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Alcohol Use, Cannabis Use, and Discrimination by Sexual Orientation and Gender Identity within the All of Us Research Program

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Short running title: Alcohol use, cannabis use, everyday discrimination

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ABSTRACT

Purpose: Sexual and gender minority (SGM) populations face substance use disparities attributed to minority stress. We examined the relationship between discrimination and alcohol and cannabis use among SGM and cisgender heterosexual people.

Method: We conducted a cross-sectional analysis of the *All of Us* Research Program data (2017-2022) to examine the relationship between discrimination (Everyday Discrimination Scale, EDS) and alcohol use (consumption items – Alcohol Use Disorders Identification Test, AUDIT-C) and past 3-month cannabis use. Adjusted linear and logistic regression models were used for AUDIT-C scores and past 3-month cannabis use, respectively. We used interaction terms to assess how associations differed across sexual orientation and gender modality groups.

Results: Among 98,822 participants, mean EDS scores were highest among gender minority people assigned female at birth (Mean [M]=14.78) and lowest among cisgender heterosexual men (M=6.14). There was a nonlinear association between EDS and AUDIT-C scores. EDS scores were positively associated with AUDIT-C scores at low levels of discrimination; there was an inverse association at higher levels of EDS. EDS was associated with greater odds of past 3-month cannabis use, though associations diminished at higher EDS levels. Interaction by sexual orientation and gender modality group was significant (p<.05), indicating that associations between discrimination and alcohol and cannabis use varied by group. Although estimates were largely imprecise, associations particularly varied among gender minority groups and cisgender sexual minority men.

Conclusion: Discrimination had a nonlinear relationship with alcohol and cannabis use, and these relationships were pronounced among SGM subgroups.

Introduction

Sexual minority (SM, *e.g.* people who identify as gay, lesbian, bisexual, pansexual, etc.) and gender minority (GM, *e.g.,* people who identify as non-binary, transgender, etc.) populations (collectively abbreviated SGM) experience greater rates of substance use and substance use disorders.[1–4] Substance use disparities among SGM people are attributed to minority stress[5–8] (*i.e.,* the distal and proximal stress processes from exposure to stigma related to one's sexual orientation and/or gender identity[9–11]). A better understanding of the relationship between discrimination and alcohol and cannabis use is important for tailoring clinical and community services for substance use for SGM communities.

Among SGM populations, experiences of discrimination are associated with increased alcohol and cannabis use, though with mixed findings.[12–14] The 2015 U.S. Transgender Survey found elevated alcohol use among GM individuals with increased odds of binge drinking when participants reported three or more types of transphobic discrimination.[15] Among a large sample of SGM adults, those who reported past-year discrimination had greater cannabis use risk over time.[16] More research is needed to understand the relationship between discrimination and cannabis use among SGM people, particularly among GM people.[17,18] There are relatively few studies on alcohol and cannabis use with large samples of GM people.

Alcohol and cannabis use are likely impacted by differences in discrimination exposures (*e.g.,* discrimination on the basis of bisexuality, intersecting racial and sexual minority identities),[19–21] social influences (*e.g.,* targeted marketing of marginalized communities[22] and norms of one's social network[23]), and biological correlates of substance use (*e.g.,* testosterone levels and alcohol use[24]). These may cause differences in the prevalence of alcohol and cannabis

use among SGM people by gender identity, sexual orientation (*e.g.,* monosexual, plurisexual),[25,26] race and ethnicity[27], and age.[28,29] Prior work suggests greater odds of and severity of cannabis use among GM people, some of which co-occurs with alcohol use.[30] Research that clarifies patterns of discrimination with alcohol and cannabis use at the intersection of gender and sex may help guide future work understanding and intervening on the underlying social, biological, and psychological drivers of substance use disparities.

The National Institutes of Health's *All of Us* Research Program – a large-scale effort to collect data from at least one million individuals in the United States with community engagement among those historically underrepresented in biomedical research, including SGM communities, may help address limitations in prior work. Prior *All of Us* work showed health disparities among a large cohort of SGM people compared to cisgender heterosexual people, including elevated rates of substance use.[31] We leveraged *All of Us* data to examine the relationship between everyday experiences of discrimination and alcohol and cannabis use, considering the intersections of sexual orientation, gender identity, and sex assigned at birth.

Methods

Data Source and Participants

We conducted a cross-sectional analysis using the controlled tier data set (C2022Q4R11) of the *All of Us* Research Program. The aims, recruitment methods, and sites of *All of Us* have been previously described.[32] Enrollment for *All of Us* began in May 2017 through affiliated health care provider organizations or the enrollment website. Eligible participants for *All of Us* are 18 years or older, based in the United States or its territories, and have the capacity to consent.

For our analysis, we included all participants who provided informed consent and enrolled in *All of Us* through May 2022 and who completed the following surveys: "The Basics," "Social Determinants of Health," and "Lifestyle," which query demographic information, social factors of health, and substance use, respectively. We excluded participants who did not self-report their gender, sex assigned at birth, and sexual orientation. We also excluded intersex participants because "Intersex" was a response option for the item querying sex assigned at birth, which resulted in the inability to categorize participants' gender in relation to their sex assigned at birth.

The *All of Us* Institutional Review Board determined that individual projects using *All of Us* controlled tier data do not constitute human subjects research, as these data comply with regulatory requirements for secondary research use of non-individually identifiable information.

Measures

Participant Characteristics. Education level, current age, census division, enrollment year, race/ethnicity, and annual individual income were included for analysis.

Sexual Orientation and Gender Modality. Sexual orientation, gender identity, and sex assigned at birth were queried in "The Basics" survey (**Supplementary Table S1**). Modifying the approach described in Tran et al., 2023,[31] we categorized participants into the following subgroups: cisgender heterosexual women, cisgender heterosexual men, cisgender SM men, cisgender SM women, GM people assigned female at birth (AFAB) of any sexual orientation, and GM people assigned male at birth (AMAB) of any sexual orientation. This categorization approach was chosen to ensure sufficient sample size for analyses and comply with *All of Us* data privacy policies, while still considering social, biological, and structural influences (*e.g.*,

transphobia) on an individual's lived experiences based on their gender modality (*i.e.*, an individual's gender identity in relation to their sex assigned at birth[33]).

Discrimination. Discrimination was measured with the Everyday Discrimination Scale (EDS[34]), which queries the frequency of nine experiences of day-to-day mistreatment and discrimination (*e.g.*, "You are called names or insulted."). This scale encompasses overall experiences of discrimination without specifying the targeted identity or personal characteristic in the primary question stems. It can capture discrimination against one's sexual orientation and gender identity, along with other characteristics for which SGM and cisgender heterosexual people may face discrimination (*e.g.*, race and ethnicity, religion, disability). Participants may respond on a 6-point Likert scale from "Almost every day" to "Never." The 9-item responses were summed to create a composite score (ranging 0 to 45).

Alcohol Use. Alcohol use was measured with the three consumption items of the Alcohol Use Disorders Identification Test (AUDIT-C[35]). The AUDIT-C scale included items that assessed the frequency of alcohol use, number of daily alcohol drinks, and frequency of binge drinking. Responses for each item were rated on a 5-point Likert scale (range: 0-4) and summed to create a total score that ranged from 0 to 12.

Cannabis Use. Cannabis use was measured with the first item of the National Institute on Drug Abuse's Modified Alcohol Smoking and Substance Involvement Screening Test (NIDA-ASSIST[36,37]). We examined dichotomized past 3-month cannabis use (any use or no use). Participants are asked: "In your LIFETIME, which of the following substances have you ever used?" Those who selected "Marijuana (cannabis, post, grass, hash, weed, etc.)" were subsequently asked: "In the PAST THREE MONTHS, how often have you used marijuana (cannabis, pot, grass, hash, etc.)?" with responses ranging from "Never" to "Daily or almost

daily." We defined past 3-month cannabis use as having reported any use *versus* no use to allow sufficient sample sizes across subgroups.

Statistical Analysis

We summarized participant characteristics using descriptive statistics. For our initial analysis, we fitted four separate multivariable models to investigate: 1) differences in AUDIT-C scores across sexual orientation and gender modality groups, 2) differences in past 3-month cannabis use between these groups, 3) associations between EDS and AUDIT-C scores, and 4) associations between EDS and past 3-month cannabis use. Linear and logistic regression were used for AUDIT-C and past 3-month cannabis use, respectively, and all models were adjusted for race and ethnicity, census division, current age, and the quadratic term for age, education, income, and enrollment year. Robust standard errors were estimated using the Huber-White sandwich estimator. Participants with missing covariate information – including those who skipped questions, selected "Prefer not to answer," or selected "Don't know the answer" – were recoded into a separate category to account for missingness.

For models 1 and 2, reference groups were chosen based on the lowest AUDIT-C scores and the prevalence of past 3-month cannabis use[38] among the most well-described groups (*i.e.,* cisgender heterosexual people) to examine substance use outcomes across subgroups. Based on these criteria, cisgender heterosexual women and cisgender heterosexual men were chosen as reference groups for examining differences in AUDIT-C scores and cannabis use, respectively. For models 3 and 4, we regressed AUDIT-C scores and past 3-month cannabis use on both linear and quadratic EDS z-scores (hereafter referred to as EDS scores) to explore non-linear relationships. We present these results at five specific EDS z-scores (minimum, mean, +1 standard deviation [SD], +3, +2 SD, +4 SD) for ease of interpretation.

We tested for interactions between EDS and sexual orientation and gender modality subgroups by comparing nested models with and without interaction terms. Estimated associations are presented as conditional mean AUDIT-C scores and probability of past 3-month cannabis use across all levels of EDS for each sexual orientation and gender modality group. To further consider the additional influence of sexual minority stress on substance use among SGM people, we conducted a sensitivity analysis to examine how EDS is associated with AUDIT-C scores and past 3-month cannabis use for monosexual (exclusively select 'Gay;' 'Lesbian;' or 'Straight…') and plurisexual (exclusively selected 'Bisexual;' 'Polysexual, omnisexual, sapiosexual, or pansexual;' or selected multiple options for sexual orientation) individuals. We first restricted the sample to SGM people and ran adjusted models that further stratified SGM groups by monosexual and plurisexual individuals. All analyses were performed in the *All of Us* Researcher Workbench using R version 4.2. Results adhered to the *All of Us* Data and Statistics Dissemination Policy, preventing disclosure of cell counts from 1 to 19.

Results

Participant characteristics are described in **Table 1.** Of the 98,822 participants included in the analyses, 31.0% (*n*=30,642) were cisgender heterosexual men, 58.1% (*n*=57,424) were cisgender heterosexual women, 5.8% (*n*=5,698) were cisgender SM women, 3.6% (*n*=3,596) were cisgender SM men, 1.1% (*n*=1,044) were GM people AFAB, and 0.4% (n=418) were GM people AMAB. The mean age of study participants was about 59 years old (range 20-124; we checked for age outliers and did not find evidence of data inaccuracies). Overall, the mean AUDIT-C score was 2.31 (*SD*=1.99), 6.2% (*n*=6,052) reported past 3-month cannabis use, and the median EDS score was 6 (interquartile range=1–11). Mean EDS scores among gender

modality and sexual orientation subgroups (**Table 2**) were highest among GM people AFAB (M=14.78) and AMAB (M=14.14). Among SGM people, mean EDS scores were highest among plurisexual individuals compared to the monosexual individuals of the same gender modality (mean EDS ranging 9.23–15.43, **Table 2**)

Cronbach's alpha for the EDS across all subgroups, cisgender heterosexual people, cisgender SM people, and GM people were greater than 0.90. Cronbach's alpha for AUDIT-C scores across cisgender heterosexual people was 0.52, for cisgender SM people was 0.64, and GM people was 0.65. AUDIT-C scores and cannabis use prevalence varied across sexual orientation and gender modality subgroups (**Table 2**), suggesting elevated alcohol and cannabis use among SGM subgroups compared to the cisgender heterosexual reference groups. The exception was alcohol use among GM people AFAB, who had significantly lower AUDIT-C scores compared to cisgender heterosexual women ($B = $ -0.33, 95% confidence interval [95% CI] -0.44 to -0.21).

There was evidence of a non-linear relationship between EDS and AUDIT-C scores ($p<0.001$, see **Table 3** for estimates across EDS z-scores). There was a positive association with AUDIT-C scores at low levels of EDS (B=0.04, 95% CI 0.01–0.07 at minimum EDS z-score). At high levels of EDS, there were increasingly negative associations with AUDIT-C scores (B= -0.11, 95% CI -0.17 to -0.05 at 4 SD above mean EDS).

We found a significant interaction between discrimination and sexual orientation and gender modality groups on AUDIT-C scores ($p<0.05$). These results are characterized in **Figure 1** and **Supplementary Table S2**. Three patterns are apparent. EDS is associated with higher AUDIT-C scores for cisgender heterosexual men and cisgender sexual minority men at lower

levels of discrimination, but, at higher levels of discrimination (*e.g.*, 2 SD above the mean), there is an inverse association. Cisgender heterosexual women and cisgender sexual minority women had decreasing AUDIT-C scores at higher levels of EDS, but this downward trend was only significant for cisgender heterosexual women. GM people AFAB and AMAB had increasingly higher AUDIT-C scores associated with higher levels of EDS, though estimates were largely non-significant and imprecise.

We found some evidence for a nonlinear relationship (*p*=0.06) between EDS scores and past 3-month cannabis use (**Table 3**). There were higher odds of cannabis use at minimum EDS (OR=1.09, 95% CI 1.03–1.16), mean EDS (OR=1.06, 95% CI 1.02–1.10), and 1 SD above mean EDS scores (OR=1.03, 95% CI 1.01–1.06). At higher levels of EDS (*i.e.,* 2, 3, 4 SD above the mean), the association was not significant.

There was a significant interaction between sexual orientation and gender modality group and discrimination on past 3-month cannabis use (p<0.05). These results are illustrated in **Figure 2** and **Supplementary Table S3** and show distinctive patterns for cisgender heterosexual women, cisgender sexual minority men, and GM people AMAB. At lower levels of discrimination, EDS was associated with greater cannabis use for cisgender heterosexual women but less cannabis use for cisgender sexual minority men. For both groups, the magnitude of association diminished at higher discrimination levels. Among GM people AMAB, past 3-month cannabis use appears to vary more substantially across discrimination levels; the association is positive at lower discrimination levels but negative at higher discrimination levels. Among cisgender heterosexual men, cisgender sexual minority women, and GM people AFAB, we only see variation in the association around the null.

Sensitivity Analyses Between Monosexual and Plurisexual SGM Subgroups

We found that generally the relationship between EDS and AUDIT-C was the same as in primary analyses (see **Supplementary Figure S1**). Sensitivity analyses suggested a potential increase in AUDIT-C scores at high levels of EDS among some subgroups (*i.e.,* plurisexual GM people AMAB, cisgender monosexual sexual minority women, and monosexual GM people AFAB), but results were imprecise. Across all other groups, AUDIT-C scores increased at minimum EDS scores (0.99 below mean) but decreased as EDS increased.

Probability of past 3-month cannabis use across increasing EDS scores among plurisexual and monosexual SGM subgroups are included in **Supplementary Figure S2**. Overall, estimates were imprecise but suggested generally increased cannabis use at lower levels of EDS with a diminished effect at higher levels of EDS across most groups. Cisgender monosexual men, cisgender plurisexual men, and cisgender plurisexual women evidenced minimal to no change in odds of cannabis use across EDS scores.

Discussion

In this study, we examined alcohol and cannabis use among a large sample of SGM and cisgender heterosexual people within the *All of Us* Research Program. We found that everyday discrimination had non-linear associations with alcohol and cannabis use, and the associations between discrimination and alcohol and cannabis use varied by sexual orientation and gender modality groups. This study suggests that alcohol and cannabis use may increase at lower levels of discrimination. These results highlight the importance of substance use prevention and clinical services providing support for those experiencing discrimination, with equal attention for

individuals experiencing low levels of discrimination. Further, beyond individual level clinical interventions, these results reify the idea that reducing discrimination is a public health concern.

Among all participants, at lower levels of everyday discrimination, there was a positive association with predicted AUDIT-C scores and, inversely, at higher levels of discrimination, associations were negative. This may align with a prior systematic review of discrimination and alcohol use that found mixed results when global associations were tested between discrimination and alcohol use.[39] Increasing levels of everyday discrimination were associated with greater odds of past 3-month cannabis use, similar to prior work on discrimination due to race and ethnicity where SGM status was not reported.[40] These relationships differed across gender modality and sexual orientation groups. Although some estimates were imprecise, these results suggest that the level of discrimination is an important consideration for the risk of substance use. Alcohol and cannabis use interventions tailored to be protective against discrimination may be particularly impactful if designed for and in partnership with SGM communities. Sensitivity results suggested that there may be differences in discrimination and alcohol and cannabis use between SGM plurisexual and monosexual individuals of the same gender modality groups, although imprecise estimates indicated that more research is needed in larger samples to clarify these relationships.

SGM subgroups in *All of Us* — GM subgroups in particular — reported higher mean levels of EDS than cisgender heterosexual people. Plurisexual individuals had higher mean levels of EDS compared to their monosexual counterparts. It is important to note these results do not indicate that people are less likely to use alcohol and cannabis at higher levels of discrimination — rather, we found that these associations generally grow weaker at high levels of discrimination. Therefore, more research is needed to better understand how increasing levels

of discrimination impact alcohol and cannabis use given the imprecise estimates. These imprecise estimates were likely related to the smaller sample sizes of some SGM subgroups. The *All of Us* cohort is not a representative sample and may include fewer SGM people experiencing high levels of discrimination. *All of Us* does not currently have longitudinal survey data, so it was not possible to examine causal and directional relationships between discrimination and alcohol and cannabis use. Prior work has found significant indirect associations between discrimination and alcohol use through more complex processes such as coping and psychosocial resources.[39] Future research with longitudinal data should examine the underlying biological and psychological mechanisms of these disparities to inform screening, psychoeducation, and interventions with SGM communities.

These results suggest that there may be a pronounced impact of everyday discrimination among SGM people. The EDS does not measure all components of minority stress (*i.e.,* internalized stigma, concealment and disclosure of identity, anticipation of stigma and discrimination, and structural stigma), which may contribute to downstream health consequences of day-to-day discrimination exposures that the EDS does capture. There may be a distinct coping burden due to the structural and social mistreatment that SGM people face.[41,42] The EDS may not fully capture the quantity, chronicity, and severity of discrimination experiences. For instance, the EDS does not account for exposures to acute minority stressors (*e.g.,* early-life family rejection, traumatic victimization related to one's SGM identity) that may be formative in an individual's later substance use and coping behavior.[43–46] The EDS also does not measure from whom people are experiencing discrimination (*e.g.,* family, coworkers, strangers, other SGM people). Future work should investigate if the number or severity of discrimination events

have the strongest effect on substance use behavior within a specific window of time or over an individual's developmental trajectory.

Limitations

These findings leveraged cross-sectional, self-report data. *All of Us* does not have survey measures on problematic cannabis use and had insufficient sample sizes to examine the frequency of cannabis use across sexual orientation and gender modality subgroups. Future work that uses more robust measures of cannabis use (*e.g.,* the full NIDA-modified ASSIST) rather than a single item focused on consumption may have greater variability to enable these analyses.

To comply with *All of Us* data privacy policies and to ensure sufficient samples of respondents, GM participants were collapsed into two gender modality subgroups, based on gender minority status and sex assigned at birth. Future research among gender minority communities, particularly when examining gender minority stress, would be improved with sufficient samples to stratify by gender identity. There are likely differences in discrimination exposures specific to identities (*e.g.,* stigma experienced by people who are non-binary, asexual) that were grouped in the sexual orientation and gender modality categories in this study. This study did not have sufficient sample size to further examine the intersections of identities (*e.g.,* race and ethnicity) or stratify by age groups. A measure specific to intersectional minority stress[47] may elucidate how intersectional stressors contribute to substance use behavior.

Despite these limitations, this study provides important information on the relationship between different levels of discrimination and cannabis and alcohol use across SGM and cisgender heterosexual people among a large, national U.S. sample. Additional measurements of substance use — particularly co-use of substances— and minority stress are essential to enhance our understanding of these relationships among SGM people. Furthermore, interventional studies

to reduce harmful substance use in response to discrimination will be critical to addressing disparities among SGM populations.

Conclusions

In sum, this study indicates that everyday discrimination is associated with distinct patterns of alcohol and cannabis use. We observed increased alcohol and cannabis at lower levels of discrimination, which varied by sexual orientation and gender modality groups. Interventions to buffer against low levels of discrimination for SGM populations may be particularly important for addressing disparities.

Author Contributions:

Gowri Sunder — Conceptualization, Funding Acquisition, Methodology, Writing – original draft, Writing – review and editing

Nguyen K. Tran — Data curation, Formal Analysis, Methodology, Software, Visualization, Writing – original draft, Writing – review and editing

Juan M. Peña — Writing – review and editing

Mitchell R. Lunn — Funding Acquisition, Methodology, Supervision, Writing – review and editing

Juno Obedin-Maliver— Funding Acquisition, Supervision, Writing – review and editing

Annesa Flentje — Conceptualization, Funding Acquisition, Methodology, Supervision, Writing – review and editing

Additional Information: To learn more about the *All of Us* Research Program's data, go to https://www.researchallofus.org. For information on how LGBTQIA+ participants are taking part in *All of Us*, go to https://www.joinallofus.org/lgbtqia. Precision Medicine Initiative, PMI, *All of Us*, the *All of Us* logo, and "The Future of Health Begins With You" are service marks of the US Department of Health and Human Services, NIH.

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Table 1: Demographic characteristics, substance use, and level of discrimination of "Social Determinants of Health" survey respondents in the *All of Us* Research Program who provided substance use, gender identity, sexual orientation, and sex assigned at birth data (*n*= 98,822)

Characteristics	
Sexual orientation and gender modality subgroups (*n, %*)	
Cisgender heterosexual men	30,642 (31.0)
Cisgender heterosexual women	57,424 (58.1)
Cisgender sexual minority men	3,596 (3.6)
Cisgender sexual minority women	5,698 (5.8)
Gender minority people assigned female at birth	1,044 (1.1)
Gender minority people assigned male at birth	418 (0.4)
Plurisexual and monosexual SGM subgroups (n, %)	
Monosexual cisgender men	2,709 (2.7)
Plurisexual cisgender men	887 (0.9)
Monosexual cisgender women	1,860 (1.9)
Plurisexual cisgender women	3,838 (3.9)
Monosexual gender minority people assigned female at birth	336 (0.3)
Plurisexual gender minority people assigned female at birth	657 (0.7)
Monosexual gender minority people assigned male at birth	207 (0.2)
Plurisexual gender minority people assigned male at birth	180 (0.2)
Missing sexual orientation data	82 (0.0)
Age (mean, SD)	59.4,16.5
Race/ethnicity (*n, %*)[a]	
Asian	3,561 (3.6)
Black, African American, or African	7,951 (8.0)
Hispanic, Latino, or Spanish	8,459 (8.6)
Middle Eastern or North African	926 (0.9)
Native Hawaiian or Pacific Islander	152 (0.2)
White	79,822 (80.8)
Sexual orientation (*n, %*)[a]	
Asexual	336 (0.3)
Bisexual	4,553 (4.6)
Gay	2,897 (2.9)
Lesbian	1,658 (1.7)
Polysexual or pansexual	385 (0.4)
Queer	443 (0.4)

Straight	88,785 (89.8)
Two-Spirit[b]	<20
Gender identity (*n, %*)[a]	
Genderfluid	24 (0.0)
Genderqueer	31 (0.0)
Gender variant	<20
Man	34,309 (34.7)
Nonbinary	871 (0.9)
Questioning	<20
Transgender men	317 (0.3)
Transgender women	183 (0.2)
Two-Spirit[b]	<20
Woman	63,177 (63.9)
Another specific gender[c]	35 (0.0)
Education level (*n, %*)	
High school or less	10,441 (10.6)
Some college	23,292 (23.6)
College graduate	29,647 (30.0)
Advanced degree	34,597 (35.0)
Skipped/prefer not to answer/don't know	845 (0.9)
Income (*n, %*)	
Less than $25,000	12,004 (12.1)
$25,000 - 49,999	15,109 (15.3)
$50,000 - 99,999	26,885 (27.2)
$100,000 - 149,999	16,542 (16.7)
$150,000 or more	19,067 (19.3)
Skipped/prefer not to answer/don't know	9,215 (9.3)
Enrollment year (*n, %*)	
2017	1,940 (2.0)
2018	17,061 (17.3)
2019	25,736 (26.0)
2020	12,203 (12.3)
2021	19,488 (19.7)
2022	22,394 (22.7)
Census division (*n, %*)	
East North Central	25,341 (25.6)
East South Central	5,430 (5.5)
Middle Atlantic	15,875 (16.1)
Mountain	9,091 (9.2)
New England	10,784 (10.9)
Pacific	14,589 (14.8)
South Atlantic	9,644 (9.8)
West North Central	4,144 (4.2)
West South Central	3,848 (3.9)
US territories or missing	76 (0.1)

Past 3-months cannabis use (*n, %*)	6,053 (6.2%)
AUDIT-C for alcohol use (mean, SD)	2.31 (1.99)
EDS score for discrimination experiences (median, IQR)	6.00 (1.00-11.00)

Abbreviations: SD= standard deviation, EDS= Everyday Discrimination Scale, IQR= interquartile range, SGM= sexual and gender minority, AUDIT-C= Alcohol Use Disorders Identification Test, consumption items.

[a] Participants could select more than one response; thus, the percentages may sum to greater than 100%. 3.81% selected more than one race and ethnicity, 0.44% selected more than one sexual orientation, and 0.18% selected more than one gender identity.
[b] The response option "Two-Spirit" is shown to all participants, regardless of race and ethnicity selected.
[c] Includes participants who self-reported that none of the response options best described their gender identity and provided their specific gender identity.

Table 2. Alcohol Use Disorders Identification Test scores and past 3-month cannabis use among sexual orientation and gender modality subgroups in *All of Us*.

	EDS Score	AUDIT-C Score		Past 3-Month Cannabis Use	
	Mean (SD)	Mean (SD)	Adjusted *B* (95% CI)	n (Row %)	Adjusted OR (95% CI)
Cisgender heterosexual men	6.14 (6.95)	2.66 (2.21)	0.57 (0.54–0.60)	1,523 (5.0)	Ref
Cisgender heterosexual women	7.07 (6.98)	2.09 (1.79)	Ref	3,319 (5.8)	0.99 (0.93–1.06)
Cisgender sexual minority men	8.70 (8.19)	2.79 (2.39)	0.66 (0.58–0.74)	275 (7.6)	1.21 (1.06–1.38)
Cisgender sexual minority women	10.99 (8.16)	2.40 (2.03)	0.13 (0.08–0.19)	699 (12.3)	1.41 (1.28–1.56)
Gender minority people assigned female at birth	14.78 (8.96)	2.02 (1.84)	-0.33 (-0.44 to -0.21)	177 (17.0)	1.61 (1.36–1.91)
Gender minority people assigned male at birth	14.14 (10.24)	2.67 (2.40)	0.45 (0.22–0.69)	59 (14.1)	1.63 (1.23–2.17)

Note: Models were adjusted for race and ethnicity, census division, current age, the quadratic term for current age, education, income, and enrollment year.
Abbreviations: EDS= Everyday Discrimination Scale, SD=standard deviation, AUDIT-C= Alcohol Use Disorders Identification Test consumption items, 95% CI= 95% confidence interval, OR= odds ratio, Ref= reference group

Table 3. Estimates of Alcohol Use Disorders Identification Test Scores and Past Three-Month Cannabis Use and 95% Confidence Intervals at Everyday Discrimination Scale Z-Scores.

| EDS z-scores	Estimates of AUDIT-C scores B (95% CI)	Estimates of odds of past 3-month cannabis use OR (95% CI)
-0.99	**0.04 (0.01 – 0.07)**	**1.09 (1.03 – 1.16)**
0	0.01 (-0.01 – 0.03)	**1.06 (1.02 – 1.10)**
1	**-0.02 (-0.04 to -0.01)**	**1.03 (1.01 –1.06)**
2	**-0.05 (-0.08 to -0.02)**	1.01 (0.97 – 1.05)
3	**-0.08 (-0.12 to -0.04)**	0.98 (0.92 – 1.04)
4	**-0.11 (-0.17 to -0.05)**	0.95 (0.87 –1.04)

Note: Models were adjusted for race and ethnicity, census division, current age, the quadratic term for current age education, income, and enrollment year. Significant estimates are bolded. *Abbreviations:* EDS= Everyday Discrimination Scale, AUDIT-C= Alcohol Use Disorders Identification Test consumption items, 95% CI= 95% confidence interval, OR= odds ratio

Figure 1. Predicted Alcohol Use Disorders Identification Test Scores (and 95% Confidence Interval) of Sexual Orientation and Gender Modality Subgroups Across Levels of Everyday Discrimination Scale Z-Scores.
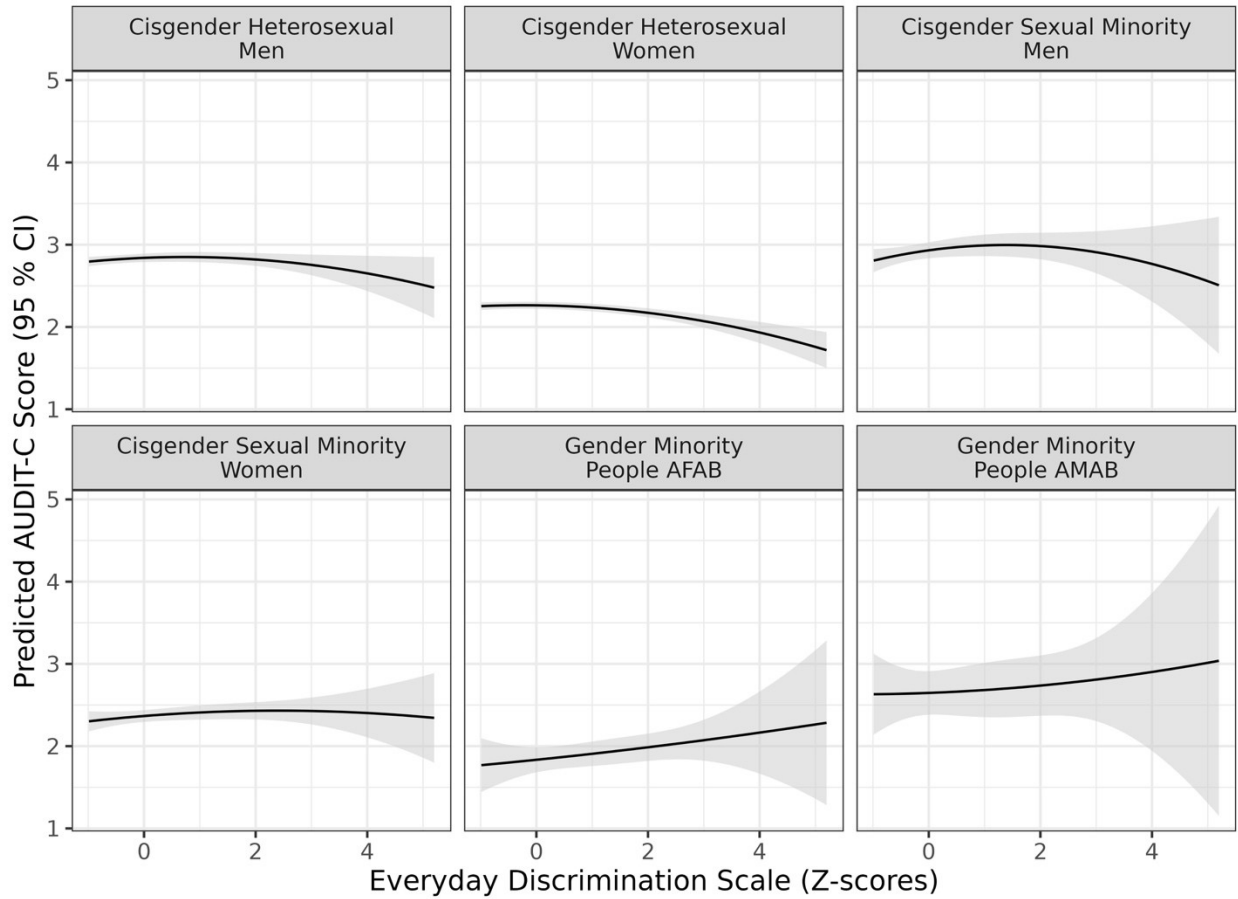
Models were adjusted for race and ethnicity, census division, current age, the quadratic term for current age education, income, and enrollment year. Alcohol use was measured with the Alcohol Use Disorders Identification Test consumption items (AUDIT-C). Grey band indicates 95% confidence interval. AFAB= assigned female at birth, AMAB= assigned male at birth.

Figure 2. Predicted Probabilities of Past 3-Month Cannabis Use (and 95% Confidence Interval) of Sexual Orientation and Gender Modality Subgroups Across Levels of Everyday Discrimination Z-Scores.
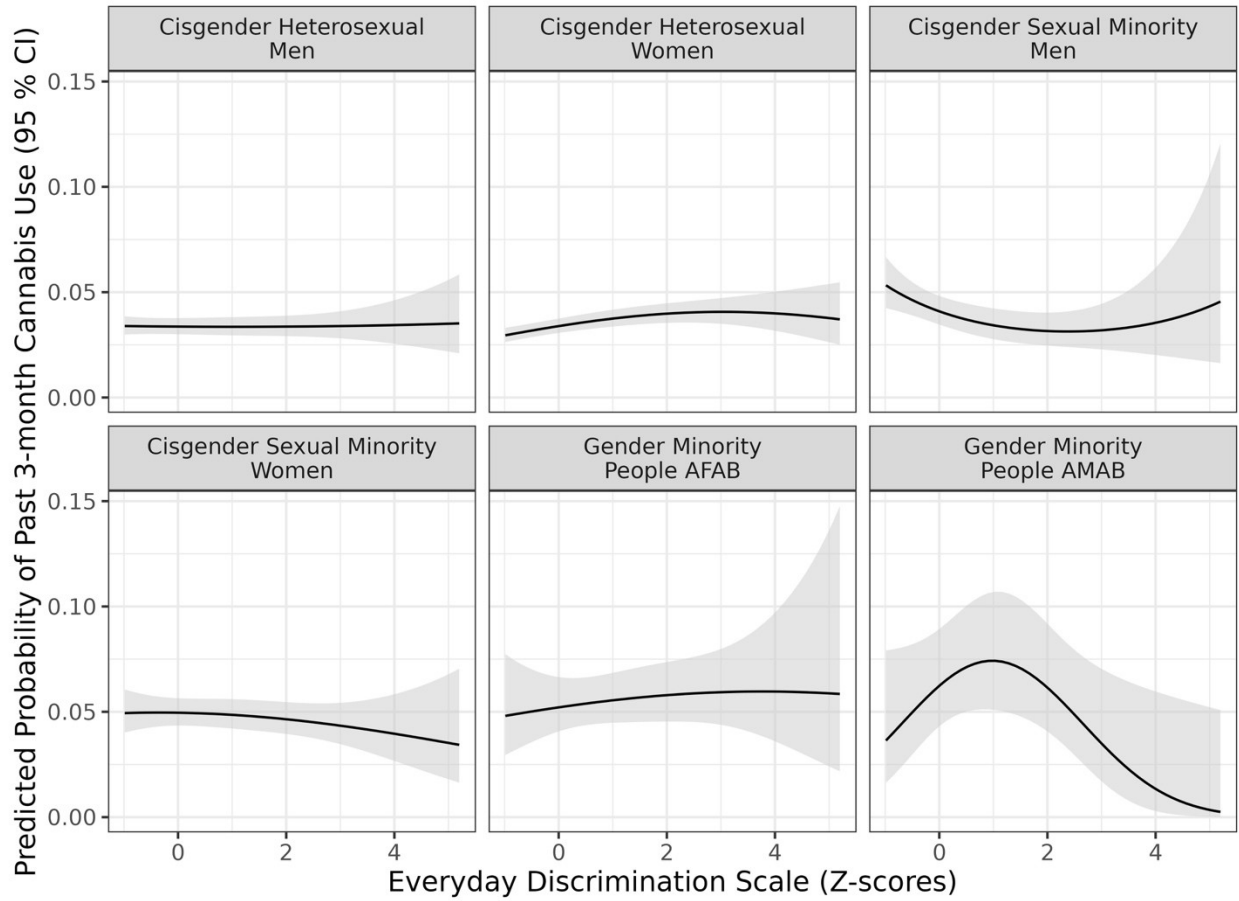
Models were adjusted for race and ethnicity, census division, current age, the quadratic term for current age, education, income, and enrollment year. Grey band indicates 95% confidence interval. Dotted line indicates the null association. AFAB= assigned female at birth, AMAB= assigned male at birth.