Self-Esteem, attitudes towards alcohol and other substance use among undergraduate students in Nairobi, Kenya: A sex-disaggregated cross-sectional analysis

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ABSTRACT

This study examined the relationship between self-esteem and attitudes toward alcohol and other substance use (ASU) among undergraduate students in Nairobi, Kenya, focusing on sex differences. Studies across Africa have shown a high rate of ASU among university students due to the normalization of alcohol consumption and the accessibility of drugs. We analyzed data from 406 undergraduate students (51% male), with an average age of 19 years, at a public university in Nairobi. Alcohol and substance use were measured using the Assessment of Smoking and Substance Involvement Test (ASSIST), self-esteem was measured using the Rosenberg scale, and attitudes toward alcohol were assessed using the Attitudes Towards Alcohol scale. Sex disaggregated, modified Poisson regression models estimated the relative risk of ASU associated with covariates (self-esteem and attitudes towards alcohol use) as the primary explanatory variables of interest. Each per-point increase in social ease reduced the risk of current alcohol use by 17% in females and 18% in males. Living at home or in private residences consistently increased the risk of ASU for both sexes. These findings underscore the influence of social and contextual factors on ASU and highlight the need for university-based prevention strategies to inform the ASU-related attitudes among students.

Keywords: *Alcohol and Substance use, attitudes, university students, self-esteem, social environment, Kenya.*

1.1 INTRODUCTION

Alcohol and substance use (ASU) among college students is a significant public health issue globally. While higher education is expected to promote healthy behaviors, evidence suggests that alcohol misuse is more prevalent among college students than among non-students (Welsh et al., 2019). In the United States (U.S.), approximately one in four (24%) undergraduates report binge drinking, and nearly half (44%) report past-year cannabis use (Schulenberg et al., 2021). Similar trends exist in Europe, although prevalence varies by country (Helmer et al., 2014)and investigate whether perceptions of peer norms are associated with personal use of illicit substances and attitudes.\ nMethod\nThis study used baseline data from the Social Norms Intervention for the prevention of Polydrug usE (SNIPE.

In Africa, the use of alcohol and substances among students is on the rise. In Kenya, 25% of university students report lifetime ASU (Musyoka et al., 2020b)taking longer to complete their studies or dropping out of university. This study determined the prevalence and patterns of alcohol and substance use of students at the entry to the university. Method A total of 406 (50.7% male, often involving the consumption of inexpensive local brews with high ethanol content. A study in Western Kenya found that over 37% of health science students engaged in heavy drinking (Mangeni & Mbuthia, 2018)with more than 40% of students already affected. Health care professionals are believed to be the lead in healthy practices but as well can be a serious source of safety lapses for patients if they engage in substance misuse. Although this is a very important subject area, studies regarding prevalence of substance abuse especially among students undertaking health related courses remain scant. Objective: The study sought to determine substance use/abuse and likely consequences among student studying health related courses at a tertiary institution. Study Setting: The study was conducted among students undertaking health related courses in the College of Health Sciences within a large tertiary learning institution in Western Kenya. Study Subjects: The College of Health Sciences has four main schools; Medicine, Nursing, Dentistry and Public Health. Two schools; school of Medicine and school of Nursing were picked using simple random sampling. Proportionate sampling was then applied to each group. In total, 376 students from both the Bachelor of Science in Nursing and medicine programs were interviewed using a pre-tested questionnaire. Results: The main substance commonly used and abused among students in the college of Health Sciences is alcohol. Other substances include; cigarettes, miraa and cannabis. About 37% of all the students interviewed had ever consumed alcohol. Of those who had taken alcohol, 35.6% were nursing students while 64.4% were medical students. More males (56.8%. ASU is also linked to adverse health outcomes such as violence, alcohol poisoning, and engaging in risky sexual behaviors (Mangeni & Mbuthia, 2018)with more than 40% of students already affected. Health care professionals

are believed to be the lead in healthy practices but as well can be a serious source of safety lapses for patients if they engage in substance misuse. Although this is a very important subject area, studies regarding prevalence of substance abuse especially among students undertaking health related courses remain scant. Objective: The study sought to determine substance use/abuse and likely consequences among student studying health related courses at a tertiary institution. Study Setting: The study was conducted among students undertaking health related courses in the College of Health Sciences within a large tertiary learning institution in Western Kenya. Study Subjects: The College of Health Sciences has four main schools; Medicine, Nursing, Dentistry and Public Health. Two schools; school of Medicine and school of Nursing were picked using simple random sampling. Proportionate sampling was then applied to each group. In total, 376 students from both the Bachelor of Science in Nursing and medicine programs were interviewed using a pre-tested questionnaire. Results: The main substance commonly used and abused among students in the college of Health Sciences is alcohol. Other substances include; cigarettes, miraa and cannabis. About 37% of all the students interviewed had ever consumed alcohol. Of those who had taken alcohol, 35.6% were nursing students while 64.4% were medical students. More males (56.8%.

Several factors contribute to ASU among college students, including peer influence, the use of ASU to cope with distress, and a lack of parental or adult supervision (Welsh et al., 2019). Many students view alcohol and substance use as integral to their university experience, adopting attitudes such as “everyone is doing it, so it cannot be dangerous” (Willis et al., 2019). Peer and family interactions play an important role in shaping pro-drug use among adolescents, which predicts ASU use in later life (Khalil et al., 2022; Zapolski et al., 2019)which is concerning given associated negative consequences, including health and functional deficits. Family and peer factors are associated with a high risk of substance use among justice-involved youth. It is hypothesized that this risk process operates through pro-drug attitudes. However, limited research has been conducted on the mechanisms through which family and peer factors increase risk for substance use among juvenile justice involved youth. The current study examined both the direct and indirect effects of family and peer substance use on youth’s substance use (alcohol and illicit drug use. Adolescents exposed to permissive parental attitudes, parental substance use, or low supervision are more likely to engage in alcohol and substance use (Bouchard et al., 2018; Ogunsola & Fatusi, 2017).

Self-esteem influences academic commitment and school engagement, both of which have been associated with an increased risk for ASU (Desai et al., 2019; Morojele et al., 2002). High self-esteem is connected with favorable outcomes, including strong social well-being and achievement in one’s career. Moreover, low self-esteem is linked to adverse mental health outcomes such as depression, anxiety,

and suicidal thoughts. Students with low self-esteem struggle with time management and exhibit higher levels of internalizing and externalizing psychological symptoms compared to those with high self-esteem (Arsandaux et al., 2020; Kreski et al., 2023; Ngo et al., 2020).

Studies have documented sex differences in the prevalence of ASU among males and females (Polak et al., 2023; White, 2020). Historically, males have used alcohol and substances more frequently, but recent research shows that the gender gaps are narrowing, particularly among adolescents (ME McCaul, D Roach, DS Hasin, C Weisner, G Chang, 2019; DS Hasin, C Weisner, G Chang, 2019White, 2020)DS Hasin, C Weisner, G Chang, 2019. Women who initiate ASU tend to escalate their use rapidly and experience similar negative consequences as men (White, 2020). Across Africa, recent studies have documented significant differences in ASU between males and females, with males reporting a higher prevalence of lifetime and current ASU. In Kenya, male students are twice as likely to use drugs compared to females (Musyoka et al., 2020b)taking longer to complete their studies or dropping out of university. This study determined the prevalence and patterns of alcohol and substance use of students at the entry to the university. Method A total of 406 (50.7% male. Similarly, Francis and colleagues (Francis et al., 2015)including as a risk factor for HIV infection, but few data are available on the epidemiology of alcohol use and alcohol use disorders (AUD found that the prevalence of alcohol consumption among male students in Northern Tanzania was 45%, nearly double the 26% prevalence among female students. However, females have higher rates of prescription drug use and new psychoactive substances (Fattore et al., 2020). Although valuable, existing studies, which are primarily cross-sectional, have focused on specific contexts and have not adequately explored the unique and changing risk and protective factors associated with alcohol and substance use among college students. Thus, research is needed to examine the evolving ASU risk and protective factors, particularly in low-resource settings.

1.1.1 The Present Study

This study is significant because it examines a large population of African college students, exploring the relationship between self-esteem, attitudes towards ASU, and sex differences among university students in Kenya. Given the limited research on prevention and treatment strategies, understanding these dynamics is essential for developing interventions that enhance self-esteem and influence attitudes towards ASU.

1.2 METHODS

1.2.1 Study Area

The study was conducted at the University of Nairobi, which has a total student population of 61,000, comprising both graduate and undergraduate students. These students can be sponsored publicly (using public funds) or privately, and they can reside on or off campus. The University

of Nairobi encompasses eleven faculties located in Nairobi City (www.uonbi.ac.ke). The Faculty of Science and Technology (Chiromo) and the Faculty of Education (Kikuyu) were selected due to the high prevalence of ASU. The study included first-year students from these faculties. These campuses were chosen to assess the need for and design prevention and intervention services. Additionally, they offer a wide range of sciences and humanities courses, ensuring comprehensive representation across the study domains within the University of Nairobi system.

1.2.2 Procedures

A cross-sectional survey was conducted during the 2018/2019 academic year. A random sample of 406 students was selected using the computer software random.org, which generated and assigned random numbers to all students. The selected students were approached and asked for their consent to participate in the survey. If a student was absent from class on the day of data collection or declined to participate, the next student on the list was approached and invited to participate. This process continued until the desired sample size of 406 participants was achieved. Detailed sample size selection and calculations can be found elsewhere (Musyoka et al., 2020a). Self-administered questionnaires were distributed in classrooms, and students were given 30 minutes to complete them before lectures. Participants provided written informed consent. The collected questionnaires were immediately checked for completeness and securely stored in a locked drawer accessible only to the principal investigator (PI).

1.2.3 Ethics and Consent:

Participants provided written informed consent before taking part in the study. Ethical approval was granted by the Kenyatta National Hospital and the University of Nairobi Ethical Committee with reference number P98/02/2018. Additionally, clearance was obtained from the National Commission for Science, Technology & Innovation under reference number 990379.

1.2.4 Measures

Participants were asked to self-report their sex, age, school, field of study, sponsorship type, relationship type, and residence. Sex was measured as a binary variable (male or female). Age (18-25 years) was measured as a continuous variable. The following categorical variables were also reported: marital status (single or in a relationship), residence type (campus hostels, private, or home), sponsorship type (government or private), and field of study (Arts or Sciences).

Attitudes towards alcohol were measured using the Attitudes Towards Alcohol scale, which consists of 15 items scored on a 4-point Likert-type scale ranging from 1 (not at all) to 4 (nearly every day). It evaluates the risk profile of alcohol consumption among young consumers aged 18 to 26 years. This scale includes three domains: Domain 1: Social ease describes drinking behavior stemming from the subject's perception that

alcohol can facilitate social relationships, interactions with the opposite sex, and a sense of belonging to peer groups. Domain 2: Unease describes drinking behavior driven by the subject's need to escape feelings of despair, sadness, or anger to cope with personal, family, or relationship problems; and Domain 3: Economic aspects describes drinking behavior influenced by the ease or low cost of obtaining alcohol (Francalanci et al., 2011). This tool has been validated in various settings involving diverse populations (Humeniuk & Ali, 2006). The total score ranges from 15 to 60, with higher scores indicating positive attitudes towards alcohol. The internal consistency for social ease (Cronbach's alpha 0.85), economic impact (Cronbach's alpha 0.73), and unease (Cronbach's alpha 0.83) is high.

Self-esteem was assessed using the Rosenberg Self-Esteem Scale (RSES) (Rosenberg, 2015), which consists of ten items. Participants rated their agreement with each statement on a 4-point Likert scale, where 4 signifies strongly agree, 3 signifies agree, 2 signifies disagree, and 1 signifies strongly disagree. The possible score range on the scale is from 10 to 40, with higher scores reflecting elevated levels of self-esteem. The overall mean score was 22.67, with a standard deviation of 4.4. The scores ranged from 10 to 40, indicating moderate self-reported self-esteem among university students. The scale's internal consistency was acceptable, with a Cronbach's alpha coefficient of 0.70.

To identify alcohol and substance use, we utilized the Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST) scale (WHO | The ASSIST Project - Alcohol, Smoking and Substance Involvement Screening Test, 2018). This scale identifies over ten different substances, including alcohol, cannabis, and tobacco, which are among the most commonly used drugs by students (Humeniuk & Ali, 2006; WHO | The ASSIST Project - Alcohol, Smoking and Substance Involvement Screening Test, 2018). Participants were asked whether they had ever (lifetime) used alcohol and/or any of the listed substances. If the answer was affirmative, we gathered more detailed information about the frequency and consequences of using the endorsed substances over the previous month. The validity and reliability of the ASSIST tool have been reported as good and have been adapted for use in Kenya to investigate substance use among university students (Muriungi et al., 2013; Ndegwa et al., 2017). For this study, the primary outcomes of alcohol and substance use were assessed as 'Ever Used' and 'Current Use'. Specifically, 'Current Use' was defined as the consumption or use of alcohol or other substances in the three months preceding the day of data collection, following the ASSIST guidelines (Humeniuk et al., 2008).

1.2.5 Statistical analysis

First, the socio-demographic characteristics of the sample were calculated using descriptive statistics. Summary statistics

of socioeconomic status, as well as current and lifetime alcohol and substance use by sex, were derived from means, standard deviations (SD), frequencies, and proportions. Additionally, modified Poisson regression models (Zou et al., 2004) were fitted to estimate the gender-disaggregated relative risk of the outcomes associated with the covariates (self-esteem and attitudes toward alcohol use) as the primary explanatory variables of interest. Each outcome variable was assigned a score of 1 when alcohol or substance use was present and 0 when it was absent. We specifically used modified Poisson regression, as described by Zou et al. (2004), because it allows for the direct estimation of relative risks when applied to binary dependent variable data. The logistic regression model permits only the estimation of odds ratios.

Additionally, modified Poisson models are less sensitive to model assumptions. Logistic regression assumes that the log odds of the outcome are linearly related to the predictors, whereas modified Poisson regression does not make this assumption. Therefore, modified Poisson models can be more robust when this assumption is violated. Considering the gender-specific nature of young adults' use of alcohol and substances in this analysis, we disaggregated the results by sex. We used STATA 17 software to conduct the statistical analyses.

1.3 RESULTS

Table 1 presents the characteristics of 406 undergraduate students from a public university in Nairobi, Kenya, stratified by sex (male and female). Slightly more than half of the participants were male (51%), with a mean age of 19 years (SD=1.30), and they were slightly older than females (t=5.02, p<.001). The overall mean score for attitudes towards alcohol was 42.18 (SD=9.37), indicating no significant difference between males and females. The scale included aspects of social ease, unease, and economic factors, with no significant differences observed between males and females in each sub-scale. Similarly, self-esteem averaged 22.67 (SD=4.40), without significant differences between males and females. The majority of participants (79%) lived in campus hostels, and most were single (98%), while a significantly higher proportion of males (3%) reported being in a relationship compared to females (1%). Additionally, 91% of students received government aid, and 55% were enrolled in science courses.

Regarding substance use, 25% of participants reported lifetime substance use, with males (31%) significantly more likely to report substance use than females (20%). A similar pattern was observed for lifetime alcohol use, with 22% of participants indicating lifetime alcohol use and a significantly higher proportion of males (28%) reporting alcohol use compared to females (16%). Current substance use, defined as alcohol and/or substance use within the three months preceding the data collection date, was significantly higher among males (26%) than females (15%) (t=8.56, p<.001). Likewise, current alcohol use was more widespread (t=11.79, p<.001) among males

(23%) than females (11%). Overall, the results suggest notable sex-based differences in substance use among participants, with males reporting higher levels of alcohol and substance use than females.

Table 1: Social Demographic Characteristics of the Participants Stratified by Sex (N=406)

Variable	Total Sample (N=406)	Females (n=200)	Males (n=206)	t-test or X^2
Age (Mean ± SD) 18-25	19.34±1.30	19.02±1.08	19.65±1.43	5.02***
Attitudes towards alcohol (total score, Mean ± SD) 15-60	42.18±9.37	42.38±8.89	42.0±9.83	-0.41
Attitude toward alcohol sub-scales				
Social ease	14.11±3.73	14.28±3.59	13.94±3.87	-0.90
Unease	13.73±3.64	13.61±3.50	13.85±3.77	0.70
Economic aspects	14.35±3.50	14.5±3.63	14.20±3.61	-0.87
Self-esteem (Mean ± SD) 10-40	22.67±4.40	22.88±4.20	22.45±4.59	-0.95
Residence type				5.37
Campus hostels	318 (79%)	149 (75%)	169 (83%)	
Private	25 (6%)	12 (6%)	13 (6%)	
Home	62 (15)	39 (19%)	23 (11%)	
Missing (n)	1		1	
Marital status				4.41*
Single	398 (98%)	199 (99%)	199 (97%)	
In a relationship	8 (2%)	1 (1%)	7 (3%)	
Sponsorship type				0.07
Government aided	371 (91%)	182 (91%)	189 (92%)	
Private sponsorship	35 (9%)	18 (9%)	17 (8%)	
Field of study				0.76
Arts course	184 (45%)	95 (48%)	89 (43%)	
Sciences course	222 (55%)	105 (52%)	117 (57%)	
Outcomes				
Lifetime substance use				6.0**
Yes	103 (25%)	40 (20%)	63 (31%)	

No	303 (75%)	160 (80%)	143 (69%)	
Lifetime alcohol use				8.07***
Yes	89 (22%)	32 (16%)	57 (28%)	
No	317 (78%)	168 (84%)	149 (72%)	
Current substance use				8.56***
Yes	83 (20%)	29 (15%)	54 (26%)	
No	323 (80%)	171 (85%)	152 (74%)	
Current alcohol use				11.79***
Yes	69 (17%)	21 (11%)	48 (23%)	
No	337 (83%)	179 (89%)	158 (77%)	
Note: *p<.05, **p<.01, ***p<.001				

We fitted modified Poisson regression models to estimate the correlates of current and lifetime alcohol and substance use. The results of the regression models are presented in Table 2—models 1-4. In models 1 and 2, results indicate that each point of social ease was associated with a 17% reduced risk for both current alcohol use (adjusted relative risk [ARR]=0.83; 95% confidence interval [CI], 0.77-0.88; P <.001) and lifetime alcohol use (ARR= 0.83; 95% CI, 0.79-0.88; p < .001). Being female was associated with a reduced risk of current alcohol use (ARR = 0.45; 95% CI, 0.28-0.72; p < .001) and lifetime alcohol use (ARR = 0.61; 95% CI, 0.42-0.88; p = .01). We also found that government sponsorship was marginally associated with a lower risk of current alcohol use (ARR = 0.61, 95% CI, 0.37, 1.00; p = 0.05) compared to private sponsorship. Compared to campus hostels, private accommodation (ARR = 2.38; 95% CI, 1.26, 4.51; p = 0.01) and home residence (ARR = 1.97; 95% CI, 1.17, 3.33; p = 0.01) were associated with a higher risk of current alcohol use. Moreover, living in private residences (ARR = 2.17; 95% CI, 1.27-3.68; p = .01) and family homes (ARR = 21.93; 95% CI: 1.23-3.03; p = .01) were associated with increased risk of lifetime alcohol use compared to those living in campus hostels.

Table 2: Correlates of Current and Lifetime Alcohol and Substance Use (N=403)

	Current Alcohol use (90 days)	Lifetime Alcohol Use	Current Substance Use (90 days)	Lifetime Substance Use
	Adjusted Incidence Risk Ratios—IRR-(95% confidence intervals), p values			
Variable	**Model 1** IRR (95% CI), p-values	**Model 2** IRR (95% CI), p-values	**Model 3** IRR (95% CI), p-values	**Model 4** IRR (95% CI), p-values
Self-esteem, per point	1.02 (0.97, 1.08), 0.39	1.00 (0.96, 1.05), 0.85	1.00 (0.94, 1.05), 0.87	1.00 (0.95, 1.04), 0.84
Attitudes towards alcohol				
Social ease, per point	**0.83 (0.77, 0.88), <.001**	**0.83 (0.79, 0.88), <.001**	**0.86 (0.81, 0.92), <.001**	0.86 (0.82, 0.91), <.001
Unease, per point	1.02 (0.93, 1.12), 0.70	1.04 (0.96, 1.12), 0.36	1.00 (0.92, 1.09), 0.99	1.00 (0.94, 1.08), 0.89
Economic aspects, per point	0.98 (0.91, 1.06), 0.62	0.97 (0.91, 1.03), 0.35	0.96 (0.90, 1.02), 0.19	0.95 (0.90, 1.00), 0.06
Age, per year	0.99 (0.86, 1.13), 0.85	1.04 (0.94, 1.15), 0.41	0.99 (0.88, 1.12), 0.88	1.05 (0.96, 1.15), 0.33
Sex (ref: Male)				
Female	**0.45 (0.28, 0.72), <.001**	**0.61 (0.42, 0.88), 0.01**	**0.58 (0.39, 0.86), 0.01**	**0.71 (0.51, 0.98), 0.04**
Residence type (ref: campus hostels)				
Private	**2.38 (1.26, 4.51), 0.01**	**2.17 (1.27, 3.68), 0.01**	**2.44 (1.34, 4.44), 0.01**	**2.19 (1.31, 3.65), 0.01**
Home	**1.97 (1.17, 3.33), 0.01**	**1.93 (1.23, 3.03), 0.01**	**1.89 (1.16, 3.08), 0.01**	**1.73 (1.14, 2.62), 0.01**
Marital status (ref: Single)				
In a relationship	1.59 (0.77, 3.27), 0.21	1.20 (0.63, 2.27), 0.58	1.40 (0.69, 2.80), 0.35	1.08 (0.59, 1.99), 0.80
Sponsorship type (ref: Private)				

Government-sponsored	**0.61 (0.37, 1.00), 0.05**	0.80 (0.53, 1.21), 0.29	0.78 (0.49, 1.25), 0.30	0.91 (0.61, 1.37), 0.66
Field of study (ref: Art subjects)				
Science subjects	0.96 (0.59, 1.56), 0.87	1.09 (0.71, 1.67), 0.68	1.01 (0.66, 1.56), 096	1.07 (0.74, 1.55), 0.70

1.3.1 Self-esteem, Attitudes Towards Alcohol, and Current and Lifetime Substance Use

In models 3 and 4, the results of a Poisson regression analysis indicated that a per-point increase in social ease was associated with reduced risk of current substance use by 14% (ARR=0.86; 95% CI, 0.81-0.92; p<0.001). Being female compared to males reduced the risk of current substance use by 42% (ARR=0.58; 95% CI, 0.39-0.86; p=0.01) and 29% for lifetime substance use (ARR=0.71; 95% CI, 0.51-0.98; p=0.01). Compared to campus hostels, living in a private residence (ARR=2.44; 95% CI, 1.34-4.44; p=0.01) and living at home (ARR=1.89; 95% CI, 1.16-3.08; p=0.01) were associated with increased risk for current substance use. Similarly, compared to campus hostels, living in a private residence (ARR=2.19; 95% CI, 1.31-3.65; p=0.01) and living at home (ARR=1.73; 95% CI, 1.14-2.62; p=0.01) were associated with a higher risk for lifetime substance use.

Table 3: Correlates of Current and Lifetime Alcohol Use, Stratified by Sex (N=403)

	Model 5: Current Alcohol use (90 days)		**Model 6: Lifetime alcohol use**	
	Adjusted Incidence Risk Ratios—IRR-(95% confidence intervals), p values			
Variable	**Female** IRR (95% CI), p-values	**Male** IRR (95% CI), p-values	**Female** IRR (95% CI), p-values	**Male** IRR (95% CI), p-values
Self-esteem, per point	0.99 (0.87, 1.12), 0.83	1.04 (0.98, 1.11), 0.17	1.01 (0.93, 1.10), 0.83	1.01 (0.95, 1.06), 0.86
Attitudes towards alcohol				

Social ease, per point	**0.83 (0.74, 0.94), 0.01**	**0.82 (0.76, (0.89), <.001**	**0.87 (0.78, 0.96), 0.01**	**0.82 (0.77, 0.89), <.001**
Unease, per point	1.04 (0.84, 1.28), 0.73	1.02 (0.92, 1.13), 0.69	1.03 (0.89, 1.19), 0.73	1.05 (0.96, 1.14), 0.31
Economic aspects, per point	1.01 (0.86, 1.19), 0.87	0.95 (0.87, 1.03), 0.22	0.92 (0.81, 1.05), 0.22	0.98 (0.91, 1.05), 0.60
Age, per year	0.87 (0.58, 1.31), 0.50	1.02 (0.91, 1.15), 0.71	0.90 (0.66, 1.24), 0.53	1.08 (0.98, 1.18), 0.14
Residence type (ref: campus hostels)				
Private	**4.95 (1.94, 12.64), <.001**	1.66 (0.74, 3.72), 0.22	**3.65 (1.65, 8.10), <.001**	1.65 (0.86, 3.16), 0.13
Home	2.04 (0.72, 5.76), 0.18	**2.23 (1.18, 4.20), 0.01**	**2.39 (1.04, 5.51), 0.01**	1.71 (0.97, 3.00), 0.06
Marital status (ref: Single)				
In a relationship	**0.00 (0.00, 0.00), <.001**	1.63 (0.83, 3.18), 0.15	**0.00 (0.00, 0.00), <.001**	1.16 (0.62, 2.15), 0.65
Sponsorship type (ref: Private)				
Government -sponsored	0.68 (0.29, 1.56), 0.36	**0.48 (0.27, 0.86), 0.01**	1.03 (0.54, 1.94), 0.94	0.63 (0.37, 1.06), 0.09
Field of study (ref: Art subjects)				
Science subjects	2.40 (0.80, 7.23), 0.12	0.67 (0.37, 1.16), 0.15	2.18 (0.93, 5.12), 0.07	0.81 (0.50, 1.34), 0.42

1.3.2 Self-esteem, Attitudes Towards Alcohol, and Current and Lifetime Alcohol Use by Sex

Table 3 (models 5 and 6) presents the modified Poisson regression analysis results assessing the correlates of current and lifetime alcohol use across sexes. A sex-disaggregated analysis indicated that social ease, residence, and sponsorship types were associated with current and lifetime alcohol use. Specifically, a per-point increase in social ease was associated with reduced risk of current alcohol use for females (ARR=0.83; 95% CI, 0.74-0.94; p=0.01) and males (ARR=0.82; 95% CI, 0.76-0.89; p<.001). In the same way, social ease reduced the risk of lifetime alcohol use by 13% among females (ARR=0.87; 95% CI, 0.78-0.96; p=0.01) and 18% among males (ARR=0.82; 95% CI, 0.77-0.89; p<.001). In addition, being in a private residence compared to campus hostels, increased the risk of current alcohol use (ARR=4.95; 95% CI, 1.94-12.64; p<.001) and lifetime alcohol use (ARR=3.65; 95% CI, 1.65-8.10; p<.001) for females but not males. Similarly, staying at home increased the risk of current alcohol use (ARR=2.23; 95% CI, 1.18-4.20; p=0.01) for males, not females, and lifetime alcohol use for females, not males (ARR=2.39; 95% CI, 1.04-5.51; p=0.01). Being on a government sponsorship reduced the risk of current alcohol use by 52% among males but not females (ARR=0.48; 95% CI, 0.27-0.86; p=0.01).

Table 4: Correlates of Current and Lifetime Substance Use, Stratified by Sex (N=403)

	Model 7: Current Substance Use (90 days)		**Model 8: Lifetime Substance Use**	
	Adjusted Incidence Risk Ratios—IRR-(95% confidence intervals), p values			
	Female	**Male**	**Female**	**Male**
Variable	IRR (95% CI), p-values	IRR (95% CI), p-values	IRR (95% CI), p-values	IRR (95% CI), p-values
Self-esteem, per point	0.94 (0.84, 1.04), 0.22	1.02 (0.96, 1.08), 0.51	0.97 (0.90, 1.05), 0.44	1.00 (0.95, 1.06), 0.91
Attitudes towards alcohol				
Social ease, per point	**0.87 (0.79, 0.97), 0.01**	**0.86 (0.80, 0.94), <.001**	**0.88 (0.81, 0.95), <001**	**0.87 (0.81, 0.93), <.001**
Unease, per point	1.03 (0.88, 1.21), 070	0.99 (0.90, 1.09), 0.86	1.01 (0.90, 1.14), 0.83	1.00 (0.92, 1.09), 0.98

Economic aspects, per point	0.94 (0.82, 1.07), 0.35	0.95 (0.87, 1.02), 0.17	0.90 (0.81, 1.00), 0.05	0.96 (0.90, 1.03), 0.28
Age, per year	0.72 (0.49, 1.07), 0.10	1.06 (0.94, 1.18), 0.33	0.79 (058, 1.08), 0.14	**1.12 (1.02, 1.23), 0.01**
Residence type (ref: campus hostels)				
Private	**4.17 (1.70, 10.25), 0.01**	1.89 (0.83, 4.30), 0.13	**3.03 (1.38, 6.68), 0.01**	1.89 (0.95, 3.76), 0.07
Home	**2.51 (1.02, 6.20), 0.05**	**1.85 (1.03, 3.32), 0.04**	**2.39 (1.19, 4.82), 0.01**	1.49 (0.87, 2.53), 0.14
Marital status (ref: Single)				
In a relationship	**0.00 (0.00, 0.00), <.001**	1.39 (0.74, 2.63), 0.31	**0.00 (0.00, 0.00), <.001**	1.05 (0.61, 1.80), 0.86
Sponsorship type (ref: Private)				
Government-sponsored	0.80 (0.37, 1.73), 0.58	0.65 (.034, 1.22), 0.18	1.04 (0.55, 1.95), 0.91	0.80 (0.46, 1.42), 0.45
Field of study (ref: Art subjects)				
Science subjects	1.40 (0.64, 3.01), 0.40	0.84 (0.50, 1.42), 0.52	1.34(0.72, 2.50),0.35	0.95 (0.61, 1.49), 0.83

1.3.3 Self-esteem, Attitudes Towards Alcohol, and Current and Lifetime Substance Use by Sex

The results of the modified Poisson regression analysis assessing the correlates of current and lifetime substance use across sexes are presented in Table 4 (Models 7 and 8). Each unit increase in social ease was associated with reduced risk of current substance use for females (ARR=0.87; 95% CI, 0.79-0.97; p=0.01) and males (ARR=0.86; 95% CI, 0.80-0.94; p<.001).

In the same way, social ease reduced the risk of lifetime substance use by 12% among females (ARR=0.88; 95% CI, 0.81-0.95; p<.001) and 13% among males (ARR=0.87; 95% CI, 0.81-0.93; p<.001). Age per additional year was associated with an increased

risk of lifetime substance use by 12% (ARR=1.12; 95% CI, 1.02-1.23; p=0.01) among males but not females. Living in a private residence % (ARR=4.17; 95% CI, 1.70-10.25; p=0.01) and at home % (ARR=2.51; 95% CI, 1.02-6.20; p=0.05) increased the risk of current substance use among females. Among males, however, living at home was associated with an increased risk for current substance use % (ARR=1.85; 95% CI, 1.03-3.32; p=0.04). Similarly, compared to campus hostels, living in a private residence % (ARR=3.03; 95% CI, 1.38-6.68; p=0.01) and at home % (ARR=2.39; 95% CI, 1.19-4.82; p=0.01) increased the risk of lifetime substance use among females but not males.

1.4 DISCUSSION

This study examined sex differences in the association between self-esteem and attitudes toward alcohol, as well as current and lifetime alcohol and substance use among undergraduate students. Our findings showed that males had significantly higher rates of alcohol and substance use than females. In many African societies, alcohol and substance use among young men is socially acceptable (Fattore et al., 2020). This is particularly due to historical norms that have granted men greater social and economic power, making alcohol more accessible to them (Fonseca et al., 2021). Social acceptance and social pressures may further encourage substance use among males (Zapolski et al., 2019)which is concerning given associated negative consequences, including health and functional deficits. Family and peer factors are associated with a high risk of substance use among justice-involved youth. It is hypothesized that this risk process operates through pro-drug attitudes. However, limited research has been conducted on the mechanisms through which family and peer factors increase risk for substance use among juvenile justice involved youth. The current study examined both the direct and indirect effects of family and peer substance use on youth's substance use (alcohol and illicit drug use. Additionally, in many African cultures, alcohol is commonly consumed during major celebrations like weddings, childbirths, naming, and burial ceremonies (Kanu, 2019). These cultural norms shape young people's attitudes toward alcohol and substance use (Skylstad et al., 2022). Understanding these influences is essential for designing community-based interventions that challenge social norms and promote healthier behaviors.

Our findings revealed that social ease, one of the aspects of attitudes towards alcohol, was associated with a reduced risk of alcohol use for both females and males. While alcohol use is often linked to socialization, our findings suggest that university students did not use substances to build social relationships or fit into peer groups. This may be due to the participants being in their first year of university and not yet having formed strong social networks. In contrast, previous research indicates that alcohol helps young people overcome social barriers (Fuentes et al., 2020). In many African settings, alcohol

is widely accessible and viewed as a tool for socialization (Fonseca et al., 2021; Kanu, 2019; Skylstad et al., 2022). Consequently, youths are more likely to engage in alcohol and substance use due to peer influence and the need to fit in with their peers (Cheetham & Lubman, 2017; Delacruz, 2016; Leung et al., 2014)2016; Leung et al., 2014. Specifically, youths who believed their peers were involved in substance use spent time with peers who used alcohol, tobacco, and other drugs for coping and fun and were more likely to engage in alcohol and substance use (Brooks-Russell et al., 2014; Tyler et al., 2016)community, family, peers, individual. Therefore, understanding these social dynamics is crucial for identifying risk and protective factors that influence alcohol and substance use among youth.

We also found that living in private hostels increased the risk of alcohol and substance use among females, while living at home heightened the risk for males. This may be due to weak regulations on alcohol availability, as unregulated local alcoholic beverages such as “changaa,” “muratina,” and “busaa” are widely accessible in Kenya (Ferreira-Borges et al., 2015; Papas et al., 2010)Kenya, two types of brew are common: chang’aa, spirits, and busaa, maize beer. Local residents refer to the amount of brew consumed by the amount of money spent, suggesting a culturally relevant estimation method. The purposes of this study were to analyze ethanol content of chang’aa and busaa; and to compare two methods of alcohol estimation: use by cost, and use by volume, the latter the current international standard. Laboratory results showed mean ethanol content was 34% (SD = 14%. Additionally, students in private hostels often come from wealthier backgrounds and possess greater financial resources to purchase alcohol and other substances. The lack of parental supervision in these settings may further contribute to substance use. In contrast, university hostels often enforce strict rules that discourage alcohol and substance use. Attending university often represents the student’s first experience of independence, which may increase their likelihood of engaging in substance use (Fromme et al., 2008). Consistent with previous research, parental supervision and open discussions about substance use can help mitigate these risks (Muchiri & dos Santos, 2018; Yap et al., 2017)we conducted a systematic review and meta-analyses of longitudinal studies examining the range of modifiable parenting factors that are associated with adolescent alcohol initiation and levels of later use/misuse. Methods: A systematic literature search was conducted in PubMed, PsycINFO and Embase. Studies were included if they (i. Future research should explore whether female students use alcohol and substances to cope with stress and separation anxiety in their new environment.

While self-esteem has been established as a protective factor against many risky behaviors, we found no significant association between self-esteem and alcohol and substance use for either

males or females. This may be explained by differences in gender socialization in Kenya. Women may internalize their emotions, leading to anxiety or depression, while men may externalize their emotions through risk-taking behaviors such as substance use (Kapungu & Petroni, 2017; Polak et al., 2023). These patterns suggest that prevention and treatment interventions should consider gender-specific approaches to address alcohol and substance use.

The findings of this study should be interpreted in light of several limitations. First, the cross-sectional nature of our study limits our ability to draw conclusions about the association between self-esteem and attitudes toward alcohol and substance use among undergraduate students. Without temporal ordering of variables, the relationships observed may be bidirectional or influenced by other factors. Second, the study was conducted at a single public university, which limits generalizability to other institutions, particularly private universities that may have different social and economic dynamics. Lastly, self-reported data may be subject to recall bias or social desirability bias, whereby students underreport or overreport their alcohol and substance use.

We used pictorial charts of standard alcoholic beverages to help participants estimate their consumption more accurately and reduce recall bias. Additionally, we assured participants of confidentiality to encourage honest responses. Despite these limitations, our findings emphasize the significant influence of attitudes toward alcohol and substance use on the behavior of university students.

This study contributes to the limited research on how norms and attitudes influence young adults' perspectives on alcohol and substance use. Research suggests that social acceptability and peer influence are key drivers of substance use among young men (Fattore et al., 2020; Cheetham & Lubman, 2017; Delacruz, 2016; Leung et al., 2014)2016; Leung et al., 2014. These findings emphasize the need for behavioral interventions that target community norms and social influences on alcohol and substance use.

The findings underscore the significance of considering sex differences when examining attitudes towards alcohol and substance use (ASU). Future research should further explore these differences to develop targeted interventions that address the unique needs of males and females. Universities should prioritize prevention programs that shape students' attitudes towards ASU.

1.4.1 CONCLUSION

Overall, this study highlights the vital role of social and environmental influences on alcohol and substance use to inform targeted prevention interventions. Future research and programs should build on these findings to develop effective preventive measures and policies that promote healthier behaviors and reduce the risks associated with alcohol and

substance use among university students.

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