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Alcohol, Tobacco, and Comorbid Psychiatric Disorders and Associations with Sexual Identity and Stress-related Correlates

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Abstract

Objective: To examine psychiatric comorbidities associated with alcohol use disorders (AUDs) and with tobacco use disorders (TUDs) among heterosexual, bisexual, and gay/lesbian men and women in the U.S. and whether stress-related factors were predictive of comorbidities.

Methods: We used data from the National Epidemiologic Study on Alcohol and Related Conditions-III (2012–2013, $n=36,309$) to examine the co-occurrence of past-year AUD or past-year TUD with past-year: (1) anxiety disorders, (2) mood disorders, and (3) post-traumatic stress disorder (PTSD) by sexual identity (heterosexual, bisexual, gay/lesbian) and sex. We also examined the association of stress-related factors and social support with presence of comorbidities.

Results: Comorbidities were more prevalent among women and sexual minorities, particularly bisexual women. More than half of bisexual (55%) and gay/lesbian (51%) individuals who met criteria for a past-year AUD had a psychiatric comorbidity, while only one-third of heterosexual individuals who met criteria for a past-year AUD did. Similar differences were found among those who met criteria for a past-year TUD. Among sexual minorities, frequency of sexual orientation discrimination (significant aOR range=1.08–1.10), number of stressful life events (significant aOR range=1.25–1.43), and ACEs (significant aOR range=1.04–1.18) were associated with greater odds of comorbidities. Greater social support was inversely associated with TUD comorbidities (significant aOR range=0.96–0.97).

Conclusions: This research suggests integrated substance use and mental health prevention and treatment programs are needed particularly for individuals who identify as sexual minorities. The increased stressors experienced by sexual minority individuals may be important drivers of these high levels of comorbidities.

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INTRODUCTION

Anxiety, mood, and post-traumatic stress disorders are more common among individuals with an alcohol and tobacco use disorders (AUDs and TUDs) than among the general population[1–3]. Individuals with a co-occurring substance use disorder and other psychiatric disorder are at increased risk for negative health consequences as well as greater risk in other domains including economic difficulties, social isolation, homelessness, and incarceration[4,5] compared to individuals with substance use disorders and no comorbid psychiatric disorder. In addition, individuals with comorbid psychiatric disorders have poorer substance use disorder treatment outcomes compared to individuals without psychiatric comorbidities[7–9].

Studies have well established that sexual minorities have a greater prevalence of AUD and TUD[10–13]. Sexual minorities also have greater prevalence of anxiety and mood disorders[11,14,15]; in particular, substantially elevated rates of PTSD have been found among sexual minorities[15]. While other psychiatric disorders are also of public health concern, for this study we focus on mood and anxiety disorders and PTSD. Mood disorders include major depressive disorder, dysthymia, bipolar I, and bipolar II, while anxiety disorders include generalized anxiety disorder, specific phobia, social anxiety disorder, panic disorder, and agoraphobia based on DSM-5 criteria[16]. Mood and anxiety disorders are two of the most prevalent types of psychiatric disorders in the U.S., and both are highly comorbid with AUD and TUD[17,18]. (Hereafter, we will use the term comorbid psychiatric disorder to refer to comorbid mood and anxiety disorders. Hence, we use AUD and TUD psychiatric comorbidities to refer to AUD comorbid with anxiety disorders, mood disorders, or PTSD and TUD comorbid with anxiety disorders, mood disorders, or PTSD.) Little research has examined if AUD and TUD psychiatric comorbidities are more prevalent among sexual minorities. One study using a Swedish sample examined the co-occurrence of alcohol and tobacco use and with general psychological distress and found a stronger link among sexual minorities than among heterosexuals[19]. Another study using national U.S. data found sexual minorities were overrepresented among those with AUD and PTSD and those with drug use disorder and PTSD [9]. However, little research using national studies has examined sexual identity differences in prevalence of AUD and TUD psychiatric comorbidities and their examined correlates.

Prevalence of AUD, TUD, and AUD and TUD psychiatric comorbidities differ for men and women[20,21]. Sexual identity disparities also differ substantially for men and women. In particular, bisexual women are at heightened risk for alcohol, tobacco, and other substance use disorders[12,13], anxiety disorders, and mood disorders[14,22] compared to heterosexual women.

The minority stress model[23] is a prominent theory used to understand higher prevalence of substance use and psychiatric disorders in sexual minorities. A growing body of research has demonstrated that sexual minorities experience chronic and accumulating stressors in multiple domains of their lives specific to their identity as a sexual minority[24]. The domains include both adverse childhood experiences (ACEs) and current stressful life events which can be experienced by all individuals but occur more often among sexual

minorities[15,25,26]. In addition to higher prevalence of stressful experiences, sexual minorities often face stressors specific to being a member of a marginalized group including sexual orientation discrimination[27–29]. ACEs, stressful life events[30–32], and sexual orientation discrimination[27–29] are each associated with risk for AUD and TUD. However, it is not known if each of these stress-related domains are also associated with co-occurring substance use and psychiatric disorders; moreover, these constructs are not often examined together in the same study.

More recent iterations of the minority stress model and related empirical research have demonstrated the importance of resilience and in particular, highlight the importance of considering social support and other potential protective factors [33]. Recent studies have found social support to be associated with lower odds of AUD among sexual minority men[34] and that a lack of social support (social isolation) is associated with problematic alcohol, tobacco, and marijuana use[19].

In this study, we propose two aims: (1) to examine the prevalence of the co-occurrence of psychiatric disorders with AUD and with TUD by sex and sexual identity, and (2) to examine whether stress-related risk factors are associated with these comorbidities.

METHODS

Participants.

Data are from the nationally representative National Epidemiologic Study on Alcohol and Related Conditions-III (NESARC-III) study, collected in 2012–13. Non-institutionalized civilian adults in the US ages 18 and older (N=36,309) were surveyed via in-person interviews. Individuals were sampled at the household level, oversampling for young adults (ages 18–24), Black, and Hispanic individuals[35]. Survey weights were used to adjust for oversampling of these groups and to account for varying rates of nonresponse. Household, person-level, and overall response rates were 72%, 84%, and 60%, respectively. Participants were informed in writing about the nature of the survey before they consented to participate in the study. Institutional Review Boards at both the National Institutes of Health and Westat approved the study protocol; the first author's institution ruled the study exempt because it involved existing de-identified data. The analytic sample included all participants that had valid data on sexual identity and other relevant covariates ($n=35,796$). Psychiatric comorbidity prevalences were also estimated among those who met criteria for a past-year AUD ($n=5,042$) and a past-year TUD ($n=7,188$). We examined correlates of psychiatric comorbidities among the full sample and among sexual minorities. For this study, sexual minorities included those who identified as gay/lesbian, bisexual, and individuals who identified as heterosexual, but reported same-sex attraction or behavior ($n=3,203$).

Measures.

Sexual identity.—Individuals reported which category best described them: heterosexual (straight), gay or lesbian, bisexual, or not sure. Those who selected “not sure” were coded as missing. Previous research has shown the “not sure” group to have distinct substance use risk[10], but we did not have sufficient sample size to examine separately for this analysis.

Past-year *AUD* and *TUD* were assessed using the National Institute on Alcohol Abuse and Alcoholism's (NIAAA) Alcohol Use Disorder and Associated Disabilities Interview Schedule-5 (AUDADIS-5). The AUDADIS-5 is a structured diagnostic interview which assesses DSM-5 diagnostic criteria and can be administered by non-clinician interviewers[36]. Consistent with DSM-5 criteria, a threshold of two symptoms was used to meet criteria for a diagnosis of AUD or TUD. We dichotomized each measure to compare those who met and did not meet criteria for a disorder in the past year. Due to the lower prevalence of other substance use disorders in the population as well as the heterogeneity within the "other" substance use disorder category, we focused on AUD and TUD for this study.

Past-year psychiatric disorders were also assessed with the AUDADIS-5 using DSM-5 diagnostic criteria. *Past-year mood disorders* (non-substance use related) included major depressive disorder, bipolar I and II disorder, and dysthymia. *Past-year anxiety disorders* included generalized anxiety disorder, specific phobia, social anxiety disorder, panic disorder, and agoraphobia. *Past-year post-traumatic stress disorder (PTSD)* was examined as a separate psychiatric disorder.

Stress-related correlates.

Past-year sexual orientation discrimination.: Individuals identified as gay/lesbian, bisexual, or who identified as heterosexual and reported same-sex attraction or behavior were asked questions regarding sexual orientation discrimination. The discrimination measure was derived from the Experiences of Discrimination scale[37] and included six items assessed on a four-point scale regarding the frequency of different types of discrimination (e.g., discrimination in health care settings, public settings, and obtaining a job). Responses were summed to create a scale ranging from 0–24. *Adverse childhood experiences* were assessed with 18 items (e.g., physical, sexual, emotional abuse, exposure to family violence, parental incarceration). This was assessed continuously in a scale ranging from 0 to 18. The measure of *past-year stressful life events* included 16 life events (e.g., moved, lost employment, got divorced). We created a summary measure of the number of events experienced in the past year (0–16). *Social support* was assessed with twelve questions assessing perceived social support using items from the Interpersonal Support Evaluation List (ISEL) for General Populations[38]. Responses were on a four-point scale ranging from definitely false to definitely true. Negative items were reverse coded such that higher scores indicated greater social support. The scale ranged from 0–48.

Controls.—Multivariable regression analyses controlled for *sex* (male vs. female), *sexual identity* (heterosexual, bisexual, and gay/lesbian), *race/ethnicity* (White non-Hispanic, Black non-Hispanic, American Indian/Alaska Native non-Hispanic, Asian/Native Hawaiian/Other Pacific Islander non-Hispanic, and Hispanic), *education* (high school diploma or greater vs. less than high school diploma), *income* (<\$25,000, \$25,000-\$59,999, \$60,000+), *urbanicity* (urban vs. rural), and *region* (Northeast, Midwest, South, and West).

Analysis

We first estimated AUD psychiatric comorbidities (anxiety disorders, mood disorders, and PTSD) in the past year and TUD psychiatric comorbidities (anxiety disorders, mood disorders, and PTSD) in the past year for men and women by sexual identity. We estimated these psychiatric comorbidity prevalences in the: (1) full sample ($n=35,796$), (2) among those who met criteria for a past-year AUD ($n=5,133$), and (3) among those who met criteria for a past-year TUD ($n=7,303$). Unadjusted bivariate logistic regression models were conducted to identify significant differences in comorbidity prevalence by sexual orientation using heterosexual-identifying individuals as the reference. Second, in the full sample ($n=35,796$) we examined stress-related correlates of AUD and TUD psychiatric comorbidities using six separate multivariable logistic regression models for each comorbidity. These correlates included stressful life events, ACEs, and social support. Finally, we examined stress-related correlates of AUD and TUD psychiatric comorbidities among sexual minorities ($n=3,202$) using multivariable logistic regression models. Stress-related correlates among sexual minorities included sexual orientation discrimination, stressful life events, ACEs, and social support. Multivariable logistic regression analyses controlled for sex, sexual identity, race/ethnicity, college degree attainment, family income, region, and urbanicity. All analyses were conducted using Stata's svy procedures[39] to account for the NESARC-III sample design.

RESULTS

Descriptives.

Table 1 provides descriptive characteristics of the sample overall and by sexual identity and sex. Prevalence was significantly higher among bisexual and gay/lesbian individuals compared to heterosexuals for past-year AUD, TUD, anxiety disorders, mood disorders, and PTSD. Estimates for bisexual individuals were the highest of the three groups. One of the largest differences was the four-fold greater prevalence of PTSD among bisexual individuals (17.9%) compared to heterosexual individuals (4.4%). Men who identified as gay had particularly high prevalence of past-year AUD (31.4% vs. 13.8% in overall sample) and TUD (40.8% vs. 12.0% in overall sample). Both gay men and bisexual men had significantly higher prevalence of all disorders compared to heterosexual men. Bisexual women had particularly high prevalence of anxiety disorders (32.5% compared to 13.0% in overall sample), mood disorders (34.9% compared to 12.8% in overall sample), and PTSD (21.0% vs. 5.6% in overall sample) and had significantly higher prevalence of AUD and TUD compared to heterosexual women. Gay/lesbian women had higher prevalence of AUD, TUD, and mood disorders compared to heterosexual women.

Past-year AUD, TUD and psychiatric comorbidities by sexual identity and sex.

We examined prevalence of past-year co-morbid disorders by sexual identity and sex as follows: AUD and anxiety disorders, AUD and mood disorders, AUD and PTSD, TUD and anxiety disorders, TUD and mood disorders, and TUD and PTSD (Figure 1). Bisexual men had significantly higher prevalence of all psychiatric comorbidities compared to heterosexual men. Gay men had significantly higher prevalence of all psychiatric comorbidities compared to heterosexual men except for comorbid TUD and PTSD.

AUD and psychiatric comorbidities (Supplemental Figure A).

Among those meeting criteria for a past-year AUD ($n=5,133$), 34.0% also met criteria for an anxiety disorder, mood disorder, or PTSD. Psychiatric comorbidities were more prevalent among bisexual (55.2%) and gay/lesbian (51.2%) individuals compared to heterosexuals (32.9%).

Among men, 25.8% of heterosexual men who met criteria for a past-year AUD had a psychiatric comorbidity (anxiety disorder, mood disorder, or PTSD) compared to 42.8% of bisexuals who met criteria for a past-year AUD and 66.1% of gay men who met criteria for a past-year AUD. Only gay and heterosexual men were significantly different. Bisexual men who met criteria for an AUD were significantly more likely to have a comorbid anxiety disorder (29.7%) compared to heterosexual men (13.8%). Gay men who met criteria for a past-year AUD were more likely to have a comorbid anxiety disorder, mood disorder, and PTSD; the estimated prevalence for each psychiatric comorbidity was more than double that of heterosexual men.

Overall AUD psychiatric comorbidities (mood disorders, anxiety disorders, PTSD) estimates were higher among women who met criteria for an AUD than men. Among women, almost one half (44.6%) of heterosexual women who met criteria for a past-year AUD had a psychiatric comorbidity (mood disorder, anxiety disorder, PTSD). A large majority of bisexual women who met criteria for a past-year AUD had a psychiatric comorbidity (60.5%); 43.2% had a comorbid mood disorder, significantly more than that for heterosexual women (28.5%). Over one-quarter of bisexual women who met criteria for a past-year AUD also had PTSD (28.3%). Gay/lesbian women who met criteria for a past-year AUD had similar prevalence of psychiatric comorbidities overall (42.5%) and for each individual psychiatric comorbidity compared to heterosexual women.

TUD comorbidities (Supplemental Figure B).

Among those who met criteria for a past-year TUD ($n=7,303$), 35.6% had a psychiatric comorbidity (mood, anxiety, or PTSD). Psychiatric comorbidity prevalence was significantly higher for bisexual individuals (55.6%) than heterosexual individuals (34.9%) meeting criteria for a past-year TUD; this was true for each specific psychiatric comorbidity. Anxiety disorders were more prevalent among gay/lesbian individuals (28.3%) who met criteria for a past-year TUD than heterosexual individuals (20.4%).

Among men, about one-quarter (26.6%) of heterosexuals who met criteria for a past-year TUD had a psychiatric comorbidity. Psychiatric comorbidities were considerably higher in prevalence for bisexual men (39.9%) and gay men (44.1%) who met criteria for a past-year TUD, but only significantly so for gay men. Anxiety disorders and mood disorders were significantly higher among gay men (28.0% and 29.5%, respectively) who met criteria for a past-year TUD while anxiety disorders and PTSD were higher among bisexual men (29.9% and 18.8%, respectively) compared to heterosexual men (anxiety: 14.5%, PTSD: 5.6%) who met criteria for a past-year TUD.

Among women, 45.7% of heterosexuals who met criteria for a past-year TUD had a psychiatric comorbidity. Comorbidity prevalence for gay/lesbian women was similar

(45.1%). Bisexual women had significantly higher prevalence of psychiatric comorbidities (62.7%). Almost half of bisexual women who met criteria for a past-year TUD had a mood disorder (45.1%), significantly more than heterosexual women (28.9%). Among those who met criteria for a past-year TUD, bisexual women were also more likely to have PTSD (30.9%) compared to heterosexual women (13.2%)

Stress-related correlates of past-year AUD and TUD psychiatric comorbidities among full sample (Table 2).

We examined whether stress-related factors were associated with greater odds of each type of comorbidity while controlling for sociodemographics. We found that greater stressful life events were associated with greater odds of each of the six types of comorbidities examined (aORs ranged from 1.30 to 1.43). ACEs were associated with all six types of comorbidities (aORs ranged from 1.08 to 1.19). Greater social support was associated with lower odds of five of the six comorbidities (aORs ranged from 0.96 to 0.98). Social support was not significantly associated with odds of AUD+PTSD. We also tested for potential interactions of social support with stressful life events and with ACEs and found minimal evidence that social support was a significant moderator (results not shown). Only one interaction was significant such that for those with greater stressful life events, social support was less protective than for those with fewer stressful life events ($p=0.003$).

Stress-related correlates of past-year AUD, TUD and psychiatric comorbidities among sexual minorities (Table 3).

Among sexual minorities ($n=3,203$), we examined whether stress-related factors were associated with greater odds of each type of psychiatric comorbidity while controlling for other sociodemographics. This included examining the additional stress-related factor of sexual orientation discrimination that was only assessed among sexual minorities. Greater frequency of sexual orientation discrimination was associated with greater odds of many psychiatric comorbidities examined including AUD+anxiety disorders (aOR: 1.08; 95% CI: 1.01, 1.15), AUD+PTSD (aOR: 1.10; 95% CI: 1.03, 1.17), TUD+anxiety disorders (aOR: 1.09; 95% CI: 1.02, 1.17), and TUD+mood disorders (aOR: 1.08; 95% CI: 1.01, 1.15). A greater number of stressful life events in the past year was also positively associated with all comorbidities examined (significant aORs ranged from 1.25 to 1.43). A greater number of ACEs was associated with all comorbidities except comorbid AUD+anxiety (significant aOR range=1.04–1.18). Greater social support was inversely associated only with TUD+anxiety disorders (aOR: 0.97; 95% CI: 0.95, 0.99) and TUD+mood disorders (aOR: 0.96; 95% CI: 0.94, 0.98).

DISCUSSION

This study provides important information about the prevalence of AUD and TUD psychiatric comorbidities among sexual minority populations. Similar to work examining AUD and PTSD[9], we found that sexual minorities have higher prevalence of AUD and TUD psychiatric comorbidities than heterosexuals. Importantly we found that this was not simply driven by higher rates of AUD and TUD. Consistent with previous research, we found higher prevalences of psychiatric disorders among those who met criteria for a past-

year AUD and past-year TUD, respectively. And, among sexual minority men and women who met criteria for an AUD and TUD, we found a greater co-occurrence of psychiatric disorders than among heterosexuals who met criteria for an AUD and for a TUD.

Consistent with research examining single disorders[14,29], we found variation in risk among sexual minorities by sexual identity and sex. Risk for psychiatric comorbidities was particularly high for bisexual women. In fact, well over half of bisexual women who met criteria for an AUD or TUD had a psychiatric comorbidity. Thus, it is important for clinicians to know that psychiatric comorbidities are more often present than not among sexual minorities that present with an AUD or TUD. Mental health screening is important for all that present with an AUD or a TUD, as different treatment strategies may be more effective for individuals with comorbid psychiatric disorders; mental health screening is particularly imperative for sexual minority individuals. We found PTSD prevalence among bisexual women with an AUD or with a TUD particularly high, which may point to underlying stressful and traumatic life events being important factors driving higher comorbidity among sexual minorities overall and bisexual women in particular.

In fact, our findings examining correlates suggest that experiences of sexual orientation discrimination and victimization have robust associations with comorbidities among sexual minorities. Sexual orientation discrimination, ACEs, and recent stressful life events were each independently predictive of many AUD and TUD comorbidities. This is consistent with previous research that has shown these factors to be associated with single disorders. This also lends additional support to the minority stress model and highlights the importance of structural change that is needed to reduce discrimination and stressful experiences among sexual minorities in order to mitigate their health disparities. Clinicians should be cognizant of the challenges faced by sexual minorities and include these factors as part of their initial assessment and treatment. Importantly, treatment environments should be affirming of sexual minority status. Clinicians should examine their policies and practices to ensure that they are not engaging in discriminatory practices.

Also consistent with the minority stress model, we found that social support was protective[33]. More research to identify the types and sources of social support that are most beneficial and how they can be incorporated into treatment is needed, as this may be an important tool for building resilience. In addition, these results suggest that earlier prevention strategies for sexual minorities that incorporate social support may help reduce substance use and psychiatric disparities. We found minimal evidence that social support served as a buffer in the association of stressors and comorbidities; additional research that examines these associations longitudinally and using larger samples of sexual minorities is needed.

Limitations

This study was cross-sectional, thus we were not able to determine temporal ordering regarding minority stress correlates and the presence of substance use and psychiatric disorders. Longitudinal data would further elucidate the complex relationships between stress-related factors and comorbidities. This study was conducted in 2012–2013. Given cultural and policy changes in the U.S. regarding sexual minorities, it is possible more recent

data could yield different results. However, recent studies among youth have shown that substance use related disparities have persisted for sexual minorities through at least 2015[40]. Still, it is critical to monitor these potential changes. This study may provide important baseline data with which to assess whether substance use and other psychiatric disorder disparities are improving or persisting for sexual minorities in the U.S. Another limitation is the small sample size of sexual minorities, which did not allow for the examination of how these associations varied by sex and sexual identity. National studies are needed that oversample sexual minorities allowing for a more detailed look at risk and protective factors among this heterogeneous population. Finally, the NESARC-III study does not include information regarding gender identity, and thus, we could not examine or control for this in our analysis.

In sum, sexual minorities experience greater comorbidities compared to heterosexual counterparts. Stressors are associated with greater comorbidities among all individuals, and sexual minority specific stressors including sexual orientation discrimination may contribute to comorbidities among sexual minorities. These additional stressors should be considered in assessment and treatment of sexual minorities with substance use and other psychiatric disorders as these comorbidities may pose heightened challenges in assessment, diagnoses, and treatment.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1.
Comorbidities prevalence by sexual identity (a) overall, (b) among men, (c) among women
Note: Reference = heterosexual, *p<0.05, **p<0.01, ***p<0.001

Table 1.

Descriptives of disorders overall and by sexual identity and sex (n=35,976)

	Men and Women				Men			Women		
	Overall	Heterosexual	Bisexual	Gay/Lesbian	Heterosexual	Bisexual	Gay	Heterosexual	Bisexual	Gay/Lesbian
Past-year AUD	13.8%	13.4%	30.2% [*]	25.9% [*]	17.3%	31.4% [*]	26.6% [*]	9.7% [*]	29.7% [*]	24.9% [*]
Past-year TUD	20.0%	19.6%	37.6% [*]	28.9% [*]	23.0%	40.8% [*]	30.0% [*]	16.4% [*]	36.3% [*]	27.3% [*]
Past-year anxiety disorders	13.0%	12.6%	28.9% [*]	22.2% [*]	8.7%	20.2% [*]	23.0% [*]	16.3% [*]	32.5% [*]	21.1%
Past-year mood disorders	12.8%	12.4%	31.2% [*]	21.7% [*]	9.3%	21.9% [*]	20.3% [*]	15.4% [*]	34.9% [*]	23.7% [*]
Past-year PTSD	5.6%	4.4%	17.9% [*]	6.7% [*]	3.0%	10.3% [*]	6.2% [*]	5.7% [*]	21.0% [*]	7.4%
Stress-related factors										
Sexual orientation discrimination (0–24; mean) ^a	0.7	0.2	1.1	2.2	0.2	1.2	2.2	0.2	1.1	2.3
Stressful experiences (0–16; mean) ^b	1.6	1.6	3.1	2.3	1.6	2.8	2.2	1.6	3.2	2.5
Adverse childhood experiences (0–18; mean) ^c	2.9	2.8	4.9	3.8	2.7	4.2	3.7	2.9	5.2	3.9
Social support (0–48; mean) ^d	42.0	42.1	40.0	41.9	42.0	39.2	41.0	42.2	40.3	43.2

Note: AUD=alcohol use disorder, TUD=tobacco use disorder, PTSD=post-traumatic stress disorder.

^a sexual orientation discrimination items were asked of individuals who identified as gay/lesbian, bisexual, or identified as heterosexual, but reported non-heterosexual attraction or behavior. The discrimination scale included six items assessed on a four-point scale regarding the frequency of different types of discrimination^b sum of the number of stressful events in the past year out of a potential 16 life events^c sum of the number of 18 potential experiences^d twelve questions assessing perceived social support using items from the Interpersonal Support Evaluation List (ISEL) for General Populations. Responses were on a four-point scale ranging from definitely false to definitely true^{*} significantly different from heterosexuals at p<0.05

Table 2.

Multivariable associations with AUD and TUD psychiatric disorders (n=35,796)

	Comorbid AUD + Anxiety	95% CI	aOR ^a	Comorbid AUD + Mood	95% CI	aOR	Comorbid AUD +PTSD	95% CI	aOR	Comorbid TUD +Anxiety	95% CI	aOR	Comorbid TUD + Mood	95% CI	aOR	Comorbid TUD + PTSD	95% CI
Stressful life events past 12 months (0–16) ^b	1.38	1.34, 1.41 [*]	1.43	(1.39, 1.47) [*]	1.39	(1.35, 1.44) [*]	1.30	(1.26, 1.34) [*]	1.32	(1.28, 1.36) [*]	1.30	(1.25, 1.34) [*]					
Adverse childhood events (0–18) ^c	1.08	(1.06, 1.10) [*]	1.08	(1.06, 1.09) [*]	1.15	(1.12, 1.17) [*]	1.10	(1.09, 1.12) [*]	1.11	(1.09, 1.13) [*]	1.19	(1.16, 1.21) [*]					
Social support (0–48) ^d	0.98	(0.97, 0.99) [*]	0.97	(0.96, 0.98) [*]	0.99	(0.97, 1.01)	0.96	(0.95, 0.97) [*]	0.96	(0.95, 0.97) [*]	0.98	(0.96, 0.99) [*]					
Sexual identity																	
Heterosexual ^e	REF.		REF.		REF.		REF.		REF.		REF.		REF.		REF.		REF.
Bisexual	1.84	(1.28, 2.65) [*]	1.97	(1.29, 3.02) [*]	2.71	(1.68, 4.38) [*]	1.54	(1.03, 2.30) [*]	1.58	(1.09, 2.28) [*]	2.39	(1.51, 2.78) [*]					
Gay/Lesbian	2.43	(1.63, 3.63) [*]	2.53	(1.75, 3.66) [*]	2.35	(1.37, 4.02) [*]	1.79	(1.13, 2.84) [*]	1.61	(1.03, 3.53)	0.88	(0.45, 1.71)					
Female	1.00	(0.84, 1.20)	0.93	(0.81, 1.07)	1.17	(0.95, 1.44)	1.29	(1.09, 1.52) [*]	1.16	(1.02, 1.31) [*]	1.50	(1.20, 1.87) [*]					
Race/ethnicity																	
White non-Hispanic	REF.		REF.		REF.		REF.		REF.		REF.		REF.		REF.		REF.
Black non-Hispanic	0.72	(0.56, 0.93) [*]	0.71	(0.56, 0.90) [*]	1.02	(0.69, 1.53)	0.46	(0.38, 0.56) [*]	0.41	(0.34, 0.50) [*]	0.61	(0.45, 0.83) [*]					
American Indian/ Alaska	0.86	(0.48, 1.55)	0.79	(0.50, 1.23)	1.25	(0.62, 1.55)	0.95	(0.57, 1.61)	0.66	(0.43, 1.01)	0.83	(0.48, 1.45)					
Native non-Hispanic																	
Asian non-Hispanic	0.68	(0.44, 1.05)	0.69	(0.50, 0.95) [*]	0.60	(0.28, 1.30)	0.24	(0.17, 0.35) [*]	0.35	(0.26, 0.47) [*]	0.30	(0.13, 0.68) [*]					
Hispanic	0.77	(0.60, 0.99) [*]	0.71	(0.58, 0.86) [*]	1.02	(0.71, 1.47)	0.37	(0.30, 0.46) [*]	0.43	(0.35, 0.54) [*]	0.46	(0.33, 0.64) [*]					
College degree	0.94	(0.72, 1.21)	0.89	(0.72, 1.08)	0.82	(0.57, 1.17)	0.44	(0.35, 0.54) [*]	0.51	(0.41, 0.64) [*]	0.47	(0.33, 0.64) [*]					
Family income																	
Low	REF.		REF.		REF.		REF.		REF.		REF.		REF.		REF.		REF.
Medium	0.76	(0.62, 0.93) [*]	0.76	(0.63, 0.93) [*]	0.69	(0.51, 0.93) [*]	0.74	(0.62, 0.88) [*]	0.71	(0.61, 0.82) [*]	0.82	(0.67, 1.02)					
High	0.72	(0.56, 0.93) [*]	0.79	(0.63, 0.98) [*]	0.64	(0.44, 0.93) [*]	0.52	(0.43, 0.63) [*]	0.49	(0.41, 0.64) [*]	0.49	(0.35, 0.69) [*]					
Region																	
Northeast	REF.		REF.		REF.		REF.		REF.		REF.		REF.		REF.		REF.

	Comorbid AUD + Anxiety	Comorbid AUD + Mood	Comorbid AUD +PTSD	Comorbid TUD +Anxiety	Comorbid TUD + Mood	Comorbid TUD + PTSD
	aOR ^a	aOR	aOR	aOR	aOR	aOR
	95% CI	95% CI	95% CI	95% CI	95% CI	95% CI
Midwest						
	0.76	0.71	0.79	0.84	0.77	0.65
	(0.55, 1.04)	(0.57, 0.89) [*]	(0.45, 1.39)	(0.67, 1.05)	(0.61, 0.82) [*]	(0.44, 0.99) [*]
South	0.77	0.67	0.82	0.94	0.90	0.87
	(0.58, 1.02)	(0.53, 0.83) [*]	(0.53, 1.29)	(0.77, 1.15)	(0.72, 1.11)	(0.60, 1.25)
West	0.88	0.80	0.88	0.75	0.76	0.62
	(0.66, 1.16)	(0.65, 1.00)	(0.58, 1.34)	(0.59, 0.95)	(0.60, 0.95) [*]	(0.43, 0.91) [*]
Urban	0.79	0.59	0.93	1.29	1.02	1.36
	(0.63, 0.98) [*]	(0.47, 0.74) [*]	(0.64, 1.35)	(1.10, 1.52)	(0.84, 1.23)	(1.02, 1.82) [*]

^{*} p<0.05

^a aOR=adjusted odds ratio

^b sum of the number of stressful events in the past year out of a potential 16 life events

^c sum of the number of 18 potential experiences

^d twelve questions assessing perceived social support using items from the Interpersonal Support Evaluation List (ISEL) for General Populations. Responses were on a four-point scale ranging from definitely false to definitely true

^e When examining the full NESARC-III sample heterosexual refers to all individuals who identified as heterosexual

Multivariable associations with AUD and TUD psychiatric disorders among sexual minorities (n=3,203)^a

Table 3.

	Comorbid AUD + Anxiety	Comorbid AUD + Mood	Comorbid AUD +PTSD	Comorbid AUD	Comorbid TUD +Anxiety	Comorbid TUD + Mood	Comorbid TUD + PTSD
	aOR ^b (95% CI)	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)
Sexual orientation discrimination past 12 months (0–24) ^c	1.08 (1.01, 1.15)	1.04 (0.97, 1.12)	1.10 (1.03, 1.17)*	1.09 (1.02, 1.17)*	1.08 (1.01, 1.15)*	1.06 (0.99, 1.13)	1.06 (0.99, 1.13)
Stressful life events past 12 months (0–16) ^d	1.40 (1.32, 1.49)	1.43 (1.34, 1.52)*	1.43 (1.34, 1.52)*	1.27 (1.20, 1.35)*	1.29 (1.22, 1.26)*	1.25 (1.16, 1.34)*	1.25 (1.16, 1.34)*
Adverse childhood events (0–18) ^e	1.03 (1.00, 1.06)	1.04 (1.01, 1.08)*	1.10 (1.06, 1.14)*	1.07 (1.04, 1.11)*	1.07 (1.04, 1.10)*	1.18 (1.14, 1.22)*	1.18 (1.14, 1.22)*
Social support (0–48) ^f	1.00 (0.97, 1.02)	0.98 (0.95, 1.01)	1.02 (0.99, 1.05)	0.97 (0.95, 0.99)*	0.96 (0.94, 0.98)*	1.00 (0.98, 1.03)	1.00 (0.98, 1.03)
Sexual identity	REF.	REF.	REF.	REF.	REF.	REF.	REF.
Heterosexual ^g	REF.	REF.	REF.	REF.	REF.	REF.	REF.
Bisexual	1.06 (0.68, 1.64)	1.26 (0.75, 2.10)	1.33 (0.74, 2.41)	1.15 (0.76, 1.74)	1.09 (0.71, 1.69)	1.92 (1.08, 3.42)	1.92 (1.08, 3.42)
Gay/Lesbian	1.16 (0.68, 1.99)	1.43 (0.86, 2.39)	0.87 (0.47, 1.58)	1.04 (0.62, 1.73)	0.97 (0.58, 1.64)	0.63 (0.28, 1.42)	0.63 (0.28, 1.42)
Female	1.06 (0.68, 1.64)	0.96 (0.64, 1.42)	1.60 (0.89, 2.86)	1.50 (1.05, 2.17)*	1.51 (1.04, 2.19)*	2.24 (1.25, 4.02)*	2.24 (1.25, 4.02)*
Race/ethnicity	REF.	REF.	REF.	REF.	REF.	REF.	REF.
White non-Hispanic	REF.	REF.	REF.	REF.	REF.	REF.	REF.
Black non-Hispanic	0.66 (0.41, 1.05)	0.55 (0.36, 0.86)*	1.34 (0.73, 2.47)	0.41 (0.26, 0.65)*	0.38 (0.25, 0.58)*	0.79 (0.46, 1.35)	0.79 (0.46, 1.35)
American Indian/Alaska Native non-Hispanic	1.55 (0.62, 3.89)	0.96 (0.46, 2.01)	1.25 (0.54, 2.89)	0.21 (0.05, 0.95)*	0.14 (0.04, 0.49)*	0.12 (0.02, 0.65)*	0.12 (0.02, 0.65)*
Asian non-Hispanic	0.85 (0.40, 1.80)	0.67 (0.27, 1.66)	1.14 (0.28, 4.69)	0.41 (0.14, 1.18)	0.29 (0.11, 0.75)*	0.26 (0.05, 1.33)	0.26 (0.05, 1.33)
Hispanic	0.81 (0.49, 1.33)	0.81 (0.53, 1.26)	1.29 (0.70, 2.38)	0.43 (0.27, 0.69)*	0.66 (0.41, 1.05)	0.84 (0.44, 1.60)	0.84 (0.44, 1.60)
College degree	0.90 (0.57, 1.42)	0.80 (0.51, 1.25)	0.64 (0.35, 1.15)	0.46 (0.20, 0.72)*	0.51 (0.31, 0.84)*	0.46 (0.23, 0.92)*	0.46 (0.23, 0.92)*
Family income	REF.	REF.	REF.	REF.	REF.	REF.	REF.
Low	REF.	REF.	REF.	REF.	REF.	REF.	REF.
Medium	0.70 (0.45, 1.09)	0.75 (0.48, 1.16)	0.93 (0.52, 1.67)	0.66 (0.44, 1.00)*	0.54 (0.39, 0.76)*	0.83 (0.52, 1.33)	0.83 (0.52, 1.33)
High	0.60 (0.39, 0.94)*	0.53 (0.33, 0.87)*	0.91 (0.50, 1.65)	0.53 (0.38, 0.75)*	0.45 (0.28, 0.70)*	0.59 (0.32, 1.07)	0.59 (0.32, 1.07)
Region							

	Comorbid AUD + Anxiety	Comorbid AUD + Mood	Comorbid AUD +PTSD	Comorbid TUD +Anxiety	Comorbid TUD + Mood	Comorbid TUD + PTSD
	aOR ^b (95% CI)	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)
Northeast	REF.	REF.	REF.	REF.	REF.	REF.
Midwest	1.19 (0.66, 2.13)	0.72 (0.39, 1.32)	1.16 (0.54, 2.47)	0.93 (0.48, 1.80)	1.28 (0.70, 2.34)	1.18 (0.60, 2.33)
South	1.07 (0.62, 1.86)	0.81 (0.49, 1.34)	1.51 (0.85, 2.67)	1.00 (0.57, 1.73)	1.00 (0.57, 1.76)	1.21 (0.63, 2.30)
West	1.26 (0.75, 2.10)	1.03 (0.64, 1.66)	1.27 (0.69, 2.34)	1.07 (0.61, 1.88)	1.11 (0.63, 1.93)	0.73 (0.36, 1.49)
Urban	0.84 (0.48, 1.48)	0.59 (0.34, 1.05)	0.89 (0.39, 2.01)	1.33 (0.90, 1.96)	0.78 (0.49, 1.23)	1.22 (0.65, 2.29)

* p<0.05

^a sexual minorities included those who identified as gay/lesbian, bisexual, and identified as heterosexual but reported non-heterosexual attraction or behavior

^b aOR=adjusted odds ratio

^c sexual orientation discrimination items were asked of individuals who identified as gay/lesbian, bisexual, or identified as heterosexual but reported non-heterosexual attraction or behavior. The discrimination scale included six items assessed on a four-point scale regarding the frequency of different types of discrimination

^d sum of the number of stressful events in the past year out of a potential 16 life events

^e sum of the number of 18 potential experiences

^f twelve questions assessing perceived social support using items from the Interpersonal Support Evaluation List (ISEL) for General Populations. Responses were on a four-point scale ranging from definitely false to definitely true

^g This analysis was conducted among sexual minorities. In this analysis heterosexual refers to individuals who reported heterosexual identity and non-heterosexual attraction or behavior.