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Structural Stigma and Cigarette Smoking in a Prospective Cohort Study of Sexual Minority and Heterosexual Youth

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Abstract

Background—Sexual minority youth are more likely to smoke cigarettes than heterosexuals but research into the determinants of these disparities is lacking.

Purpose—To examine whether exposure to structural stigma predicts cigarette smoking in sexual minority youth.

Methods—Prospective data from adolescents participating in the Growing Up Today Study (2000–2005).

Results—Among sexual minority youth, living in low structural stigma states (e.g., states with non-discrimination policies inclusive of sexual orientation) was associated with a lower risk of cigarette smoking after adjustment for individual-level risk factors (Relative Risk[RR]=0.97, 95% Confidence Interval[CI]: 0.96, 0.99, $p=0.02$). This association remained marginally significant after additional controls for potential state-level confounders (RR=0.97, 95% CI: 0.93, 1.00, $p=0.06$). In contrast, among heterosexual youth, structural stigma was not associated with past-year smoking rates, documenting specificity of these effects to sexual minority youth.

Conclusions—Structural stigma represents a potential risk factor for cigarette smoking among sexual minority adolescents.

Keywords

stigma; sexual orientation; cigarette smoking

Tobacco use is the leading preventable cause of death in the United States.(1) Public health efforts to reduce tobacco-related morbidity and mortality have focused on identifying

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Conflict of Interest Statement

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population subgroups that evidence elevated rates of tobacco use. Sexual minorities (i.e., individuals who identify as lesbian, gay, bisexual, and transgender (LGBT)) are one group that exhibits substantial disparities in this health-risk behavior. Sexual orientation-related disparities in tobacco use emerge early in adolescence (2–5) and persist into adulthood (6–8). A recently released report from the Institute of Medicine (IOM) noted the dearth of research on determinants of LGBT health disparities and underscored the need for studies that identify whether aspects of the social environment surrounding LGBT individuals explain the disproportionate burden of disease within this population (9). The current study addresses this research priority outlined in the IOM report by evaluating social determinants of cigarette smoking among a prospective cohort of U.S. adolescents.

To accomplish this research goal, we draw on theories of stigma and minority stress, which posit that the excess stress to which individuals from stigmatized minority categories are exposed explains the elevated rates of morbidity among minority group members (10, 11). Stigma occurs at multiple levels (12), ranging from interpersonal interactions to structural (also called institutional) conditions and practices that constrain individuals' opportunities, thereby excluding them from health-promoting resources (13). Most studies have focused on interpersonal forms of stigma—including victimization, hate crimes, and discrimination (10, 14)—which serve as a risk factor for negative health outcomes (11, 15), including tobacco use (16, 17).

In contrast, there has been a dearth of studies examining the health consequences of exposure to structural stigma, although researchers have hypothesized that this form of stigma likely contributes to unequal health outcomes (13, 18, 19). One challenge to conducting this research has been developing measures that can adequately capture structural stigma. Self-report checklists have been the traditional way of measuring this construct, but such measures are problematic because individuals are often unknowing targets of structural stigma and are therefore unable to endorse these experiences in self-report measures (20). Importantly, this reporting bias would underestimate the effect of structural stigma on health. Another barrier to conducting this work has been the lack of variation in measures of structural stigma, given that most forms of structural stigma are no longer legally sanctioned (e.g., anti-miscegenation laws). There are notable exceptions to this general trend, however. For example, attitudes towards homosexuality vary considerably across U.S. states (21), as do social policies that differentially target gays and lesbians, such as same-sex marriage policies (22).

The current study took advantage of this spatial variation in social environments surrounding sexual minorities in the U.S. by linking measures of structural stigma at the state level to individual health outcomes (i.e., cigarette smoking) among sexual minority youth living in these states. Recent research has indicated that LGB adults who live in states with greater structural stigma—operationalized as having fewer protective social policies—have higher rates of psychiatric and substance disorders than LGB adults living in low structural stigma states (22, 23). Based on this previous research with adults, we hypothesized that sexual minority youth living in high structural stigma environments would be more likely to smoke over time compared to sexual minority youth living in low structural stigma environments. To evaluate this hypothesis, we used data from a large, prospective cohort study of adolescents living across the U.S. with repeated measures of sexual orientation and smoking over a five-year period.

Methods

Sample

The Growing Up Today Study (GUTS) is a national, prospective cohort study of 16,882 youth. GUTS investigators contacted the 34,174 women in the large, national Nurses' Health Study II (NHSII) cohort who were mothers of children ages 9 to 14 years, identifying over 53,000 children in the eligible age range; 18,526 mothers (54%) consented and provided the name, age, and sex of over 26,000 children. In 1996, letters and baseline questionnaires were mailed to the 13,261 girls and 13,504 boys whose mothers had granted consent. Approximately 68% of the girls (N=9,039) and 58% of the boys (N=7,843) returned completed questionnaires, thereby assenting to participate. Follow-up questionnaires have been administered annually or biennially since 1996. For the current analyses, we used data from 4 waves spanning 2000–2005.

Measures

Sexual Orientation—In the fall of 1999, a sexual-orientation question was added to the GUTS survey, and participants were asked this item again in 2001, 2003, and 2005. After 1999, when sexual orientation was first assessed, 14.6% of the GUTS sample did not complete questionnaires through 2005. Among the remaining 85.4% who initially responded to the sexual orientation question in 1999, only 3.5% did not report information on sexual orientation status at any of the subsequent waves. Out of the 4 waves included in this analysis, 42.5% reported their sexual orientation on all 4 waves, 65.6% on 3 waves, 81.1% on 2 waves, and 96.4% on 1 wave.

The measure assessing sexual orientation was adapted from the Minnesota Adolescent Health Survey (24) and asked about feelings of attraction using the following 6 mutually exclusive response options: “Which one of the following best describes your feelings? (1) Completely heterosexual (attracted to persons of the opposite sex), (2) mostly heterosexual, (3) bisexual (equally attracted to men and women), (4) mostly homosexual, (5) completely homosexual (gay/lesbian, attracted to persons of the same sex), or (6) not sure.” Respondents who in each wave reported that they were unsure about their sexual orientation, or who had missing information on the sexual-orientation item, were excluded from analyses from that wave. We removed the “unsure group” based on data from a previous study from the GUTS sample (conducted using the same years as the present analysis), which found that only 2% of both males and females reported ever being “unsure” of their sexual orientation (25). Of those who identified themselves as unsure of their sexual orientation at any time point, 66% identified as completely heterosexual at other reports and never went onto describe themselves as a sexual minority.

Based on responses to the sexual-orientation item, participants were categorized as heterosexual ($n=9431$) or sexual minority, which combined the categories mostly heterosexual ($n=527$), bisexual ($n=73$), mostly homosexual/completely homosexual ($n=31$) (numbers refer to respondents' sexual orientation in 1999). Because responses to the sexual orientation variable could change across the follow-up time points, we used the category that the respondent identified at each time point rather than his/her initial response in 1999. Thus, sexual orientation was treated as a time-varying variable in the analyses. We chose this approach, rather than imputing missing data, because previous data from this sample indicated that for sexual minorities, the mobility scores (i.e., changes in response to the sexual orientation items) were much higher than for the full cohort (25). Further, the mobility scores indicated that of all the transitions (i.e., all the occurrences of 2 consecutive waves of data) that occurred between adolescents ages 12–17 years, 8.1% of the transitions resulted in a change in reported sexual orientation identity for boys, and 12.5% of the

transitions for girls. Thus, imputed orientations would potentially bias the results. In 1999, the mean age of the respondents was 14.5 for the heterosexual sample and 15.1 for the sexual minority sample. By 2005, the mean age of the heterosexual sample was 20.7 and 20.9 for the sexual minority sample.

Structural Stigma—Drawing on an existing measure of structural stigma (26), we developed an index of the social environment surrounding sexual minority youth. The measure is composed of 4 different items. First, given recent evidence showing lower rates of mood and anxiety disorders among LGB adults living in states with greater concentrations of same-sex couples (27), we acquired information on density of same-sex partner households by state from the 2000 U.S. Census (28). Higher scores indicate that same-sex couples are more concentrated in that state; for example, a value of 2.0 means that same-sex couples are twice as likely as the typical households to be living in that state. Same-sex couples are under-represented in most states ($M=0.93$, $SD=0.25$), but there is wide variation (range: 0.48–1.71).

Second, LGB youth who attend schools with Gay-Straight Alliances (GSAs) report significantly fewer suicide attempts compared to LGB youth in schools with no GSAs (29, 30). Thus, we obtained information from the Gay, Lesbian, and Straight Education Network on the number of GSA's in each state and divided this by the number of public high schools in that state to create a variable of the proportion of GSA's per high school. The mean for this variable was 0.16 ($SD=0.14$), indicating that most states had a low number of GSAs in their high schools; however, there was substantial heterogeneity across states (range: 0.01–0.67). Higher scores indicate that GSA's are more concentrated in high schools within that state.

Third, LGB adults living in states with policies that confer protections to gays and lesbians (e.g., employment non-discrimination) have lower rates of psychiatric and substance disorders than LGB individuals living in states without these protective policies (23). Consequently, we created a variable of 5 state-level policies related to sexual orientation, including: (1) absence of constitutional amendments banning same-sex marriage; (2) employment non-discrimination policies; (3) hate crime policies that include sexual orientation as a protected class status; (4) a non-discrimination policy that extended to LGB students, and/or a statute banning bullying based explicitly on sexual orientation; and (5) statutes that do not explicitly restrict gay and lesbian couples from adoption. We coded each state on the presence or absence of each of these policies in the year 2000 and summed these variables. Higher scores indicate that a state had more policies protecting LGB individuals. Three states (6%) had 0 protective policies; 22 states (44%) had 1 protective policy; 21 states (42%) had 2 or 3 protective policies; and 4 states (8%) had 4 protective policies. No state had all 5 protective policies.

The final item measured the public opinion toward sexual minorities in each U.S. state, using aggregated responses from 41 national polls from the Roper Center's iPol archive, dating from 1999–2008 (21). These polls, which were random national samples conducted by various organizations (e.g., Gallup, Pew), yielded approximately 80,000 responses. Policy-specific opinions were collected for the following gay-related areas: adoption, hate crimes, health benefits, discrimination in jobs and housing, marriage, sodomy, and civil unions. We used the mean value for these opinions by state as our measure of state-level attitudes. Higher scores indicate more supportive attitudes towards homosexuality.

We conducted a factor analysis on these 4 items (density of same-sex couples, presence of GSA's, policies, and attitudes) to determine whether they reflected the influence of a single latent variable of structural stigma. The factor analysis was conducted in SPSS using a

Principal Component Analysis as the extraction method. We examined eigenvalues (values >1) and the scree plot to determine the appropriate number of factors to extract; both suggested that a single factor solution provided an adequate fit to the data. The factor loadings for the 4 items ranged from 0.76 to 0.93, and the items demonstrated good internal consistency ($\alpha=.78$). Consequently, these values were standardized and then summed to create an index of the extent to which the social environment was supportive of gays and lesbians in that state. Values ranged from -5.07 to 8.23 , indicating substantial variation in structural stigma. Positive scores indicate more supportive social climates, and therefore lower levels of structural stigma.

Home addresses for all mothers of GUTS participants were updated every two years beginning in 1989, the year that the NHSII cohort was begun. By linking with the NHSII database, we determined the state of residence for all GUTS participants in the year 2000. Thus, each of the 50 states received a value for the structural stigma variable in that year.

Past-Year Cigarette Smoking—Cigarette smoking was assessed in years 2000, 2001, 2003, and 2005 with a single-item question asking participants if they smoked cigarettes in the past year (no data were obtained from the GUTS sample during 2002 or 2004). We coded this as a dichotomous variable, indicating any vs. no use.

Covariates—Individual-level covariates including participants' race/ethnicity (white vs. non-white), age, sex, and family income (obtained from the mothers' self-report from the 2001 wave of NHSII) were included as potential confounders in the statistical models. Coding for covariates is provided in Table 1.

In order to reduce spurious contextual influences on our results, we also controlled for 3 potential state-level confounders (Table 1). First, based on previous research examining state-level influences on health (31), we adjusted for state-level income inequality by calculating the ratio of the top fifth to the bottom fifth of household income for each state using Census data from 1998–2000 (32). Second, we controlled for median household income at the state level, also obtained from the 2000 U.S. Census. Third, to minimize the likelihood that factors related to smoking (e.g., social norms) would influence our results, we controlled for the prevalence of smoking in each state, obtained from the 2000 U.S. Centers for Disease Control and Prevention's Behavioral Risk Factor Surveillance System (33). All covariates were entered as continuous variables. The correlations between structural stigma and each of the state-level covariates were as follows: prevalence of smoking ($r=-0.27$, $p=0.06$); income inequality ($r=0.03$, $p=0.84$); and median household income ($r=0.69$, $p<0.001$).

Statistical Analyses

Given the nested and longitudinal structure of the data, we used the modified Poisson method to estimate risk ratios (RR) and 95% Confidence Intervals (CI), with multivariate generalized estimating equations (GEE) adjusting for repeated measures and sibling clusters (34). We used an exchangeable residual covariance structure for these models. GEE was chosen for these analyses, rather than multi-level models, for two main reasons. First, our research question is explicitly regarding the population average of state-level effects predicting individual-level health outcomes rather than between-state variance (35). Thus, the GEE model better corresponds to our research question. Second, because individuals were not sampled to be representative of the state in the GUTS dataset, clustering by state is inappropriate without making problematic assumptions (36). In sum, GEE models allow us to robustly estimate standard errors while assessing the relation between state-level structural stigma and cigarette smoking.

Analyses proceeded in two steps. We first examined sexual orientation-related disparities in cigarette smoking using repeated-measures GEE regression. We then ran two repeated-measures logistic regression models to assess the influence of structural stigma on cigarette smoking. In the first model, we examined prospective associations between structural stigma and cigarette smoking controlling for individual-level factors. In the second model, we included the three state-level confounders. These analyses were stratified by sexual orientation (i.e., they were run as separate models comparing heterosexual to sexual minority respondents). Because there were no interactions between structural stigma and sex in predicting smoking, we combined boys and girls in all models. Analyses were conducted using SAS 9.3.

Results

Demographics of the study sample are provided in Table 1. During the 4 waves of data examined, sexual minority youth were significantly more likely to have smoked in the past year than their heterosexual peers in models adjusting for sex, age, race/ethnicity, and family income (Table 2).

The next set of analyses examined whether structural stigma predicted cigarette smoking. Sexual minority youth living in states with lower levels of structural stigma against gays and lesbians were significantly less likely to have smoked in the past year (Table 3). Associations between structural stigma and past-year smoking were significant after adjustment for individual-level risk factors (RR=0.97, 95% CI: 0.96, 0.99, $p<0.001$) and were marginally significant after controlling for state-level confounders (RR=0.97, 95% CI: 0.93, 1.00, $p=0.06$). Sexual minority youth living in a state that is at least 2 standard deviation units more stigmatizing than average across the U.S. has nearly a 20% increased risk of smoking compared to sexual minority youth living in a state with an average structural stigma score (i.e., score equal to the mean of 1.09). In contrast, among heterosexual youth, structural stigma was not associated with past-year smoking (Table 3), documenting specificity of these effects to sexual minority youth.

Discussion

Epidemiologic studies have consistently documented marked disparities in tobacco use related to sexual orientation (2–8). Although several risk factors (e.g., depressive symptoms, low self-esteem, and dieting/weight concerns) are associated with greater tobacco use among sexual minority youth, sexual orientation disparities in tobacco use persist after controlling for individual-level risk factors (3). Consequently, there has been growing interest in determining whether social-contextual factors contribute to sexual orientation differences in tobacco use, spurred in part by the release of the 2011 IOM report urging researchers to consider social determinants of LGBT health (9).

The current study addressed this research priority by evaluating one potential social determinant of cigarette smoking among sexual minority adolescents, that of structural stigma. Stigma not only disadvantages individuals through negative interactions, for example via exposure to hate crimes or victimization (11, 14, 15), but also through the institutional practices and social conditions in which stigmatized individuals are embedded (12, 13, 18, 19). Drawing on recent literature suggesting that these structural forms of stigma may harm the health of sexual minorities (22, 23, 26), the current study demonstrated that sexual minority youth living in high structural stigma states were more likely to smoke in the past year than sexual minority youth living in low structural stigma states. These results were robust to adjustment for individual-level risk factors, consistent with other research showing that certain aspects of the social environment confer risk for adverse health

outcomes independent of individual characteristics (37, 38). Moreover, structural stigma was a risk factor that was unique to sexual minority youth; heterosexual youth living in high structural stigma states were no more likely to smoke than those in low structural stigma states.

We are aware of only two other studies that have examined social determinants of tobacco use among sexual minorities using measures of the social environment that do not rely on self-report. The first showed that sexual minority female college students had lower rates of tobacco use if they attended colleges with a greater presence of LGB campus resources (39). A more recent study found that LGB adolescents living in counties with more supportive environments for sexual minority youth (e.g., higher proportion of schools inclusive anti-bullying policies) had lower smoking rates than those living in counties with less supportive social environments (40). These studies provided important insights but both relied on cross-sectional data. The current study therefore provides novel data on structural stigma as a risk factor for smoking behaviors among sexual minority youth over time. In addition, although these two prior studies (39, 40) controlled for some community-level confounders of the relationship between social climate and smoking (e.g., region of country and school smoking policies), we included additional state-level covariates that have not been previously considered. Our results showed that income inequality and state-level prevalence of smoking are both strong predictors of cigarette smoking among sexual minority (and heterosexual) youth. Moreover, structural stigma remained marginally associated with cigarette smoking among sexual minority youth after adjustment for these robust ecologic risk factors for smoking. This finding is particularly noteworthy given the relatively small sample size of sexual minorities, which reduces statistical power.

This study has several limitations. First, with observational data, there is the possibility of unmeasured confounding in which the associations between structural stigma and cigarette smoking are not causal but instead are due to the influence of an unmeasured variable. We sought to minimize confounding through controlling for multiple established risk factors at both the individual and state level. Second, an alternative explanation for the findings is differential selection, such that healthy sexual minorities select into low stigma environments. In this case, individual characteristics of sexual minorities would cause smoking patterns, rather than aspects of the environments in which they live. However, the correlation between state of residence in 2000 and 2003 in the full sample was very large ($r=0.98$, $p<0.0001$), indicating that there is low geographic mobility. Further, mobility rates did not differ between sexual minority and heterosexual respondents. Third, most of the measures for structural stigma come from the year 2000, in order to coincide with the 2000 Census data on density of same-sex couples, as well as with the state-level policies. Moreover, the year 2000 occurred right after sexual orientation was first assessed in GUTS and also provided an opportunity to examine the influence of structural stigma on subsequent smoking behaviors in several years following 2000. However, the measures for state-level attitudes and GSAs aggregated data across several years, and therefore may be more contemporaneous with, rather than prior to, our outcome measures. Fourth, longitudinal studies are subject to attrition bias. Although our results indicate that there was no difference in baseline smoking status between those who were lost-to-follow-up, it remains unclear how differential loss-to-follow-up might influence sexual orientation estimates of smoking rates. Finally, the GUTS cohort is not a random sample of all U.S. adolescents, and participants are primarily white and are children of nurses. Although this may limit generalizability, it also reduces confounding by socioeconomic status, a strong predictor of smoking (41). Moreover, the GUTS dataset is one of only two cohort studies measuring sexual orientation that provide adequate geographic variation to examine social determinants of sexual orientation health disparities. This dataset therefore offered a rare opportunity to examine our research question.

Future research is needed to identify the mechanisms through which broad social factors like structural stigma create risk for adverse health outcomes among sexual minority populations. One putative mechanism is stress. If stress were to mediate the relationship between structural stigma and smoking, there would need to be evidence that (1) structural stigma creates stress and (2) stress increases risk for smoking. In support of the first pathway, LGB adults report that living in stigmatizing social environments is quite stressful (42, 43). In turn, when structural forms of stigma are eliminated, there is a concomitant reduction in stress-related health problems (44). The broader literature on general life stressors and smoking has revealed physiological mechanisms through which smoking may reduce the negative sequelae of stress (45–47), providing preliminary evidence for the second pathway. Additional research into stress and other potential mediating pathways remains an important area for further study. Future studies are also needed to determine whether the results of the current study remain consistent across other relevant measures of cigarette use, including frequency and quantity of use, as well as nicotine dependence.

Given the substantial health and societal costs associated with tobacco use (1), the field requires evidence-based interventions that can address tobacco use disparities among at-risk populations. Our finding that structural stigma predicts elevations in cigarette smoking among sexual minorities during an important developmental window for smoking initiation has important implications not only for the etiology of sexual orientation health disparities but also for the development of public health interventions that can reduce these disparities.

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Table 1

Demographics and Study Variables: Growing Up Today Study (2000–2005)

Variable	Heterosexual (N=11,240)	Sexual Minority ¹ (N=2,190)	Chi-Square Statistic or Independent- Samples T-Test, df, <i>p</i> -value
Demographics	N (%)	N (%)	
Sex			$X^2 (1) = 216.43, p < 0.0001$
Female	6208 (55.2%)	609 (72.2%)	
Male	5032 (44.8%)	1581 (27.8%)	
Race/Ethnicity			$X^2 (1) = 30.42, p < 0.0001$
White	10545 (93.8%)	1984 (90.6%)	
Other	695 (6.2%)	206 (9.4%)	
Family income (in 2001)			$X^2 (2) = 9.97, p = 0.007$
<\$49,000	1169 (10.4%)	235 (10.7%)	
>\$50,000	7872 (70.0%)	1590 (72.6%)	
Missing	365 (16.7%)	2199 (19.6%)	
Independent Variable²	Mean (SD)	Mean (SD)	
Structural Stigma	1.09 (3.17)	1.62 (3.26)	$t = -7.10, p < 0.0001$
State-Level Covariates²	Mean (SD)	Mean (SD)	
Income Inequality	44.96 (2.03)	45.25 (2.06)	$t = -6.17, p < 0.0001$
Median Household Income	54.47 (6.56)	55.55 (6.84)	$t = -6.78, p < 0.0001$
Smoking Prevalence	23.20 (3.13)	22.72 (3.27)	$t = 6.29, p < 0.0001$

Notes:

¹The sexual minority group is composed of individuals who self-identified as mostly heterosexual, bisexual, mostly homosexual and completely homosexual.

²Structural stigma and state-level covariates were measured in 2000.

Table 2

Age-Standardized¹ Prevalence Estimates of Past-Year Cigarette Smoking in the Growing Up Today Study by Sexual Orientation and Study Year (2000–2005)

Year	Heterosexual (N=11,240)	Sexual Minority ² (N=2,190)	Chi-Square Statistic, df, <i>p</i> -value
	N (%)	N (%)	
2000	751 (9.6%)	208 (24.7%)	$\chi^2 (1) = 175.49, p < 0.0001$
2001	1226 (13.6%)	321 (33.4%)	$\chi^2 (1) = 261.08, p < 0.0001$
2003	1859 (19.1%)	404 (41.0%)	$\chi^2 (1) = 257.73, p < 0.0001$
2005	1988 (22.1%)	529 (39.9%)	$\chi^2 (1) = 199.37, p < 0.001$

Notes. N = number of respondents who reported any past-year cigarette smoking.

¹To create age-standardized prevalence estimates, we created weights based on the proportion of individuals in each age category among the total sample and then used those weights to adjust the age proportions of the sexual minorities and heterosexuals to be equivalent. We did this to control for potential confounding by age because the sexual orientation observations in GUTS tend to be slightly older than the heterosexuals.

²The sexual minority group is composed of individuals who self-identified as mostly heterosexual, bisexual, mostly homosexual and completely homosexual.

Table 3
Associations between Structural Stigma and Past-Year Cigarette Smoking¹ Among Sexual Minority and Heterosexual Youth: Growing Up Today Study (2000–2005)

Parameters	Sexual Minority (N=2,190) ²			Heterosexual (N=11,240)		
	Model 1 ³ RR ⁴ 95% CI ⁴	P-value	Model 2 ³ RR 95% CI	Model 1 RR 95% CI	P-value	Model 2 RR 95% CI
Structural Stigma ⁵	0.97 (0.96, 0.99)	<0.001	0.97 (0.93, 1.00)	1.00 (0.99, 1.01)	0.470	0.99 (0.97, 1.01)
	Individual-Level Covariates⁶					
Age	1.08 (1.06, 1.10)	<0.001	1.08 (1.06, 1.10)	1.17 (1.16, 1.18)	<0.0001	1.17 (1.16, 1.18)
Sex (Male)	1.15 (1.02, 1.31)	0.029	1.15 (1.01, 1.30)	0.93 (0.87, 0.99)	0.019	0.93 (0.87, 0.99)
Race/Ethnicity (Non-White)	0.89 (0.74, 1.07)	0.199	0.90 (0.75, 1.08)	0.95 (0.83, 1.09)	0.442	0.97 (0.85, 1.12)
Family Income	0.91 (0.78, 1.05)	0.197	0.92 (0.79, 1.06)	1.02 (0.92, 1.14)	0.686	1.03 (0.92, 1.15)
	State-Level Covariates⁷					
Income Inequality	--	--	1.05 (1.01, 1.10)	--	--	1.04 (1.02, 1.07)
Median Household Income	--	--	1.00 (0.98, 1.01)	--	--	1.00 (0.99, 1.01)
Smoking Prevalence	--	--	1.02 (0.99, 1.05)	--	--	1.03 (1.01, 1.05)

Notes.

¹ Results based on repeated measures observations. The number of observations for each group was: 36,792 completely heterosexual and 4,232 sexual minorities (3,220 mostly heterosexual, 599 bisexual, and 413 lesbian/gay).

² Sexual minority category includes respondents who self-identify as mostly heterosexual, bisexual, mostly homosexual and completely homosexual.

³ In Model 1, we examined associations between structural stigma and cigarette smoking controlling for individual-level factors (age, sex, race/ethnicity, and family income). In Model 2, we included additional controls for the three state-level confounders (income inequality, median household income, and smoking prevalence).

⁴ RR=Relative Risk and 95% Confidence Interval.

⁵ Structural stigma (a combined measure of state-level attitudes toward homosexuality, 5 state-level policies targeting gays and lesbians, proportion of Gay Straight Alliances in schools in the state, and density of same-sex couples in the state) was reverse coded such that high scores indicate low structural stigma (range: -5.07 to 8.23).

⁶ Sex: Female=1. Race/Ethnicity: White=1. Age and family income are continuous measures.

⁷ Income inequality is the ratio of the top fifth to the bottom fifth of household income by state. Median household income at the state level obtained from the U.S. Census. State-level prevalence of smoking was obtained from the Centers for Disease Control and Prevention.