

# Tobacco Use Among Adults by Sexual Orientation: Findings from the Population Assessment of Tobacco and Health Study

Christopher W. Wheldon, PhD,<sup>1</sup> Annette R. Kaufman, PhD,<sup>1</sup>  
Karin A. Kasza, MA,<sup>2</sup> and Richard P. Moser, PhD<sup>1</sup>

## Abstract

**Purpose:** The aim of this study was to characterize lifetime tobacco use across two measures of sexual orientation and six types of tobacco products.

**Methods:** We conducted a cross-sectional analysis of the Population Assessment of Tobacco and Health (Wave 1, 2013–2014, USA) to estimate the prevalence of tobacco use (cigarettes, e-cigarettes, cigars, pipes, hookah, and smokeless) stratified by gender (men/women), age (<25/≥25 years old), and sexual orientation. Sexual orientation was operationalized as sexual identity and sexual attraction.

**Results:** Younger lesbian/gay and bisexual women had higher relative odds of experimental use of all six tobacco products compared to heterosexual women, whereas lesbian/gay and bisexual women in both age groups had higher odds of regular use of cigarettes, e-cigarettes, cigars, and hookah than heterosexual women. Younger gay men (but not older gay men) had higher relative odds of experimental and regular use of cigarettes compared to heterosexual men. Older gay men had higher odds of experimental e-cigarette and hookah use, but lower odds of regular cigar and experimental/regular smokeless tobacco use. Measures of sexual orientation identity and sexual attraction resulted in similar estimates of tobacco use with noted differences in those who identified as “something else,” as well as among those who indicated asexual attraction.

**Conclusion:** Our findings reflect a complex relationship between sexual orientation and tobacco use. Gender-based and product-specific approaches to tobacco prevention and control efforts are needed to address the high use of tobacco among sexual minority women.

**Keywords:** sexual attraction, sexual orientation identity, tobacco products, tobacco use

## Introduction

CONCERN IS INCREASING AMONG public health researchers about disparities in cancer risk in sexual minority populations.<sup>1</sup> However, current limitations in cancer surveillance systems, which do not routinely include data on sexual orientation, prevent the direct assessment of cancer risk among sexual minority populations.<sup>2</sup> Instead, cancer risk is inferred from known factors, such as tobacco use.<sup>3</sup> Tobacco use is associated with cancer mortality, even among former smokers; so lifetime tobacco exposure is a strong determinant of cancer mortality.<sup>4</sup>

We know from nationally representative studies that the rate of current cigarette smoking (i.e., smoking ≥100 cigarettes in lifetime and currently smoking every day or some

days) is approximately 29%–37% higher in sexual minorities compared to heterosexual/straight adults.<sup>5,6</sup> While estimates of current cigarette use are important for behavioral surveillance and tobacco control efforts,<sup>7</sup> they do not completely characterize cancer risk. Regular use of tobacco products, even if that use is not current, provides needed information on the cancer risk.

A comprehensive understanding of tobacco use, including use of tobacco products other than traditional cigarettes, is also needed to describe the full spectrum of exposure to known and potential carcinogens. Previous research indicates that sexual minorities had higher current use of cigars, pipes, hookah, e-cigarettes, and smokeless tobacco with considerable variation by gender.<sup>5</sup> However, in this study, sexual minorities

<sup>1</sup>Behavioral Research Program, Division of Cancer Control and Population Sciences, National Cancer Institute, Bethesda, Maryland.

<sup>2</sup>Department of Health Behavior, Roswell Park Cancer Institute, Buffalo, New York.

were defined as individuals identifying as gay, lesbian, bisexual, or “something else” other than heterosexual. Collapsing identity subgroups (i.e., gay, bisexual) into one group representing a sexual minority category likely conceals important differences between subgroups.<sup>8</sup> In fact, higher tobacco use is more consistently found among bisexual women.<sup>9</sup>

Sexual orientation is often conceptualized across three domains as follows: sexual identity (e.g., gay/lesbian, bisexual, straight), sexual attraction (e.g., same-sex attracted, both-sex attracted, opposite-sex attracted), and sexual behavior.<sup>10</sup> While these domains are highly related, they are not perfectly concordant, and tobacco use behaviors may differ across these domains.<sup>11</sup> There is also reason to expect that tobacco use differs significantly between sexual minority men and women, as well as between different sexual minority subgroups (i.e., gay vs. bisexual identified persons).<sup>5,9,12,13</sup>

In the current literature, there are inconsistent findings regarding the relative risk of tobacco use among sexual minorities.<sup>5,9</sup> Assessment of lifetime tobacco use inclusive of multiple tobacco products and across multiple domains of sexual orientation will help to inform empirical and theoretical work in this area. In this study, we characterized lifetime tobacco use behaviors using two measures of sexual orientation and across six types of tobacco products. Tobacco use was stratified for young adults and older adults, as well as for men and women.

## Methods

The Population Assessment of Tobacco and Health (PATH) Study is a longitudinal study of persons 12 years of age and older residing in the United States. PATH Study recruitment utilized a stratified address-based, area-probability sampling design that oversampled young adults (aged 18–24 years), tobacco users, and African Americans. Population and replicate weights were created to adjust for the complex study design characteristics and nonresponse. Wave 1 was fielded from September 2013 to December 2014. The weighted response rate for the household screener was 54.0%, and among households that were screened, the overall weighted response rate for adults was 74%. Additional details about the sample design can be found elsewhere.<sup>14</sup>

In the current investigation, we analyzed wave 1 data from adults 18 years of age or older who responded to the questions about sexual orientation identity ( $N=15,996$  for men;  $N=15,552$  for women) and attraction ( $N=15,963$  for men;  $N=15,489$  for women). Missing data on key grouping (<3%) and tobacco use (<1%) variables were minimal. Interviews were conducted in the home using audio computer-assisted self-interviewing. Informed consent was obtained directly from adults after completing a brief screener survey and before the wave 1 interview. Ethics review was obtained by Westat, the prime contractor responsible for data collection. In this analysis, we used deidentified data, and the protocol was reviewed and determined to be exempt by the National Institutes of Health’s Office of Human Subjects Research Protections.

## Measures

### Sexual orientation

We used two measures of sexual orientation as follows: sexual attraction and sexual identity. Participants were first

asked, “To whom have you felt sexually attracted, even if you did not take any action based on feeling attracted?” Response options were as follows: (1) Only to females, never to males, (2) Mostly to females, and at least once to a male, (3) About equally often to females and to males, (4) Mostly to males, and at least once to a female, (5) Only to males, never to females, and (6) I have never felt sexually attracted to anyone at all. Responses were recoded to reflect only same-sex or mostly same-sex attractions. Category 3 was coded as both-sex attracted, and category 6 was coded as asexual.

Participants were then asked, “Do you think of yourself as: (1) Lesbian or gay, (2) Straight, that is not lesbian or gay, (3) Bisexual, (4) Something else.” If a participant chose “something else” they were probed for more information. If they “made a mistake and did not mean to pick this answer” they were presented with the identity question again. In the second response 40 participants refused to answer and were counted as missing for sexual orientation identity. If they indicated that they use an alternative (e.g., queer) or no specific identity label, were unsure of their sexual orientation identity, or describe themselves as something other than gay/lesbian, bisexual, or heterosexual, they were classified as “something else” ( $n=470$ ). This is a heterogeneous category that may or may not represent a “sexual minority” subgroup. It was included in this analysis since this response category is commonly included in survey items measuring sexual orientation identity,<sup>15</sup> but is inconsistently used in analyses seeking to identify disparities in tobacco use by sexual orientation identity.<sup>5,16</sup> In this way, the current study will provide an empirical basis of tobacco use differences across multiple categories of sexual orientation identity commonly used in national surveys.

### Lifetime tobacco product use

Tobacco product types were grouped into the following six categories for analysis: traditional cigarettes, electronic cigarettes, cigars (including traditional, filtered, and cigarillos), pipes, hookah, and smokeless (including loose snus, moist snuff, dip, spit, chewing tobacco, snus, and dissolvable products). Cigarette use was operationalized as *never* if there was no history of smoking a cigarette; *experimental* use was defined as having ever tried a cigarette, but smoked <100 cigarettes in a lifetime; and *regular* use as having smoked at least 100 cigarettes in one’s life.

For the other five tobacco product categories, *never* use was defined as having never smoked/used the product, not even one or two times; *experimental* use was having tried the product, but not using that product on a regular basis (e.g., responded “no” to “Have you ever used e-cigarettes fairly regularly?”); and *regular* use was having used the product “fairly regularly.” In addition to assessing use of each tobacco product individually, we created a summary measure to indicate if the participant ever tried (i.e., experimental use) or regularly used (i.e., regular use) at least one or more of the six tobacco products. Similar retrospective measures of smoking behaviors across multiple decades have been found to be valid and reliable.<sup>17,18</sup>

**Covariates.** We adjusted for racial/ethnic identity (derived categorical race variable), poverty status (based on

U.S. Department of Health and Human Services 2015 poverty guideline), educational attainment, U.S. census region, and urban/rural designation of the county of residence. Sex was measured using binary male/female response categories. See PATH documentation/codebook for detailed descriptions of study methodology and derived variables, including poverty calculations.<sup>19</sup>

### Statistical analyses

All analyses were conducted in SAS 9.4 (SAS Institute Inc., Cary, NC). Estimates were weighted to represent the U.S. adult population, and variances were estimated using the balanced repeated replication method with Fay's adjustment to increase estimate stability.<sup>20</sup> Estimates for which the relative standard error was >30% were noted as these estimates may be unreliable. Multinomial logistic regression was used to estimate the association between sexual orientation and tobacco use. The odds ratios reflect the likelihood of experimental or regular use (vs. never use) by sexual minorities compared to heterosexuals (referent category). Models were adjusted for covariates previously described and stratified by gender and age. Statistical significance was considered by examining the 95% confidence intervals of the adjusted odds ratios. Differences in prevalence estimates between measures of sexual orientation were examined by subtracting the estimates for sexual orientation identity (e.g., gay/lesbian identified) from sexual attraction (e.g., same-sex attracted).

## Results

The distribution of age, gender, racial/ethnic identity, poverty status, education, U.S. census region, and urban segments is reported in Supplementary Table S1 (Supplementary Data are available online at [www.liebertpub.com/lgbt](http://www.liebertpub.com/lgbt)). The weighted distribution of the analytic sample approximates the U.S. population. Approximately 6% of the weighted sample identified as gay/lesbian, bisexual, or something else; similarly, 6% indicated either same-sex, both-sex, or asexual attractions. The concordance of identity (i.e., lesbian/gay, bisexual, or heterosexual) and attraction (i.e., same-sex attracted, both-sex attracted, opposite-sex attracted) for men and women was moderate (Cramer's  $V=0.72$  and  $0.78$ , respectively) after excluding those who identified as "something else" or who reported asexual attraction. A detailed comparison of sexual orientation identity and attraction is reported in Supplementary Table S2.

### Tobacco use among women

In Table 1 we present prevalence estimates and adjusted odds ratios for women stratified by sexual orientation identity and age group.

For young women (18–24 years), never using any tobacco product was more prevalent for heterosexual women (39.84%; 95% confidence interval (CI): 37.37–42.31) compared to lesbian/gay (23.63%; 95% CI: 13.14–34.12) and bisexual women (16.05%; 95% CI: 11.17–20.93). Young lesbian/gay and bisexual identified women had higher relative odds of experimental use (vs. no use) of each of the six tobacco products compared to their heterosexual peers. Similarly, young lesbian/gay and bisexual women had higher

relative odds of regular use (vs. no use) of cigarettes, e-cigarettes, cigars, and hookah compared to their heterosexual peers. Regular use of pipes and smokeless products was rare among young women.

For older women (i.e., 25+ years), never use of any tobacco product was highest for women identifying as "something else" (47.21%; 95% CI: 36.65–57.77) and heterosexual women (34.19%; 95% CI: 32.72–35.66) compared to lesbian/gay (18.04%; 95% CI: 8.08–28.00) and bisexual women (18.83%; 95% CI: 11.17–26.49). Older lesbian/gay and bisexual-identified women had higher relative odds of experimental use (vs. no use) of e-cigarettes, cigars, pipes, hookah, and smokeless products compared to their heterosexual peers. Similarly, older lesbian/gay and bisexual women had higher relative odds of regular use (vs. no use) of cigarettes, e-cigarettes, cigars, and hookah compared to their heterosexual peers. Regular use of pipes and smokeless tobacco was rare among older women regardless of sexual orientation identity.

In Table 2 we present prevalence estimates and adjusted odds ratios for women stratified by sexual attraction and age group. In general, prevalence estimates by sexual attraction were closely aligned—differences of <5 percentage points—with those for sexual orientation identity across both age groups. There were few differences in the odds ratios between measures of identity and attraction. The relative odds of experimental cigarette use were not statistically different between young same-sex and opposite-sex attracted women. Younger and older women with asexual attraction had lower relative odds of experimental or regular use (vs. no use) of cigarettes, e-cigarettes, cigars, and hookah. Regular use of most tobacco products was also very low for this group. In general, asexual women had lower odds of regular use compared to heterosexual women.

### Tobacco use among men

In Table 3 we present prevalence estimates and adjusted odds ratios for men stratified by sexual orientation identity and age group. For young men (18–24 years), there was no difference in the summary measure of tobacco use. Young gay men had higher relative odds of experimental use (vs. no use) of cigarettes compared to their heterosexual peers; however, they had lower relative odds of experimental use (vs. no use) of cigars compared to heterosexual men. No other differences in experimental use among young men were found. Similarly, young gay men had higher relative odds of regular cigarette use (vs. no use) compared to their heterosexual peers. Regular use of pipes and smokeless products was rare among young gay and bisexual men.

For older men (25+ years) never use of any tobacco was highest for men identifying as "something else" (28.52%; 95% CI: 14.07–42.97), but confidence intervals overlapped with all other sexual orientation identity subgroups. Older gay men had higher relative odds of experimental use (vs. no use) of e-cigarettes and hookah compared to their heterosexual peers; however, they had lower relative odds of experimental use (vs. no use) of smokeless products compared to heterosexual men. Men identifying as "something else" had lower relative odds of experimental cigar and smokeless product use (vs. no use)

TABLE 1. LIFETIME TOBACCO USE AND SEXUAL IDENTITY AMONG U.S. ADULT WOMEN BY AGE: POPULATION ASSESSMENT OF TOBACCO AND HEALTH STUDY WAVE 1 (2013–2014), N = 15,552

	Lesbian/gay			Bisexual			Something else			Heterosexual		
	%	SE	AOR	95% CI	%	SE	AOR	95% CI	%	SE	%	SE
Age 18–24 years												
Any tobacco												
Never (REF)	23.63	5.35	1.00	1.00	16.05	2.49	1.00	1.00	33.10	5.80	1.00	1.26
Experimental	28.89	4.85	1.44	0.70–2.98	26.59	2.37	<b>1.95</b>	1.28–2.95	36.90	5.16	1.34	0.96
Regular	47.49	4.97	<b>3.34</b>	1.72–6.45	57.36	3.05	<b>5.20</b>	3.49–7.76	30.00	4.54	1.49	0.90
Cigarette												
Never (REF)	36.12	5.17	1.00	1.00	24.93	2.80	1.00	1.00	47.27	6.03	1.00	1.12
Experimental	31.60	4.25	<b>1.72</b>	1.02–6.74	30.81	2.04	<b>2.37</b>	1.7–3.29	33.99	5.39	1.44	0.88
Regular	32.28	4.37	<b>2.92</b>	1.64–5.21	44.26	3.00	<b>4.76</b>	3.36–6.74	18.74	3.38	1.14	0.76
E-cigarette												
Never (REF)	57.62	4.85	1.00	1.00	49.59	2.94	1.00	1.00	65.68	5.30	1.00	0.78
Experimental	36.07	4.57	<b>2.51<sup>a</sup></b>	1.58–3.97	41.55	2.60	<b>2.93<sup>a</sup></b>	2.26–3.81	24.64	4.42	2.00 <sup>a</sup>	0.70
Regular	6.31 <sup>b</sup>	2.48	<b>2.93<sup>a</sup></b>	1.1–7.81	8.86	1.34	<b>3.99<sup>a</sup></b>	2.59–6.14	9.68	2.84	<b>3.65<sup>a</sup></b>	0.31
Cigars												
Never (REF)	41.66	5.17	1.00	1.00	40.55	2.65	1.00	1.00	65.17	5.00	1.00	1.03
Experimental	35.32	4.81	<b>2.16<sup>c</sup></b>	1.27–3.65	40.04	2.60	<b>2.55<sup>c</sup></b>	1.97–3.30	26.95	4.80	1.12 <sup>c</sup>	0.92
Regular	23.02	4.11	<b>5.93<sup>c</sup></b>	3.43–10.27	19.42	2.10	<b>5.47<sup>c</sup></b>	4.04–7.42	7.87	2.16	1.60 <sup>c</sup>	0.39
Regular pipe <sup>d</sup>												
Never (REF)	88.63	3.42	1.00	1.00	83.37	1.80	1.00	1.00	94.26	1.82	1.00	0.35
Experimental	11.37	3.42	<b>2.70</b>	1.30–5.58	16.63	1.80	<b>3.52</b>	2.64–4.69	5.74 <sup>b</sup>	1.82	1.20	0.35
or regular												
Hookah												
Never (REF)	43.85	4.89	1.00	1.00	39.72	2.47	1.00	1.00	55.45	5.45	1.00	1.26
Experimental	43.06	4.73	<b>1.92</b>	1.23–3.00	45.38	2.55	<b>2.40</b>	1.83–3.14	32.10	4.88	1.14	1.09
Regular	13.09	3.29	<b>3.26</b>	1.58–6.73	14.89	1.66	<b>3.97</b>	1.86–5.5	12.45	2.92	<b>2.45</b>	0.37
Smokeless <sup>d</sup>												
Never (REF)	87.41	2.92	1.00	1.00	87.50	1.88	1.00	1.00	90.35	2.43	1.00	0.43
Experimental	12.59	2.92	<b>2.84<sup>c</sup></b>	1.58–5.10	12.50	1.88	<b>2.15<sup>c</sup></b>	1.46–3.16	9.65	2.43	1.84 <sup>c</sup>	0.43
or regular												
Age 25 years or older												
Any tobacco												
Never (REF)	18.04	5.08	1.00	1.00	18.83	3.91	1.00	1.00	47.21	5.39	1.00	0.75
Experimental	28.68	5.54	1.68	0.71–3.97	19.79	3.13	1.43	0.77–2.63	24.92	4.22	0.78	0.62
Regular	53.28	5.24	<b>2.52</b>	1.22–5.22	61.38	3.95	<b>3.49</b>	2.08–5.84	27.87	3.88	0.67	0.72
Cigarette												
Never (REF)	20.59	4.82	1.00	1.00	21.27	3.88	1.00	1.00	48.82	5.43	1.00	0.75
Experimental	28.94	5.37	1.67	0.80–3.50	21.03	2.81	1.46	0.86–2.47	25.81	4.22	0.83	0.61
Regular	50.46	5.11	<b>2.32</b>	1.24–4.35	57.70	3.77	<b>3.17</b>	1.98–5.08	25.37	3.81	0.64	0.70

(continued)

TABLE 1. (CONTINUED)

	Lesbian/gay			Bisexual			Something else			Heterosexual				
	%	SE	AOR	95% CI	%	SE	AOR	95% CI	%	SE	AOR	95% CI	%	SE
E-cigarette														
Never (REF)	64.21	3.77	1.00	1.00	62.62	3.33	1.00	1.00	83.94	2.46	1.00	1.00	86.41	0.33
Experimental	26.19	3.26	<b>3.35</b>	2.26-4.97	26.65	2.83	<b>3.19</b>	2.37-4.28	13.28	2.28	1.17	0.77-1.77	10.97	0.26
Regular	9.60	2.13	<b>4.95</b>	2.88-8.53	10.73	1.24	<b>5.36</b>	3.90-7.37	2.78 <sup>b</sup>	0.85	1.21	0.59-2.49	2.62	0.14
Cigars														
Never (REF)	52.47	5.37	1.00	1.00	51.66	3.55	1.00	1.00	78.40	3.69	1.00	1.00	78.71	0.50
Experimental	36.72	4.80	<b>2.54</b>	1.53-4.21	36.77	3.49	<b>3.16</b>	2.31-4.34	16.74	3.48	1.10	0.65-1.85	19.11	0.47
Regular	10.82	2.16	<b>6.91</b>	3.8-12.58	11.57	1.52	<b>6.71</b>	4.86-9.25	4.87	1.17	<b>2.06</b>	1.21-3.49	2.18	0.12
Regular pipe <sup>d</sup>														
Never (REF)	80.80	3.34	1.00	1.00	85.76	2.07	1.00	1.00	91.81	2.48	1.00	1.00	94.58	0.26
Experimental	19.20	3.34	<b>3.81</b>	2.38-6.08	14.24	2.07	<b>2.89</b>	2.11-3.97	8.19 <sup>b</sup>	2.48	1.90	0.95-3.80	5.42	0.26
or regular														
Hookah														
Never (REF)	77.82	3.18	1.00	1.00	72.52	2.39	1.00	1.00	88.91	2.10	1.00	1.00	90.93	0.29
Experimental	19.66	2.89	<b>2.41</b>	1.57-3.71	23.72	2.23	<b>3.60</b>	2.72-4.78	9.47	1.90	1.13	0.7-1.84	8.48	0.27
Regular	2.52 <sup>b</sup>	1.17	<b>4.32</b>	1.42-13.10	3.77	0.79	<b>6.83</b>	4.35-10.72	1.62 <sup>b</sup>	0.68	2.26	0.82-6.25	0.59	0.05
Smokeless <sup>d</sup>														
Never (REF)	80.81	3.97	1.00	1.00	87.36	2.33	1.00	1.00	95.93	1.55	1.00	1.00	95.46	0.23
Experimental	19.19	3.97	<b>4.88</b>	2.86-8.32	12.64	2.33	<b>3.10</b>	2.07-4.65	4.07 <sup>b</sup>	1.55	1.15	0.51-2.60	4.54	0.23
or regular														

Bolded AORs are statistically significant ( $P < 0.05$ ).

<sup>a</sup>Asian race was combined with "other" in the multivariable model due to low cell sizes.

<sup>b</sup>Estimate has relative standard error >30%.

<sup>c</sup>Asian race was combined with "other," and advanced degree was combined with bachelor's or higher due to low cell sizes.

<sup>d</sup>Experimental and regular use combined due to low prevalence.

AOR, adjusted odds ratios from multinomial logistic regression; CI, confidence interval; REF, reference category; SE, standard error.

TABLE 2. LIFETIME TOBACCO USE AND SEXUAL ATTRACTION AMONG U.S. ADULT WOMEN BY AGE: POPULATION ASSESSMENT OF TOBACCO AND HEALTH STUDY WAVE 1 (2013–2014), N=15,489

	Same sex			Both sexes			Asexual			Opposite sex				
	%	SE	AOR	95% CI	%	SE	AOR	95% CI	%	SE	AOR	95% CI	%	SE
Age 18–24 years														
Any tobacco														
Never (REF)	26.02	4.67	1.00	1.00	15.50	2.98	1.00	1.00	83.95	4.96	1.00	1.00	38.26	1.25
Experimental	28.50	4.09	1.21	0.67–2.19	27.31	2.73	<b>1.96</b>	1.18–3.23	6.67 <sup>b</sup>	3.53	<b>0.10</b>	0.03–0.35	35.88	0.95
Regular	45.47	4.26	<b>2.56</b>	1.50–4.34	57.18	3.40	<b>4.82</b>	3.00–7.76	9.38 <sup>b</sup>	3.55	<b>0.19</b>	0.08–0.45	25.86	0.89
Cigarette														
Never (REF)	38.20	4.61	1.00	1.00	26.95	3.10	1.00	1.00	88.47	3.86	1.00	1.00	52.53	1.10
Experimental	30.03	4.03	1.44	0.90–2.31	30.06	2.58	<b>1.97</b>	1.38–2.80	3.32 <sup>b</sup>	1.98	<b>0.07</b>	0.02–0.33	28.44	0.87
Regular	31.77	3.81	<b>2.36</b>	1.45–3.81	42.99	3.11	<b>3.80</b>	2.66–5.44	8.21	3.24	<b>0.29</b>	0.12–0.73	19.03	0.76
E-cigarette <sup>d</sup>														
Never (REF)	59.85	4.44	1.00	1.00	50.90	3.17	1.00	1.00	92.39	3.22	1.00	1.00	75.31	0.82
Experimental	40.15	4.44	<b>2.08<sup>a</sup></b>	1.32–3.12	49.10	3.17	<b>2.68<sup>a</sup></b>	2.01–3.58	7.61 <sup>b</sup>	3.22	<b>0.26<sup>a</sup></b>	0.10–0.67	24.69	0.82
or regular														
Cigars														
Never (REF)	45.99	4.46	1.00	1.00	42.41	3.41	1.00	1.00	91.55	3.45	1.00	1.00	66.79	1.01
Experimental	33.52	4.12	<b>1.73<sup>c</sup></b>	1.12–2.68	37.15	3.03	<b>2.10<sup>c</sup></b>	1.53–2.9	4.39 <sup>b</sup>	2.29	<b>0.14<sup>c</sup></b>	0.04–0.51	27.38	0.92
Regular	20.49	3.47	<b>4.51<sup>c</sup></b>	2.74–7.43	20.44	2.49	<b>5.12<sup>c</sup></b>	3.54–7.41	4.06 <sup>b</sup>	2.59	0.53 <sup>c</sup>	0.12–2.41	5.83	0.39
Regular pipe <sup>d</sup>														
Never (REF)	86.91	3.33	1.00	1.00	85.99	1.74	1.00	1.00	97.58	1.23	1.00	1.00	94.80	0.37
Experimental	13.09	3.33	<b>2.87</b>	1.51–5.46	14.01	1.74	<b>2.57</b>	1.87–3.53	2.42 <sup>b</sup>	1.23	0.61	0.19–1.99	5.20	0.37
or regular														
Hookah <sup>d</sup>														
Never (REF)	44.98	4.29	1.00	1.00	44.68	3.37	1.00	1.00	89.56	3.65	1.00	1.00	58.72	1.25
Experimental	55.02	4.29	<b>1.88</b>	1.28–2.76	55.32	3.37	<b>2.02</b>	1.52–2.67	10.44 <sup>b</sup>	3.65	<b>0.19</b>	0.09–0.43	41.28	1.25
or regular														
Smokeless <sup>d</sup>														
Never (REF)	85.53	2.85	1.00	1.00	89.65	1.90	1.00	1.00	95.06	2.71	1.00	1.00	93.66	0.45
Experimental	14.47	2.85	<b>2.94</b>	1.79–4.83	10.35	1.90	<b>1.59</b>	1.03–2.46	4.94 <sup>b</sup>	2.71	1.14	0.30–4.38	6.34	0.45
or regular														
Age 25 years or older														
Total, no.	206				247				296				10302	
Any tobacco														
Never (REF)	16.80	4.11	1.00	1.00	18.07	4.81	1.00	1.00	54.34	4.09	1.00	1.00	33.69	0.75
Experimental	31.23	5.16	1.95	0.94–4.05	16.83	3.38	1.14	0.56–2.32	22.36	3.36	<b>0.65</b>	0.42–0.99	29.42	0.61
Regular	51.98	4.72	<b>2.67</b>	1.44–4.95	65.11	5.30	<b>3.40</b>	1.69–6.83	23.30	2.97	<b>0.51</b>	0.35–0.74	36.89	0.73
Cigarette														
Never (REF)	19.11	3.93	1.00	1.00	19.59	4.87	1.00	1.00	55.96	3.95	1.00	1.00	35.86	0.75
Experimental	32.18	5.06	<b>2.00</b>	1.05–3.81	19.19	3.59	1.32	0.67–2.61	21.44	3.22	<b>0.65</b>	0.43–0.99	28.33	0.59
Regular	48.71	4.52	<b>2.45</b>	1.43–4.20	61.12	5.24	<b>3.28</b>	1.66–6.35	22.60	2.98	<b>0.52</b>	0.36–0.76	35.76	0.71

(continued)

TABLE 2. (CONTINUED)

	Same sex			Both sexes			Asexual			Opposite sex				
	%	SE	AOR	95% CI	%	SE	AOR	95% CI	%	SE	AOR	95% CI	%	SE
E-cigarette														
Never (REF)	65.66	3.07	1.00	1.00	62.33	4.35	1.00	1.00	93.29	1.00	1.00	1.00	85.97	0.33
Experimental	25.73	2.82	<b>3.21</b>	2.31-4.47	25.78	3.40	<b>2.83</b>	1.92-4.17	5.61	0.88	<b>0.43</b>	0.30-0.60	11.30	0.26
Regular	8.60	1.78	<b>4.32</b>	2.62-7.12	11.89	1.91	<b>5.39</b>	3.48-8.35	1.10 <sup>b</sup>	0.40	<b>0.43</b>	0.19-0.94	2.73	0.14
Cigars														
Never (REF)	56.42	4.97	1.00	1.00	48.66	4.18	1.00	1.00	92.95	1.72	1.00	1.00	78.04	0.50
Experimental	33.52	4.52	<b>2.08</b>	1.30-3.33	36.95	3.75	<b>2.98</b>	2.06-4.77	6.16	1.68	<b>0.40</b>	0.21-0.74	19.66	0.47
Regular	10.06	2.30	<b>5.85</b>	3.06-11.18	14.39	2.56	<b>7.99</b>	5.02-12.73	0.89 <sup>b</sup>	0.32	<sup>e</sup>		2.30	0.12
Regular pipe <sup>d</sup>														
Never (REF)	82.51	3.10	1.00	1.00	83.55	2.85	1.00	1.00	95.13	1.89	1.00	1.00	94.51	0.26
Experimental	17.49	3.10	<b>3.33</b>	2.07-5.36	16.45	2.85	<b>3.13</b>	2.06-4.77	4.87 <sup>b</sup>	1.89	1.17	0.47-2.88	5.49	0.26
or regular														
Hookah <sup>d</sup>														
Never (REF)	77.33	3.06	1.00	1.00	70.14	3.61	1.00	1.00	98.63	0.44	1.00	1.00	90.50	0.31
Experimental	22.67	3.06	<b>2.51</b>	1.71-3.68	29.86	3.61	<b>3.83</b>	2.62-5.60	1.37 <sup>b</sup>	0.44	<b>0.15</b>	0.07-0.30	9.50	0.31
or regular														
Smokeless														
Never (REF)	82.70	3.83	1.00	1.00	85.28	3.03	1.00	1.00	97.89	0.96	1.00	1.00	95.40	0.24
Experimental	14.38	3.80	<b>3.81</b>	1.94-7.49	12.08	2.91	<b>3.09</b>	1.71-5.58	1.69 <sup>b</sup>	0.93	0.59	0.16-2.16	4.19	0.22
Regular	2.92 <sup>b</sup>	1.14	<b>9.17</b>	3.51-23.95	2.64 <sup>b</sup>	0.80	<b>6.10</b>	2.87-12.96	0.41 <sup>b</sup>	0.23	<sup>e</sup>		0.41	0.06

Bolded AORs are statistically significant ( $P < 0.05$ ).

<sup>a</sup>Asian race was combined with "other" in the multivariable model due to low cell sizes.

<sup>b</sup>Estimate has relative standard error >30%.

<sup>c</sup>Asian race was combined with "other," and advanced degree was combined with bachelor's or higher due to low cell sizes.

<sup>d</sup>Experimental and regular use combined due to low prevalence.

<sup>e</sup>Not estimated due to small cell size.

TABLE 3. LIFETIME TOBACCO USE AND SEXUAL IDENTITY AMONG U.S. ADULT MEN BY AGE:  
POPULATION ASSESSMENT OF TOBACCO AND HEALTH STUDY WAVE 1 (2013–2014), N = 15,996

	Gay				Bisexual				Something else				Heterosexual	
	%	SE	AOR	95% CI	%	SE	AOR	95% CI	%	SE	AOR	95% CI	%	SE
Age 18–24 years														
Any tobacco														
Never (REF)	20.91	6.18	1.00	1.00	34.15	6.99	1.00	1.00	34.50	7.80	1.00	1.00	29.18	1.33
Experimental	34.32	5.63	1.68	0.73–3.86	29.38	5.93	0.95	0.47–1.91	37.31	7.22	1.15	0.50–2.66	28.41	0.78
Regular	44.77	5.09	1.58	0.79–3.16	36.47	5.70	0.75	0.41–1.34	28.19	5.78	0.52	0.21–1.27	42.41	1.06
Cigarette														
Never (REF)	28.55	6.07	1.00	1.00	45.48	6.42	1.00	1.00	42.66	7.51	1.00	1.00	42.42	1.19
Experimental	35.71	5.35	<b>1.85</b>	1.01–1.56	27.31	5.96	0.89	0.47–1.69	39.86	7.81	1.26	0.57–2.76	29.69	0.84
Regular	35.75	4.99	<b>2.13</b>	1.19–3.80	27.20	4.94	0.92	0.54–1.56	17.48	4.70	0.51	0.21–1.25	27.89	0.88
E-cigarette														
Never (REF)	55.92	5.72	1.00	1.00	63.14	5.19	1.00	1.00	71.21	6.87	1.00	1.00	62.06	1.07
Experimental	35.39	5.11	1.36	0.86–2.14	30.38	4.94	0.98	0.63–1.53	21.30	5.86	0.52	0.23–1.16	30.70	0.94
Regular	8.69	2.41	1.53	0.74–3.16	6.47 <sup>a</sup>	2.45	0.87	0.35–2.13	7.49 <sup>a</sup>	3.47	0.94	0.30–2.92	7.23	0.40
Cigars														
Never (REF)	59.31	5.00	1.00	1.00	54.40	6.13	1.00	1.00	63.84	7.40	1.00	1.00	45.88	1.30
Experimental	28.51	4.10	<b>0.56</b>	0.35–0.89	34.48	5.77	0.73	0.44–1.23	27.58	6.52	0.51	0.25–1.03	40.07	1.13
Regular	12.18	2.97	0.69	0.37–1.28	11.12	3.10	0.72	0.37–1.39	8.57 <sup>a</sup>	3.60	0.49	0.17–1.46	14.05	0.51
Regular pipe														
Never (REF)	86.00	3.30	1.00	1.00	71.16	5.03	1.00	1.00	82.12	4.57	1.00	1.00	79.27	0.85
Experimental	11.33	2.93	0.60	0.33–1.10	25.87	4.61	1.54	0.93–2.56	10.67 <sup>a</sup>	3.62	0.59	0.27–1.26	18.28	0.79
Regular	2.67 <sup>a</sup>	1.56	1.04	0.23–4.59	3.07 <sup>a</sup>	1.73	1.32	0.34–5.07	7.21 <sup>a</sup>	3.27	2.23	0.51–9.73	2.45	0.24
Hookah														
Never (REF)	42.91	5.95	1.00	1.00	57.85	6.13	1.00	1.00	62.28	6.13	1.00	1.00	52.99	1.31
Experimental	42.92	5.26	1.47	0.89–2.42	29.36	5.51	0.77	0.45–1.34	33.00	7.36	0.84	0.45–1.56	35.87	1.00
Regular	14.17	3.09	1.64	0.88–3.06	12.79 <sup>a</sup>	3.97	1.06	0.47–2.39	4.72 <sup>a</sup>	2.47	0.39	0.10–1.46	11.14	0.54
Smokeless <sup>b</sup>														
Never (REF)	85.39	3.44	1.00	1.00	78.36	4.75	1.00	1.00	89.77	3.82	1.00	1.00	71.69	0.96
Experimental	14.61	3.44	<b>0.47</b>	0.27–0.84	21.64	4.75	0.61	0.35–1.08	10.23 <sup>a</sup>	3.82	<b>0.31</b>	0.12–0.81	28.31	0.96
Age 25 years or older														
Any tobacco														
Never (REF)	16.37	5.35	1.00	1.00	14.42	4.78	1.00	1.00	28.52	7.37	1.00	1.00	19.58	0.78
Experimental	37.49	5.63	1.53	0.60–3.90	23.41	5.71	1.12	0.39–3.23	30.97	6.19	0.93	0.40–2.19	27.40	0.53
Regular	46.14	5.42	1.11	0.46–2.65	62.17	5.69	1.70	0.71–4.05	40.51	4.60	0.60	0.29–1.26	53.02	0.76
Cigarette														
Never (REF)	20.13	5.57	1.00	1.00	16.52	4.60	1.00	1.00	32.62	7.27	1.00	1.00	25.78	0.78
Experimental	36.62	5.84	1.63	0.72–3.71	33.05	5.23	1.80	0.85–3.80	35.54	6.34	1.02	0.48–2.17	28.43	0.59
Regular	43.25	5.31	1.34	0.64–2.81	50.43	6.17	1.83	0.84–3.99	31.85	4.25	0.54	0.27–1.10	45.79	0.72
E-cigarette														
Never (REF)	73.69	3.42	1.00	1.00	77.96	3.97	1.00	1.00	81.75	3.16	1.00	1.00	82.98	0.37
Experimental	21.27	2.99	<b>1.87</b>	1.25–2.79	17.36	3.39	1.37	0.84–2.25	13.22	2.48	0.77	0.50–1.20	13.68	0.31
Regular	5.04	1.38	1.73	0.94–3.21	4.68 <sup>a</sup>	1.40	1.42	0.69–2.91	5.02 <sup>a</sup>	1.90	1.48	0.59–3.75	3.34	0.14
Cigars														
Never (REF)	46.72	4.63	1.00	1.00	42.45	5.42	1.00	1.00	64.83	4.30	1.00	1.00	43.55	0.77
Experimental	48.77	4.57	0.92	0.61–1.37	38.02	6.14	0.80	0.47–1.84	25.84	3.87	<b>0.55</b>	0.35–0.85	46.37	0.74
Regular	4.52	1.17	<b>0.41</b>	0.23–0.74	19.53	4.08	<b>2.01</b>	1.10–3.68	9.33	2.30	0.73	0.40–1.35	10.08	0.37
Regular pipe														
Never (REF)	76.42	4.31	1.00	1.00	53.60	5.66	1.00	1.00	76.15	4.12	1.00	1.00	67.21	0.68
Experimental	19.44	3.61	0.64	0.40–1.02	26.75	4.82	1.33	0.83–2.15	19.27	3.72	0.87	0.52–1.46	26.13	0.62
Regular	4.12 <sup>a</sup>	2.55	0.54	0.13–2.29	19.65	5.31	<b>3.88</b>	1.78–8.46	4.58 <sup>a</sup>	2.08	1.02	0.32–3.25	6.66	0.33
Hookah														
Never (REF)	71.45	3.53	1.00	1.00	77.85	3.94	1.00	1.00	85.46	3.13	1.00	1.00	84.82	0.41
Experimental	26.66	3.33	<b>1.92</b>	1.35–2.73	20.06	3.87	1.43	0.88–2.34	12.78	2.95	0.87	0.51–1.49	13.71	0.37
Regular	1.90 <sup>a</sup>	0.85	1.25	0.43–3.63	2.09 <sup>a</sup>	0.99	1.41	0.45–4.39	1.76 <sup>a</sup>	1.07	0.88	0.19–4.02	1.47	0.10
Smokeless														
Never (REF)	88.49	2.44	1.00	1.00	72.47	5.28	1.00	1.00	86.66	2.39	1.00	1.00	70.03	0.71
Experimental	9.41	1.98	<b>0.40</b>	0.25–0.63	18.35	4.57	1.00	0.55–1.83	5.91 <sup>a</sup>	1.78	<b>0.37</b>	0.19–0.72	17.24	0.53
Regular	2.09 <sup>a</sup>	1.11	<b>0.14</b>	0.04–0.51	9.18 <sup>a</sup>	2.95	0.74	0.34–1.60	7.43	1.85	0.68	0.38–1.23	12.74	0.46

Bolded AORs are statistically significant ( $P < 0.05$ ).

<sup>a</sup>Estimate has relative standard error  $> 30\%$ .

<sup>b</sup>Experimental and regular use combined due to low prevalence.



TABLE 4. LIFETIME TOBACCO USE AND SEXUAL ATTRACTION AMONG U.S. ADULT MEN BY AGE:  
POPULATION ASSESSMENT OF TOBACCO AND HEALTH STUDY WAVE 1 (2013–2014), N=15,963

	Same sex				Both sexes				Asexual				Opposite sex	
	%	SE	AOR	95% CI	%	SE	AOR	95% CI	%	SE	AOR	95% CI	%	SE
Age 18–24 years														
Any tobacco														
Never (REF)	25.92	5.60	1.00	1.00	39.28	9.10	1.00	1.00	64.23	6.98	1.00	1.00	28.69	1.36
Experimental	33.58	4.51	1.33	0.68–2.61	29.22	6.67	1.03	0.47–2.58	19.71	5.18	<b>0.32</b>	0.16–0.66	28.71	0.79
Regular	40.50	4.98	1.18	0.60–2.30	31.50	6.53	0.66	0.33–1.29	16.07	4.39	<b>0.16</b>	0.08–0.33	42.59	1.05
Cigarette														
Never (REF)	34.39	5.48	1.00	1.00	50.38	8.33	1.00	1.00	70.23	6.53	1.00	1.00	41.90	1.22
Experimental	33.82	4.55	1.39	0.79–2.46	25.21	6.61	0.83	0.36–1.94	21.53	5.59	<b>0.43</b>	0.21–0.87	30.00	0.87
Regular	31.79	4.40	1.58	0.89–2.79	24.41	5.52	0.77	0.41–1.46	8.23 <sup>a</sup>	3.21	<b>0.16</b>	0.06–0.41	28.10	0.88
E-cigarette														
Never (REF)	58.93	5.22	1.00	1.00	69.06	6.46	1.00	1.00	87.20	3.83	1.00	1.00	61.77	1.09
Experimental	31.92	4.24	1.17	0.77–1.79	24.87	5.73	1.77	0.44–1.35	7.75 <sup>a</sup>	2.90	<b>0.18</b>	0.07–0.44	30.99	0.96
Regular	9.15	2.53	1.50	0.73–3.06	6.07 <sup>a</sup>	2.85	0.74	0.24–2.25	5.05 <sup>a</sup>	2.33	0.51	0.17–1.54	7.25	0.40
Cigars														
Never (REF)	63.54	4.80	1.00	1.00	60.91	7.71	1.00	1.00	83.49	4.32	1.00	1.00	45.43	1.33
Experimental	26.39	4.22	<b>0.49</b>	0.31–0.77	27.00	6.25	0.62	0.33–1.17	9.96 <sup>a</sup>	3.47	<b>0.16</b>	0.07–0.38	40.54	1.15
Regular	10.07	2.32	<b>0.55</b>	0.31–0.98	12.09 <sup>a</sup>	3.89	0.80	0.33–1.95	6.55 <sup>a</sup>	2.73	<b>0.25</b>	0.10–0.64	14.04	0.52
Regular pipe <sup>b</sup>														
Never (REF)	87.11	2.42	1.00	1.00	72.78	6.48	1.00	1.00	92.35	3.12	1.00	1.00	79.02	0.86
Experimental or regular	12.89	2.42	<b>0.59</b>	0.38–0.94	27.22	6.48	1.58	0.82–3.01	7.65 <sup>a</sup>	3.12	<b>0.37</b>	0.14–0.99	20.98	0.86
Hookah														
Never (REF)	48.02	5.46	1.00	1.00	62.80	6.88	1.00	1.00	80.50	5.50	1.00	1.00	52.70	1.32
Experimental	39.00	4.68	1.18	0.73–1.89	29.71	5.88	0.91	0.55–1.50	15.10 <sup>a</sup>	5.03	<b>0.33</b>	0.14–0.77	36.10	1.03
Regular	12.97	2.43	1.24	0.67–2.31	7.49 <sup>a</sup>	3.24	0.66	0.24–1.80	4.40 <sup>a</sup>	2.16	<b>0.30</b>	0.10–0.90	11.19	0.53
Smokeless <sup>b</sup>														
Never (REF)	86.01	2.74	1.00	1.00	80.56	4.99	1.00	1.00	92.29	2.89	1.00	1.00	71.66	0.99
Experimental or regular	13.99	2.74	<b>0.47</b>	0.30–0.75	19.44 <sup>a</sup>	4.99	0.59	0.30–1.16	7.71 <sup>a</sup>	2.89	<b>0.22</b>	0.08–0.60	28.34	0.99
Age 25 years or older														
Any tobacco <sup>c</sup>														
Never or experimental (REF)	52.27	5.11	1.00	1.00	39.45	9.96	1.00	1.00	68.67	4.24	1.00	1.00	46.73	0.75
Regular	47.73	5.11	0.90	0.58–1.38	60.55	9.96	1.72	0.72–4.12	31.33	4.24	<b>0.36</b>	0.24–0.55	53.27	0.75
Cigarette														
Never (REF)	21.23	4.83	1.00	1.00	13.02 <sup>a</sup>	4.58	1.00	1.00	45.51	5.13	1.00	1.00	25.45	0.79
Experimental	35.55	4.97	1.51	0.76–3.02	33.09	9.80	2.57	0.83–7.96	29.53	4.28	0.67	0.42–1.09	28.56	0.62
Regular	43.22	4.74	1.28	0.69–2.38	53.88	9.56	<b>3.17</b>	1.22–8.20	24.96	3.98	<b>0.28</b>	0.17–0.46	45.99	0.71
E-cigarette														
Never (REF)	74.80	2.84	1.00	1.00	61.79	8.35	1.00	1.00	92.89	1.98	1.00	1.00	82.86	0.37
Experimental	20.86	2.58	<b>1.81</b>	1.3–2.51	29.30	7.22	<b>3.21</b>	1.49–6.92	5.91	1.62	<b>0.29</b>	0.16–0.54	13.74	0.31
Regular	4.33	1.23	1.48	0.80–2.75	8.91 <sup>a</sup>	3.22	<b>3.85</b>	1.43–10.39	1.19 <sup>a</sup>	0.94	0.27	0.04–1.76	3.40	0.14
Cigars														
Never (REF)	44.17	4.15	1.00	1.00	32.01	7.65	1.00	1.00	79.08	3.57	1.00	1.00	43.21	0.76
Experimental	48.98	3.98	1.01	0.71–1.44	50.67	8.25	1.62	0.74–3.54	15.99	3.52	<b>0.29</b>	0.17–0.49	46.57	0.73
Regular	6.86	1.76	0.68	0.37–1.25	17.32 <sup>a</sup>	6.02	2.61	0.98–6.97	4.93 <sup>a</sup>	1.59	<b>0.33</b>	0.16–0.69	10.22	0.37
Regular pipe														
Never (REF)	74.52	4.32	1.00	1.00	61.78	8.98	1.00	1.00	84.02	3.45	1.00	1.00	67.13	0.71
Experimental	18.64	3.06	0.65	0.42–1.02	24.97	7.44	1.15	0.48–2.77	11.55	3.18	<b>0.50</b>	0.26–0.96	26.18	0.64
Regular	6.84 <sup>a</sup>	2.97	0.96	0.34–2.71	13.25 <sup>a</sup>	5.89	2.34	0.79–6.96	7.42 <sup>a</sup>	2.95	1.56	0.56–4.31	6.69	0.33
Hookah <sup>b</sup>														
Never (REF)	73.77	3.01	1.00	1.00	73.48	6.59	1.00	1.00	93.95	1.58	1.00	1.00	84.59	0.42
Experimental or regular	26.23	3.01	<b>1.66</b>	1.20–2.30	26.52	6.59	1.91	0.94–3.90	6.05	1.58	<b>0.34</b>	0.19–0.64	15.41	0.42
Smokeless														
Never (REF)	87.97	2.47	1.00	1.00	79.12	5.09	1.00	1.00	89.75	1.93	1.00	1.00	69.79	0.74
Experimental	10.41	2.26	<b>0.46</b>	0.28–0.74	11.20	1.72	0.65	0.31–1.35	7.58	1.72	<b>0.45</b>	0.27–0.76	17.38	0.55
Regular	1.61 <sup>a</sup>	0.83	<b>0.11</b>	0.03–0.38	9.68 <sup>a</sup>	3.88	0.89	0.33–2.44	2.67 <sup>a</sup>	0.99	<b>0.19</b>	0.08–0.46	12.83	0.46

Bolded AORs are statistically significant ( $P < 0.05$ ).

<sup>a</sup>Estimate has relative standard error >30%.

<sup>b</sup>Experimental and regular use combined due to low prevalence.

<sup>c</sup>Never and experimental use combined due to low prevalence.

compared to heterosexual men. For regular use, older gay men had lower relative odds of cigar and smokeless product use (vs. no use) compared to their heterosexual peers; however, bisexual men had higher relative odds of regular cigar and pipe use (vs. no use) compared to heterosexual men in that age group.

In Table 4 we present prevalence estimates and adjusted odds ratios for men stratified by sexual attraction and age group. For never cigarette and never hookah use, the differences between gay identified and same-sex attracted categories for men in the young age group were >5 percentage points. The estimates were larger based on gay sexual orientation identity compared to male same-sex attraction, but most of the differences in estimates were found between measures of bisexuality. In general, the estimates for both sexual attraction (compared to bisexual identity) reflected higher abstinence in young men (e-cigarettes and cigars) and higher experimentation in older men (e-cigarettes, cigars, and hookah).

For overall tobacco use, never use of any tobacco product was highest among asexual men in the younger (64.23%; 95% CI: 50.55–77.91) age group. Relative odds of use were also similar with a few notable exceptions. Among men in the younger age group, same-sex attraction was not associated with higher relative odds of experimental or regular cigarette use (vs. no use) compared to opposite sex attracted men—as it was for gay vs. heterosexual identity. In addition, same-sex attracted young men had lower relative odds of regular cigar use (vs. no use) compared to their opposite-sex attracted peers.

Among men in the older age group, both-sex attracted men had higher relative odds of experimental and regular e-cigarette use (vs. no use)—as well as higher relative odds of regular cigarette use (vs. no use)—compared to opposite-sex attracted men. Asexual attraction was inversely associated with tobacco use, particularly among the older age group of men. Younger and older men with asexual attraction had lower relative odds of experimental or regular use (vs. no use) of e-cigarettes, cigars, hookah, and smokeless products compared to opposite-sex attracted men. Asexual men in the older age group also had lower relative odds of experimental use (vs. no use) of pipes, as well as lower relative odds of regular use (vs. no use) of cigarettes, cigars, and smokeless product use.

## Discussion

We found complex patterns of tobacco use behaviors that varied by sexual orientation. Sexual minority identity (i.e., lesbian/gay or bisexual) and attraction (i.e., same-sex or both-sex) among women were consistently associated with higher prevalent use for six tobacco products. Sexual minority women also had the highest prevalence of cigarette and e-cigarette use out of all subgroups—including men. These findings are consistent with previous research that demonstrates higher tobacco use among sexual minority women, but provide further evidence for consistent patterns of use across age cohorts, multiple measures of sexual orientation, and tobacco products.<sup>5,9,21</sup> We found higher use among both lesbian/gay and bisexual identified women in comparison to their heterosexual counterparts. This contrasts with a previous study that found bisexual identified, but not lesbi-

an/gay identified women, had higher *current* use of some tobacco products.<sup>9</sup>

Tobacco use among men varied less consistently by sexual orientation (compared to women). Cigarette, e-cigarette, and hookah use differed by sexual orientation among men; however, these associations varied by age group and measure of sexual orientation. Differences in age cohorts—particularly among men—may reflect evolving patterns of use and are not fully captured in previous research.<sup>5,9</sup> There was less consistency in measures of identity and attraction among bisexual men. Lack of concordance between measures of sexual orientation was also found in a previous study of cigarette use.<sup>13</sup> More research is needed to explain discordance between measures of sexual orientation and the importance of those differences to specific health behaviors.

Our results also highlight the importance of alternative identity labels (e.g., “something else” category), as well as the unique patterns of tobacco use among men and women who described themselves as asexual. Sexual identities emerge from sociocultural processes, are dynamic, and change over time.<sup>22,23</sup> Identifying oneself in opposition to labels such as gay, lesbian, or bisexual, could be indicative of unique cultural subgroups. For example, asexuality is associated with emerging communities who share common understandings of their sexuality that are distinct from other sexual minority groups.<sup>24</sup> Yet alternative identity labels are often omitted from measures of sexual orientation identity, which may have implications for population-based research that seeks to characterize tobacco use in diverse sexual minority populations.

Explanatory theories focused on the etiology of tobacco disparities for sexual minorities has been described elsewhere<sup>25</sup>; however, our findings have implications for future theory development. These models should be able to account for the distinct patterns of tobacco use—with preferences for some products over others—based on sexual orientation, age, and gender. For example, if tobacco use is conceptualized as a coping behavior resulting from psychological distress associated with social rejection and stigmatization—as is the case in the Minority Stress Model<sup>26</sup>—then what accounts for the greater disparities in use among sexual minority women compared to sexual minority men? Are these differences explained by differential exposure to minority stressors based on gender or age? In addition, what role does sexual orientation identity development—inclusive of multiple identity subgroups (e.g., bisexual, asexual)—have in explaining differences in tobacco use?

To address these questions, more research is needed to develop models based in theories of intersectionality<sup>27</sup>—in which multiple characteristics of an individual and community are thought to result in unique experiences of inequity and marginalization—and models that consider tobacco use as part of specific developmental trajectories.<sup>28</sup> Given the differences identified by gender, these theories should also consider the implications of tobacco use as a behavior that is used to express one’s gender. The tobacco industry has long used symbols of masculinity and femininity as marketing strategies.<sup>29,30</sup> This includes using symbols of masculinity to market tobacco products to sexual minority communities.<sup>31</sup> Research has demonstrated that an individual’s ideologies about masculinity may be related to their

tobacco use.<sup>32</sup> It is unclear how masculinity ideologies may relate to higher prevalence of tobacco use among female sexual minorities, preference for specific types of tobacco products, or differences between sexual minority identities. Future research should examine the role of gender-based variables (e.g., endorsement of normative masculinity ideologies) in mediating the association between sexual orientation and tobacco use behaviors. Overall these sociocultural perspectives are not mutually exclusive and together can expand upon existing models that link sexual minority identities with health disparities.<sup>26</sup> Initial attempts at integrating these theoretical perspectives into a model of health promotion have been described elsewhere.<sup>33</sup>

### Limitations

Small sample sizes among some of the subgroups resulted in large standard errors producing less reliable estimates. We were also unable to stratify by other important demographic characteristics such as racial/ethnic identity, which would likely result in important nuances.<sup>13</sup> In addition, different measures of tobacco use (i.e., current use, poly-use, disaggregated cigar use) might produce different results. Similarly, the “something else” category encompasses a highly heterogeneous group that may or may not represent the conceptual definition of “sexual minority.” Research is needed to better understand the unique characteristics of this group. Furthermore, a nonbinary measure of gender identity was not included in the PATH study wave 1, which may influence how sex-disaggregated attraction measures are interpreted. However, it is possible that some transgender individuals were included in the analysis based on the binary gender responses (male/female).

### Conclusion

Our findings reflect a complex relationship between sexual orientation and tobacco use. Gender-based and product-specific approaches to tobacco prevention and control efforts are needed to address the high use of tobacco, particularly among sexual minority women. The addition of these approaches to ongoing intervention work may increase the reach and success of those efforts.<sup>34</sup> Further research is needed to identify modifiable factors that may help explain the patterns of tobacco use among specific sexual minority subgroups.

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Address correspondence to:  
*Christopher W. Wheldon, PhD*  
*Behavioral Research Program*  
*Division of Cancer Control and Population Sciences*  
*National Cancer Institute*  
*9609 Medical Center Drive*  
*Room 3E-212, MSC 9712*  
*Bethesda, MD 20892-9712*

*E-mail:* [chris.wheldon@nih.gov](mailto:chris.wheldon@nih.gov)