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Tobacco product use and susceptibility to use among sexual minority and heterosexual adolescents

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ABSTRACT

Sexual identity is associated with tobacco use in adults. We examined tobacco use and susceptibility to use by sexual identity in adolescents. Data were collected in February 2019 via Qualtrics research participant panels. Data analyses were performed in June 2019 and updated in October 2020. Respondents aged 13–17 reported sexual identity (heterosexual vs. sexual minority [lesbian, gay, bisexual, or other]), past-month and lifetime tobacco product use, susceptibility to e-cigarette use, friend(s)' e-cigarette use, tobacco marketing exposure, and demographic characteristics. The sample ($n=983$) was 72.9% female, 46.5% non-Hispanic white, and 26.1% sexual minority with a mean age of 15.0 years ($SD=1.4$). Sexual minority adolescents were more likely to have friend(s) who vape (53.0% versus 42.0%; $p=0.003$). In adjusted models, sexual minority adolescents had greater odds of ever smoking tobacco (odds ratio [OR]=2.06; 95% confidence interval [CI]: 1.42–2.98) or using e-cigarettes (OR=1.55; 95% CI: 1.08–2.25) relative to heterosexual adolescents. Past-month tobacco smoking and e-cigarette use did not differ by sexual identity. Among participants who had never used tobacco products, sexual minority adolescents reported greater susceptibility to e-cigarette use (OR=1.62; 95% CI: 1.04–2.52) compared to heterosexual adolescents. Exposure to cigarette and e-cigarette marketing, e-cigarette use by friends, and respondent sex were significant covariates in all models. The current findings indicate greater susceptibility to use e-cigarettes and greater tobacco product initiation, but not continuation, among sexual minority adolescents. Sexual minority-tailored interventions may be warranted to prevent tobacco product initiation. Worth exploring are the associations between sexual identity, tobacco marketing exposure, and friend(s)' e-cigarette use.

1. Introduction

Tobacco use causes preventable morbidity, mortality, and health care expenditures (Jha et al., 2013; Warren et al., 2014). Although public health efforts have successfully reduced the prevalence of tobacco use in the general population, some groups have not benefitted equally and continue to experience a greater burden of tobacco use (Drope et al., 2018). In particular, previous research has found higher tobacco prevalence by sexual minority (i.e., individuals whose sexual identity may include but is not limited to lesbian, gay, bisexual, or pansexual) than heterosexual adults (Johnson et al., 2016; Lee, 2009). Lesbian and bisexual adult women are more likely to smoke cigarettes than heterosexual women (Wheldon et al., 2018; Li et al., 2018), and gay adult men are more likely to smoke cigarettes than heterosexual men (Li et al., 2018). E-cigarette use also is more prevalent among sexual minority men

and women compared to heterosexual adults (Johnson et al., 2016; Agaku et al., 2014; Hoffman et al., 2018).

The higher prevalence of tobacco product use in sexual minority adults may be driven by tobacco industry targeted marketing strategies (Dilley et al., 2008; Smith et al., 2008) and/or normative influence in sexual minority social networks (Fallin et al., 2014; Jannat-Khah et al., 2018). In the United States (US), tobacco companies spend about \$1 million an hour on cigarette marketing (Federal Trade Commission, 2018). Spending on e-cigarette marketing and promotion has grown rapidly over the last decade (Kornfield et al., 2015), with paralleled rise in public awareness and use of e-cigarette products (King et al., 2015; Huang et al., 2016). Compared to combustible cigarettes, e-cigarettes are often perceived as safer (Baeza-Loya et al., 2014) and more socially acceptable (Lee et al., 2017). Minority stress due to harassment and discrimination (Coulter et al., 2018; Meyer, 2013; Austin et al., 2004)

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and greater prevalence of depression among sexual minority adults (Blosnich et al., 2013) also are hypothesized as contributing factors for tobacco product use. Barriers to successful treatment for cessation may contribute to higher prevalence, including differential access to health care (Burns et al., 2011), limited availability of providers trained in delivering sensitive care for sexual minorities (Institute of Medicine Committee on Lesbian, Gay, Bisexual, and Transgender Health Issues and Research Gaps and Opportunities, 2011), and provider discrimination on the basis of sexual identity (Boehmer and Case, 2004).

Less is known about tobacco product use among sexual minority adolescents. While cigarette smoking among adolescents has been on the decline, the rise in e-cigarette use among adolescents has been termed an epidemic (US Department of Health and Human Services, 2018). Adolescent e-cigarette use is associated with progression to combustible cigarette use (Austin et al., 2004), and early tobacco use is associated with sustained use in adulthood (U.S. Department of Health and Human Services, 2016; US Department of Health and Human Services, 2012). The limited studies of sexual minority adolescents that are available have provided some evidence to suggest greater cigarette use by bisexual adolescents, though these studies did not account for media exposure or peer use (Austin et al., 2004; Azagba et al., 2014). US surveillance data also indicate greater e-cigarette, cigarette, cigar, any tobacco, and dual or poly tobacco use among adolescents identifying as lesbian, gay, or bisexual compared to heterosexual (Creamer et al., 2020).

Previous studies have shown greater tobacco advertising exposure (Dilley et al., 2008) and more favorable perceptions of such advertising (Jannat-Khah et al., 2018) by sexual minority adults. Among adolescents, both exposure to tobacco marketing (Papaleontiou et al., 2020) and peer e-cigarette use (Barrington-Trimis et al., 2015) are associated with increased tobacco product use. To our knowledge, however, tobacco product use and susceptibility to initiating e-cigarette use have yet to be examined in sexual minority adolescents while also considering advertising exposure and peer use. The current study aimed to examine ever and current tobacco product use in sexual minority and heterosexual adolescents, e-cigarette use by close friends, and exposure to tobacco product marketing. Further, among never tobacco product users, we investigated differences by sexual identity in susceptibility to initiating e-cigarette use.

2. Methods

2.1. Sample

This study is a secondary analysis by sexual identity of data collected in February 2019 via Qualtrics research panels (Fielding-Singh et al., 2020). Participants were 1003 US adolescents reporting on their tobacco product use, friend(s)' e-cigarette use, exposure to tobacco marketing, and susceptibility to e-cigarette use. The survey was administered online and was anonymous. Adolescents were invited to participate if they were between 13 and 17 years of age, English-speaking, and living in the US. Parental consent and adolescent assent were obtained by survey panel providers, and assent was obtained again at the start of the current study. The Stanford University School of Medicine Institutional Review Board approved the study procedures.

2.2. Measures

Measures of tobacco product use and susceptibility, marketing exposure, harm perceptions, and peer use were informed by the Population Assessment of Tobacco and Health (PATH) Study (United States Department of Health and Human Services, 2018), with expanded response options to capture adolescent tobacco marketing exposure across various media.

2.2.1. Demographic characteristics

Sexual identity was ascertained by asking respondents, "Do you consider yourself to be:" (heterosexual or straight, gay, lesbian, bisexual, or a sexual identity not listed). Adolescents who indicated that their sexual identity was not listed were asked to specify. Respondents were classified as sexual minority (i.e., lesbian, gay, bisexual, or other) or heterosexual. Sex, age, and race/ethnicity were self-reported.

2.2.2. Tobacco marketing exposure

Participants were asked, "In the past 30 days, how many times did you see vaping/e-cigarette products in the following places," reported separately for combustible cigarettes and e-cigarettes: movies, YouTube, stores, emails or text messages, online ads, social media user posts, print media (newspaper, magazines), TV or radio, and billboards (e-cigarette only). Anti-tobacco ads were excluded. Response options were 0, 1, 2–3, or 4+ times. Responses were summed to create two distinct summary scores for cigarette marketing exposure and e-cigarette marketing exposure, respectively. Possible scores ranged from 0 to 27 for cigarettes and 0–30 for e-cigarettes.

2.2.3. Friend(s)' e-cigarette use

Respondents were asked, of their five closest friends, how many had vaped in the past month (classified as 1+ vs. 0).

2.2.4. Tobacco product use

Ever and past-month tobacco product use were assessed for combustible cigarettes, cigars, and e-cigarettes. Ever use of cigarettes was assessed by asking, "Have you ever smoked a cigarette, even just a puff?" Cigar use was assessed as ever using "a cigar, cigarillo, or little cigar like Swisher Sweets or Black and Mild." Cigars are often flavored and sold individually and cheaply, making them attractive to adolescents, and adolescents may not distinguish between cigar and cigarette use (Rait et al., 2016). In addition, cigar use exceeds cigarette use among Black and Hispanic/Latinx adolescents (Creamer et al., 2020). Hence, cigar and cigarette use were combined in analyses to indicate tobacco smoking, ever and past-month. The section assessing e-cigarette use started with a preamble that defined the product category (i.e., electronic nicotine or vaping products, typically using a nicotine liquid, although the amount of nicotine can vary), named and included a photo of different e-cigarette product types (e.g., e-cigarettes, vape pens, mods) and listed some common brands (e.g., JUUL, Suorin, Vuse). Adolescents were then asked, "Have you heard of vaping products?" Those who said yes were asked, "Have you ever tried vaping products?" Ever e-cigarette users were asked about product type(s) (i.e., e-cigarette or vape pen, pod mod, tank type). For cigarettes, cigars, and e-cigarettes, following reported ever use, participants were asked about use in the past 30 days.

2.2.5. Susceptibility to use e-cigarettes

Susceptibility to initiating e-cigarette use was examined only among participants who had heard of e-cigarettes and reported never having used e-cigarettes or smoked a tobacco product. Susceptibility to initiating e-cigarette use was assessed by asking: "How likely is it that you will use a vaping product in the next year?," "Do you think you will try a vaping product soon?," and "If one of your friends were to offer you a vaping product, would you use it?" Response options ranged from "definitely not" to "definitely yes." Respondents selecting "definitely not" for all three items were classified as not susceptible.

2.3. Statistical analysis

Chi-square tests and *t*-tests were used to evaluate associations between sexual identity and participant characteristics, ever and past-month tobacco smoking and e-cigarette use, and e-cigarette use susceptibility. The number of days products were used in the past month were summarized using medians and interquartile ranges and examined

in association with sexual identity using the Wilcoxon Rank Sum test. Multivariable logistic regression was used to compare the odds of ever and past-month tobacco smoking and e-cigarette use and e-cigarette use susceptibility between sexual minority adolescents and heterosexual counterparts. Models were adjusted for age, sex, race/ethnicity, friend(s)' e-cigarette use, and tobacco marketing exposure. In adjusted analyses, race/ethnicity was dichotomized as non-Hispanic white versus all other racial/ethnic groups, given limited sample sizes. All *p*-values were calculated using 2-sided tests, and statistical significance was evaluated at the *p*<0.05 level. Statistical analyses were performed in June 2019 and updated in October 2020.

3. Results

3.1. Sample description

The resulting sample was 983 adolescents who were 72.9% female, 46.5% non-Hispanic white, 19.4% Hispanic/Latinx, and 17.5% Black (Table 1). The mean age was 15.0 years (standard deviation [SD]=1.4),

Table 1
Demographic characteristics and tobacco product use by participant sexual identity.

	Heterosexual (n=726)	Sexual minority (n=257)	p-value
	n (%) / M ± SD	n (%) / M ± SD	
Age	14.9 ± 1.4	15.3 ± 1.4	0.001
Sex			<0.0001
Male	196 (27)	28 (10.9)	
Female	529 (72.9)	210 (81.7)	
Missing	1 (0.1)	19 (7.4)	
Race/ethnicity			0.012
Non-Hispanic white	350 (48.2)	100 (38.9)	
Hispanic/Latinx	123 (16.9)	65 (25.3)	
Non-Hispanic black	126 (17.4)	41 (16)	
Other	116 (16)	44 (17.1)	
Missing	11 (1.5)	7 (2.7)	
Combustible tobacco smoking[‡]			
Ever smoked tobacco	128 (17.6)	77 (30)	<0.0001
Past-month tobacco use	42 (5.8)	19 (7.4)	0.36
Days of cigarette use, median (IQR)	3.5 (18)*	2.0 (20)*	0.55
E-cigarettes			
Heard of vaping products	679 (93.5)	249 (96.9)	0.044
Ever e-cigarette use	183 (27)	97 (40)	0.0004
Past-month e-cigarette use	114 (16.8)	49 (19.7)	0.31
Days of e-cigarette use, median (IQR)	3 (13)*	3 (11)*	0.42
Vape device type (among ever e-cigarette users)			
E-cigarette or vape pen (e.g., Vuse, NJOY, Blu)	70 (38.3)	46 (48)	0.12
Pod mod (e.g., JUUL, Suorin, Phix)	132 (72.1)	53 (55.2)	0.005
Tank type (e.g., ego)	82 (44.8)	52 (54.2)	0.14
Friend(s)' past 30-day E-cigarette use			0.003
Friends did not vape	394 (58)	117 (47)	
Close friend(s) vaped	285 (42)	132 (53)	
Positive susceptibility score (among never tobacco product users)	135 (26.7)	55 (38.7)	0.005
Cigarette marketing exposure score^Δ	8.7 ± 6.3	9.4 ± 6.6	0.14
E-cigarette marketing exposure score^Δ	7.7 ± 7.1	8.7 ± 7.0	0.07

M = mean; SD = standard deviation.

[‡]Includes cigarettes or cigars.

*Median and IQR; assessed only among adolescents who endorsed any 30-day use.

^Δmarketing exposure sum scores derived from summing each channel's exposure score (for cigarettes and nicotine vaping products separately). Possible sum scores ranged from 0 to 27 (cigarettes) and 0 to 30 (vaping products).

and 257 respondents (26.1%) identified as sexual minorities. On average, sexual minority adolescents were older (mean=15.3 years, SD=1.4) than heterosexual adolescents (mean=14.9 years, SD=1.4; *p*=0.001). Sexual minority adolescents also were more likely to be female relative to heterosexual adolescents (81.7% vs. 72.9%; *p*<0.0001) and less likely to be non-Hispanic white (38.9% vs. 48.2%; *p*=0.012).

3.2. E-cigarette use by friends and tobacco product marketing exposures

Sexual minority adolescents were more likely to have friend(s) who vaped in the past month compared to heterosexual adolescents (53.0% vs. 42.0%; *p*=0.003). Mean scores for exposure to cigarette marketing (*p*=0.14) and e-cigarette marketing (*p*=0.07) were similar for sexual minority and heterosexual adolescents.

3.3. Ever tobacco smoking

The prevalence of ever smoking tobacco products (cigarettes or cigars) was 20.7% for the sample overall and higher for sexual minority than heterosexual adolescents (30.0% vs. 17.6%; *p*<0.0001; Table 1). In the fully adjusted model (Table 2), the odds of ever smoking tobacco were two-fold greater for sexual minority than heterosexual adolescents (Odds Ratio [OR]=2.06; 95% Confidence Interval [CI]: 1.42–2.98). Older age (OR=1.18; 95% CI: 1.04–1.34), having friend(s) who vaped in the past month (OR=3.05; 95% CI: 2.13–4.39), and greater exposure to cigarette marketing (OR=1.04; 95% CI: 1.01–1.06) also were associated with ever smoking tobacco products.

3.4. Ever using e-cigarettes

The prevalence of ever using e-cigarettes was 30.0% for the sample overall and significantly higher for sexual minority than heterosexual adolescents (40.0% vs. 27.0%; *p*=0.0004). Among ever e-cigarette users, sexual minority adolescents were less likely to use pod mod products (55.2% vs. 72.1%; *p*=0.005) compared to heterosexual adolescents. In the multivariable model, the odds of ever e-cigarette use were significantly greater in sexual minority adolescents compared to heterosexual adolescents (OR=1.55; 95% CI: 1.08–2.25). The odds of ever e-cigarette use also were greater among adolescents with friend(s) who vaped in the past month versus did not vape (OR=7.22; 95% CI: 5.06–10.3), older adolescents (OR=1.28; 95% CI: 1.13–1.45), and adolescents with greater e-cigarette marketing exposure (OR=1.03; 95% CI: 1.01–1.06).

Table 2
Odds of ever smoking tobacco or using e-cigarettes by sexual identity.

	Ever smoking tobacco OR [95% CI]	Ever E-cigarette use OR [95% CI]
Sexual identity		
Heterosexual	Reference	Reference
Sexual minority (lesbian, gay, bisexual, or other)	2.06 [1.42–2.98]	1.55 [1.08–2.25]
Age	1.18 [1.04–1.34]	1.28 [1.13–1.45]
Sex		
Male	Reference	Reference
Female	0.69 [0.46–1.03]	0.90 [0.61–1.35]
Race/ethnicity		
Non-Hispanic white	Reference	Reference
Other	1.17 [0.83–1.65]	1.35 [0.97–1.89]
Friend(s)' past 30-day E-cigarette use		
Friends did not vape	Reference	Reference
Close friend(s) vaped	3.05 [2.13–4.39]	7.22 [5.06–10.3]
Cigarette marketing exposure score	1.04 [1.01–1.06]	–
E-cigarette marketing exposure score	–	1.03 [1.01–1.06]

3.5. Past-month use

No statistical differences by sexual identity were observed for the odds of past-month tobacco smoking (OR=1.31; 95% CI: 0.71–2.41) or e-cigarette use (OR=0.98; 95% CI: 0.63–1.53; Table 3). Friend(s) e-cigarette use and greater exposure to marketing were each significantly associated with past-month tobacco smoking and e-cigarette use. Older age was significantly associated with past-month e-cigarette use but not past-month tobacco smoking. Among past-month users, the number of days smoking and vaping did not differ by sexual identity (Table 1).

3.6. Susceptibility to use e-cigarettes

Among those who had never used a tobacco product, sexual minority adolescents were significantly more likely to be susceptible to initiating e-cigarette use than heterosexual adolescents (38.7% vs. 26.7%; $p=0.005$; Table 4). In the adjusted model, the odds of susceptibility to e-cigarette use were greater among sexual minority than heterosexual adolescents (OR=1.62; 95% CI: 1.04–2.52), greater for adolescents with friend(s) who vaped in the past month versus had friend(s) who did not vape (OR=2.23; 95% CI: 1.49–3.33), greater for adolescents of color versus non-Hispanic white (OR=1.55; 95% CI: 1.06–2.26), and greater among adolescents with increased exposure to e-cigarette marketing (OR=1.06; 95% CI: 1.03–1.09).

4. Discussion

In the current study, ever smoking tobacco and ever vaping e-cigarettes were more likely among sexual minority adolescents than heterosexual adolescents and these findings held after accounting for differences in demographic characteristics, peer use, and exposure to marketing. E-cigarette product type also differed, with less pod mod use among sexual minority adolescents compared to heterosexual adolescents. Among adolescents who had never used a tobacco product, sexual minority adolescents were more susceptible to initiating e-cigarette use. However, sexual minority and heterosexual adolescents did not significantly differ in the likelihood of past-month tobacco product use. Hence, it appears that tobacco product initiation, but not continuation, differed by sexual identity in the current sample.

Previous studies have demonstrated positive associations between sexual minority identity and cigarette and e-cigarette use in adults (Agaku et al., 2014; Hoffman et al., 2018; Huang et al., 2016) and adolescents (Austin et al., 2004; Azagba et al., 2014; Creamer et al., 2020).

Table 3
Odds of past-month smoking tobacco and e-cigarette use by sexual identity.

	Past-month smoking tobacco	Past-month E-cigarette use
	OR [95% CI]	OR [95% CI]
Sexual identity		
Heterosexual	Reference	Reference
Sexual minority (lesbian, gay, bisexual, or other)	1.31 [0.71–2.41]	0.98 [0.63–1.53]
Age	1.10 [0.89–1.36]	1.22 [1.05–1.42]
Sex		
Male	Reference	Reference
Female	0.62 [0.33–1.18]	0.72 [0.45–1.15]
Race/ethnicity		
Non-Hispanic white	Reference	Reference
Other	1.27 [0.72–2.23]	1.30 [0.89–1.94]
Friend(s) past 30-day E-cigarette use		
Friends did not vape	Reference	Reference
Close friend(s) vaped	3.60 [1.86–6.94]	12.4 [7.15–21.6]
Cigarette marketing exposure score	1.08 [1.04–1.12]	–
E-cigarette marketing exposure score	–	1.06 [1.03–1.09]

Table 4
Demographic characteristics and adjusted odds of non-user susceptibility to e-cigarette use initiation.

	Susceptible non-user adolescents	p-value	Odds of non-user susceptibility
	n (%) ¹ / M±SD		OR [95% CI]
Sexual identity		0.005	
Heterosexual	135 (26.7)		Reference
Sexual minority (lesbian, gay, bisexual, or other)	55 (38.7)		1.62 [1.04–2.52]
Age	15.0 ±1.4	0.055	1.02 [0.89–1.17]
Sex		0.009	
Male	32 (20.8)		Reference
Female	157 (31.7)		1.65 [1.03–2.65]
Race/ethnicity		0.05	
Non-Hispanic white	91 (26.2)		Reference
Other	94 (33.5)		1.55 [1.06–2.26]
Friend(s) past 30-day E-cigarette use		<0.0001	
Friends did not vape	110 (25.5)		Reference
Close friend(s) vaped	83 (46.4)		2.23 [1.49–3.33]
E-cigarette marketing exposure	9.1 ±6.4	<0.0001	1.06 [1.03–1.09]

¹Row percentages

The current findings provide evidence that the associations for ever use and susceptibility persist among sexual minority adolescents even after controlling for peer use, which also was found to be greater among sexual minority than heterosexual youth. Past studies investigating the underlying causes of increased substance use by sexual minorities point to the role of targeted advertising (Lee, 2009; Wheldon et al., 2018), normative influence in sexual minority social networks (Li et al., 2018), and/or minority stress (Dilley et al., 2008; Smith et al., 2008). The finding that sexual minority adolescents were less likely to use pod mod devices relative to heterosexual adolescents could be related to a preference for using products that are more publicly conspicuous. Previous research has shown that pod mod products tend to be favored by youth because they can be easily concealed and used discretely (Fadus et al., 2019), whereas normative influence in sexual minority social networks may instead encourage use of products that are more socially visible. For instance, a study of lesbian, gay, bisexual, and transgender youth identified tobacco use as a mechanism to signal social belonging and conform to normative pressure (Remafedi, 2007), and a study of bisexual young adults reported tobacco use facilitated social interactions with peers and romantic or sexual interests (McQuoid et al., 2019). Thus, more socially visible products may be used by sexual minority adolescents in efforts, conscious or unconscious, to signal belonging and facilitate relationship building and development. Further research is needed to investigate the most salient contributing factors to sexual minority substance use.

Despite higher prevalence of ever smoking tobacco and using e-cigarettes and greater susceptibility to initiate e-cigarette use, sexual minority adolescents did not differ from heterosexual adolescents in the likelihood of past-month use. Among US adolescents, tobacco use initiation is likely driven by factors such as marketing exposure and beliefs that tobacco use is normative, while continuation is largely driven by dependence (Kiernan, 2002). Despite reporting similar overall marketing exposure as their heterosexual peers in this study, sexual minority adolescents may be exposed to targeted advertising aimed at sexual minorities (Dilley et al., 2008; Smith et al., 2008). Moreover, sexual minority adolescents were more likely to have close friends who used e-cigarettes and may view tobacco product use as more normative than their heterosexual peers. Sexual minority adolescents in this study may have had greater vulnerability to tobacco use initiation than

heterosexual adolescents, but similar vulnerability to dependence once tobacco use was initiated. However, results should be interpreted with caution, as few participants in the sample overall had smoked tobacco in the past month. Additionally, as adolescent tobacco smoking continues to decline in prevalence (Watson et al., 2018), it is possible that the observed disparity between sexual minority and heterosexual adolescents could be diminishing over time. Longitudinal research is needed to investigate this important question, which may be influenced by trends in e-cigarette use. Finally, prior longitudinal research with adolescents has shown a pattern of sustained e-cigarette use with graduation to e-cigarette pod products (Vogel et al., 2019). The lower pod use observed here among sexual minority adolescents may in part explain the differential finding of greater e-cigarette susceptibility and initiation but not current use.

Our findings indicated that e-cigarette marketing exposure was associated with greater odds of ever e-cigarette use, past-month use, and susceptibility to use. These results are consistent with previous studies demonstrating that greater tobacco marketing exposure is associated with adolescents' positive attitude towards e-cigarettes (Vogel et al., 2020) and that exposure to both cigarette and e-cigarette advertisements are associated with increased e-cigarette use (Papaleontiou et al., 2020). Taken together, these results suggest the need for research examining the role of regulatory constraints on tobacco advertisements as a public health strategy to address e-cigarette use by sexual minority adolescents.

Finally, we observed a significantly greater susceptibility to initiate e-cigarette use among adolescents identifying as a race/ethnicity other than non-Hispanic white; the associations for race/ethnicity with ever or current smoking of tobacco or vaping e-cigarettes were nonsignificant. The necessity to aggregate racial/ethnic subgroups in the current study due to small sample sizes may have obscured some differences. National data indicate current use of cigarettes, cigars, and e-cigarettes is greater in non-Hispanic white and Hispanic adolescents relative to Black adolescents (Creamer et al., 2020), while a study in California found multi-ethnic adolescents were more likely to smoke cigarettes compared to non-Hispanic white adolescents (Unger et al., 2000). Reported age of initiation also differs by race/ethnicity: younger on average for non-Hispanic white individuals compared to Asian, Pacific Islander, and Black individuals (Trinidad et al., 2004). Later initiation patterns may relate to the current study's finding of greater susceptibility to use e-cigarettes among adolescents of color, but not greater use. Future research is needed on tobacco susceptibility and use patterns across intersecting racial/ethnic and sexual identities.

4.1. Limitations

This study has limitations to consider. Given limited sample sizes, we aggregated data from all sexual minority respondents, which may mask variation between sexual minority subgroups. Future research using nationally representative, disaggregated data is necessary to examine if the trends observed in this study persist across distinct sexual identities relative to heterosexual counterparts. Notably, even existing national surveys continue to inadequately or inconsistently collect and report respondent sexual identity, which underscores a need for improved sampling and outreach efforts that produce more representative datasets (Dermoddy et al., 2020). Though not the purpose of this study, future research investigating possible differences in tobacco product use between gender minority (i.e., individuals whose gender identity may include but is not limited to trans, non-binary, gender non-conforming, two-spirit, and/or genderqueer) adolescents and their cisgender counterparts also is needed. In addition, this study relied on self-reported measures, so the direction and magnitude of observed associations may be vulnerable to bias. Finally, these cross-sectional data cannot be used for causal inference.

4.2. Conclusion

In this study, sexual minority adolescents were more likely to endorse ever smoking tobacco and using e-cigarettes. Additionally, among never tobacco product users, sexual minority adolescents were more susceptible to initiating e-cigarette use relative to heterosexual counterparts. These relationships persisted despite statistical adjustments for demographic characteristics, peer use, and exposure to marketing of tobacco products. Given the emergent nature of adolescent e-cigarette use, surveillance efforts remain critical for monitoring clinical and public health outcomes, and future research utilizing larger samples and longitudinal assessments is necessary to identify trends in use, risk factors, and possible prevention and cessation strategies for sexual minority adolescents.

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Disclosure statement

JPP has provided consultation to pharmaceutical and technology companies that make medications and other treatments for quitting smoking and has served as an expert witness in lawsuits against the tobacco companies. The other authors declare that they have no financial relationships with any organizations that might have an interest in the submitted work.

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