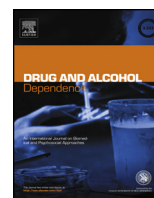




Contents lists available at ScienceDirect

Drug and Alcohol Dependence

journal homepage: www.elsevier.com/locate/drugalcdep



Full length article

Reported alcohol drinking and mental health problems in Hong Kong Chinese adolescents

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ARTICLE INFO

Article history:

Received 14 September 2015

Received in revised form 15 April 2016

Accepted 16 April 2016

Available online xxx

Keywords:

Alcohol drinking

Adolescents

Mental health problems

Hong Kong

ABSTRACT

Objective: To investigate the association between reported alcohol drinking and mental health problems in Hong Kong adolescents.

Methods: In a school-based questionnaire survey in 2012–13 on 4620 Secondary one (US Grade seven) to six students (mean age 14.5, SD 1.6 years; 53.4% boys), alcohol drinking was classified as never drinking (reference), experimental, former, less-than-weekly and weekly drinking. Binge drinking was defined as drinking at least five drinks on one occasion. Mental health was assessed using the Strengths and Difficulties Questionnaire (SDQ) with five subscales (emotional symptoms, conduct problems, hyperactivity, peer relationship problems and prosocial activity) and the total difficulties score (sum of the first four subscales). Multilevel regression was used to analyse the associations of mental health problems with drinking frequency and binge drinking, adjusting for potential confounders.

Results: Compared with never drinking, higher total difficulties scores were associated with less-than-weekly drinking (adjusted odds ratio AOR 1.39, 95% CI 1.01–1.91), weekly drinking (AOR 3.21, 95% CI 2.18–4.70), and binge drinking (AOR 2.18, 95% CI 1.42–3.32). Weekly drinking was most strongly associated with hyperactivity (AOR 6.27, 95% CI 1.42–3.32) among all subscales. Girls were more likely than boys to report emotional problems (AOR 3.36 vs 1.47) and hyperactivity (AOR 19.2 vs 2.31) related to weekly alcohol drinking (both P for interaction <0.05).

Conclusions: In Hong Kong adolescents, less-than-weekly, weekly, and binge drinking are associated with higher risks of mental health problems based on self-reported data. Prospective studies are warranted to explore the causality between alcohol drinking and mental health problems.

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1. Introduction

Alcohol drinking is prevalent worldwide and more common than tobacco and illicit drug use in adolescents (Johnston et al., 2015; American Academy of Pediatrics, 2001). Underage alcohol drinking is an important public health problem and may lead to severe health and social consequences, such as acute and chronic health problems, injuries and delinquency (Newcomb and McGee, 2002; Powell et al., 2007). Binge drinking, common among adolescent drinkers, is associated with attempted suicide, illicit drug use and car use with a driver who has been drinking (Miller et al., 2007).

Heavy and chronic alcohol drinking kills neurons, decreases neurogenesis, and causes cognitive and affective dysfunction,

especially in adolescents, whose brains are undergoing rapid development (Guerra and Pascual, 2010). Laboratory evidence has also shown that decreased neurogenesis leads to depression-like behaviours in rats (Malberg et al., 2000; Santarelli et al., 2003).

Alcohol use disorder (dependence or abuse) and psychiatric disorders, such as depression, anxiety, and conduct disorders are known to co-occur in adults (Burns and Teesson, 2002; Kessler et al., 1997, 2005). Alcohol abuse has also been linked to psychiatric disorders in American and European adolescents in both epidemiological and clinical studies (Armstrong and Jane, 2002; Deykin et al., 1987; Fergusson et al., 1994; Rohde et al., 1996; Strandheim et al., 2009; Windle and Davies, 1999; Wittchen et al., 2007). However, only one study, involving a relatively large sample of around 9000 Norwegian adolescents has reported that alcohol intoxication is associated with depressive and anxiety symptoms in girls, and with conduct and attention problems in both sexes (Strandheim et al., 2009). While the co-occurrence of alcohol abuse and depression in adolescents has been consistently reported, the

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observed associations between alcohol drinking and other psychiatric disorders vary. Alcohol abuse was associated with depression and behavioural disorders in American and Norwegian adolescents (Rohde et al., 1996; Strandheim et al., 2009), but not associated with behavioural disorders in another study of American college students aged 16–19 (Deykin et al., 1987). Sex differences in mental health have been well documented, with depression more common in girls and conduct disorders in boys (Parker and Roy, 2001; Scott, 1998). Depression is more strongly associated with alcohol use disorder in girls than in boys (Deykin et al., 1987), and anxiety is reportedly associated with alcohol use disorder in girls only (Rohde et al., 1996; Strandheim et al., 2009). Similarly, poor concentration and externalizing problems are associated with heavy drinking in Finnish adolescent girls but not boys (Laukkanen et al., 2001; Strandheim et al., 2009). However, these results are subject to confounding, such as by smoking and socioeconomic status.

Although comorbidity of excessive alcohol drinking and mental disorders has been extensively reported, the association between more moderate drinking patterns and mental disorders is understudied. Therefore, we investigated the association between reported alcohol drinking and mental health problems in Hong Kong Chinese adolescents, whose drinking prevalence is much lower than that of their Western counterparts (weekly drinking 4.4% vs 8%–21%; Bendtsen et al., 2014) and among whom adequate proportions of never, former, moderate and heavier drinkers are available for comparison. The analysis considered potential sex differences, with adjustment for potential confounders, including socioeconomic status, smoking, and illicit drug use.

2. Methods

2.1. Study design

This study is part of a large school-based questionnaire survey on reported adolescent alcohol drinking, conducted during November 2012 to April 2013. Detailed methods have been reported (Huang et al., 2015). Briefly, a total of 44 randomly selected secondary schools (25% response rate at school level) from all the five regions of Hong Kong (Hong Kong Island, Kowloon East, Kowloon West, New Territory East, New Territory West) participated. All Secondary one (US grade seven) to six students in the selected schools were included. An invitation letter was sent to parents via the students to explain the purpose of the voluntary survey. Declining parents were to ask their children to return a blank questionnaire during the survey. Student participation remained voluntary even with parental consent. A self-administered, anonymous questionnaire was completed in classrooms. A teacher was present to maintain classroom order, but was instructed to avoid patrolling or observing the students' answers. Completed questionnaires were put in an opaque envelope immediately in front of the students to be collected by the research team. Ethics approval was obtained from the Institutional Review Board of the University of Hong Kong/Hospital Authority Hong Kong West Cluster. Test-retest reliability of alcohol-related variables was examined, generating intraclass correlation coefficients (ICC) that ranged from 0.46 to 0.97, indicating moderate-to-good test-retest reliability.

2.2. Subjects

The whole survey collected questionnaires from 23,096 students (91.0% of 25,381 invited; mean age 14.7 years, SD 1.8; 51.6% boys). As most schools preferred a shorter questionnaire due to time issues, several shorter versions of questionnaires containing different sets of items were used and 4620 students (85.9% of 5377; mean age 14.5 years, SD 1.8; 51.6% boys) provided valid data on the

study variables after excluding those with: (i) missing sex or age data, or with over 50% of items omitted; (ii) conflicting information on the frequency of reported alcohol drinking (among the 3 items on drinking status, frequency of drinking and binge drinking); or (iii) age 18 years or above (the Strength and Difficulties Questionnaire is for children aged 4–17) (757 of 5377 students were excluded). Students retained in the analyses were similar to those in the original sample ($n = 5377$) in sex (53.4% and 53.8% boys, respectively) and age (mean age 14.5, SD 1.6 vs 14.8, SD 1.8).

2.3. Measurements

Students were asked to "Describe your drinking status" with responses of "I have never drunk alcohol" (never drinkers), "I have only tried once or several times" (experimental drinkers), "I used to drink less than weekly, but have stopped drinking now" (former drinkers), "I used to drink every week, but have stopped drinking now" (former drinkers), "I drink presently" (regardless of frequency) (present drinkers). According to another question "How often do you drink alcohol?" with responses ranging from "I do not drink" to "I drink every day", present drinkers were divided into "less-than-weekly drinking" and "weekly or more frequent drinking" (referred to hereafter as weekly drinking). Therefore, drinking frequency was classified as "never drinking", "experimental drinking", "former drinking", "less-than-weekly drinking", and "weekly drinking". Binge drinking was assessed by the question "How many days in the past 30 days have you drunk at least 5 drinks on one occasion?" with responses recoded as no (0 day) or yes (any number of days). To compare the differences in mental health between never drinkers and binge drinkers, a new binge drinking variable based on self-report was created with 3 categories of "never drinkers" "non-binge drinkers" and "binge drinkers". All drinking variables were based on self-report.

Mental health was assessed using the Strengths and Difficulties Questionnaire (SDQ), which has good reliability and validity in Chinese and Caucasian adolescents (Goodman, 2001; Lai et al., 2010). SDQ has been used to screen for child and adolescent psychiatric disorders in European and Asian countries (Woerner et al., 2004), and treated as an outcome in epidemiological studies (Hamer et al., 2009). The questionnaire has 25 items, each on a three-point scale (not true, somewhat true, and certainly true). Detailed scoring methods for each item can be found at the SDQ official website www.sdq.com.

The outcomes of the present study consisted of 5 subscales: (i) emotional symptoms (e.g., I worry a lot), (ii) conduct problems (e.g., Often fight with other children or bully them), (iii) hyperactivity (e.g., Easily distracted, concentration wanders), (iv) peer relationship problems (e.g., Generally liked by other children), and (v) prosocial behaviour (e.g., Shares readily with other children), and a total difficulties score, which is the sum of scores of the first four abovementioned subscales.

Each subscale of emotional symptoms, conduct disorders, hyperactivity/inattention, peer relationship problems and the total difficulties score were categorised into 4 groups, which were further dichotomised as "very high" versus "others" ("close to average", "slightly raised" and "high"; Black et al., 2010). Similarly, the prosocial activity scale was dichotomised as "very low" versus "others" ("close to average", "slightly lowered" and "low"). It should be noted that SDQ is a screening tool based on self-report rather than a diagnostic test.

Information on socio-demographic characteristics including sex, age, perceived family affluence, housing type, place of birth, and marital status of parents, and students' smoking status and illicit drug use was also collected. Socioeconomic status plays an important role in both reported alcohol drinking and mental health (Huang et al., 2015; Muntaner et al., 2004). Perceived family afflu-

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