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Alcohol Availability, Cost, Age of First Drink and Association with At-Risk Alcohol Use in Moshi, Tanzania

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Abstract

Background: The Kilimanjaro region has one of the highest levels of reported alcohol intake per capita in Tanzania. Age at first drink has been found to be associated with alcohol problems in adulthood, but there is less information on the age of first drink in the Kilimanjaro region and its associations with alcohol-related consequences later in life. Furthermore, local alcohol cost and availability may influence the prevalence of alcohol use and alcohol use disorders.

Method: Data on the age of first drink, alcohol use disorder identification tool (AUDIT), number and type of alcohol consequences (DrInC), and perceived alcohol at low cost and high availability for children and adolescents were collected from an alcohol and health behavior survey of injury patients (N = 242) in Moshi, Tanzania. Generalized linear models were used to test age at first drink, perceived alcohol cost and availability, and their association with the AUDIT and DrInC scores, and current alcohol use, respectively.

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AUTHOR CONTRIBUTIONS

CAS, DZ, BTM, and JRV developed the conceptual question and rationale for this project.

BTM, CAS were responsible for data collection.

DZ, JRV were responsible for the data analysis and graphing.

DZ, CAS, EG, JMH, FS, MS, BTM, JRV, contributed to the interpretation of the results.

DZ, EG wrote the initial draft of the manuscript.

All authors critically edited and approved the final manuscript.

CONFLICT OF INTEREST STATEMENT

None declared

Results: Consuming alcohol before age 18 was significantly associated with higher AUDIT and DrInC scores, with odds ratios of 1.22 (CI: 1.004, 1.47) and 1.72 (CI: 1.11, 2.63), respectively. Female gender is strongly associated with less alcohol use and alcohol consequences, represented by an odds ratio of 3.70 (CI: 1.72, 8.33) for an AUDIT score above 8 and an odds ratio of 3.84 (CI: 2.13, 6.67) with the DrInC score. Perceived high availability of alcohol for children is significantly related to higher alcohol use quantity, with the odds ratio of 1.6 (CI: 1.17, 2.20).

Conclusions: The first use of alcohol before the age of 18 is associated with higher alcohol use and alcohol-related adverse consequences. In Tanzania, age at first drink is an important target for interventions aiming to prevent negative alcohol-related consequences later in life.

Keywords

Alcohol; Age at First Drink; Perceived cost and availability; Alcohol use disorders; Alcohol consequences

Introduction

Alcohol use disorders (AUDs) are associated with significant health, economic, and social burdens on individuals as well as the overall community. Consequently, alcohol use is a global public health problem (Organization & Unit, 2014). Worldwide, alcohol use ranks as one of the three leading risk factors for global disease burden due to a large number of deaths and disability-adjusted life years (DALYs) attributable to this risk factor annually (Lim et al., 2012). Among deaths due to alcohol consumption each year, 25.8% are due to unintentional and intentional injuries (Organization & Unit, 2014).

The World Health Organization reports that the prevalence of AUDs is 3.3 % in Africa (Organization & Unit, 2014). AUDs are likely underreported in many parts of Africa due to the large amount of homebrew. Despite the relatively low prevalence of reported AUDs in Africa, the detrimental impact of alcohol use has a greater disease burden in low- and middle-income countries (Benegal, Chand, & Obot, 2009). Within Africa, alcohol accounted for 6.4% of all deaths and 4.7% of all DALYs in 2012 (Ferreira-Borges, Rehm, Dias, Babor, & Parry, 2016). Studies have shown that alcohol use and AUDs are associated with medical complications, injuries, road traffic injuries, unemployment, and decreased work productivity (Boniface, Museru, Kiloloma, & Munthali, 2016; Fischer, Najman, Plotnikova, & Clavarino, 2015; Francis et al., 2015; Staton et al., 2017).

Alcohol use is common among young people in eastern Africa and even more so in Tanzania. Early age of onset of alcohol use is associated with a higher risk of AUDs (Benjet, Borges, Méndez, Casanova, & Medina-Mora, 2014; Fischer et al., 2015; Foster, Hicks, Iacono, & McGue, 2014). In 12 eastern African countries including Tanzania, alcohol use among young people (15–24 years old) was reported at 52% ever-use, 26% use in the last year, and 15% problem drinking (Francis, Grosskurth, Changalucha, Kapiga, & Weiss, 2014). Specifically, university students and sex workers had the highest levels of alcohol use (Francis et al., 2014). The 2017 Global School-Based Student Health Survey in Tanzania reported that, among the students surveyed who ever had a drink of alcohol, 91.2% had an age of first use before the age of 14 (Nyandindi, 2017). Similarly, of young people (15–24

years old) in northern Tanzania, 11–28% of young males screened positive for AUD (Francis et al., 2015). While there are studies on alcohol use by young people, there is limited literature on the age of first use in Kilimanjaro and its associations with alcohol-related consequences later in life.

Furthermore, local alcohol availability and cost may impact the prevalence of alcohol use and AUDs within that region. In northern Tanzania, the prevalence of alcohol use was substantially higher in the Kilimanjaro region (Francis et al., 2015; Mitsunaga & Larsen, 2008; Nyandindi, 2017). In this region, young adults reported wide alcohol availability and high exposure to alcohol advertisements. One study found that approximately two-thirds of secondary school students and nearly all participants from the remaining groups reported that it was “very easy to obtain alcohol” if they wanted (Francis et al., 2015). Moreover, alcohol was relatively affordable and reported to be inexpensive in northern Tanzania even for individuals without a reliable cash income (Bovet, 2001; Francis et al., 2015). Greater alcohol availability and low cost of alcohol make it easily accessible across a variety of ages and incomes. However, there is a lack of data concerning the relationship between AUD prevalence, perception of alcohol availability, and cost in the Kilimanjaro region.

The burden of alcohol use, especially among injury patients, is high in the Kilimanjaro region of Tanzania. Approximately 30% of the injury patients presented in KCMC ED consumed alcohol at the time of injury and were considered “hazardous drinkers” (Staton et al., 2018). Injury patients who suffered an alcohol-related injury may be at high risk for drink drive, fighting, and other alcohol-related risky behaviors (Cryer, 2005; Nilsen et al., 2008). Injury patients are also a vulnerable population that suffers from both alcohol stigma and related complications. Therefore, injury patients were chosen as our sample as they would improve the sensitivity and provide significant insight into alcohol use in the community. Design sensitivity refers to the ability of a study to detect significant effects (Beck, 1994). Moreover, this population is ideal to target for future interventions for hazardous alcohol use and AUDs.

Alcohol use has been studied among various populations in eastern Africa and has specifically shown to be a risk factor for road traffic injuries (Benegal et al., 2009; Boniface et al., 2016; Chalya et al., 2014; Staton et al., 2017), violence, physical abuse, and suicidal ideation. However, there is a lack of research on the age of first use, cost, and alcohol availability and their association with high-risk alcohol behavior. This study aims to characterize the age at first drink, cost, and availability of alcohol in Moshi Tanzania and describe the population of injury patients by two alcohol assessing instruments: Alcohol Use Disorders Identification Test (AUDIT) and Drinker Inventory of Consequences (DrInC). Finally, this study assesses if the perception of alcohol availability is associated with the presence of AUDs and alcohol-related consequences among injury patients. We hypothesize that patients who started drinking at an earlier age would have greater alcohol consumption, experience more alcohol-related consequences, and believe that alcohol is more available for children, compared to patients who started to drink later in life. We also hypothesize that patients who think alcohol is less expensive or more available for children would have higher alcohol consumption and drinking frequency thus more alcohol use disorders than those who think alcohol is more expensive and less available.

Materials and Methods

Study Design and Sample

A total of 341 injury patients who presented to the Kilimanjaro Christian Medical Centre (KCMC) Emergency Department (ED) for acute care of their injury were enrolled in a self-reported alcohol and health behavior survey. Participants were included if they were 18 years old, seeking care at KCMC ED for an acute (<24 hours old) injury of any severity, clinically sober at the time of enrollment, medically stable, able to communicate in fluent Swahili, and consented to participate before discharge from the hospital. The assessment of clinically sober and medically stable was based on test results such as the breath alcohol test and physicians' subjective judgment. This study only included those who consumed alcohol at least once in their lifetime (n=242) (Figure 1).

Study Setting

Moshi is a city located in the Kilimanjaro Region of Northern Tanzania and contains a population of more than 180,000 people (Tanzania, 2012). The majority of people in Moshi are members of the Chagga, Masai, and Pare ethnic groups (Tanzania, 2012). Moshi is home to KCMC, the third-largest hospital in Tanzania. KCMC is also a referral hospital for over 15 million in urban and rural areas of Northern Tanzania. This study took place in KCMC and its ED.

Variables

Variables overview: We collected basic demographic information including age and gender, age of first alcohol use, alcohol use and consequences, and perceived alcohol at low cost and availability for children variables. Age and sex were considered to have a possible confounding effect on the association between age at first alcohol use and progression to the development of alcohol disorders or the occurrence of negative alcohol consequences. Age of first drink was also treated as a dichotomous variable with the cutoff point of 18 because 18 is both legal drinking age in Tanzania as well as the median and mean age of first drink of our participants.

We also included two dichotomous variables of perceived alcohol at low cost and availability for children to explore their associations with age at first use alcohol use. We asked whether alcohol is available for children as this question is more specific than asking the general availability and might be more accurate in detecting wide availability. A high perceived availability of alcohol for children may reflect participants' own experience when they were young or indicate that local children are commonly exposed to alcohol at their homes. A high availability of alcohol for children may contribute to the early onset of drinking and increased alcohol use (Komro, Maldonado-Molina, Tobler, Bonds, & Muller, 2007).

Definitions of scales used: We chose both DrInC and AUDIT to represent alcohol use and its consequences because DrInC focuses on the result while AUDIT focuses on the process. Combining both scales can increase the interpretability of this study.

Alcohol-related consequences score was treated as a count variable and measured by the validated Swahili version of the DrInC questionnaire (J. R. Vissoci, 2018). DrInC is a 50-item harm assessment questionnaire, which is used specifically for assessing adverse consequences of alcohol abuse. DrInC scores ranged from 0 to 45 because it contains 5 reverse-scaled control items (Miller, Tonigan, & Longabaugh, 1995). DrInC measures five categories: Interpersonal, Physical, Social, Impulsive, and Intrapersonal aspects (Miller et al., 1995). Each category employs a focus on the past 3 months, as well as a lifetime measure of alcohol consequences. The consequences identified using DrInC have been shown to correlate with other outcome measures, such as psychosocial functioning and psychiatric dysfunctions (Cisler & Zweben, 1999).

Alcohol use disorders were measured by the AUDIT. AUDIT is an instrument used to identify people with problem drinking patterns (Babor, Higgins-Biddle, Saunders, & Monteiro, 2001). The 10-item AUDIT assesses alcohol intake (question 1–3), alcohol dependence (question 4–6), and alcohol-related problems (question 7–10). A World Health Organization collaborative study showed AUDIT has 92% sensitivity and 94% specificity in 6 countries (Saunders, Aasland, Babor, De la Fuente, & Grant, 1993). AUDIT's psychometric properties have been validated in many different regions, including Tanzania (Bohn, Babor, & Kranzler, 1995; Claussen & Aasland, 1993; Gache et al., 2005; Isaacson, Butler, Zacharke, & Tzelepis, 1994; Piccinelli et al., 1997; Skipsey, Burleson, & Kranzler, 1997; Steinbauer, Cantor, Holzer III, & Volk, 1998; J. R. N. Vissoci et al., 2017).

AUDIT score was analyzed both as a continuous variable and a dichotomous variable in this study. AUDIT's score ranges from 0–40. A score of 8 or more indicates harmful drinking globally and in our population. (Conigrave, Hall, & Saunders, 1995; Saunders et al., 1993).

Statistical Analysis

R software was used to conduct the statistical analyses. All variables were first assessed with basic descriptive statistics. The missing data for the AUDIT (19.57%) and DrInC (6.96%) scales were simulated by multiple imputation. No significant differences in the model were found with and without the imputed data. First, we used ordinal logistic regression (package *lms*) to test the associations between age at first drink, perceived alcohol at low cost and availability for children and ordinal outcomes, alcohol use quantity and frequency. Second, negative binomial models (function *glm.nb*) were used to test age at first drink, perceived alcohol cost and availability, and their association with DrInC score and AUDIT score. Third, binomial generalized linear models (function *glm*) were used to test age at first drink and its association with AUDIT categories, perceived alcohol at low cost and availability for children, respectively.

Ethical statement

This study was approved by the Institutional Review Board of the Duke University (IRB #Pro000061652) and the Kilimanjaro Christian Medical Center Ethics Committee, as well as the National Institute of Medical Research in Dar Es Salaam, Tanzania.

Results

Demographics

In total 341 KCMC injury patients were enrolled in the survey. Of these, 99 patients (29.03%) reported they never drank alcohol and were excluded from further analysis. Thus 242 patients were included in these analyses. The majority of participants (82.5%) are male, and the mean age is 37.48 years. The average age at first drink is 18.65. More than half (60.5%) of the participants reported drinking alcohol at least twice a week. The mean AUDIT score among those who ever drank alcohol was 9.28, and the median AUDIT score was 7, suggesting a little less than half of the patients had an alcohol use disorder if using the cutoff at 8. The mean DrInC score of 8.19 indicates that, on average, participants reported suffering 8 of 45 negative alcohol-related consequences.

Alcohol use

Results from our general linear model were divided into three parts based on three different sets of dependent variables, including alcohol use, alcohol consequences, and perceived alcohol at low cost and availability for children. Age and gender were controlled as confounding across all analyses. As shown in Table 3, males had significantly more alcohol use than females and those with a perceived high availability of alcohol for children exhibit an increased quantity of alcohol use by an odds of 1.60 (CI: 1.17, 2.20; $p < 0.01$). Older people tended to consume alcohol more frequently. Figure 2 shows boxplots of age at first drink, alcohol use quantity, and alcohol use frequency. No association between variables was found, suggesting that age at first drink does not associate with how often or how much people drink in this population.

Alcohol use disorders and consequences

As shown in Table 4, males have significantly higher AUDIT and DrInC scores than females, suggesting that males who present with injuries have more alcohol use problems than females. The age at first drink is significantly associated with the number of alcohol-related consequences (DrInC score) and AUDIT scores. For each year earlier a patient starts to drink alcohol, his odds of increased alcohol-related consequences increases by 1.053 (CI: 1.02, 1.09; $p < 0.01$). The first drink below 18 years old increases the AUDIT score by 1.22 (CI: 1.004, 1.47; $p < 0.01$) times and consequences by 1.72 (CI: 1.11, 2.63; $p < 0.05$) times. A perceived high availability of alcohol for children is associated with a higher AUDIT score with an odds of 1.40 (CI: 1.13, 1.73; $p < 0.01$). Figure 3 shows the distribution of AUDIT and DrInC scores in relation to age at first drink categories (cutoff at 18) and perceived alcohol availability for children.

Perceived alcohol at low cost and high availability for children

As shown in Table 5, a male gender does not associate with perceived alcohol at low cost and high availability for children ($p > 0.05$). The early onset of alcohol use is significantly associated with higher perceived alcohol availability for children (OR=1.06, CI: 1.01, 1.12) but not with perceived at low cost. Figure 4 shows the distribution of age at first drink with perceived alcohol availability for children and adolescents.

Discussion

This is the first study examining the association of gender, age of first drink, and perception of alcohol and availability for children on the risk of AUDs and alcohol-related consequences in Tanzania. Overall, we found that females presenting with injuries to an emergency department in Moshi, Tanzania had a lower prevalence of harmful alcohol use than males. In our study, those who started to drink before 18 years of age were more likely to have higher AUDIT and DrInC scores in adulthood. While the perceived low cost of alcohol was not associated with alcohol use, the perceived availability of alcohol for children was positively associated with alcohol use quantity and AUDIT score.

In our study and as expected, males patients were significantly more likely to report alcohol use and related consequences than females patients. This finding corresponds to the Global Status Report: Alcohol and Young People, which reports that in Africa males are more likely to drink and experience alcohol harm than females (Jernigan & Organization, 2001). However, it is also possible that the conservative local culture deters women from disclosing their alcohol use because of stigma. Even so, it is unlikely to change our gender pattern of alcohol use, as a previous study has shown 7.7% of women versus 22.8% of men were found to be abusing alcohol in Moshi (Mitsunaga & Larsen, 2008). The potential cultural norms and socialization practices that may protect women from drinking alcohol and experiencing alcohol-related harm warrants further research to strengthen intervention programs aimed at delaying and preventing alcohol use among women.

The drinking culture that promotes alcohol use is strong in Moshi. Many people start to drink before the age of 18, especially for the Chagga ethnic group. It is common to see Chagga parents share alcohol with their children (Castens, Luinga, Shayo, & Tolia, 2012). In Tanzania, the legal drinking age is 18. However, the mean age of first drink in this study was 18.65 (SD: 6.06) years, indicating that many had their first drink prior to the legal drinking age. Our study shows that people who start drinking before the age of 18 have 1.72 times more alcohol-related consequences than those who start drinking after 18. Finding that a lower age at first drink is associated with higher alcohol consequences in sub-Saharan Africa underscores findings from previous research in Africa and other countries around the world that early alcohol exposure leads to future alcohol problems (Chou & Pickering, 1992; Grant & Dawson, 1997; Irwin, Schuckit, & Smith, 1990; Prescott & Kendler, 1999; Swahn et al., 2011; Swahn, Bossarte, & Sullivent, 2008; York, Welte, Hirsch, Hoffman, & Barnes, 2004).

Supporting our first hypothesis, early onset of alcohol use is also significantly associated with higher AUDIT scores, a 10-year accumulate odds ratio of 1.20, and an odds ratio of 1.22 for people who start to drink alcohol before the age of 18. However, the association between the early onset of alcohol use and AUDIT category (cutoff at 8) is not statistically significant. The difference between using the AUDIT score and the AUDIT category might be attributed to the inapplicable AUDIT cutoff point of 8 in Tanzania. Previous meta-analyses have found significant variance in AUDIT cutoffs as low as a score of two (Babor et al., 2001; Reinert & Allen, 2007). Other cutoffs based on gender, defining hazardous use 8 and 5 for men and women respectively in Mbarara, Uganda (Santos et al., 2014) yet use

4 and 3 for men and women respectively in Kampala, Uganda (Hahn et al., 2014). However, no studies have explored AUDIT cutoff scores in Tanzania culture.

Our results also differed from a previous study, which showed that the early onset of alcohol use is related to both higher alcohol consumption and higher numbers of consequences (Rothman, Dejong, Palfai, & Saitz, 2008). No association was found between age at first drink and alcohol use quantity and frequency in our study, suggesting that the age at first drink might not associate how much or how often people drink. However, it is linked to the increased negative alcohol-related consequences drinkers experience. It should be noted that this study does not imply any causal relationships due to its retrospective nature, as noted in previous literature.

The perceived alcohol at low cost was not found to be associated with alcohol use, which contradicts previous literature demonstrating that a higher perceived cost can significantly reduce drinking (Chaloupka, Grossman, & Saffer, 2002). One possible reason is that the industrial production and home production of alcohol are extremely common and the price of alcohol is low in Tanzania, such that it is not a barrier to consume alcohol. For example, Konyagi (a 40% alcohol liquor) costs 4000 TSH (\$2) per 750ml; banana beer and banana wine are only 500 TSH (25 cents) per 500ml. Although sachets (small plastic bags) of alcohol that are sold very cheaply were outlawed in March 2017 for environmental reasons, per local news reports, they were available for sale when our survey was conducted. Currently, there is no minimum unit price for alcohol in Tanzania. A study in England found that a minimum price of alcohol at 45 pence per unit can reduce alcohol consumption and health harm by 3.7%, which has an effect of approximately 45 times greater than below-cost selling (Brennan, Meng, Holmes, Hill-McManus, & Meier, 2014). Alcohol cost is unlikely to influence consumption if the alcohol price is below a certain threshold. However, it should be noted that simply carrying out a minimum price of alcohol is unlikely to significantly reduce harmful alcohol consumption in Tanzania because of the high rate of unregulated alcohol in the local market.

Partly supporting our second hypothesis, a high perceived alcohol availability for children and adolescents is also significantly associated with a higher alcohol use quantity (OR=1.6) and a higher AUDIT score (OR=1.4), but not with alcohol use frequency and alcohol consequences. These may suggest people who think alcohol is more available for children and adolescents are more likely to develop an alcohol use disorder and drink more but not more frequently. Our results differ slightly from results from previous studies, which showed that the perceived alcohol availability for children and adolescents is related to both alcohol use quantity, and frequency (Ahlström & Huntanen, 2007; Knibbe et al., 2005; Smart, 1977). The association between high AUDIT scores in adulthood and perceived alcohol availability for children also signified their associations with the early onset of drinking. We also found that people who start drinking early are more likely to believe alcohol is available to adolescents. This association corresponds to participants' experience of early initiation of drinking.

There are four main limitations of this study. First, this self-reported survey does not include racial or ethnic affiliation, biological factors (e.g., early puberty), socioeconomic status,

family factors or exposure to alcohol in the home, involvement with delinquent peers, childhood conduct problems, as well as early adverse life events or circumstances. Therefore, these factors cannot be taken into consideration. These factors may not only influence the age at which young people take their first drink of alcohol but also the risk of developing problems with alcohol in the adult years. When these potential confounding factors are not held constant, the associations between age at first drink and other factors might be overstated. Also, retrospective self-report data on the standard drinks of alcohol consumed may be imprecise due to the common drinking habit of sharing one cup of a homebrew among family members or friends. Injury patients might also be unwilling to self-report alcohol use immediately after an injury, which might underestimate the associations between factors. The second limitation is the relatively limited sample size ($n=246$), which makes it difficult to detect many associations. Also, the limited sample size does not allow the analyses of the linear or nonlinear effect of age at first alcohol use, which can be used to design interventions in policy, education, and interventions at the individual level. Third, we did not control the confounding influence of time. Early drinkers tend to have a longer exposure to the risk of developing alcohol problems than those who started drinking later. Finally, the generalizability and representativeness of our findings are limited due to the injury patients' specific sociodemographic characteristics, but the strength of the present findings warrants further investigation into these phenomena within the broader Moshi population. The selection of this population increased our sensitivity because injury patients suffer more consequences than the general population, thus making it easier to elucidate these associations.

With these limitations in mind, we believe this study provides important evidence regarding early alcohol onset and alcohol-related consequences. This study calls attention to the need for programs and initiatives that seek to prevent and delay alcohol use among youth. This study also brings up the necessity of paying attention to the macro alcohol use environment and culture in Tanzania. Although the legal drinking age in Tanzania is 18 years old, enforcement of this law is challenging, and few strategies target the prevention of underage drinking specifically. In fact, in Tanzania, alcoholic beverages are easily accessible for youth, and there is limited enforcement of the legal minimum age for serving and selling alcohol to youth (Castens et al., 2012). As mentioned earlier, there is also no minimum alcohol price in Tanzania as the lack of regulation and the pervasive home-brew activity. Alcohol use intervention is needed in Moshi considering its high alcohol consumption and alcohol-related injuries, but intervention may not function well without considering these local factors such as alcohol regulation, home-brew alcohol, and alcohol use culture.

Future research is needed to examine the cultural practices and norms regarding drinking, particularly by tribes, by socioeconomic status, and how these may vary by gender. Considering the cultural acceptance of alcohol and the widespread use of homebrew in Moshi, it is also important to explain any differences in the use of regulated and unregulated alcohol. Understanding how early-onset alcohol use relates to the occurrence of alcohol use disorders and consequences, we can further develop goals and strategies for future alcohol abuse prevention and intervention programs in Tanzania and the Eastern Africa region.

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Figure 1.
STROBE-Type Flow Diagram for the Retrospective Cross-Sectional Study

Fig 2.
Boxplots of age at first drink and alcohol use quantity and frequency

Fig 3.
Boxplots of AUDIT and DrInC score in relation to age categories and perceived alcohol availability for children and adolescents

Fig 4.

The boxplot of age at first drink and perceived alcohol availability for children and adolescents

Table 1.

Variables used

Variable name	Full questions
Age	Age
Gender	Gender
Age of first alcohol use	How old were you the very first time you ever drank an alcoholic beverage?
AUDIT	A 10-item questionnaire (Saunders et al., 1993)
DrInC	A 50-item questionnaire (Miller et al., 1995)
Quantity	How many (standard) drinks containing alcohol do you have on a typical day when you are drinking?
Frequency	How often do you have a drink containing alcohol?
Alcohol cost	Is alcohol available for a low cost? (Yes/No)
Alcohol availability	Is alcohol available for children or adolescents to obtain? (Yes/No)

Table 2.

Characteristics of the participants

Variables	Mean (SD)
Age at first drink (years)	18.65 (6.06)
Age since first drink (years)	18.83 (13.98)
Age (years)	37.48 (13.7)
DrInC score	8.19 (11.25)
AUDIT score	9.52 (7.23)
Number (%)	
Men	189 (82.5%)
Perceived alcohol at low cost (Yes/No)	73 (32.4%)
Perceived alcohol available for children (Yes/No)	52 (23.6%)
Alcohol use frequency	
Monthly or less	23 (12.4%)
2 to 4 times a month	50 (27.0%)
2 to 3 times a week	69 (37.3%)
4 or more times a week	43 (23.2%)
Numbers of drinks on a drinking day (%)	
1 or 2	78 (41.9%)
3 or 4	77 (41.4%)
5 or 6	18 (9.7%)
7 or 8	7 (3.8%)
10 or more	6 (3.2%)

Table 3.

The association of age at first drink, perceived at low cost and availability for children with alcohol use (in odds ratio with 95% CI)

Variables	Alcohol use behaviors	
	Alcohol use quantity	Alcohol use frequency
Male gender ^a	1.75 ^{***} (1.27, 2.50)	1.59 [*] (1.11, 2.27)
Age	0.993 (0.983, 1.003)	1.016 ^{**} (1.006, 1.028)
Age at first drink (per year earlier)	1.00 (0.98, 1.03)	1.01 (0.98, 1.03)
Age at first drink (dichotomized, <18)	1.05 (0.79, 1.39)	1.20 (0.90, 1.61)
Perceived low cost	0.96 (0.72, 1.29)	0.88 (0.64, 1.20)
Perceived high availability for children	1.60 ^{**} (1.17, 2.20)	1.23 (0.88, 1.73)

^aFemale is the reference category for gender;

^{*}
p < 0.05;

^{**}
p < 0.01;

^{***}
p < 0.001.

Table 4.

The association of age at first drink, perceived at low cost and availability for children with AUDs and alcohol consequences (in odds ratio with 95% CI)

Variables	Alcohol Use Disorders and Alcohol-related Consequences		
	AUDIT > 8	AUDIT (con)	DrInC (con)
Male gender ^a	3.70 *** (1.72, 8.33)	1.79 *** (1.39, 2.33)	3.84 *** (2.13, 6.67)
Age	0.999 (0.978, 1.020)	0.999 (0.991, 1.005)	0.980 * (0.965, 0.996)
Age at first drink (per year earlier)	1.04 (0.99, 1.09)	1.02 * (1.003, 1.034)	1.05 ** (1.02, 1.09)
Age at first drink (dichotomized, <18)	1.61 (0.93, 2.78)	1.22 * (1.004, 1.47)	1.72 * (1.11, 2.63)
Perceived low cost	1.04 (0.59, 1.83)	1.03 (0.85, 1.26)	0.96 (0.61, 1.51)
Perceived high availability for children	1.85 (0.96, 3.57)	1.40 ** (1.13, 1.73)	1.48 (0.90, 2.46)

^aFemale is the reference category for gender;

* p < 0.05;

** p < 0.01;

*** p < 0.001.

Table 5.

The association of age at first drink with perceived alcohol at low cost and high availability for children (in odds ratio with 95% CI)

Variables	Perceived Alcohol at Low Cost and High Availability for Children	
	Perceived at low cost	Perceived high availability for children
Male ^a	1.23 (0.59, 2.56)	1.75 (0.68, 4.55)
Age	0.996 (0.98, 1.02)	0.99 (0.97, 1.02)
Age at first drink (per year earlier)	1.005 (0.96, 1.05)	1.06 [*] (1.01, 1.12)
Age at first drink (dichotomized, <18)	1.10 (0.62, 1.92)	1.79 (0.96, 3.33)

^aFemale is the reference category for gender;

^{*}
p < 0.05;

^{**}
p < 0.01;

^{***}
p < 0.001.