Different versions of the Alcohol Use Disorders Identification Test (AUDIT) as screening instruments for underage binge drinking

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ABSTRACT

Background: The changes experienced in recent years in the conceptualization of binge drinking (BD) make it necessary to revise the usefulness of the existing instruments for its detection among minors. The AUDIT and its abbreviated versions have shown their utility in different populations and consumption ranges, but there has been little research into their use in the detection of BD among adolescents. This study tests the capacity of the AUDIT, AUDIT-C and AUDIT-3 to identify BD adolescents, indicating the optimal cut-off points for each sex.
Methods: High school students self-administered the AUDIT and completed a weekly self-report of their alcohol intake. BD is classified into different groups according to parameters like the quantity consumed and its frequency in the past six months, adjusting the cut-off points for each case.
Results: The results obtained with a sample of 634 adolescents (15–17 years old/52.2% female) indicate that cut-off points of 4 on the AUDIT and 3 on the AUDIT-C show the best fit. Dividing the sample by sexes, the AUDIT and the AUDIT-C would detect BD males with scores of 5 and 4, respectively (with the AUDIT-C being more sensitive), and BD females with a score of 3 on both (the more sensitive being the AUDIT).
Conclusions: All three versions are adequate to classify BD adolescents but none of them made it possible to safely differentiate binge drinkers with different consumption intensities.

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1. Introduction

Binge drinking (BD) is a problematic pattern of alcohol consumption that is highly prevalent in adolescents in Europe and the USA (Donath et al., 2011; Karagülle et al., 2010; Kraus et al., 2009; Stolle et al., 2009). The European School Survey Project on Alcohol and Other Drugs – ESPAD – (Hibell et al., 2009) reports that the percentage of adolescents who had 5 or more drinks on one occasion in the previous 30 days varied across Europe, ranging from 20% in Iceland to 60% in Denmark. This pattern of consumption is more common among boys, except in Iceland and Norway with higher rates among girls, and in the United Kingdom, Sweden and Finland where the proportions are relatively equal. In Spain, the prevalence of BD during the past month among young people from 14 to 18 years old is about 56.8% (Observatorio Español sobre Drogas (OED),

2013). Spain shows a similar pattern to several north-western European countries, with a higher percentage of girls between 14 and 15 years old who engage in BD (22.1% among girls, 18.4% among boys), while the gender ratio reverses at age 17 (45.3% among girls, 55.8% among boys).

Binge drinking is a key trigger of negative social consequences and personal health risks. Students who binge drink are more likely to report poor school performance and involvement in other health risk behaviours, such as riding with a driver who has been drinking, being currently sexually active, smoking cigarettes, being a victim of dating violence, attempting suicide, and using illicit drugs (Cortés, 2012; Cortés et al., 2010; Kahler et al., 2004; Miller et al., 2007; Motos, 2013). This pattern of consumption during adolescence and into young adulthood is also associated with detrimental effects on brain development, brain function, and neuropsychological performance (Brown et al., 2000; Tapert, 2007; Tapert et al., 2003, 2004) and interferes with normal adolescent cognitive, emotional, and social development (Hicks et al., 1993; Perkins, 2002).

In spite of the mounting evidence about the negative consequences of BD, the literature does not agree on common definitions

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of BD or heavy drinking (Aalto et al., 2009; Cortés et al., 2009; Parada et al., 2011). In its operationalizing, three aspects of drinking are generally used that can be implemented independently or in combination: the amount of alcohol ingested (number of drinks, grams of alcohol, grams necessary to reach a certain blood alcohol level, Standard Drink Units -SDUs-); the time period of consumption (in a row, 2–3 h, 4–6 h, etc.); and the time frame of BD (during the past month, past two weeks, past six months, past year, etc.). Each of these descriptors has been questioned (Courtney and Polich, 2009; DeJong, 2001; Read et al., 2008; Valencia Martín et al., 2014; Wechsler et al., 2002). However, careful consideration of all these factors could make possible more precise definitions of BD.

A standardized conceptual definition of BD is used by the US National Institute on Alcohol Abuse and Alcoholism (National Institute on Alcohol Abuse and Alcoholism (NIAAA), 2004): "a binge is a pattern of drinking alcohol that brings blood alcohol concentration (BAC) to 0.08 gram percent or above. For the typical adult, this pattern corresponds to consuming 5 or more drinks (male), or 4 or more drinks (female), in about 2 hours". The last sentence can be misleading, because in the USA, one standard alcoholic drink equals 14 g of alcohol, but in Europe (except Portugal and the UK) and Australia, one standard alcoholic drink equals about 10 g of alcohol, which obviously affects the definition of BD relative to the US definition. Few studies (i.e., Livingston, 2013) adjust the number of drinks in the NIAAA definition according to the measure in grams of alcohol in their home country. This lack of standardization can partly explain the variability that exists in the research, which in turn hinders comparison of the results obtained.

Consensus is also lacking about the time period in which alcohol is consumed, but the meaning and interpretation of results of BD measures would be improved if the speed with which alcohol is ingested and metabolized until a blood alcohol concentration (BAC) level of 0.8 g/l is reached were taken into account.

Given that it is an intermittent behaviour (Heather and Stockwell, 2004; Ministerio de Sanidad y Consumo (MSC), 2008; Townshend and Duka, 2002, 2005; Weissenborn and Duka, 2003), small variations in the time frame can produce important changes in the rates detected. The recommendation is to use a time frame that describes the behaviour pattern and takes its variability into account while presenting as little distortion as possible. Various studies have proposed the use of 6 months as the most appropriate time-frame measure (Courtney and Polich, 2009; Heather and Stockwell, 2004; Townshend and Duka, 2002, 2005; Weissenborn and Duka, 2003).

One possible definition of BD for the Spanish population that takes all these factors into account would be the consumption of 7 or more standard Spanish drinks (1 SDU = 10 g) in a row in men, or 6 or more in a row in women that bring a BAC to 0.8 g/l at least once during the past 6 months. This is the definition used in the present study. This criterion indicates only the minimum necessary to consider consumption as BD, including a diversity of drinkers (Espejo et al., 2012).

The negative consequences of this type of drinking among young people justify the need for instruments to detect it. The Alcohol Use Disorders Identification Test (AUDIT) and its reduced versions were developed to detect adult heavy drinkers, including those who are in the early stages without significant alcohol-related consequences (Aalto et al., 2009; Adewuya, 2005; Fiellin et al., 2000; Saunders et al., 1993). The sensitivity and specificity varied between 51–97% and 78–96% depending on the cut-off score and criterion used (Fiellin et al., 2000). In addition, evidence suggests that the AUDIT is a promising tool for use with young people (Aertgeerts et al., 2000; Chung et al., 2000; DeMartini and Carey, 2012; Kelly et al., 2002; Knight et al., 2003; Kokotailo et al., 2004; Miles et al., 2001; Santis et al., 2009), but the research is inconclusive about which cut-off scores best identify at-risk college and undergraduate drinkers. Studies conducted with adolescents are usually limited to hospitalized and primary care populations, yielding quite variable cut-off scores that range from 2 to 10 (Chung et al., 2000; Fairlie et al., 2006; Kelly et al., 2002; Knight et al., 2003). Very few studies use samples obtained from schools (Chung et al., 2000; Kelly et al., 2002; Knight et al., 2003; Santis et al., 2009) with a wide age range among the interviewees (12 to 20 years) and the criterion to measure BD (diagnostic classifications or the number of drinks per week). Reinert and Allen (2007) indicate that commonly used cut-off points for adults must be lowered when alcohol screens are administered to adolescents, even in their abbreviated versions (Fairlie et al., 2006).

Research with 18-year-olds reports the AUDIT-C has performed significantly better than the AUDIT, with cut-off scores of 7 in men and 5 in women (DeMartini and Carey, 2012). However, a number of researchers consider these scores too high, possibly because lifetime alcohol consumption often peaks during the late teens and early 20s (Baer et al., 2001; McCabe, 2002; U.S. Department of Health and Human Services, 1997).

The use of question three alone on the AUDIT (AUDIT-3) has performed as well as the complete AUDIT and AUDIT-C, but only in males (Aalto et al., 2009; Bradley et al., 2003). The optimal cut-off point in males was ≥2. This cut-off point coincides with a previous Finnish study (Tuunanen et al., 2007), but it is one point higher than the score reported by Bush et al. (1998), who used a lower BD threshold as their gold standard.

According to the definition of BD proposed above, based on our review and revision of other researchers' parameters, our objectives were (1) to determine the existence of different types of binge drinkers depending the intensity and frequency of use for each sex and (2) to determine the optimal cut-off scores on the AUDIT, AUDIT-C and AUDIT-3 that best identify adolescents who engage in BD and to find differing performance of these instruments in BD groups.

2. Methods

2.1. Participants

Stratified sampling was carried out in a population of students in compulsory secondary education (Grades 7–10), upper secondary (Grades 11–12), and vocational training in the city of Valencia (Spain). One school was randomly chosen from each of the 16 school districts in the city.

Questionnaires were administered during the 2011/2012 academic year in classrooms during the school day. In all cases, participation was voluntary and anonymous. The study was undertaken in compliance with Spanish legislation (approved by the Department of Education) and the code of ethics for research involving human subjects outlined by the University of Valencia Human Research Ethics Committee. The adolescents and their legal representatives signed an informed consent form.

The sample size was 1001 students, of whom 507 were female (50.6%) and 494 male (49.4%). Ages ranged between 15 and 17 years—15 years: 29.7% (297); 16 years: 40.2% (402); 17 years: 30.2% (302) (Table 1).

In the present study, 64% of these adolescents (n = 634) engaged in BD, 52.2% (n = 331) were female and 47.8% (n = 303) were male. The number of subjects engaging in BD increased with age (chi-squared = 12.305; gl = 2; p = 0.002): at age 15, 56.7% (n = 165), at age 16, 64.2% (n = 256) and at age 17, 70.5% (n = 213).

2.2. Variables and instruments

A self-report diary was used, where for each day of the week, participants had to indicate the type and number of drinks consumed and approximate time when the drinking took place. Each use was converted to grams of alcohol, based on the Spanish SDU (1 hard liquor = 20 g; 1 beer/wine = 10 g) (Valencia Martín et al., 2014). This value was multiplied by the number of glasses consumed of each type of alcoholic beverage. After calculating the number of grams consumed in each session, the session with the highest score was selected. This information was used to generate the variable: *greatest number of grams of alcohol consumed in a BD session*. Based on this variable, adolescents who exceeded 70 g for boys or 60 g for girls were classified as BD (1), and the rest were labelled as non-BD (2).

In addition, students were asked to specify how many days they had consumed alcohol at this level in each of the previous six months. This made it possible to generate a variable with *the number of total BD days within 6 months*.