BMJ Mental Health

PSYCHOSOCIAL INTERVENTIONS

Relationship between self-stigma about alcohol dependence and severity of alcohol drinking and craving

Madeline E Crozier,[1] Mehdi Farokhnia ,[1,2] Susan Persky ,[3] Lorenzo Leggio ,[1,4,5,6] Brenda Curtis [1]

► Additional supplemental material is published online only. To view, please visit the journal online (http://dx.doi.org/10.1136/bmjment-2023-300852).

[1]Translational Addiction Medicine Branch, National Institute on Drug Abuse Intramural Research Program, National Institutes of Health, Baltimore, Maryland, USA
[2]Department of Mental Health, Johns Hopkins University, Baltimore, Maryland, USA
[3]Social and Behavioral Research Branch, National Human Genome Research Institute Division of Intramural Research, National Institutes of Health, Bethesda, Maryland, USA
[4]Division of Addiction Medicine, Department of Medicine, School of Medicine, Johns Hopkins University, Baltimore, Maryland, USA
[5]Center for Alcohol and Addiction Studies, Department of Behavioral and Social Sciences, School of Public Health, Brown University, Providence, New England, USA
[6]Department of Neuroscience, Georgetown University Medical Center, Washington, District of Columbia, USA

Correspondence to
Dr Brenda Curtis, National Institutes of Health, Bethesda, MD 20892, USA; brenda.curtis@nih.gov

Received 31 July 2023
Accepted 17 October 2023

To cite: Crozier ME, Farokhnia M, Persky S, *et al*. *BMJ Ment Health* 2023;**26**:1–6.

ABSTRACT

Background The correlates and consequences of stigma surrounding alcohol use are complex. Alcohol use disorder (AUD) is typically accompanied by self-stigma, due to numerous factors, such as shame, guilt and negative stereotypes. Few studies have empirically examined the possible association between self-stigma and alcohol-related outcomes.

Objective To investigate the relationship between self-stigma about alcohol dependence and the severity of alcohol consumption and craving.

Methods In a sample of 64 participants, the majority of whom had a diagnosis of AUD (51), bivariate correlations were first conducted between Self-Stigma and Alcohol Dependence Scale (SSAD-Apply subscale) scores and Alcohol Use Disorders Identification Test (AUDIT) scores, Alcohol Timeline Follow-Back, Obsessive-Compulsive Drinking Scale (OCDS) scores and Penn Alcohol Cravings Scale scores. Based on the results, regression analyses were conducted with SSAD scores as the predictor and AUDIT and OCDS scores as the outcomes.

Findings SSAD scores positively correlated with AUDIT scores, average drinks per drinking day, number of heavy drinking days and OCDS scores ($p<0.001$, $p=0.014$, $p=0.011$ and $p<0.001$, respectively). SSAD scores were also found to be a significant predictor of AUDIT and OCDS scores ($p<0.001$ and $p<0.001$, respectively), even after controlling for demographics.

Conclusions Higher levels of self-stigma were associated with more severe AUD, greater alcohol consumption, and more obsessive thoughts and compulsive behaviours related to alcohol.

Clinical implications Our results suggest that potential interventions to reduce self-stigma may lead to improved quality of life and treatment outcomes for individuals with AUD.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Self-stigma has a negative impact on the well-being of individuals with alcohol use disorder (AUD). Research has shown that self-stigma is associated with depression, anxiety, shame, low self-esteem, hopelessness, low social support, reduced help-seeking and low drinking refusal self-efficacy.

WHAT THIS STUDY ADDS

⇒ Without controlling for the aforementioned factors associated with well-being, this study explores the relationship between self-stigma and correlates of alcohol use. It demonstrates that higher levels of self-stigma are associated with more severe AUD and more obsessive thoughts and compulsive behaviours towards drinking.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ This study highlights the importance of integrating interventions that lower self-stigma in individuals with AUD. It also emphasises the importance of stigma reduction policies to help improve the well-being and treatment outcomes for individuals with AUD.

INTRODUCTION

Alcohol consumption and alcohol use disorder (AUD) impose enormous socioeconomic and health-related burdens in the USA and worldwide. There are many factors that influence the identification, treatment and recovery of AUD.[1–3] One increasingly relevant factor is stigma. Alcohol-related stigmatisation is a complex issue because in many societies, moderate alcohol consumption is widely accepted and at times encouraged. However, as individuals increase their alcohol intake and/or begin to develop AUD, this behaviour becomes more stigmatised. While alcohol use is generally glamorised or normalised in society, having an AUD is highly stigmatised.[4]

Stigma is a broad concept that encompasses negative views of a certain trait or topic. Stigma uses a label (eg, 'alcoholic' or 'addict') and an associated stereotype (eg, unworthy, unpredictable, out of control) to produce a negative response (eg, biased policies, discrimination, social rejection).[5] Stigma has a wide-ranging impact, and intersectionality can further compound its effect on different populations. Studies have found that stigma related to substance use can be impacted by age, education, gender, race and other comorbidities.[6 7] However, these results are mixed, and further research investigating the intersectionality of stigma should be conducted. Stigma is also a factor contributing to the low percentage of individuals who receive

treatment for mental health conditions, with stigma being linked to reduced help-seeking, especially among racial/ethnic minorities, young people, and those in military and health professions.[8] Stigmatising labels also influence medical care and healthcare professionals' perceptions of individuals with substance use disorders.[9] Individuals with AUD experience different types of stigma, including public, institutional and internalised (self) stigma.[10] Self-stigma, also known as internalised stigma, refers to the negative attitudes a person has towards themselves.[11] AUD is typically accompanied by self-stigmatisation, as negative societal attitudes and stereotypes towards unhealthy alcohol use become internalised and affect self-perception.[12]

Self-stigma is associated with negative alcohol-related outcomes, such as increased levels of alcohol use and harmful drinking patterns.[13] Although some findings have been mixed, stigma is also thought to be a barrier to seeking treatment among individuals with AUD given the possibility of being met with judgement, discrimination and more stigma.[14] Additionally, internalised stigma can encourage substance use to cope with low self-regard and social isolation, suggesting a potential reciprocal influence.[15]

The Self-Stigma and Alcohol Dependence Scale (SSAD) was developed to quantify and operationalise self-stigma in relation to alcohol use.[16] It consists of four steps of self-stigma (aware, agree, apply and harm). A cross-sectional study of patients hospitalised for alcohol misuse treatment demonstrated the validity and reliability of the SSAD and found that higher self-stigma was associated with lower drinking refusal self-efficacy.[16] While this study and others suggest a link between self-stigma and substance misuse,[12 17] few studies have empirically examined the possible association between self-stigma and the severity of AUD, alcohol craving and drinking. To our knowledge, our study is the first to examine these potential associations. To help address the gap in the literature regarding the relationship between self-stigma and alcohol-related outcomes, we hypothesised that higher self-stigma would be associated with higher severity of alcohol use and other alcohol-related outcomes. Our primary aim was to investigate the association between alcohol-related self-stigma, quantified by the SSAD, and the severity of alcohol use, measured via the Alcohol Use Disorders Identification Test (AUDIT). As a secondary aim, we also investigated whether alcohol-related self-stigma scores would be associated with levels of alcohol consumption, alcohol obsession and compulsion, and alcohol craving.

METHODS

Setting and participants

Data used for this study were collected from two alcohol-related human laboratory studies conducted at the National Institutes of Health Clinical Center, Bethesda, Maryland, USA (ClinicalTrials.gov NCT03152760 and NCT02707055). The inclusion/exclusion criteria of the two parent studies are presented in the online supplemental appendices 1 and 2. Most participants had a current diagnosis of AUD according to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition. All participants had a negative urine drug test for illegal drugs, a body mass index $\geq 18.5\,kg/m^2$ and $<40\,kg/m^2$, and no significant medical or psychiatric comorbidities. Other eligibility criteria were geared toward the specifics of each parent study. Assessments used for the present study were all administered at baseline (before any intervention or experimental procedure was conducted).

Assessments

Self-Stigma and Alcohol Dependence Scale

The SSAD measures the four steps of self-stigma (aware, agree, apply and harm). For this analysis, we used the 'Apply' subscale. The SSAD-Apply subscale is a 16-question scale on statements one applies stereotypes to oneself.[16] Each question is ranked on a scale from 1 ('strongly disagree') to 7 ('strongly agree'). For example, sample items include: 'Because I have alcohol problems, I am unreliable'; 'Because I have alcohol problems, I am below average intelligence'; and 'Because I have alcohol problems, I am disgusting'. Responses are then totalled to provide an overall score, with higher scores signifying higher levels of self-stigma. Total scores range from 16 to 112.

Alcohol Use Disorders Identification Test

The AUDIT is used to measure the severity of alcohol use over the course of the past year.[18] This assessment is a 10-item multiple choice questionnaire asking about the quantity and frequency of alcohol consumption, drinking behaviour, and alcohol-related problems or reactions. A total AUDIT score between 1 and 7 denotes low-risk alcohol consumption, 8–14 hazardous or harmful alcohol consumption and 15–40 likelihood of alcohol dependence (moderate-to-severe AUD).

Alcohol Timeline Follow-Back

The Alcohol Timeline Follow-Back (TLFB) provides an alcohol drinking history through a calendar that starts the day before the participant is enrolled and typically goes back 90 days.[19] Based on an interview with a trained research staff member, the number of standard drinks consumed each day is recorded (one standard drink=14 g of alcohol≈12 oz beer, 5 oz wine or 1.5 oz hard liquor) and various summary variables are generated. For this analysis, the average number of standard drinks a person drank per drinking day and the number of heavy drinking days over the past 90-day period were used. Heavy drinking was defined as consuming more than four drinks for males and more than three drinks for females.[20]

Obsessive-Compulsive Drinking Scale

The Obsessive-Compulsive Drinking Scale (OCDS) reflects obsession and compulsivity related to craving and drinking behaviour over the course of the past week.[21] It has 14 questions scored on a scale from 0 to 4. Total scores range from 0 to 56, with higher scores indicating more obsessive thoughts and compulsive behaviours.

Penn Alcohol Craving Scale

The Penn Alcohol Craving Scale (PACS) is a five-item self-administered questionnaire designed to measure alcohol craving over the course of the past week.[22] Each item is scored from 0 (no craving) to 6 (high craving), so the total score ranges from 0 to 30, with higher scores indicating more craving for alcohol. Questions measure frequency, intensity and duration of thoughts about drinking, along with ability to resist drinking. The final question asks the participant to provide an average rating of their craving.

Analyses

Descriptive statistics were used to summarise demographic characteristics of the study sample and other variables of interest. Normal distribution was tested for using Kolmogorov-Smirnov test. Due to most variables of interest significantly deviating from normal distribution, we performed bivariate

Spearman correlations to explore possible associations between SSAD scores and alcohol-related measures, including AUDIT, TLFB, OCDS and PACS scores. Based on the results, separate regression analyses were then performed with SSAD scores as an independent variable and AUDIT and OCDS scores as the outcome, with and without controlling for demographic variables. R^2 values were calculated to determine the proportion of the outcomes that was predicted by the SSAD score, with values ranging from 0 to 1. We also calculated the variance inflation factors (VIFs) to test for multicollinearity in the regression models; VIF scores higher than 5 generally indicate problematic multicollinearity. We did not adjust for multiple testing mainly because the four alcohol-related measures were selected a priori and examine relatively separate aspect of drinking behaviour; generating hypotheses for future research was an objective of this work given the paucity of literature; and our two-tier analytical approach selected the most important variables for our main analyses, that is, regressions.[23 24] IBM SPSS Statistics V.28 (IBM) was used, and the significance level was set as $p<0.05$ (two tailed) for all analyses.

FINDINGS

Demographic characteristics and summary statistics

Only participants with complete SSAD data were included in the present study. Out of the 77 individuals enrolled in the two parent studies, 7 participants did not have SSAD data and 2 participants had outlying alcohol TLFB data (defined as total drinks >3500 drinks in a 90-day period), so they were removed from all analyses. This step was taken to ensure data quality/reliability, as the nature of these responses to the TLFB may indicate less reliable responses to the other scales as well. Additionally, four participants had participated in both parent studies and, therefore, only their most recent data were used. This resulted in 64 total participants being included in the present analysis (online supplemental figure 1). Participants were, on average, 48.6 years old (SD=11.0), and predominately male (73.4%), non-Hispanic (95.3%) and white (59.4%). Means and SDs of all continuous variables and n (%) of all categorical variables are presented in table 1. Two participants had missing data for PACS, resulting in an n=62 for this scale.

Associations between self-stigma and alcohol-related measures

Results of bivariate correlations for all variables are presented in table 2. Self-stigma scores were positively correlated with AUDIT scores, average drinks per drinking day, heavy drinking days and OCDS scores ($p<0.001$, $p=0.014$, $p=0.011$ and $p<0.001$, respectively), with moderate-to-strong correlation coefficients,[25] but not with PACS scores.

Table 3 summarises the results of the multiple regression analyses. All VIFs were under 5, indicating no multicollinearity that warranted further investigation. Separate regressions were run for each outcome and the full results can be found in the online supplemental appendix 3. Self-stigma scores were a significant predictor of AUDIT and OCDS scores, with and without controlling for demographic variables. When controlling for demographics, the regression models explained 29.8% of the variance in AUDIT scores and 32.8% of the variance in OCDS scores. Regression models excluding individuals without a diagnosis of AUD found similar results (online supplemental appendix 4).

Table 1 Demographic variables and summary statistics

Variable		n	%	Mean	SD
Demographic variables	Age, years			48.6	11.0
	Sex, male	47	73.4		
	Sex, female	17	26.6		
	Race, white/ European American	38	59.4		
	Race, black/African American	22	34.4		
	Race, Asian	3	4.7		
	Race, unknown	1	1.6		
	Ethnicity, Hispanic/ Latino	1	1.6		
	Ethnicity, not Hispanic/Latino	61	95.3		
	Ethnicity, other	2	3.1		
	Years of education			13.5	3.9
	BMI, kg/m^2			27.0	4.3
	Current AUD diagnosis*	51	79.7		
	Current smoker	33	51.6		
Assessments	SSAD-'Apply' score			45.5	16.0
	TLFB average drinks per drinking day			11.4	9.7
	TLFB heavy drinking days			52.2	36.1
	AUDIT score			20.2	11.3
	OCDS score			15.9	10.4
	PACS score			8.1	7.0

*AUD diagnosis was determined by the Structured Clinical Interview for DSM-5 or by alcohol dependence or alcohol abuse according to the Structured Clinical Interview for DSM-4.
AUD, alcohol use disorder; AUDIT, Alcohol Use Disorders Identification Test; BMI, body mass index; DSM-4/5, Diagnostic and Statistical Manual of Mental Disorders, Fourth/Fifth Edition; OCDS, Obsessive-Compulsive Drinking Scale; PACS, Penn Alcohol Cravings Scale; SSAD, Self-Stigma and Alcohol Dependence Scale; TLFB, Timeline Follow-Back (alcohol drinking history).

DISCUSSION

This study aimed to investigate the relationship between self-stigma and various alcohol-related outcomes within a clinical context. Specifically, we examined the association between alcohol-related self-stigma, as assessed by the SSAD, and the severity of alcohol use, levels of alcohol consumption, alcohol obsession and compulsion, and alcohol craving. Our hypothesis proposed that higher levels of self-stigma would be associated with an increased severity of alcohol use and its related consequences. Notably, our findings revealed significant positive

Table 2 Bivariate correlations of alcohol-related variables with self-stigma scores

Variable	Spearman correlation coefficient (r)	Significance (2-tailed)
AUDIT score	0.471	<0.001
TLFB average drinks per drinking day	0.357	0.004
TLFB heavy drinking days	0.324	0.009
OCDS score	0.507	<0.001
PACS score	0.036	0.782

AUDIT, Alcohol Use Disorders Identification Test; OCDS, Obsessive-Compulsive Drinking Scale; PACS, Penn Alcohol Cravings Scale; TLFB, Timeline Follow-Back (alcohol drinking history).

Table 3 Summary of multiple regression analyses with self-stigma score as an independent variable

	Not controlling for demographics					Controlling for demographics*				
Outcome	B	SE	β	t	P value	B	SE	β	t	P value
AUDIT score	0.259	0.062	0.468	4.165	<0.001	0.219	0.065	0.394	3.366	0.001
OCDS score	0.253	0.056	0.498	4.520	<0.001	0.222	0.058	0.436	3.799	<0.001

*Demographics that were controlled for include: age, sex, race, years of education, BMI and smoking status.
AUDIT, Alcohol Use Disorders Identification Test; BMI, body mass index; OCDS, Obsessive-Compulsive Drinking Scale.

correlations between self-stigma scores and several crucial variables related to AUD, including the severity of alcohol use disorder, alcohol consumption, and obsessive and compulsive thoughts towards drinking. Moreover, our study demonstrated that self-stigma scores emerged as a significant predictor of both the severity of AUD (measured with the AUDIT) and the intensity of obsessive thoughts and compulsive behaviours about drinking (measured with the OCDS). These outcomes underscore the critical potential role of self-stigma in shaping alcohol-related behaviours.

Our study contributes to the growing body of literature pointing to potential associations between self-stigma and alcohol-related outcomes.[13] This observed association between higher self-stigma and poorer alcohol-related outcomes can be explained by several mechanisms. First, individuals burdened by self-stigma may internalise negative societal attitudes and stereotypes surrounding AUDs, leading to diminished self-worth and self-perception. This negative self-perception may contribute to a cycle of self-destructive behaviours, reinforcing and perpetuating problematic alcohol use. Second, self-stigma may act as a barrier to seeking help and accessing appropriate treatment for AUD. Individuals who experience self-stigma may feel shame, fear judgement and anticipate discrimination, which can hinder their willingness to engage in treatment-seeking behaviours. Consequently, the lack of timely intervention and support may exacerbate the severity of alcohol use and its associated consequences. As the direction of the effect is not established, it is also possible that people with more severe AUD may feel worse about themselves and are therefore more prone to internalising stigma. It is likely that this relationship between self-stigma and alcohol-related outcomes is ultimately bidirectional. It is also important to note that stigma is just one of the factors influencing this multifaceted disorder. Other potential factors, such as neurobiological factors and psychiatric comorbidities, could also be influencing this relationship.

Existing literature underscores the detrimental impact of higher levels of self-stigma on multiple aspects of the lives of individuals with AUD, encompassing domains such as interpersonal relationships, mental wellness and self-worth.[26] Interventions targeting self-stigma can potentially enhance both alcohol-related outcomes and the overall quality of life for individuals with AUD.[27 28] Notably, therapeutic approaches like group-based acceptance and commitment therapy have demonstrated effectiveness in diminishing self-stigma associated with substance use disorders.[28 29] These findings provide promising evidence that self-stigma can be effectively reduced in populations with substance use disorder, emphasising the importance of developing and implementing programmes, such as acceptance-based treatment, to mitigate self-stigma in individuals with AUD.

Our findings also suggest that people with higher levels of self-stigma have a more severe AUD, which is particularly concerning given that existing literature highlights self-stigma as one of the barriers to treatment-seeking.[14] A systematic review identified stigma as one of the top three barriers to treatment-seeking among individuals with a substance use disorder in the majority of quantitative studies examined. Moreover, other studies have shown stigma to be the most influential barrier in preventing individuals with AUD from seeking treatment, even when access is facilitated, such as through telephone-delivered treatment.[30] These studies underscore the role stigma has on hindering treatment-seeking and the detrimental impact of self-stigma on the severity of AUD. Additionally, stigma contributes to the barriers that hinder the integration of multidisciplinary approaches in the treatment of AUD and its medical consequences, including alcohol-related organ damage.[31]

Another notable finding of this study was lack of significant correlation between self-stigma scores and PACS scores, despite the significant relationship observed with OCDS scores. This result is intriguing considering that both questionnaires are often referred to as measuring craving.[32] One possible explanation for this discrepancy is that OCDS and PACS assess different aspects of the complex phenomenon of craving. Recent studies have argued that the OCDS is not necessarily representative of craving, but instead focuses on obsession (preoccupation with alcohol) and compulsion (behavioural and motivational aspects of alcohol consumption).[33] The OCDS may also better align with themes in the self-stigma scale, such as weakness and instability, than the PACS. Nevertheless, further research is necessary to gain a deeper understanding of the relationship between self-stigma and alcohol craving.

To our knowledge, this is the first study that looked at the SSAD-Apply subscale in relation to severity of AUD, alcohol consumption, craving, and obsession and compulsion towards alcohol. One cross-sectional study of 153 patients hospitalised for alcohol misuse treatment used this scale to test drinking refusal self-efficacy in relation to self-stigma. They demonstrated that higher self-stigma scores are related to lower drinking refusal self-efficacy, thus showing a link between self-stigma and worse alcohol-related outcomes.[16] However, this study differed from ours in that it looked specifically at individuals undergoing treatment for AUD and did not investigate the relationship between self-stigma and any other alcohol-related variables.

The study presented here has several limitations. Our study had a relatively small sample size and used predominately male participants around the age of 50 years. Because this was a secondary analysis, some of the inclusion and exclusion criteria were specific to each parent study (for example, exclusion of females with childbearing potential). Due to the small sample size and limited demographics, the results may not be generalisable to other populations. This is particularly important because studies have found that the risk factors for developing alcohol-related self-stigma differ among demographic groups.[34] Therefore, future studies should focus on comparing the relationship between self-stigma and alcohol-related outcomes among various demographic factors. Relatedly, there are several confounding variables, such as socioeconomic status, social support, attitude towards treatment and mental health status that could have impacted these results. Future studies should

try to control for these variables to truly assess the relationship between self-stigma and alcohol-related outcomes. Additionally, this study was a secondary analysis of previous studies, although this limitation is mitigated by the fact that the data here analysed were collected at baseline, so before any study procedures or study medications. As a cross-sectional study, our findings cannot establish causality and while important and clinically relevant associations were demonstrated, longitudinal studies are required to better understand the potential causal link between self-stigma, AUD and alcohol-related outcomes. Finally, while the SSAD-Apply subscale has demonstrated validity and reliability, it only looks at one aspect of stigma, self-stigma. Future studies would benefit from assessing multiple types of stigma, including public, perceived and institutional stigma, which may help provide insight into a larger relationship between stigma in general and AUD.

Overall findings suggest that higher levels of self-stigma relate to more severe AUD, higher amounts of alcohol consumption, and more obsession and compulsion towards alcohol. These results further highlight the need for stigma reduction programmes and interventions to potentially increase the number of individuals with AUD who seek treatment. This study also emphasises the importance of stigma reduction and policies in improving the well-being of individuals with AUD. Further perspective research that looks at larger sample sizes and more diverse populations is needed to provide a deeper understanding of the relationship between self-stigma and alcohol-related outcomes.

Twitter Mehdi Farokhnia @mehdifarokhnia and Susan Persky @iamsusanpersky

Acknowledgements We thank the clinical and research staff involved in patient care, data collection/analysis and technical support in the joint NIDA/NIAAA Clinical Psychoneuroendocrinology and Neuropsychopharmacology Section, the NIAAA clinical programme of the Division of Intramural Clinical and Biological Research (DICBR) and the NIH Clinical Center. We would also like to express our gratitude to the participants who took part in these studies.

Contributors MEC—conceptualisation, methodology, formal analysis, investigation, data curation, writing (original draft), writing (review and editing), visualisation. MF—conceptualisation, methodology, formal analysis, investigation, resources, data curation, writing (original draft), writing (review and editing), visualisation, supervision, project administration. SP—conceptualisation, methodology, writing (review and editing), supervision. LL—conceptualisation, methodology, resources, writing (review and editing), supervision, funding acquisition. BC—guarantor, conceptualisation, writing (original draft), writing (review and editing), visualisation, supervision, project administration, funding acquisition.

Funding This work was supported by (a) National Institutes of Health (NIH) intramural funding (ZIA-DA000635) (Section on Clinical Psychoneuroendocrinology and Neuropsychopharmacology, PI: LL), jointly supported by the National Institute on Drug Abuse (NIDA) Intramural Research Program (IRP) and the National Institute on Alcohol Abuse and Alcoholism (NIAAA) Division of Intramural Clinical and Biological Research (DICBR); (b) NIH intramural funding (ZIA-DA000628) (Technology and Translational Research Unit, PI: BC) supported by the NIDA IRP; (c) a UH2/UH3 grant (TR000963, PIs: LL and Akhlaghi) from the National Center for Advancing Translational Sciences (NCATS); (d) a grant from the Peter G Dodge Foundation (PGDF; PI: LL); (e) supported by the Intramural Research Program of the National Human Genome Research Institute (SP).

Competing interests None declared.

Patient consent for publication Not required.

Ethics approval This study involves human participants. Data used for this study were collected from two alcohol-related human laboratory studies conducted at the National Institutes of Health (NIH) Clinical Center, Bethesda, Maryland, USA. Both studies were approved by the appropriate NIH Institutional Review Board. All participants provided written informed consent and were compensated for their time and participation in the respective studies.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available from the corresponding author upon reasonable request.

ORCID iDs
Mehdi Farokhnia http://orcid.org/0000-0003-0902-4212
Susan Persky http://orcid.org/0000-0002-7768-5744
Lorenzo Leggio http://orcid.org/0000-0001-7284-8754
Brenda Curtis http://orcid.org/0000-0002-2511-3322

REFERENCES

1 Guinle MIB, Sinha R. The role of stress, trauma, and negative affect in alcohol misuse and alcohol use disorder in women. *Alcohol Res* 2020;40:05.
2 Yang P, Tao R, He C, *et al*. The risk factors of the alcohol use disorders-through review of its comorbidities. *Front Neurosci* 2018;12:303.
3 Ashford RD, Brown AM, Curtis B. Systemic barriers in substance use disorder treatment: a prospective qualitative study of professionals in the field. *Drug Alcohol Depend* 2018;189:62–9.
4 Baysan Arabaci L, Ayakdaş Dağli D, Taş G, *et al*. Stigmatization and social functioning levels of patients with alcohol use disorders. *J Addict Nurs* 2020;31:295–301.
5 Link BG, Phelan J. Stigma power. *Soc Sci Med* 2014;103:24–32.
6 Kulesza M, Larimer ME, Rao D. Substance use related stigma: what we know and the way forward. *J Addict Behav Ther Rehabil* 2013;2:782.
7 Link BG, Struening EL, Rahav M, *et al*. On stigma and its consequences: evidence from a longitudinal study of men with dual diagnoses of mental illness and substance abuse. *J Health Soc Behav* 1997;38:177–90.
8 Clement S, Schauman O, Graham T, *et al*. What is the impact of mental health-related stigma on help-seeking? A systematic review of quantitative and qualitative studies. *Psychol Med* 2015;45:11–27.
9 Ashford RD, Brown AM, McDaniel J, *et al*. Biased labels: an experimental study of language and stigma among individuals in recovery and health professionals. *Subst Use Misuse* 2019;54:1376–84.
10 Corrigan P. How stigma interferes with mental health care. *Am Psychol* 2004;59:614–25.
11 American Psychiatric Association. Stigma, prejudice and discrimination against people with mental illness. 2020. Available: https://www.psychiatry.org/patients-families/stigma-and-discrimination
12 Matthews S, Dwyer R, Snoek A. Stigma and self-stigma in addiction. *J Bioeth Inq* 2017;14:275–86.
13 Kummetat JL, Leonhard A, Manthey J, *et al*. Understanding the association between alcohol stigma and alcohol consumption within Europe: a cross-sectional exploratory study. *Eur Addict Res* 2022;28:446–54.
14 Keyes KM, Hatzenbuehler ML, McLaughlin KA, *et al*. Stigma and treatment for alcohol disorders in the United States. *Am J Epidemiol* 2010;172:1364–72.
15 Earnshaw VA. Stigma and substance use disorders: a clinical, research, and advocacy agenda. *Am Psychol* 2020;75:1300–11.
16 Schomerus G, Corrigan PW, Klauer T, *et al*. Self-stigma in alcohol dependence: consequences for drinking-refusal self-efficacy. *Drug Alcohol Depend* 2011;114:12–7.
17 Anand T, Kandasamy A, Suman LN. Self-stigma, hope for future, and recovery: an exploratory study of men with early-onset substance use disorder. *Ind Psychiatry J* 2022;31:299–305.
18 Babor TFdlF JR, Saunders J, Grant M. *The alcohol use disorders identification test. Guidelines for use in primary health care*. Geneva, Switzerland: World Health Organization, 1992.
19 Sobell LCS. Timeline follow-back: a technique for assessing self-reported ethanol consumption. In: Litten J, ed. *Measuring alcohol consumption: psychosocial and biological methods*. Totowa, NJ: Humana Press1992, n.d.: 41–72.
20 National Institute of Alcohol Abuse and Alcoholism (NIAAA). Drinking levels defined 2023. n.d. Available: https://www.niaaa.nih.gov/alcohol-health/overview-alcohol-consumption/moderate-binge-drinking
21 Anton RF. Obsessive-compulsive aspects of craving: development of the obsessive compulsive drinking scale. *Addiction* 2000;95 Suppl 2:S211–7.
22 Flannery BA, Volpicelli JR, Pettinati HM. Psychometric properties of the Penn alcohol craving scale. *Alcohol Clin Exp Res* 1999;23:1289–95.
23 Bender R, Lange S. Adjusting for multiple testing--when and how *J Clin Epidemiol* 2001;54:343–9.
24 Rothman KJ. No adjustments are needed for multiple comparisons. *Epidemiology* 1990;1:43–6.
25 Dancey CP, Reidy J. *Statistics without maths for psychology*. Pearson education, 2007.
26 Livingston JD, Boyd JE. Correlates and consequences of internalized stigma for people living with mental illness: a systematic review and meta-analysis. *Soc Sci Med* 2010;71:2150–61.
27 Mittal D, Sullivan G, Chekuri L, *et al*. Empirical studies of self-stigma reduction strategies: a critical review of the literature. *Psychiatr Serv* 2012;63:974–81.
28 Can Gür G, Yılmaz E. Effectiveness of interventions in reducing substance-related stigma: a systematic review and meta-analysis of randomized controlled trials. *Issues Ment Health Nurs* 2023;44:162–75.

29 Livingston JD, Milne T, Fang ML, *et al*. The effectiveness of interventions for reducing stigma related to substance use disorders: a systematic review. *Addiction* 2012;107:39–50.
30 Cunningham JA, Sobell LC, Sobell MB, *et al*. Barriers to treatment: why alcohol and drug abusers delay or never seek treatment. *Addict Behav* 1993;18:347–53.
31 DiMartini AF, Leggio L, Singal AK. Barriers to the management of alcohol use disorder and alcohol-associated liver disease: strategies to implement integrated care models. *Lancet Gastroenterol Hepatol* 2022;7:186–95.
32 Flannery BA, Poole SA, Gallop RJ, *et al*. Alcohol craving predicts drinking during treatment: an analysis of three assessment instruments. *J Stud Alcohol* 2003;64:120–6.
33 Cordero M, Solís L, Cordero R, *et al*. Factor structure and concurrent validity of the obsessive compulsive drinking scale in a group of alcohol-dependent subjects of Mexico city. *Alcohol Clin Exp Res* 2009;33:1145–50.
34 Moore KE, Stein MD, Kurth ME, *et al*. Risk factors for self-stigma among incarcerated women with alcohol use disorder. *Stigma Health* 2020;5:158–67.