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Early Alcohol and Smoking Initiation: A Contributor to Sexual Minority Disparities in Adult Use

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Abstract

Introduction: Lesbian, gay, and bisexual (LGB) adults report higher rates of smoking and alcohol use than heterosexual peers. Prior studies have not examined whether potential disparities in early initiation among LGB youth may contribute to adult disparities.

Methods: Data on 126,463 adults (including 8,241 LGB adults) were from the 2015–2017 National Survey on Drug Use and Health. Rates of reported early alcohol and smoking initiation (prior to age 15 years) among both lesbian/gay (L/G) and bisexual adults were examined relative to same-gender heterosexual adults. Mediation analyses were used to assess whether early initiation differences contribute to disparities in adult heavy episodic drinking, alcohol use disorder, current smoking, and nicotine dependence for each subgroup. Analyses were conducted in 2018–2019.

Results: For both L/G and bisexual women, early alcohol initiation rates were elevated and explained 21%–38% of their observed disparities in adult heavy episodic drinking and alcohol use disorder. Similarly, early smoking initiation rates were elevated among both L/G and bisexual women and explained 22%–29% of their disparities in adult smoking and nicotine dependence. By contrast, no evidence was observed that early initiation mediated adult disparities for gay or bisexual men.

Conclusions: A significant proportion of alcohol and smoking disparities among L/G and bisexual women in adulthood appear attributable to early initiation, indicating the need for enhanced early prevention efforts for these groups. Making routine adolescent screening for substance use, brief intervention, and referral to treatment more culturally sensitive to LGB youth may also be an important step in reducing adult disparities for LGB women.

INTRODUCTION

National surveys find that lesbian, gay, and bisexual (LGB) adults have higher rates of smoking and heavy episodic drinking (HED) than their heterosexual peers,^{1,2} as well as

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higher rates of nicotine dependence^{3–5} and alcohol use disorder (AUD).^{6,7} One potential explanatory factor in these patterns is earlier initiation of smoking and drinking among LGB youth.^{8–13} In the general population, relative to those who start later in life, individuals who begin smoking at younger ages are more likely to develop nicotine dependence^{14–17} and individuals who begin drinking alcohol at younger ages are more likely to develop AUD.^{18–21}

Several studies have found that LGB youth initiate smoking and alcohol use at younger ages than heterosexual peers. Longitudinal survey data from U.S. adolescents indicates that both male and female LGB youth were consistently more likely to report smoking¹³ and alcohol use²² before age 13 years compared with heterosexual peers. Similar LGB disparities in early smoking and alcohol initiation have been observed among Canadian adolescents.^{9,10} Another study found that although all subgroups of LGB youth reported initiating drinking at younger ages than heterosexual peers, bisexual female individuals were at the greatest risk of early initiation as well as subsequent binge drinking.⁸ Data from the National Adult Tobacco Survey indicate that LGB women initiated smoking and daily smoking significantly younger than heterosexual women; although no differences in early initiation were observed between sexual minority and heterosexual men.¹¹

Substance use initiation during adolescence is driven by a number of factors.^{23–25} In particular, LGB youth may face minority stress, namely stigma and discrimination experienced by those in a marginalized social group,²⁶ which may elevate their risk for substance use relative to heterosexual peers.²⁷ Minority stress may be magnified during adolescence, a developmental period marked by emphasis on conformity of sexuality and gender expression²⁸ and increased homophobic attitudes and behavior.²⁹ Peer bullying and family rejection due to sexual identity are widely experienced by LGB youth³⁰ and have been linked to elevated substance use.³¹ Even LGB youth still in the process of identity formation may perceive themselves as “non-normative” and experience confusion or distress, for which substance use may represent a coping strategy.³²

To date, the degree to which excess alcohol and cigarette use among LGB adults is related to disparities in early initiation is unknown. One prior study found that young LGB women (but not sexual minority men) were more likely to persist in alcohol and tobacco use in adulthood relative to heterosexual peers; however, that study did not employ a mediation framework.¹²

This study characterizes early alcohol and cigarette initiation by sexual identity and gender using a large, nationally representative sample of U.S. adults. Potential differences by gender and sexual identity (i.e., lesbian/gay [L/G] versus bisexual) are examined as disparities in alcohol and tobacco use are more pronounced among LGB women than men^{1,2,33,34} and bisexual adults, particularly bisexual women, may be at unique risk for some substance use behaviors.^{35,36} A mediation framework is used to examine the extent to which early initiation explains LGB disparities in HED, AUD, current smoking, and nicotine dependence during adulthood. It is hypothesized that elevated rates of early initiation among LGB individuals contribute to LGB disparities during adulthood and that mediating effects may differ by gender and sexual identity.

Results will provide insight regarding optimal timing and targeting of prevention, screening, and treatment initiatives among LGB youth and the extent to which such initiatives might reduce disparities among LGB adults.

METHODS

Study Population

Data were from the 2015, 2016, and 2017 National Survey on Drug Use and Health (NSDUH), an annual nationally representative survey of drug use among the civilian, non-institutionalized U.S. population aged 12 years. Data were collected using computer-assisted interviewing to facilitate accurate reporting of sensitive behaviors. Survey respondents gave written informed consent and were compensated \$30. Respondents to the NSDUH totaled 57,146 in 2015 (70% response rate), 56,897 in 2016 (68% response rate), and 56,276 in 2017 (67% response rate). Of the 170,319 total respondents across 2015–2017, a total of 41,479 individuals aged 12–17 years were excluded as were 1,501 individuals who did not respond to the sexual identity question and 776 individuals who responded *don't know*. The final sample included 126,463 adults identifying as *heterosexual, lesbian or gay, or bisexual*. This study was determined to be exempt by RAND's IRB.

Measures

Sexual identity was assessed as: *Which one of the following do you consider yourself to be?* Response choices were: *heterosexual, that is, straight, lesbian or gay, bisexual; and don't know*. Hereafter, this paper refers to women who selected *lesbian or gay* as “L/G women,” as sexual minority women may describe themselves as “lesbian,” “gay,” or both.

Alcohol initiation age was assessed as: *How old were you the first time you had a drink of an alcoholic beverage? Please do not include any time when you only had a sip or two from a drink*. Smoking initiation age was assessed as: *How old were you the first time you smoked part or all of a cigarette?* In keeping with numerous prior studies, early initiation was defined as use before age 15 years for both alcohol and smoking.^{18,20,21,37–39}

Current smoking was defined as smoking at least one cigarette in the past 30 days. Past-month nicotine dependence was measured by the Fagerström Test for Nicotine Dependence item assessing whether the first cigarette smoked was within 30 minutes of waking up. Past-month HED was defined as at least one occurrence of HED (i.e., four or more drinks in a day for women and five or more drinks in a day for men) in the past 30 days. An individual was classified as having a past-year AUD if they met DSM-IV abuse or dependence criteria for alcohol in the past 12 months.

Demographic covariates were: gender (male, female), age (18, 19, 20, 21, 22–23, 24–25, 26–29, 30–34, 35–49, 50–64, 65 years), race/ethnicity (white, black, Hispanic, Asian, other), education level (less than high school, high school, some college/2-year college degree, 4-year college degree), employment (full-time, part-time, student, unemployed, other), family income (<\$20,000, \$20,000–\$49,999, \$50,000–\$74,999, \$75,000), marital status (married, widowed, divorced/separated, never married), living with children aged <18

years (yes, no), and urbanicity (large metropolitan area, small metropolitan area, non-metropolitan area).

Statistical Analysis

Logistic regression was used to estimate the OR of early alcohol and smoking initiation across sexual identity groups separately by gender. The extent to which relationships between sexual identity and adult alcohol and smoking outcomes were attributable to early initiation was examined in a mediation analysis framework. First, the total effect, namely the overall association between sexual identity and adult use, was estimated. If nonsignificant, there were no adult disparities in use to explain via mediation.⁴⁰ The total effect was then decomposed into the indirect effect (i.e., the portion of the total effect due to early initiation—the mediated portion) and the direct effect (i.e., the remaining, unmediated portion).⁴¹ A significant indirect effect in the presence of a significant total effect was reported as a mediated effect.⁴² For each outcome, the total effect of sexual identity was estimated with logistic regression. The direct effect was calculated by re-estimating the regression model after adding the corresponding early initiation variable. The Karlson–Holm–Breen method was implemented using the *khb* package in Stata to estimate the indirect effect in the context of non-linear models and to calculate proportion of the total effect mediated by early initiation.^{43,44} All analyses were conducted in 2018–2019 using Stata, version 15.1 and accounted for NSDUH survey design. Regression models were stratified by gender and adjusted for all demographic covariates.

RESULTS

The sample included 1,321 L/G women, 4,289 bisexual women, 1,410 gay men, and 1,221 bisexual men (Table 1). LGB adults, particularly bisexual women, were younger on average than heterosexual adults (e.g., 12.4% of heterosexual women were aged 18–25 years vs 41.5% of bisexual women). Racial/ethnic composition across sexual identity subgroups was similar. Relative to same-gender heterosexual peers, education levels were higher among gay men and L/G women and lower among bisexual men and women. LGB adults were less likely to be married (e.g., 52% of heterosexual women vs 26% of L/G women) and gay and bisexual men and L/G women were less likely to be living with children than heterosexual peers.

Compared with heterosexual peers, all LGB subgroups reported higher unadjusted rates of AUD, HED, current smoking and nicotine dependence.

After demographic adjustment, compared with same-gender heterosexual peers, rates of early alcohol initiation were elevated among L/G women (AOR=2.23, 95% CI=1.82, 2.74), bisexual women (AOR=2.36, 95% CI=2.12, 2.62), and bisexual men (AOR=1.35, 95% CI=1.10, 1.65) (Table 2). L/G women (AOR=1.81, 95% CI=1.48, 2.23), bisexual women (AOR=2.28, 95% CI=2.05, 2.54), and bisexual men (AOR=1.37, 95% CI=1.12, 1.67) had elevated rates of early smoking initiation. Gay men were not more likely than heterosexual men to initiate smoking or alcohol use early.

Early alcohol initiation was significantly associated with adult HED among women (AOR=2.02, 95% CI=1.87, 2.17; Table 3). L/G women did not exhibit HED disparities; a mediating effect of early initiation was not present. Bisexual women exhibited significant HED disparities relative to heterosexual women (total effect: AOR=1.44, 95% CI=1.29, 1.60). Early alcohol initiation had a significant mediating effect on HED (AOR=1.10, 95% CI=1.06, 1.13) for bisexual women, explaining 26% of the total effect. A significant direct effect remained when accounting for early initiation (AOR=1.31, 95% CI=1.18, 1.45).

Early alcohol initiation was significantly associated with adult AUD among women (AOR=2.78, 95% CI=2.52, 3.08). Relative to heterosexual women, L/G women had significant AUD disparities (total effect: AOR=1.37, 95% CI=1.04, 1.80). Early alcohol initiation had a significant mediating effect on AUD among L/G women (AOR=1.13, 95% CI=1.08, 1.18), explaining 38% of the total effect. No significant direct effect remained when accounting for early initiation. Bisexual women also exhibited AUD disparities compared with heterosexual women (total effect: AOR=1.95, 95% CI=1.67, 2.27). Early alcohol initiation had a significant mediating effect on AUD (AOR=1.15, 95% CI=1.10, 1.20) among bisexual women, explaining 21% of the total effect. A significant direct effect remained when adjusting for early initiation (AOR=1.70, 95% CI=1.46, 1.97).

Among men, early alcohol initiation was significantly associated with adult HED (AOR=1.91, 95% CI=1.79, 2.04). Neither gay nor bisexual men exhibited HED disparities; mediating effects of early initiation were not present.

Early alcohol initiation was significantly associated with adult AUD among men when controlling for sexual identity (AOR=2.22, 95% CI=2.01, 2.46). Relative to heterosexual men, gay men had significant AUD disparities (total effect: AOR=1.41, 95% CI=1.13, 1.75; direct effect: AOR=1.44, 95% CI=1.16, 1.79); however, early alcohol initiation was not a significant mediator. Bisexual men did not exhibit AUD disparities; a mediating effect of early initiation was not present.

Early smoking initiation was significantly associated with current smoking among women (AOR=2.91, 95% CI=2.70, 3.12; Table 4). Relative to heterosexual women, L/G women experienced significant current smoking disparities (total effect: AOR=1.58, 95% CI=1.33, 1.87). Early smoking initiation had a significant mediating effect on current smoking (AOR=1.11, 95% CI=1.06, 1.16) among L/G women, explaining 22% of total effect. After adjusting for early initiation, a significant direct effect remained (AOR=1.43, 95% CI=1.21, 1.69). Bisexual women also exhibited current smoking disparities relative to heterosexual women (total effect: AOR=1.93, 95% CI=1.75, 2.12). Early smoking initiation had a significant mediating effect among bisexual women (AOR=1.16, 95% CI=1.11, 1.21), explaining 22% of the total effect. A significant direct effect remained when accounting for early initiation (AOR=1.67, 95% CI=1.51, 1.84).

Early smoking initiation was significantly associated with adult nicotine dependence among women (AOR=3.01, 95% CI=2.75, 3.31). Relative to heterosexual women, L/G women had significant nicotine dependence disparities (total effect: AOR=1.45, 95% CI=1.10, 1.92). Early smoking initiation had a significant mediating effect on nicotine dependence among

L/G women (AOR=1.11, 95% CI=1.06, 1.16), explaining 28% of the total effect. No significant direct effect remained. Bisexual women also experienced nicotine dependence disparities compared with heterosexual women (total effect: AOR=1.67, 95% CI=1.44, 1.94). Early smoking initiation had a significant mediating effect among bisexual women (AOR=1.16, 95% CI=1.11, 1.22), explaining 29% of the total effect. When accounting for early initiation, a significant direct effect remained (AOR=1.44, 95% CI=1.24, 1.67).

Among men, early smoking initiation was significantly associated with current smoking (AOR=2.41, 95% CI=2.26, 2.57). Gay men exhibited current smoking disparities compared with heterosexual men (total effect: AOR=1.29, 95% CI=1.06, 1.57; direct effect: AOR=1.29, 95% CI=1.06, 1.57); however, early smoking initiation was not a significant mediator. Bisexual men did not exhibit current smoking disparities; a mediating effect of early initiation was not present.

Early smoking initiation was significantly associated with adult nicotine dependence among men (AOR=2.65, 95% CI=2.48, 2.83). Gay men experienced significant nicotine dependence disparities (total effect: AOR=1.29, 95% CI=1.06, 1.57; direct effect: AOR=1.29, 95% CI=1.06, 1.57); yet, early smoking initiation was not a significant mediator. Bisexual men did not exhibit nicotine dependence disparities; a mediating effect of early initiation was not present.

DISCUSSION

This study characterized disparities in early initiation of alcohol and smoking across LGB subgroups and examined the potential mediating effects of early initiation on adult alcohol and smoking disparities. Relative to heterosexual women, L/G and bisexual women reported significantly higher rates of initiating smoking and alcohol use prior to age 15 years. Both L/G and bisexual women exhibited adulthood disparities in AUD, current smoking, and nicotine dependence; bisexual women additionally exhibited disparities in HED. Mediation analyses indicated that early alcohol initiation explained 21%–38% of HED and AUD disparities and early smoking initiation explained 22%–29% of current smoking and nicotine dependence disparities among L/G and bisexual women. This suggests that enhanced prevention and early intervention may considerably reduce adult disparities among LGB women.

Results provided no evidence that early initiation represented a mediating pathway for use among gay or bisexual men. For mediation to be present, disparities in both early initiation and adult outcomes must be present. Although bisexual men initiated alcohol use and smoking earlier than their heterosexual counterparts, they did not exhibit disparities in adult alcohol or smoking outcomes. Conversely, though gay men exhibited disparities in AUD, smoking, and nicotine dependence during adulthood, they did not initiate smoking or alcohol use at significantly younger ages than heterosexual men.

Minority stress and LGB-specific stressors during adolescent development may contribute to the observed early initiation disparities among L/G and bisexual women and bisexual men. Relative to heterosexual peers, male and female sexual minority youth experience higher

rates of school-based bullying, electronic bullying, and feeling unsafe at school.⁴⁵ Furthermore, LGB youth experience higher levels of childhood sexual and physical abuse⁴⁶ as well as sexual dating violence.⁴⁵ Additionally, relative to heterosexual peers, female LGB youth report lower parental support,⁴⁷ a significant protective factor for substance use during adolescence.^{48,49} Emerging evidence suggests that LGB female individuals, relative to heterosexual counterparts, have more favorable alcohol use expectancies and overestimate the amount of alcohol peers consume, both of which may elevate drinking risk.^{50,51} As traditional female gender norms are generally protective against substance use, weaker identification with female gender norms among L/G and bisexual female individuals may also contribute to early initiation risk.⁵² Both male and female bisexual youth may face bisexual-specific stigma arising from the dominant binary model of sexual orientation (homosexuality or heterosexuality), including skepticism regarding bisexuality, perceptions that bisexuals are confused about their sexual identity, and bisexual “invisibility.”⁵³ Relative to both heterosexual and other sexual minority individuals, bisexual male and female individuals are at increased risk for anxiety, depression, and suicidality^{54,55}; these mental health problems may arise in adolescence and contribute to substance use risk.

Universal screening for substance use, brief intervention, and referral to treatment has recently been recommended as part of routine adolescent health care.⁵⁶ Its implementation should be inclusive of LGB youth, addressing risk factors salient to sexual minorities that are also important to heterosexual youth (e.g., family relationships, bullying). Although attachment-based family therapy has been found to reduce suicidal ideation among LGB youth,⁵⁷ the effectiveness of integrating this model into substance use treatment for LGB youth remains largely unexamined.^{58,59} School-based drug prevention programs often focus on internal and external pressures to use⁶⁰; curricula that discuss LGB-specific stressors (e.g., coming out, rejection by peers and family) may help address LGB early initiation. Broadly, initiatives that serve to reduce LGB minority stress may also have a preventative effect. For example, sexuality education curricula that are inclusive of sexual minorities promote a safer school climate for LGB youth⁶¹ and school-based gay–straight alliances and anti-bullying state laws are associated with reduced LGB bullying and victimization.^{62,63}

Overall, the current findings highlight important heterogeneity in early initiation risk and adult disparities among sexual minorities. It is not clear why gay male individuals are uniquely not at risk for early initiation, despite having elevated rates of smoking and alcohol use during adulthood, or why early initiation among bisexual male youth does not lead to elevated use during adulthood as it does for L/G and bisexual female youth. Minority stress experiences, as well as other risk factors, likely vary by sexual identity and gender in complex ways that are not yet fully understood. Although disparities for bisexual male youth did not persist into adulthood, early use of alcohol and tobacco has particularly detrimental effects and points to the need to enhance adolescent prevention efforts. The later emergence of disparities for gay male individuals suggests unique factors may influence their alcohol and smoking relative to other sexual minorities; further work is needed to identify these factors and determine at what age the disparities emerge for gay male individuals.

Limitations

Measures of sexual identity, substance use behaviors, and age of first use are self-reported; measurement error may be present due to social desirability or recall bias. Though analyses adjusted for multiple demographic covariates, other salient risk and protective factors that may differ between heterosexual and LGB individuals were not measured by the NSDUH (e.g., discrimination, victimization, social support); residual confounding may be present owing to these unmeasured factors. Given the cross-sectional nature of the data, mediation analyses are not intended to establish causality. Although the patterns of associations observed are consistent with the hypothesis that substance use outcomes among LGB adults are mediated by early initiation, alternative causal relationships are possible.

CONCLUSIONS

Adolescent prevention and treatment efforts are needed to address early alcohol and smoking initiation among L/G and bisexual female and bisexual male youth. Reducing early initiation among LGB female youth may notably reduce their adulthood disparities in alcohol and cigarette use. More research is needed to elucidate why early initiation among bisexual male youth does not appear to elevate use during adulthood and to examine the etiology of disparities in alcohol and cigarette use among adult gay men.

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MSS conceptualized the study, performed analyses, and led manuscript writing; RLC contributed to the study design, interpretation of results, and manuscript writing. Both authors have read and approved the final version of the manuscript.

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Table 1.

Characteristics of 2015–2017 NSDUH Adult Participants by Sexual Identity and Gender

Variable	Women			Men		
	Heterosexual, % n=62,038	Lesbian/ Gay, % n=1,321	Bisexual, % n=4,289	Heterosexual, % n=56,184	Gay, % n=1,410	Bisexual, % n=1,221
Demographics						
Age, years						
18–25	12.4	20.9	41.5	14.4	19.0	29.9
26–34	14.8	20.6	28.5	16.1	22.1	20.7
35–49	24.6	23.0	19.8	25.3	21.4	19.5
50–64	26.2	23.5	7.8	25.7	28.2	18.6
65	21.9	12.0	2.4	18.5	9.4	11.3
Race/ethnicity						
White	64.7	63.8	61.3	65.3	62.0	59.1
Black	12.4	15.7	14.1	11.0	11.7	10.3
Hispanic	15.1	14.3	15.7	16.0	18.1	20.2
Other	7.9	6.2	8.9	7.6	8.2	10.4
Education						
Less than high school	11.8	10.4	13.0	13.8	7.9	13.5
High school	23.5	19.5	26.9	26.8	16.2	24.6
Some college/2 year degree	32.8	35.2	38.4	29.0	29.5	31.6
4 year college degree	31.9	34.9	21.8	30.5	46.4	30.4
Employment						
Full time	41.6	52.0	44.3	57.8	56.4	51.5
Part time	15.9	11.8	19.7	10.0	13.9	15.2
Unemployed	3.7	7.0	9.2	5.0	6.5	6.2
Student	36.9	26.7	22.9	25.2	20.2	23.0
Other	1.8	2.4	3.9	1.9	3.1	4.1
Marital status						
Married	51.5	25.5	24.8	55.5	15.7	27.8
Widowed	8.9	3.2	1.1	3.0	1.4	2.9
Divorced/Separated	15.9	11.9	15.7	12.1	6.6	9.0
Never married	23.8	59.4	58.4	29.3	76.2	60.3
Children aged <18 years in household						
Yes	39.3	31.4	48.3	35.2	11.7	27.9
Total family income						
<\$20,000	18.3	24.7	28.1	14.4	17.2	24.2
\$20,000-\$49,999	30.4	29.3	34.4	28.8	28.2	33.2
\$50,000-\$74,999	16.2	14.7	13.6	16.3	18.6	15.5
\$75,000	35.1	31.4	23.9	40.4	35.9	27.1
Urbanicity						

Variable	Women			Men		
	Heterosexual, % n=62,038	Lesbian/ Gay, % n=1,321	Bisexual, % n=4,289	Heterosexual, % n=56,184	Gay, % n=1,410	Bisexual, % n=1,221
Large metro	55.3	57.1	57.9	55.6	69.7	61.5
Small metro	30.1	31.0	30.4	30.0	22.6	27.7
Non-metro	14.6	12.0	11.7	14.4	7.8	10.8
Alcohol and smoking initiation						
Mean age of alcohol initiation, years	17.6	16.5	16.0	16.6	17.1	16.5
Mean age of cigarette initiation, years	16.3	16.1	15.2	15.8	16.4	15.9
Adult alcohol outcomes						
Heavy episodic drinking	21.2	30.1	38.7	31.8	37.4	33.0
Alcohol use disorder	3.9	7.7	12.5	7.8	14.0	11.6
Adult smoking outcomes						
Current smoking	17.1	28.1	36.2	22.9	28.0	27.1
Nicotine dependence	8.4	13.1	16.5	10.8	13.0	12.9

Note: Prevalence estimates are weighted to account for NSDUH survey design.

NSDUH, National Survey on Drug Use and Health.

Table 2.

Prevalence and AORs of Early Alcohol and Smoking Initiation (Prior to Age 15 Years) by Sexual Identity and Gender

Variable	Women		Men	
	%	AOR (95% CI)	%	AOR (95% CI)
Early alcohol initiation (prior to age 15 years)				
Sexual identity				
Heterosexual	11.7	ref	19.8	ref
Lesbian/Gay	25.1	2.23 (1.82, 2.74)	17.9	0.83 (0.67, 1.03)
Bisexual	27.8	2.36 (2.12, 2.62)	24.4	1.35 (1.10, 1.65)
Early smoking initiation (prior to age 15 years)				
Sexual identity				
Heterosexual	16.7	ref	25.0	ref
Lesbian/Gay	26.6	1.81 (1.48, 2.23)	21.5	0.97 (0.79, 1.18)
Bisexual	30.5	2.28 (2.05, 2.54)	27.3	1.37 (1.12, 1.67)

Note: Boldface indicates statistical significance ($p < 0.05$). All AOR estimates are weighted to account for NSDUH survey design and adjusted for age, race/ethnicity, education level, employment, marital status, living with children under age 18 years, income, and urbanicity.

NSDUH, National Survey on Drug Use and Health.

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Table 3.**Mediation Analysis Results by Sexual Identity and Gender: Past-Month HED and Past-Year AUD**

Variable	Total effect	Direct effect	Mediated effect (indirect effect)	
	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	% Mediated
Women				
Past-month heavy episodic drinking				
Sexual identity (ref: Heterosexual)				
Lesbian/Gay	1.13 (0.93, 1.38)	1.04 (0.86, 1.27)	N/A ^a	N/A
Bisexual	1.44 (1.29, 1.60)	1.31 (1.18, 1.45)	1.10 (1.06, 1.13)	26
Early alcohol initiation		2.02 (1.87, 2.17)		
Past-year alcohol use disorder				
Sexual identity (ref: Heterosexual)				
Lesbian/Gay	1.37 (1.04, 1.80)	1.22 (0.93, 1.60)	1.13 (1.08, 1.18)	38
Bisexual	1.95 (1.67, 2.27)	1.70 (1.46, 1.97)	1.15 (1.10, 1.20)	21
Early alcohol initiation		2.78 (2.52, 3.08)		
Men				
Past-month heavy episodic drinking				
Sexual identity (ref: Heterosexual)				
Gay	1.04 (0.90, 1.20)	1.06 (0.92, 1.22)	N/A ^a	N/A
Bisexual	0.91 (0.75, 1.11)	0.88 (0.73, 1.07)	N/A ^a	N/A
Early alcohol initiation		1.91 (1.79, 2.04)		
Past-year alcohol use disorder				
Sexual identity (ref: Heterosexual)				
Gay	1.41 (1.13, 1.75)	1.44 (1.16, 1.79)	0.98 (0.94, 1.02)	N/A
Bisexual	1.23 (0.89, 1.70)	1.18 (0.85, 1.64)	N/A ^a	N/A
Early alcohol initiation		2.22 (2.01, 2.46)		

Note: Boldface indicates statistical significance ($p < 0.05$). All AOR estimates are weighted to account for NSDUH survey design and adjusted for age, race/ethnicity, education level, employment, marital status, living with children under age 18 years, income, and urbanicity. Total effect was estimated by a regression model including sexual identity and covariates. Direct and indirect effects were estimated by a regression model including sexual identity, early initiation, and covariates.

^aNo disparity in adult substance use behavior/disorder.

N/A, not applicable (no evidence of mediation); HED, heavy episodic drinking; AUD, alcohol use disorder; NSDUH, National Survey on Drug Use and Health.

Table 4.

Mediation Analysis Results by Sexual Identity and Gender: Current Smoking and Past-Month Nicotine Dependence

Variable	Total effect	Direct effect	Mediated effect (indirect effect)	
	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	% Mediated
Women				
Current smoking				
Sexual identity (ref: Heterosexual)				
Lesbian/Gay	1.58 (1.33, 1.87)	1.43 (1.21, 1.69)	1.11 (1.06, 1.16)	22
Bisexual	1.93 (1.75, 2.12)	1.67 (1.51, 1.84)	1.16 (1.11, 1.21)	22
Early smoking initiation		2.91 (2.70, 3.12)		
Past-month nicotine dependence				
Sexual Identity (ref: Heterosexual)				
Lesbian/Gay	1.45 (1.10, 1.92)	1.31 (0.99, 1.73)	1.11 (1.06, 1.16)	28
Bisexual	1.67 (1.44, 1.94)	1.44 (1.24, 1.67)	1.16 (1.11, 1.22)	29
Early smoking initiation		3.01 (2.75, 3.31)		
Men				
Current smoking				
Sexual identity (ref: Heterosexual)				
Gay	1.29 (1.06, 1.57)	1.29 (1.06, 1.57)	1.00 (0.95, 1.04)	N/A
Bisexual	1.06 (0.86, 1.31)	1.01 (0.82, 1.25)	N/A ^a	N/A
Early smoking initiation		2.41 (2.26, 2.57)		
Past-month nicotine dependence				
Sexual identity (ref: Heterosexual)				
Gay	1.40 (1.11, 1.78)	1.41 (1.12, 1.78)	0.99 (0.95, 1.05)	N/A
Bisexual	1.17 (0.93, 1.48)	1.11 (0.88, 1.41)	N/A ^a	N/A
Early smoking initiation		2.65 (2.48, 2.83)		

Note: Boldface indicates statistical significance ($p < 0.05$). All AOR estimates are weighted to account for NSDUH survey design and adjusted for age, race/ethnicity, education level, employment, marital status, living with children under age 18 years, income, and urbanicity. Total effect was estimated by a regression model including sexual identity and covariates. Direct and indirect effects were estimated by a regression model including sexual identity, early initiation and covariates.

^aNo disparity in adult substance use behavior/disorder.

N/A, not applicable (no evidence of mediation); NSDUH, National Survey on Drug Use and Health.