



Gender Differences in Alcohol Use: a Nationwide Study in a Multiethnic Population

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Abstract

The increase in alcohol consumption, and the greater consequences of chronic alcohol use among females, as well as the convergence of the gender gap warrants investigation. This paper aims to uncover gender differences in individuals with alcohol use disorder (AUD) in Singapore. The SMHS 2016 was a population-based, cross-sectional, epidemiological study. Recruitment spanned from August 2016 to March 2018, where 6126 respondents were recruited. Similarly to global estimates, lifetime prevalence and 12-month prevalence for AUD were higher in males than females. However, females had a higher prevalence of obsessive–compulsive disorder (OCD) co-morbidity than males. Women also had an earlier onset and age of recovery of AUD than men. Alarming, male (94.14%) and female (100%) respondents reported low help-seeking for their AUD. Gender differences in individuals with AUD were identified in Singapore population. Future research should direct its effort to identify barriers to help-seeking for individuals with alcohol use disorder.

Keywords Gender differences · Alcohol use disorder · Singapore · Multiethnic · Comorbidity · Help-seeking

Excessive and frequent alcohol use can often lead to alcohol use disorder (AUD), and research has predominantly and disproportionately focused on men (Agabio et al., 2017; Holzhauser et al., 2020; Maxwell et al., 2022; Verplaetse et al., 2021; White, 2020). However, Mazure and Jones (2015) highlighted the importance of considering gender, and identifying critical gender differences in alcohol use and AUD between males and females in healthcare research. Although males have higher prevalence rates of AUD and maladaptive drinking patterns, the prevalence rates for AUD and unhealthy alcohol consumption behaviors among females are rising—with studies

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reporting a gender convergence over the past decade (Agabio et al., 2017; Grant et al., 2017; Grucza et al., 2018; Kang et al., 2020; Kim & Kim, 2021; Slade et al., 2016; White, 2020). Grant et al. (2017) reported an 84% increase in prevalence rates for AUD in females, relative to males, which only saw a 35% increase in the USA over a 12-month period (2012–2013). In the same study, they also observed an increase in alcohol use (16% vs. 7%) and high-risk drinking (58% vs. 16%) among females when compared to males, respectively (Grant et al., 2017). An analysis based on data from 2000 to 2016, from six different nationwide surveys in the USA, indicated an increase of 6% of female alcohol consumers each year, as well as a 14% increase in binge drinking, whereas only a 0.2% decrease in the number of drinkers, and an increase by only 0.5% in binge drinking was observed in males (Grucza et al., 2018). In South Korea, females were observed exhibiting more maladaptive drinking patterns but a decrease was observed among males suggesting a gender convergence in alcohol consumption (Kang et al., 2020). Kim and Kim (2021) examined the trends of alcohol consumption from 1998 to 2018 among South Korean adults, and found that females had more than doubled their daily alcohol intake. Both findings by Kang et al. (2020) and Grucza et al. (2018) substantiate the systematic review of 68 studies by Slade et al. (2016), where they reported a global narrowing of the gender gap in alcohol use. The increase in alcohol consumption and AUD prevalence among females is a critical issue that warrants study. Hence, there is growing research interest for the exploration of gender differences in various aspects of alcohol consumption and AUD and its associated risk factors and clinical outcomes (Nolen-Hoeksema, 2004; Nolen-Hoeksema & Hilt, 2006; White, 2020).

There are gender differences in the development, perpetuation, service utilization, and treatment of AUD and maladaptive drinking patterns (Agabio et al., 2017; Castillo-Carniglia et al., 2019; Gilbert et al., 2019; Greaves et al., 2022; Maxwell et al., 2022; Uy et al., 2014; White, 2020). Firstly, men and women are ascribed to different societal standards and norms. Sociocultural perspective, traditional masculine norms specifically, can play a role and is strongly associated with alcohol use among men and have been attributed to excessive consumption of alcohol, which then predicted alcohol-related issues (Maxwell et al., 2022; Nolen-Hoeksema, 2004; Nolen-Hoeksema & Hilt, 2006; Wilsnack et al., 2005; Uy et al., 2014). The development of AUD also features differences between the genders. For instance, the interval between the onset of first alcoholic drink to seeking treatment was shorter in females than in males, suggesting a faster progression of AUD in females (Greaves et al., 2022; Johnson et al., 2005). Additionally, women were more likely to experience a relapse than men following a stressful event or drug-related cue (Maxwell et al., 2022). White (2020) highlighted a risk-severity paradox indicating that although females do not consume as much alcohol as males, they suffer greater alcohol-related harms than men at lower levels. Moreover, females are at higher risk of medical consequences due to alcohol than males for liver disease, cardiomyopathy, and breast cancer (Agabio et al., 2017). Individuals with AUD would often have underlying comorbid psychiatric disorders (Castillo-Carniglia et al., 2019). For instance, they reported that across countries, the estimated presence of AUD among individuals with anxiety disorder ranged from 20 to 40%, noting it to be a common dual diagnosis (Castillo-Carniglia et al., 2019). In the case of obsessive-compulsive disorder (OCD) and AUD comorbidity, Gentil et al. (2009) found that the presence of both conditions in males could lead to a more severe course of illness for their OCD. According to Agabio et al. (2017), the evidence is mixed on whether there are any gender differences

with comorbid disorders but found that among women, only mood disorders were more prevalent than in men after controlling for sociodemographic characteristics and additional psychiatric conditions. A study by Gilbert et al. (2019) reported gender differences in service utilization among US adult population with diagnoses of alcohol abuse and/or alcohol dependence. They found that women were less likely to utilize alcohol services, specialty services, and the 12-step group than men (Gilbert et al., 2019). In view of the gender differences and the severe impact of AUD, particularly on women, it would be important to explore gender differences in Singapore to understand whether any local gender differences exist.

In Singapore, the national population health survey in 2020 revealed that males regularly consumed more alcohol than females (3.4% vs. 1.0%, respectively), between the ages of 18 to 74 years (Soh et al., 2020). The nationwide survey Singapore Mental Health Study (SMHS) 2016 also reported an increase in lifetime prevalence of AUD among the local male population when compared to SMHS 2010 (4.6% vs. 3.6%, respectively) (Subramaniam et al., 2012, 2020a). They also highlighted that females had lower odds of alcohol abuse than males. Although it was noted that when compared to global estimates, Singapore's lifetime prevalence of AUD in 2010 was comparable to China (4.7%) but considerably lower than Australia (22.1%) (Subramaniam et al., 2012). Lim et al. (2007) conducted a study in Singapore in 1992, 1998, and 2004, covering a cohort between 1923 and 1986, reported a gender convergence driven by an increase in alcohol use among females in Singapore. Furthermore, the association with a variety of co-morbid mental health conditions and a stark decline in quality of life urges careful consideration and study (Lee et al., 2020; World Health Organization, 2019). This sets a greater precedence for this paper, where it aims to expand the literature by investigating the gender differences in AUD, as well as establishing their prevalence and associated risk factors in Singapore.

Methods

Sampling and Procedures

This study used data from the Singapore Mental Health Study (SMHS) 2016, which was a nationwide, cross-sectional study conducted between August 2016 and March 2018. Details of the methodology of the SMHS 2016 can be found in an earlier article (Subramaniam et al., 2020a). Briefly, participants (Singapore Citizens and Permanent Residents) who were aged 18 and above, living in Singapore, were randomly selected based on a national population registry. The study recruited a total of 6126 respondents (overall response rate: 69.5%) using disproportionate stratified sampling (by age and ethnicity); the prominent ethnic groups in Singapore were sampled in proportion: Chinese (30%), Malay (30%), Indian (30%), and Others (10%). Those excluded from the study were due to (1) severe physical/mental conditions that rendered them incapable of participating, (2) language barriers, (3) living overseas, (4) were institutionalized/hospitalized at the time of the study, and (5) were not contactable due to incomplete or incorrect address. Respondents were sent an invitation letter followed by a home visit by a trained interviewer. Informed consent was obtained from all respondents prior to the commencement of the survey interviews, and/or from their

parents/guardians for respondents who were below 21 years of age (age of majority in Singapore). The surveys were interviewer-led and conducted in a single visit in the respondents' preferred language (i.e., English, Chinese, or Malay) and venue by a trained interviewer. This study received ethical approval by the National Healthcare Group Domain Specific Review Board (DSRB Ref. No: 2015/01035).

Measures

All instruments and measures in this study were available in English, Chinese, and Malay. Respondents were given the option to choose the language they were most comfortable with before initiating the data collection.

Sociodemographic Information and Other Assessments

A standardized questionnaire was used to collect respondents' age, sex, ethnicity, marital and employment status, highest achieved educational level, monthly income, and whether they had children. In addition, the study also collected co-morbid physical conditions ascertained using a checklist that covered 18 selected chronic conditions (refer to Supplementary Materials A for breakdown of the chronic conditions). To measure drinking frequencies of any kind of beverage containing alcohol, in the last 12 months, respondents were instructed to indicate the following: [1] every day, [2] 5–6 times a week, [3] 3–4 times a week, [4] twice a week, [5] once a week, [6] 2–3 times a month, [7] once a month, [8] 3–11 times in the past year, [9] 1 or 2 times in the past year, [10] I did not drink any alcohol in the past year, but I did drink in the past, or [11] I never drank any alcohol in my life. Respondents were provided with a reference booklet that described the type of beverage and the equivalent amount that constitutes to a “drink” (refer to Supplementary Material B for reference booklet). For instance, 1 glass of wine is considered 1 drink, whereas a bottle is equivalent to 6 drinks.

Composite International Diagnostic Interview (CIDI) 3.0

The WHO-CIDI version 3.0 assesses the lifetime and 12-month prevalence of mental disorders defined by the *Diagnostic and Statistical Manual of Mental Disorders*, 4th Edition (DSM-IV) (Kessler & Üstün, 2004) and the International Classification of Disease, 10th Revision (ICD-10) Classification of Mental and Behavioral Disorders (World Health Organization, 1992). The psychiatric conditions included in the survey were classified into 4 categories: (1) affective disorders, major depressive disorder (MDD) and bipolar disorder; (2) anxiety disorders, generalized anxiety disorder (GAD) and obsessive–compulsive disorder (OCD); (3) alcohol use disorder (AUD), alcohol abuse and alcohol dependence; and (4) non-affective psychosis. Diagnostic modules for 12 months and lifetime prevalence were considered for the selected conditions. Age of onset and first help-seeking were collected as respondents' age when they first realized they had similar problems indicated by the diagnostic criteria of alcohol use disorder (onset), and when they first “talked to a professional about your use of alcohol” (first help-seeking). Treatment delay (in years) for AUD was calculated by subtracting age of onset from their age of first seeking help. Treatment gap for AUD was determined by respondents indicating whether they ever sought professional help (yes or no). The question “Starting from the time you first began having (this/any of these) problem(s), about how many different times did you ever make a serious attempt to quit drinking?” was used to collect the respondents'

number of quit attempts. The study determined age of recovery with “How old were you the last time you had any of these problems?” The number of drinks per day on average, and largest number of drinks in one day for the past year was also measured. The same reference booklet was used to aid respondents with the study’s definition of a “drink” (refer to Supplementary Material B for reference booklet). The Sheehan Disability Scale was used to measure impact of AUD on home management, ability to work, forming and maintaining close relationships, and social life. Responses included 0 for no interference, 1–3 for mild, 4–6 for moderate, 7–9 for severe, and 10 for very severe interference. The WHO-CIDI was administered by the interviewers, using the computer assisted personal interviewing (CAPI), to the respondents.

Statistical Analysis

To account for the disproportionate stratified sampling design of the survey, all estimates were weighted and adjusted for oversampling, non-responses, and post-stratification for age and ethnicity distribution to ensure the findings were representative of the Singapore adult population. Weighted mean and standard deviation were calculated for continuous variables, whereas weighted frequency and percentage were calculated for categorical variables. This analysis was performed separately for male and female and tested for significant differences using Chi-square tests for categorical variables and simple linear regression for continuous variables. Subsequently, multiple logistic regression analysis for binary outcome variable, multinomial logistic regression analysis for categorical outcome variable, and multiple linear regression analysis for continuous outcome variable were conducted to adjust for potential confounding factors. To investigate prevalence, the adverse impact on health (chronic physical and mental comorbidities), social and family life, alcohol abuse, and alcohol dependence were combined and analyzed as “alcohol use disorder” because of a small sample of for alcohol dependence. The combined “alcohol use disorder” proxy was applied for the statistical analysis. All statistical analyses were carried out using STATA version 13.

Results

Sociodemographic Information

A total of 6126 respondents were recruited which included 3068 males (50.08%) and 3058 (49.92%) females. The gender differences in sociodemographic information of the participants are listed in Table 1. Significant gender differences were noted for educational status, employment, marital status, and number of children. A higher proportion of females were divorced or widowed and unemployed (or economically inactive) compared to males ($p < 0.001$). Around 62.35% of females reported having at least one child compared to 57.62% males ($p = 0.01$). After adjusting for covariates in multiple logistic regression, female respondents had higher odds of being younger (vs 65 and above), of Chinese ethnicity (vs Indian), had a university education (vs vocational education), to be divorced/separated or widowed (vs married), and economically inactive (vs employed) than male respondents (please refer to Table 2 for STATA output).

Table 1 Sociodemographic by sex

	Male		Female	
	<i>n</i>	%	<i>n</i>	%
Age groups (years)				
18–34	881	31.85	826	29.06
35–49	729	27.81	767	31.39
50–64	810	27.70	816	26.05
65 + *	648	12.64	649	13.51
Ethnicity				
Chinese	879	75.36	903	76.08
Malay	982	12.59	1008	12.32
Indian**	940	9.02	904	8.39
Others	267	3.03	243	3.22
Education				
Primary and below	497	14.69	690	17.81
Secondary	790	22.20	858	23.85
Pre-U/Junior college	141	5.75	163	6.33
Vocational certificate*	367	9.19	141	3.39
Diploma	543	18.54	481	19.41
University	730	29.63	725	29.21
Marital status				
Never married	838	32.72	706	29.31
Married	2040	61.80	1803	57.75
Divorced*	118	4.01	225	6.35
Widowed*	72	1.48	324	6.58
Employment				
Employed	2322	79.27	1733	64.84
Economically inactive*	557	15.09	1159	30.27
Unemployed	188	5.64	166	4.89
Monthly household income (SGD \$)				
< 2000	557	15.75	590	17.22
2000 to 3999	656	19.16	675	20.86
4000 to 5999	571	21.10	542	21.64
6000 to 9999	516	22.39	487	21.22
10,000 and above	468	21.61	393	19.07
Children				
Yes	1984	57.62	2129	62.35
No	1084	42.38	929	37.65

* $p < .001$; ** $p < .05$

Gender Differences in Alcohol Use Disorder

Prevalence of Alcohol Use Disorder

Overall, the prevalence of alcohol use disorder (AUD) was higher in males (Table 3). The lifetime prevalence of AUD was 7.49% and 1.87% for males and females,

Table 2 Multiple logistic regression of sociodemographic covariates by sex

Variables	Category	β	95% CI	<i>p</i>
Age group (years)	18–34	Ref	-	-
	35–49	1.25	0.97–1.61	0.09
	50–64	0.81	0.61–1.08	0.16
	65+	0.39	0.27–0.57	<0.001
Ethnicity	Chinese	Ref	-	-
	Malay	1.02	0.87–1.21	0.78
	Indian	0.83	0.72–0.97	<0.05
	Others	0.93	0.72–1.18	0.54
Education	University	Ref	-	-
	Primary and below	0.88	0.63–1.22	0.43
	Secondary	0.89	0.69–1.17	0.40
	Pre-U/Junior college	0.90	0.60–1.34	0.60
	Vocational certificate	0.31	0.21–0.44	<0.001
	Diploma	0.97	0.76–1.25	0.82
Marital status	Married	Ref	-	-
	Never married	1.02	0.74–1.41	0.89
	Divorced/Separated	1.89	1.30–2.76	0.001
	Widowed*	7.00	3.98–12.29	<0.001
Employment status	Employed	Ref	-	-
	Economically inactive	3.12	2.49–3.91	<0.001
	Unemployed	0.96	0.66–1.40	0.85
Monthly income (SGD \$)	<2000	Ref	-	-
	2000 to 3999	1.09	0.83–1.44	0.53
	4000 to 5999	1.05	0.79–1.40	0.74
	6000 to 9999	0.90	0.67–1.23	0.52
	10,000 and above	0.82	0.59–1.14	0.24
Children	Yes	Ref	-	-
	No	0.84	0.63–1.13	0.25

¹Female was employed as reference

respectively. The 12 months' prevalence for AUD was 1.29% and 0.29% for males and females, respectively. Gender difference in lifetime and 12-month prevalence for AUD were statistically significant ($p < 0.001$; $p < 0.05$, respectively).

Alcohol Use Patterns

Females had an earlier onset of AUD than males ($p < 0.001$). Additionally, females showed significantly lower drinking frequency in the past 12 months than males ($p < 0.001$). Females were also consuming less alcoholic beverages per day than males (mean: 3.45 ± 4.22 vs 2.33 ± 2.29 , $p < 0.001$). Females consumed less than males on days they reported drinking the most in one sitting (7.15 ± 9.70 vs 4.57 ± 4.41 , $p < 0.001$).

Table 3 Gender differences in alcohol abuse patterns

	Male		Female	
	<i>n</i>	%	<i>n</i>	%
Alcohol use disorder				
<i>Prevalence</i>				
Lifetime*	235	7.49	54	1.87
12 months**	41	1.29	10	0.29
	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>
Age of onset of alcohol use disorder (years)*	26.1	8.28	20.78	4.44
Drinking frequencies in the past 12 months				
Average number of drinks per day*	3.45	4.22	2.33	2.29
Average largest number of drinks in a single day*	7.15	9.70	4.57	4.41

* $p < .001$; ** $p < .05$; *** $p = .002$

Note: Significant p values were obtained from multiple logistic regression and multiple linear regression analyses after adjusting for significant covariates including age group, ethnicity, marital status, education, and employment status

Adverse Impact of Alcohol Use Disorder

Impact on Health

The prevalence of psychiatric comorbidities and chronic physical conditions are listed in Table 4. Females had a higher prevalence of comorbid obsessive–compulsive disorder (OCD) than males ($p = 0.001$). There were no significant gender differences in the prevalence of chronic physical conditions.

Table 4 Lifetime prevalence of physical and psychiatric comorbidities

	Male		Female	
	<i>n</i>	%	<i>n</i>	%
Major depressive disorder	33	18.5	14	23.4
Generalized anxiety disorder	12	4.09	4	2.13
Obsessive compulsive disorder*	17	5.12	11	24.56
Bipolar	20	6.59	8	9.14
Non-affective psychosis	7	2.54	5	8.50
<i>Prevalence of chronic physical conditions</i>				
None	106	44.82	30	58.11
1	61	30.67	14	27.97
2 and above	68	24.50	10	14.92

* $p = .001$

Note: Significant p values were obtained from multiple logistic and multinomial logistic regression analyses after adjusting for significant covariates including age group, ethnicity, marital status, education, and employment status

Impact on Functioning

There were no significant differences in home management, employment, and social relationships between the two groups.

Recovery from Alcohol Use Disorder

Females have significantly lower number of attempts to stop alcohol drinking (mean: 0.76 ± 2.31 vs 0.34 ± 0.93 , $p < 0.003$, Table 5). All female respondents with AUD did not seek help ($n = 54$, 100%), whereas 94.14% of males did not seek help. Among the remaining male respondents who sought help, there was an average treatment delay of 7.37 ± 11.28 years. Females had an earlier age of recovery than males for alcohol use disorder (28.06 ± 8.73 vs 23.66 ± 5.70 , $p < 0.001$). In males, the age of first help-seeking for alcohol use disorder was 37.29 ± 17.19 years.

Discussion

The lifetime and 12-month prevalence of alcohol use disorder (AUD), as well as higher consumption of alcohol, remained significantly higher in males than in females in Singapore, which reflects similar estimates reported in the literature (Agabio et al., 2017; Alvanzo et al., 2011; Erol & Karpyak, 2015; White, 2020). Societies have employed the use of alcohol as a medium to symbolize and regulate gender roles (Nolen-Hoeksema, 2004; Nolen-Hoeksema & Hilt, 2006; Wilsnack et al., 2005; Uy et al., 2014). Power, sexual relationships, risky behaviors, and social responsibilities were identified as sociocultural theoretical reasons for differences in alcohol consumption between genders. For instance, on the one hand, males were more likely to engage in heavy alcohol consumption to ignore their responsibilities or vaunt their exemption to those obligations to his peers (Wilsnack et al., 2005; Uy et al., 2014). Alternatively, problematic alcohol use could also lead towards this dereliction of responsibilities and obligations in males. On the other hand, females endorsing more traditional feminine traits do not engage in alcohol consumption

Table 5 Recovery from alcohol abuse and dependence

	Male		Female		
	Mean	SD	Mean	SD	
Number of quit attempts**	0.76	2.31	0.34	0.93	
Treatment delay (years) [#]	7.37	11.28	-	-	
Treatment gap [#]	n	%	n	%	
	219	94.14	54	100	
Alcohol use disorder	Mean	SD	Mean	SD	
	Age of first help-seeking [#]	37.29	17.19	-	-
	Age of recovery**	28.06	8.73	23.66	5.70

* $p < .001$; ** $p < .05$, #test for significant differences was not conducted due to zero cell in female sample

Note: Due to small sample size ($n = 121$), multiple linear regression analysis with covariate adjustment was not conducted

as frequently as males (Nolen-Hoeksema, 2004; Nolen-Hoeksema & Hilt, 2006). Singapore promotes conservative values with an emphasis on the confluence of both Eastern and Western masculinities (Wong et al., 2016). Perhaps the values placed on gender roles in Singapore place less social sanctions on males to participate in high-risk drinking sessions, which could explain the higher rates of AUD and maladaptive drinking patterns in men. As previously mentioned, the prevalence rates of AUD in Singapore were considered low in relation to global estimates, which could be partially attributed to the underrepresentation of those of Malay ethnicity in the AUD group (Subramaniam et al., 2012). In Singapore, a census of population 2020 reported that 15% of citizens were Malay and 98.8% identified as Muslim (Department of Statistic Singapore, 2021). As their faith prohibits the consumption of alcohol, it is possible that the study did not capture their responses in respect of their beliefs, or Muslim respondents might not have been comfortable disclosing or may have abstained from drinking and hence were underrepresented in the AUD group. Nevertheless, the 2020 National Population Health Survey in Singapore reported an increase in crude prevalence of regular alcohol consumption and binge drinking among females (Soh et al., 2020), and observed the highest proportion of binge drinking among females in the younger age group (18–29 years) as compared to males (30–39 years). A cross-sectional study among students in Italy reported a higher prevalence of AUD in adolescents who engaged in binge drinking behaviors than those who did not (Addolorato et al., 2018). In view of this, healthcare services and future research studies in Singapore should carefully monitor maladaptive drinking patterns such as binge drinking in females. The earlier onset of AUD alludes to a possible telescoping effect, a phenomenon where alcohol-related consequences develop at an accelerated rate and at lower levels of alcohol use in women than in men (Greaves et al., 2022; Johnson et al., 2005). Further inquiry to support the preliminary presence of a telescoping effect among the female population in Singapore is needed.

The study also revealed significant gender differences in the prevalence of obsessive-compulsive disorder (OCD) among those with AUD, with females having a higher prevalence of OCD than males. As reported by Subramaniam et al. (2020a), there is a strong comorbidity between OCD and AUD in Singapore. In addition, Lee et al. (2020) also found that although binge drinking rates were low and were infrequent in Singapore, there was an exclusive association with anxiety disorders in females, and a stronger association between AUD and anxiety disorder in female binge drinkers. A recent meta-analysis found decreased grey matter in the anterior cingulate cortex (ACC) and insula brain regions in both OCD and AUD (Stevens et al., 2021). The alterations in the insula could lead to enhanced cravings for alcohol, and with reduced grey matter in the ACC, there would be less control over regulating the cravings, when faced with the decision to drink (Stevens et al., 2021). However, Stevens et al. (2021) did not examine potential sex or gender differences in their meta-analysis; hence, we are unable to explain the higher prevalence of AUD and OCD comorbidity in females in this study. A recent meta-analysis found that women were 1.6 times more at risk experiencing OCD than men (Fawcett et al., 2020). In addition, Pasche (2012) found that majority of individuals with OCD indicated that their symptoms first manifested during childhood, and preceded the onset of their maladaptive alcohol use, which would typically appear during early adulthood. There is a possibility that women with OCD in Singapore tend to use maladaptive drinking patterns as their coping mechanism. In view of Stevens et al. (2021) study, it is plausible that they also lack the self-regulation to buffer their cravings for alcohol. However, a previous study by Gentil et al. (2009) reported that males were more likely to have an AUD or substance use disorder and comorbid OCD than females. The comorbidity between OCD and AUD warrants investigation of common pathological mechanisms and modalities with a greater focus

on gender differences. Thus, individuals in Singapore seeking treatment for their OCD or alcohol-related issues, particularly females, must be screened regularly for early detection to reduce the burden of co-morbidities and improve the quality of care.

The current literature seems mixed regarding the recovery patterns for alcohol use disorder, and suggests no major gender differences in recovery outcomes (Holzhauer et al., 2020; Tucker et al., 2020). A plausible biological reason for the diverse findings could be that females who are pregnant or planning to get pregnant may abstain from drinking (White, 2020). From a sociological perspective, females often adopt the role of caregiver which would make them less inclined and have less opportunities to consume alcohol (Nolen-Hoeksema, 2004; Nolen-Hoeksema & Hilt, 2006; Wilsnack et al., 2005). In this study, recovery was a subjective report indicating the age they last experienced AUD-related symptoms. As females did not seek help for their AUD, formal treatments such as pharmacotherapy and psychotherapy were not reasons for their symptom alleviation and recovery (Holzhauer et al., 2020; Maxwell et al., 2022; Tucker et al., 2020). Pregnancy and motherhood and the responsibilities associated with it could explain the earlier age of recovery in females in this study, but not completely (Nolen-Hoeksema, 2004; Nolen-Hoeksema & Hilt, 2006). Tucker et al. (2020) reported that approximately 70% of individuals with AUD and maladaptive drinking patterns experience natural recovery, where they see an improvement without formal interventions. In another study, Maxwell et al. (2022) reported that social support for women, but not in men, plays a greater role in regulating alcohol use. They found that increased social support helped build a barrier against negative affect, mental health symptoms, and poor self-regulation which alleviates AUD severity (Maxwell et al., 2022). A strong family unit and collectivist culture could be a possible explanation for an earlier age of recovery for females in Singapore. However, shame and stigma are also associated and deeply rooted in Singapore culture, especially when it comes to help-seeking, which should not be overshadowed by females earlier age of recovery (Samari et al., 2022). Further study to examine the underlying motivations to achieve earlier recovery among females in Singapore could help inform future interventions.

There is a wide treatment gap for both genders, but particularly in females. Tucker et al. (2020) corroborates this finding, indicating that both males and females have a low perceived need for help for alcohol-related problems. They also highlighted that women had a lower rate of help-seeking than men in their study. Tucker et al. (2020) postulated that females were more likely to believe that their problems would improve over time and without the need of formal intervention. Curiously, none of the females with AUD sought professional help in this study. The National Addictions Management Service (NAMS) in Singapore that provides services to people with substance and behavioral addictions had identified a similar concern in their clinical services. Surveying 704 AUD patients, only 10.94% ($n=77$) were females opposed to the 89.06% ($n=627$) males (Yong et al., 2017). Considering the earlier age of recovery and borderline statistical significance of fewer quit attempts, this could be indicative of the lack of seeking treatment among females. Females were also found to be less likely to seek help at clinics that specialized in substance use treatment because of shame, guilt, and fears of being stigmatized (Gilbert et al., 2019; Kilian et al., 2021; McCrady et al., 2020) which could account for the total lack of help-seeking in the female population of this study. As previously stated, perhaps the consequences of the rapid progression of alcohol-related issues prompted early identification and recognition in females (Foster et al., 2014; Nolen-Hoeksema, 2004; Nolen-Hoeksema & Hilt, 2006; Sugarman et al., 2009), which could lend itself to self-motivated modifications in alcohol consumption behaviors (Grosso et al., 2013). Moreover, research has suggested that males

and females possess different internal motivators to seek help (Grosso et al., 2013). For instance, a common reason for males to seek help is due to the impact of their drinking on the spouse/family, suggesting the significant involvement of an external party to motivate males to seek help. On the other hand, females typically reported concerns over the progression of AUD and its impact on both their physical and mental health. The impact on interpersonal relationships within the family, in contrast to males, was the least endorsed motivator for help-seeking in females (Grosso et al., 2013). Hence, pairing their self-motivations and early detection of their alcohol-related issues, perhaps females may quit drinking or decrease the amount and/or frequency of alcohol consumption on their own which leads to the low perceived need to seek help.

There was a treatment delay of approximately 7 years among male respondents. Similar to our findings, Sanvisens et al. study (Sanvisens et al., 2020) found that male respondents first sought help for their AUD issues late in life. Public education to destigmatize and promote help-seeking behaviors should be strategically designed. Locating substance use specialists at the primary care level (i.e., polyclinics) could improve early detection and encourage help-seeking in males and females with alcohol use and dependence issues. Alternatively, providing CME/training on managing unhealthy alcohol use to GPs in the primary care setting could be beneficial for both male and female service users with alcohol-related issues (Lau et al., 2021). A possible reason for low help-seeking among both genders could be the lack of specialized services and access to or knowledge and awareness about them in Singapore, as well as the high levels of stigma associated with AUD and treatment seeking (Kilian et al., 2021; McCrady et al., 2020; Subramaniam et al., 2017). More research could be done to better understand the circumstances resulting in AUD, particularly among females, and to support them in seeking treatment and recovery.

As with all studies, there are limitations to our study. A notable limitation was the cross-sectional design, and hence, causality of the findings could not be determined. As mentioned previously, the study attempted to mitigate this limitation by analyzing the sample as AUD; however, the sample pool for AUD was still small. Hence, the small number of cases (e.g., AUD, comorbidity with OCD) in this study makes the findings challenging to be generalized. Furthermore, gender identity was not collected in this study; thus, the scope of gender differences is limited to male and female. Another limitation are respondents who had been excluded or refused to participate in the study, especially those in prison who could have a higher rate or lifetime alcohol problems.

In summary, similar to global estimates, males in Singapore had a higher prevalence of AUD than females. Although unlike Lim et al. and other studies conducted in different populations, this study did not uncover any gender convergence for AUD (Gruca et al., 2018; Kang et al., 2020; Lim et al., 2007; Slade et al., 2016). However, the exacerbation of OCD symptoms among females with AUD and OCD comorbidity warrants careful monitoring in Singapore. Moreover, although international findings had reported mixed evidence on gender differences in relation to recovery, the study unveiled an earlier age of recovery for females with AUD. In addition, both males and females showed remarkably low help-seeking for their AUD. Future research should consider a 2-phase investigation—firstly, an explorative study with individuals with AUD to understand the barriers to help-seeking with careful consideration for gender sensitive reasons to better facilitate targeted help-seeking behaviors. This could inform policymakers and relevant stakeholders to strategize campaigns to educate the public and destigmatize help-seeking. The second phase would be an implementation research evaluation of AUD services in Singapore to uncover barriers and adopt evidence-based improvements.

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Author Contribution CMJG and PVA are co-first authors. EA provided the analysis and interpretation of the data. JV, MS, SM and CSA provided the concept and design of the study. SS, ZYJ, and SR were responsible for the study management and collection of data. All authors had intellectual input into the article, as well as read and approved the final manuscript.

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Declarations

Ethics Approval The study received ethical approval by the National Healthcare Group Domain Specific Review Board (DSRB Ref. No: DSRB/2015/01035).

Informed Consent Informed consent was obtained from all respondents prior to the commencement of the survey interviews, and/or from their parents/guardians for respondents who were below 21 years of age (age of majority in Singapore).

Conflict of Interest The authors declare no competing interests.

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