinking occasions lead to intoxication in the UK among 15-16 year olds (1995-1999)[6].Risk factors for alcohol misuse among adolescents include personality traits, emotional

and behaviour problems, family history and parenting style, early onset of usage (e.g. before age 14/15, poor social connections and peer-group members who use alcohol[7]. Among those reporting drinking alcohol in the last seven days, pupils reported an average of 11.6 units, higher for boys (vs. girls) and higher for older pupils (vs. younger)[5]. Although it is illegal in the UK to give children under 5 alcohol and to buy alcohol on behalf of anyone under the age of 19, children aged 5 to 17 can drink alcohol legally[8]. According to the Chief Medical Officer (CMO), an alcohol-free childhood is recommended. Children that do drink alcohol should wait until they are age 15. Those aged 15 to 17 should drink alcohol, if at all, rarely and never more than once a week. They should never exceed 3/4 units (males) or 2-3 units (females). Parents are encouraged to set limits and agree boundaries [9].

Self-reported alcohol use in surveys may be subject to under- or over-reporting[5] and recall bias[4]. Alcohol use is influenced by social norms[3], which reflect the norms of peers or parents. Young people may under-report if they perceive alcohol drinking to be undesirable (e.g. following parental norms). Young people may over-report if they perceive the behaviour to be desirable (e.g. following peer norms, or wishing to display bravado). Social camaraderie, peer acceptance and escape are important to young people [6]. Alcohol may be regarded by teenagers as a symbol of maturity and as 'cool', sexy and sociable [8]. Several surveys, such as the Longitudinal Study of Young People in England (LSYPE), collect data on whether an adult was present during the collection of survey items related to alcohol use. It is important to consider the context in which alcohol items are administered, when analyzing results, and consider making adjustments to statistical models which acknowledge this.

Alcohol use is difficult to verify objectively, without reliance of self reported consumption. In contrast, cigarette smoking can be verified objectively at relatively low cost, by testing saliva for cotinine[10]. Research has shown that reliability is comparable with other behaviours but can be enhanced by providing 'closed' questions regarding quantity, collected in anonymous and confidential conditions[11]. Some authors have suggested that diary methods are less subject to recall bias than self reported survey items, although diary methods often agree with self reports. Another strategy adopted is to include items that refer to usage of fictional drugs, which suggest that other information provided may not be reliable. In 2008, 0.1% of English pupils reported ever using the fictional drug Semeron, although 13% reported being aware of it[5]. Reliability may vary, depending on whether young people are asked to recall whether they have ever drunk alcohol, their most recent

alcohol drinking occasion, whether the item refers to episodic (periodic) behaviour, or whether the item refers to 'usual' or 'typical' drinking behaviour patterns. These differences are one reason why specific usage in the last seven days is often preferred in surveys, over items referring to 'usual' or 'typical' behaviour [5].

2. Key concepts

2.1 Quantity, frequency and heavy drinking episodes

It is generally recognised that at the minimum set of survey items should include a measure of quantity (Q) and frequency (F) of alcohol drinking. In theory, Q x F should provide the average volume of alcohol which respondents typically drink. In practice, this approach under-represents heavy drinking and does not reflect the average (mean) quantity of alcohol which people actually consume [12]. A third measure is therefore recommended, one which allows respondents to report heavy, 'binge' or unusually high episodic drinking. The AUDIT, described below, contains items that capture all three of these important measures.

2.2 Prevalence

Cross-sectional surveys of alcohol use typically obtain estimates of the prevalence of alcohol use (the proportion of young people ever having drunk alcohol when the survey was conducted). The term 'prevalence' is usually used to refer to health outcomes (e.g. diseases), rather than behaviours which are risk factors for diseases. The term however, is increasingly used for risk factors that have policy relevance or are potentially modifiable, because the behaviour is of interest in its own right. Prevalence would be distinguished from incidence, which would refer to the proportion of young people consuming alcohol for the first time (the proportion of new 'drinkers'), within a defined period of time (e.g. one year).

2.3 Alcohol disorders

In addition to obtaining estimates of the prevalence of alcohol drinking, quantity and frequency, surveys can attempt to measure alcohol disorders or their associated symptoms. Approximately 4 to 6% of adolescents have an alcohol use disorder [2]. Alcohol disorders have formal definitions, such as those provided by the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) or the World Health Organisation International Classification of Diseases (ICD-10). Both distinguish two

different types of alcohol disorder, using different terminology to describe them: alcohol abuse or harmful use; and alcohol or dependence or dependence syndrome (DSM-IV and ICD-10 respectively) [2]. From an epidemiological perspective, alcohol disorder measurement is more difficult because it is less precisely defined [13]. Alcohol disorders are usually diagnosed in clinical settings, requiring clinical expertise and experience. Alcohol abuse is defined by having one or more of the following symptoms within the last 12 months: (1) Recurrent use resulting in failure to fulfil major role obligations at work, school, or home; (2) Recurrent use in situations which are physically hazardous; (3) Recurrent use related legal problems; (4) Continued use despite persistent or recurrent social or interpersonal problems (DSM-IV) [2]. Harmful use is defined as recurrent substance use that is causing harm to health, but not necessarily evidenced by consequences such as marital discord, legal problems or culture censure of specific substances (WHO) [2]. These terms are used inconsistently in the research literature and should be defined carefully in survey work. Several researchers have attempted to measure alcohol disorders by using questionnaires whose items are designed to match DSM-IV constructs. Example items which measure aspects alcohol abuse and dependence in young people can seen in the National Longitudinal Survey of Youth (NLSY)[14] [15]. For example, one study selected 22 symptoms measured in 1989 and 1994[16] (also see[17]).

The CAGE questionnaire was developed to detect alcoholism (Mayfield, McLeod, & Hall, 1974) and has become a popular screening tool, partly because it is short, containing only four items: (1) Have you ever felt you needed to cut down on your drinking?; (2) Have people annoyed you by criticizing your drinking?; (3) Have you ever felt guilty about drinking?; (4) Have you ever felt you needed a drink first thing in the morning (eye-opener) to steady your nerves or to get rid of a hangover? Scores are thought to reflect lifetime alcohol use, treating alcohol disorder as a stable characteristic. A score of 1 may indicate disordered drinking. A score of 2 is clinically significant indicates that the respondent should be investigated further. The acronym CAGE is formed from the key words in each item (cut, annoyed, guilty, eye-opener). CAGE is frequently used with young people, but there is some evidence that its internal consistency (an important feature of reliability) is lower among younger people. In a systematic review of the reliability of CAGE [18] [19], age was positively correlated with reliability across the range 17 to 44 years. For this and other reasons, several commentators have recommended not using the CAGE for adolescents and young people [20].

2.4 Harmful and hazardous use

The AUDIT [21] is an alternative screening tool which is recommended for use in young people[22]. Both interview and self-completion forms are available, the latter being suitable for inclusion in surveys. The AUDIT is intended to screen for

hazardous and harmful drinking, rather than alcohol dependence or harmful use, although it might prove to have predictive validity for these kinds of disorders. Example items include 'How many drinks containing alcohol do you have on a typical day when you are drinking?' and 'Has a relative or friend or a doctor or another health worker been concerned about your drinking or suggested you cut down?' Internal consistencies are generally higher than CAGE, perhaps reflecting the larger number of items (N = 10) or other psychometric strengths of the AUDIT. Several shorter versions are available, such as the AUDIT-PC (items 1,2,4,5 and 10), the AUDIT-3 (a single item asking 'How often do you have six or more drinks on one occasion?'), AUDIT-4 (items 1, 2, 3 and 10), the FAST (item 3 modified for men, items 5, 8 and 10) and the AUDIT-C which comprises its three consumption items.

Although currently under debate, it may be necessary to adjust AUDIT scores according to the age of the respondent, given that normative alcohol drinking patterns vary as a function of age. If consumption is typically higher at age 18, for example, items referring to consumption may reflect age-related trends in addition to hazardous drinking, lowering validity. One study conducted in a hospital setting proposed that the cut-off score of 4 should be used for adolescents (age range 13 to 19) [23]. Another study also in a hospital setting, proposed a score of 2 (age range 18 to 20)[20]. Among older young people (age range 18 to 20), a score of 10 has been proposed [24]. These differences suggest that further research and debate is needed, in order to agree an appropriate cut-off score. Survey work involving representative samples of young people will be particularly valuable here. One study has demonstrated the equivalence of web-based and paper-based AUDIT scores in young people [25], suggesting that web based administration is acceptable to this age group. In a sample of British adolescents (age range 16 to 25), the AUDIT was administered online and demonstrated high internal consistency and test-retest reliability [26].

2.5 Estimated blood alcohol concentration (eBAC)

For some research questions, it may be useful to calculate estimated blood alcohol concentration (eBAC) referring to a specific event. For example, researchers might hypothesize that higher eBAC is a risk factor for unprotected sexual intercourse. Event-level data on sexual behaviour usually refer to the most recent sexual event, where it is possible to ask respondents about alcohol use in relation to this event only. For example, in one survey respondents were asked about 'alcohol consumption "before or during sex"', and the 'number of cans/bottles of beer, glasses of wine, and drinks of liquor consumed'[27]. The event-level approach removes confounding from lifestyle factors and other influences on multiple health behaviours, such as personality traits. To calculate eBAC scores, it is necessary to

record gender, the total number of standard drinks consumed (converted into US standards), weight in kilograms and the number of hours spent drinking [28]:

- Males: $[(c/2)*(7.5/[2.21*w])]-(.02*t)$

- Females: $[(c/2)*(9.0/[2.21*w])]-(.02*t)$

In the formula, replace c with the total number of standard (USA) drinks consumed, w for weight in kilograms and t with the number of hours spent drinking.

3. Existing questions and the surveys on which they have been included

The following UK surveys contain questions about alcohol administered to under 18s. Those aged 18 or higher are considered adults in most surveys containing questions about alcohol (e.g. Health and Lifestyle Survey, 1984/1991, Scottish Social Attitudes Survey). Questionnaires providing survey items are available in most cases from ESDS web site. This is not an exhaustive list.

- Health Survey for England (age 16 or higher from 1991 to 1994, age 2 or higher from 1995)
- Northern Ireland Health and Social Wellbeing Survey, 2005-2006 (age 16 or higher)
- Scottish Health Survey (age range TBC)
- Survey of Smoking, Drinking and Drug Use Among Young People (from 1998, containing core questions on alcohol use but additional questions on alcohol use in 2002, 2004, 2008. Regional data is available for 2008)
- Scottish Schools Adolescent Lifestyle and Substance Use Survey (2002, 2004, 2006)
- Welsh Health Survey (age 16 or higher)
- Young Life and Times Survey (age 16 only, 2004/2005/2007)
- Branded Consumption and Social Identification: Young People and Alcohol Study, 2006-2007
- Longitudinal Survey of Young People in England (cohort aged 14 to 17; 2004 to 2007)

Survey items suitable for recording alcohol use in young people can be obtained from the Smoking, Drinking and Drug Use Among Young People surveys of 2004/6/8. These surveys have run since 1982, but were initially about smoking. These studies are good for estimating prevalence of alcohol drinking and risk factors for alcohol drinking, but are repeated cross-sectional analyses of different people.

Therefore, they cannot be used to study change in individuals across time. They can be used to study change in prevalence over time.

The single item 'Have you ever had a proper alcoholic drink – a whole drink, not just a sip? Please don't count drinks labelled low alcohol' has been used most often. It is important to include the phrase 'a whole drink, not just a sip' is important because it can changed the estimated prevalence of alcohol drinking considerably. Similarly, the phrase 'don't count drinks labelled low alcohol' should be included.

Since age of first drink has been identified in the literature as a risk factor for later alcohol and other substance use problems, the item 'How old were you when you had your first proper alcoholic drink? Write in the box your age then, in numbers not words' has been included in several surveys. The response reads 'I was _____ years old'.

Frequency of alcohol drinking has been captured by several surveys. The item is, 'How often do you usually have an alcoholic drink?' with response options ranging from 'Every day or almost every day' (1) to 'I never drink alcohol now' (7). In LSYPE, pupils were asked, 'Have you had an alcoholic drink in the last 12 months?' (Yes/No) and 'Thinking about the last 12 months, about how often did you usually have an alcoholic drink? Was it...', with response options ranging from 'Most days' (6) to 'Less often (1) for those that had. Because these questions were repeated across four years of secondary school in this cohort, they enable the onset and change over time of alcohol drinking to be modelled using sophisticated techniques such as growth mixture modelling [17] or trajectory modelling. There are relatively few surveys which have longitudinal data available (exceptions include LSYPE and NLSY). Prospective cohort studies such as LSYPE are valuable, but age related changes could reflect genuine age effects (consumption increasing and then decreasing from age 21) or a cohort effect (young people today drink differently than those born in earlier decades) [6].

LSYPE contains three questions, repeated during the first four waves of the study:

- Have you ever had a proper alcoholic drink? That is a whole drink, not just a sip. Please do not count drinks labelled low alcohol. (Yes/No)
- Have you had an alcoholic drink in the last 12 months? (Yes/No)
- Thinking about the last 12 months, about how often did you usually have an alcoholic drink? Was it... (Most days / Once or twice a week / 2 or 3 times a month / Once a month / Once every couple of months or / Less often?

Last alcoholic drink can be measured using the item 'When did you last have an alcoholic drink?' with response options ranging from 'Today' (1) to '6 months ago or more' (7). Some studies have also asked about the day drinking took place ('Sunday'

to 'Saturday'), because there may be important differences captured by when the drinking took place.

It may be useful to record 'Have you been drunk in the last 4 weeks?' (Yes/No), a temporary state of excessive alcohol consumption with a more subjective interpretation than quantity consumed. This has been accompanied by, 'How many times have you been drunk in the last 4 weeks? Write the number in the box. I have been drunk ____ times'.

Quantity of alcohol consumption can be assessed by asking, 'Write in the boxes below the number of pints, half pints, large cans, small cans and bottles of (BEER, LAGER AND CIDER)(SHANDY)(glasses of WINE)(SPIRITS AND LICQUERS)(ALCOPOPS) drunk in the last 7 days', although it may be useful to provide a visual guide that illustrates some familiar branded cans or bottles.

Alcohol diaries typically record alcohol usage daily, mitigating concerns about recall bias and forgetting [29]. They are time consuming and comparability expensive, perhaps explaining their infrequent use in large studies, but are useful for validation studies [29]. Validation studies use alcohol diaries as the 'gold standard' and self reports as the comparator, while recognising that no true gold standard is feasible for this health behaviour [29].

Other questions appeared in the 2008 survey, including, 'How would your parents/guardians feel if you started drinking alcohol?', 'If you buy alcohol, where do you usually buy it?', 'When you drink alcohol, are you usually on your own, or with other people?', 'When you drink alcohol with other people, who are you usually with?', 'And when you drink alcohol, where are you usually?' These and other questions were included to recognise the growing interest in learning more about how the location, context and social element of drinking alcohol influences drinking patterns and risk for other behaviours. Researchers should consult the 2008 survey for more detail.

4. Future developments and needs in this area

Many of the recent and future developments in alcohol measurement methodology in adults, will apply to young people (for a review, see [12]). Additional work, however, is required to improve survey methods for young people. Many of the strategies designed to validate survey items relating to alcohol use in adults may need to be repeated for young people, either as part of a nested study, or as an entirely separate study. Survey questions can be used for different purposes

(screening tools, diagnostic tests, multiscale questionnaires, retrospective assessments, evaluation of motivation to change, expectancies or self-efficacy) [2] and the requirement to modify questions for young people will depend on the intended purpose.

The AUDIT is particularly attractive for survey work involving young people, because it captures (to some extent) quantity, frequency and heavy episodes of drinking. It is more reliable than the CAGE, and has been used with young people in a variety of settings. The score used to determine whether young people's drinking is 'hazardous', however, has not been agreed. The AUDIT items referring to quantity and frequency of consumption do not currently take into account the normative alcohol drinking patterns in young people. Whether any of the AUDIT items should be revised, for surveys involving young people, is left open. Future research should test the reliability and validity of AUDIT [30], and its shorter versions, in representative samples of young people. Its performance should be demonstrated in low SES and high SES groups, and among ethnic minorities or young people whose first language is not English.

One unresolved issue in survey methodology is 'recanting', a phenomenon whereby young people report engaging in alcohol use one year, but subsequently report never having engaging in alcohol use [31]. These kinds of discrepancies have to date, comprised only a small proportion of respondents in longitudinal studies, but consistent strategies for handling this kind of data should be identified.

Among young adolescents in a recent study, the prevalence of alcohol drinking was under-estimated by questionnaires, compared to daily diary reports [32]. In contrast, the frequency of alcohol drinking was highly correlated across modes of data collection. The quantity of alcohol drinking was moderately correlated. These results caution against relying exclusively on survey questions, and suggest that comparing more than one type of data collection can be useful.

Research methodologists may wish to consider identifying alcohol items that provide clues about alcohol disorders in young people, which are appropriate to children and young people. For example, items about needing an 'eye-opener' first thing in the morning may not be appropriate for young people. Items about drinking alcohol at school, or before school, might be more sensitive at detecting problems.

Researchers interested in alcohol use among young people in surveys should use items from the surveys mentioned above, ensuring comparability with existing items. The minimum necessary information should be recorded (ever drunk alcohol, quantity, frequency, episodes of heavy or binge drinking). Where resources allow, it is useful to know the location of alcohol drinking and who is reported to have purchased the alcohol for those under 18. Very little survey work has considered the

context of alcohol consumption, particularly in the home, and whether being introduced to alcohol by parents at the dinner table (rather than by peers outside the home) moderates the risk often associated with early usage.

Alcohol is associated with other health behaviours, including smoking, drug use, physical activity and nutrition. Young people may consume alcohol in order to self-medicate psychological disorders, such as anxiety and depression [2]. These factors can introduce confounding factors, because patterns of behaviour or lifestyle may underlie the decision to engage in alcohol use. The event-level approach has proved particularly useful in removing some sources of confounding, for situations in which the association between alcohol and some specific event is desired [29] [33]. Comparatively little is known about the causes of alcohol use, with most research focused on cross-sectional estimates of prevalence or cross-sectional associations with other variables. Socio-economic status (SES) and psychological factors, such as personality traits or cognitive ability, may influence health behaviours and health outcomes in complex ways. Ignoring these factors may distort any associations survey researchers hope to find. For this reason, it is sensible to ensure that all known confounding factors have been considered, when designing or analyzing survey data.

If plans to introduce a minimum price per unit of alcohol are introduced, it has been suggested that young people would be particularly responsive to this policy [8]. Surveys could also measure the perceived impact of price on alcohol drinking behaviour, and if longitudinal, attempt to monitor the impact of policy change on self reported usage.

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