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Risk, resilience, and smoking in a national, probability sample of sexual and gender minority adults, 2017, USA

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Abstract

Background: There are well-documented inequities in smoking between sexual and gender minority (SGM, e.g., lesbian, gay, bisexual, and transgender [LGBT]) and straight and cisgender people. However, there is less information about risk for and resilience against smoking among SGM people. Such information is critical for understanding etiology and developing interventions.

Aims: To conduct a within-group assessment of risks and resiliencies relating to smoking status.

Methods: In 2017, we conducted a cross-sectional telephone survey with a national, probability-based sample of SGM adults ($N=453$). We assessed theory-informed risks (adverse childhood events, substance-use-oriented social environment, mental distress, stigma, discrimination, social isolation, and identity concealment) and resiliencies (advertising skepticism, identity centrality, social support, and SGM community participation). We applied survey weights, standardized predictor variables, and fit logistic regression models predicting smoking status. We stratified by age and SGM identity.

Results: Patterns of risk and resilience differ by age and identity. Effects were consistently in the same direction for all groups for participating in substance-use-oriented social environments, pointing to a potential risk factor for all groups. Advertising skepticism and having people you can talk to about being LGBTQ were potential protective factors.

Discussion: Intervention development should address risk and resilience that differs by SGM identity. Additionally, our findings suggest interventionists should consider theoretical frameworks beyond minority stress.

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Conclusion: While much of the literature has focused on the role of stress from stigma and discrimination in tobacco use, addressing social norms and bolstering protective factors may also be important in SGM-targeted interventions.

Keywords

sexual and gender minority; tobacco use; smoking; psychological resilience; health status disparities

INTRODUCTION

Unequivocal evidence from public health surveillance systems shows inequities in smoking for sexual and gender minority (SGM, e.g., lesbian, gay, bisexual, and transgender [LGBT]) individuals compared to their heterosexual and cisgender counterparts (Hoffman, Delahanty, Johnson, & Zhao, 2018; Wheldon, Kaufman, Kasza, & Moser, 2018). Health inequities researchers have noted a continuum of research on inequities, starting with documenting inequity, moving to understanding its origins, and ultimately developing interventions (Kilbourne, Switzer, Hyman, Crowley-Matoka, & Fine, 2006). Despite overall declines in tobacco use in the United States, there is growing evidence that SGM inequities in tobacco use are not similarly decreasing (Homma, Saewyc, & Zumbo, 2016; Watson, Lewis, Fish, & Goodenow, 2018). A critical gap in the field is understanding the origins of these inequities to inform intervention development (Blosnich, Lee, & Horn, 2013).

Although many public health surveillance and large national surveys now assess sexual orientation and a growing number of surveys assess gender identity, one barrier to understanding SGM smoking inequities is the lack of *intra*-SGM assessments of risk. Many national surveys do not have enough SGM participants to look at variability in risk among SGM participants. National surveys also lack measures specific to SGM experiences. For example, the Minority Stress Model (Meyer, 2003) includes SGM-specific distal stressors of discrimination and violence as well as proximal stressors such as family rejection, identity concealment, and internalized homophobia. The Health Equity Promotion Model (Fredriksen-Goldsen et al., 2014) similarly includes structural and individual sources of SGM-specific stressors. Thus, commonly used frameworks to understand SGM health inequities posit that the experience of stress unique to SGM populations across the life course affects health behaviors and outcomes. These frameworks also suggest that certain SGM-specific sources of resilience such as pride in identity, SGM social supports, and connections to SGM communities help to mitigate these risks. Researchers have called for a shift away from deficit-focused models and towards emphasis on SGM strengths (Fredriksen-Goldsen, Kim, Bryan, Shiu, & Emler, 2017).

Responding to limitations of surveillance data and drawing on existing models and frameworks about SGM health inequities, we implemented a national, probability-based survey of SGM adults to identify associations between potential risks and resiliencies and smoking behaviors. We grounded our approach using results from a systematic review of the etiology of tobacco use disparities for SGM people (Blosnich et al., 2013). Based on the findings of this systematic review, we conceptualized risks and resiliencies as universal (e.g.,

mental health) and SGM-specific (e.g., SGM-specific discrimination). For universal risks, we hypothesized adverse childhood experiences (ACEs), exposure to substance-use oriented social environments (e.g., spending time with people who use cigarettes, alcohol, and marijuana), and mental distress would be associated with current smoking (Anda et al., 1999; Christakis & Fowler, 2008; Fluharty, Taylor, Grabski, & Munafo, 2017). For SGM-specific risks, we hypothesized stigma, discrimination, attending substance-use oriented SGM events (e.g., SGM events where substance use would likely be normative such as at drag shows), isolation, and identity concealment would be associated with increased likelihood of being a current smoker (Gruskin, Byrne, Kools, & Altschuler, 2006; Gruskin, Byrne, Altschuler, & Dibble, 2008; McCabe et al., 2019). For universal resiliencies, we hypothesized advertising skepticism would be associated with increased likelihood of being a current *non*-smoker, given the role of SGM targeted tobacco marketing (Dilley, Spigner, Boysun, Dent, & Pizacani, 2008; Stevens, Carlson, & Hinman, 2004). For SGM-specific resiliencies, we hypothesized identity centrality, social support, and participation in SGM community events would be associated with increased likelihood of being a current non-smoker (Herrick, Egan, Coulter, Friedman, & Stall, 2013). Given changes in SGM acceptance over time, we examined differences by age.

METHODS

Sampling and Recruitment

Participants were recruited from two waves of a nationally-representative, dual-frame random-digit dialing tobacco survey of the non-institutionalized U.S. adult population conducted from September 2014 to May 2015 (Wave 1; $N=5,014$) and August 2016 to May 2017 (Wave 2; 4,208). Both waves of the survey were designed to oversample geographic areas with higher proportions of smokers. Participants had to be at least 18 years old to participate and could complete the tobacco survey in either English or Spanish. Details on sampling methods and sample characteristics are described elsewhere (Boynton et al., 2016; Jeong et al., 2019).

To further bolster numbers of smokers and SGM adults, we implemented a probability-based respondent-driven sampling method. After a respondent completed a survey, they were given the opportunity to refer up to three contacts identified as sexual minority (Wave 1)/sexual and gender minority (Wave 2) or who currently smoked to the study. Respondents who self-identified as SGM were always asked to refer SGM contacts; otherwise, participants were randomly assigned to refer SGM contacts or contacts who smoke. Under both referral conditions, respondents were paid an additional \$10 for each referral who completed the survey. Interviewers were blind to referral condition and referrals themselves needed to self-identify as SGM to be considered as such in the dataset.

Respondent-driven recruitment continued for as many iterations as fit into the data collection window. There was a maximum of 7 iterations of recruitment in the Wave 1 and up to 9 iterations of respondent-driven recruitment in Wave 2. Probability-based respondent driven sampling is an established probability-based sampling method (Heckathorn, 2002, 2007; Volz & Heckathorn, 2008) that has shown promise in recruiting SGM survey respondents (Bauer, Scheim, Pyne, Travers, & Hammond, 2015). Because probability of selection is

known for each “seed” (i.e., respondent who initiates a wave or chain of participant recruitment) and network size is assessed for each respondent, a sampling weight can be calculated for every respondent that allows for representative estimates.

Across the two waves of the parent survey, a total of 799 participants (Wave 1 $N=247$; Wave 2 $N=552$) who identified as SGM and spoke English were eligible to complete the SGM follow-up survey. Of these 799 SGM participants, 403 were seeds from the parent survey who were selected via random digit dialing and 396 were recruited from respondent-driven sampling. Of these 799 participants, 767 (96.0%) agreed to being re-contacted. Between June 7, 2017, and October 16, 2017, we fielded the SGM follow-up survey focused on SGM adults’ experiences and tobacco use. Blaise CATI software was used for data collection and to manage call attempts. Six to eight call attempts were typically made to each participant. Informed consent was obtained when participants agreed to complete the SGM follow-up survey. Each participant was paid \$30 to complete the survey.

From the 767 recruited SGM participants in the parent survey, 423 (55.1%) completed the SGM survey, 58 (7.6%) were ineligible, and 286 (37.3%) were non-respondents. Those who reported being in a romantic relationship and whose romantic partner had not already been recruited for the main tobacco survey were given the opportunity to recruit their main romantic partner to participate. A total of 55 romantic partners were referred to the SGM survey and 30 participated, for a total of 453 participants. Of note, sixteen romantic partner recruits completed both the main tobacco survey and SGM follow-up survey, yielding a total of 46 romantic partner dyads in the sample. The Wave 1 and Wave 2 weighted response rates were 42% and 39%, respectively, following the American Association for Public Opinion Research response rate 4 (RR4) formula (American Association for Public Opinion Research, 2016). The University of North Carolina at Chapel Hill IRB approved all recruitment and study procedures (#13–2779).

Sampling Weights and Adjustments

Analytic weights were calculated for the 453 SGM follow-up survey participants to account for all stages of selection, adjust for under-coverage of the target population, and adjust for dyadic relationships. Base weights were assigned to each of the 799 SGM participants from Wave 1 and Wave 2 who were eligible for the SGM follow-up survey. Base weights were equal to the Wave 1 or Wave 2 non-response adjusted weights to account for their initial probabilities of selection and non-response in the Wave 1 and Wave 2 surveys. Ineligible cases were removed from the sample and a non-response adjustment was applied to eligible cases based on a propensity model predicting response to the SGM follow-up survey based on age, sex, smoking status, phone type (cellular or landline), ethnicity, race, educational attainment, self-assessed mental-health status, sexual orientation, census region, and survey wave (based on data collected in the Wave 1 and Wave 2 surveys). Predicted probabilities of response were used to calculate non-response adjusted weights for the respondents, and non-respondents were removed from the sample. SGM follow-up survey romantic partner recruits were assigned non-response weights equal to their romantic partners’ weights, and weight trimming was conducted on the full sample of respondents. Finally, a raking adjustment was conducted to remedy any under-coverage of the target population. Control

totals were derived from the 2017 National Health Interview Survey (NHIS) Public Use File for persons identifying as lesbian, gay, bisexual, or having another sexual orientation. Weights were raked to NHIS control totals by age group, sex, current smoking status, educational attainment, marital status, and census region (based on responses to the SGM follow-up survey).

Survey Measures

Our survey codebook and details of all measures are available online in an institutional repository (accession doi:[10.15139/S3/BX0RZE](https://doi.org/10.15139/S3/BX0RZE), available from: <https://dataverse.unc.edu/dataset.xhtml?persistentId=doi:10.15139/S3/BX0RZE>).

Item development and testing.—Although we attempted to use validated scales from the literature where possible, participant burden constraints imposed by a phone survey mode required that for many of our survey items we adapt the validated measures. We did this by selecting and rewording one to two items most concordant with the construct of interest and then revising response options to fit with the survey design. To ensure that our measures were easily interpretable and assessing the intended construct, we conducted cognitive interviews with a convenience sample of 12 SGM adults and revised and retested items as indicated.

Tobacco Use Measures.—Individuals were classified as current cigarette smokers if they reported having previously smoked at least 100 cigarettes in their lifetime and were currently smoking some days or every day.

Risk and resiliency factors.—We categorized our predictors into risks and resiliencies. Within both categories, we delineated universal risks and SGM-specific risks. For universal risks, we included four adverse childhood experiences (food insecurity, drugs, physical abuse, and emotional abuse) (Felitti et al., 1998), three measures of participating in a substance-use oriented social environments derived by the research team, and two three-item mental health distress scales: anxiety ($\alpha=0.71$) and depression ($\alpha=0.78$) (Kessler et al., 2003). For SGM-specific risks, we used items measuring stigma and discrimination (Balsam, Beadnell, & Molina, 2013; Logie & Earnshaw, 2015), including items on internalized homophobia (Mohr & Kendra, 2011) and family rejection (Balsam et al., 2013); SGM-related substance-use oriented social environments (e.g., attending drag shows); isolation (Balsam et al., 2013); and, identity concealment (Meidlinger & Hope, 2014). For universal resiliencies, we assessed advertising skepticism (Obermiller & Spangenberg, 1998). For SGM-specific resiliencies, we used measures of identity centrality (Mohr & Kendra, 2011), social support (Balsam et al., 2013), and SGM community participation (Rosario, Hunter, Maguen, Gwadz, & Smith, 2001).

Demographics.—We assessed sexual orientation and gender identity following Williams Institute best practices (Badgett & Goldberg, 2009; The GenIUSS Group, 2014). For sex and gender identity, respondents were first asked “What sex were you assigned at birth, on your original birth certificate?” Was it (A) Male or (B) Female?” Next they were asked “Do you describe yourself as (A) Male, (B) Female, (C) Transgender, or (D) Some other way?”

Those responding (D) were subsequently asked “What term do you use to describe yourself?” For sexual orientation identity, respondents were asked “Do you consider yourself to be (A) straight, that is, not gay, (B) gay, (C) bisexual, or (D) something else?” Those individuals selecting (D) were then asked, “What term do you use to describe yourself?” Responses to this question were transcribed verbatim. Where participants responded “some other way” to the gender identity and sexual orientation questions, we used the verbatim answer to the follow-up question to classify them as cisgender gay, lesbian, or bisexual; or, as transgender/nonbinary. For the small number of cases where group classification was ambiguous, supplemental sexual orientation and gender identity information from the tobacco survey was used to inform consensus decision-making between the first, third, and last authors.

Characteristics such as age, race, and education were assessed primarily using measures from the Behavioral Risk Factor Surveillance System Survey. Respondents were asked to provide their age in years. Race was assessed using the item, “Which one of these groups would you say best represents your race: White, Black or African American, American Indian or Alaska Native, Asian, Pacific Islander, or Other?” Individuals identifying as mixed race were coded as “Other.” Education was coded using an ordinal scale ranging from (0) “less than a high school diploma” to (5) “graduate or professional degree.” Relationship status was assessed by asking “Are you married, divorced, widowed, separated, never married, or a member of an unmarried couple.”

Analysis

The purpose of the current study was to examine patterns of direction of effects and significance between SGM subgroups. All analyses were conducted in 2019 using SAS version 9.4 and took the sample design features into account by including sampling weight, stratification, and clustering variables. Weighted sample means and proportions were computed using the PROC SURVEYMEANS and PROC SURVEYFREQ procedures. We used PROC SURVEYLOGISTIC to compute unadjusted weighted odds ratios (ORs) for each of our risk and resilience factors. A CLUSTER statement was used to account for the non-independence of referral chains. Continuous predictors were standardized using z scores; thus, ORs should be interpreted as the predicted effect of a one standard deviation change in the predictor variable. Concordant with recommendations regarding exploratory analyses (Rothman, 1990), we did not use a false discovery rate or adjustment for multiple comparisons as we are interested in identifying potential areas for further research. We present ORs for the overall sample as well as stratified by SGM group classification and age (Matthews, Blosnich, Farmer, & Adams, 2014; McQuoid, Thrul, Ozer, Ramo, & Ling, 2019). For the purposes of the stratified analyses, we classified individuals as either cisgender lesbian, cisgender gay, cisgender bisexual, or transgender/non-binary; for the age analyses, we classified people as either young adult (18–24 years old) or older adult (25+ years old). To ensure accuracy of the confidence intervals for stratum-specific weighted analyses by subgroup (i.e., SGM and age subgroups), we employed the BY command for the PROC SURVEYMEANS procedure and the DOMAIN command for PROC SURVEYFREQ and PROC SURVEYLOGISTIC. For the risks analyses, current smoking was modeled as the

outcome; for the resiliencies analyses, not currently smoking was modeled as the outcome. Missing data were minimal; we used pairwise deletion.

RESULTS

Table 1 provides unweighted and weighted participant characteristic estimates. Table 2 shows predicted smoking from risk factors by SGM identity. Table 3 shows predicted *non-smoking* from resiliency factors by SGM identity. Table 4 shows results by age.

Risks

Regarding universal risks, childhood adverse experiences (ACEs) showed a mixed pattern of results in relation to current smoking. Participating in a substance-use-oriented social environment had a consistent direction of effects as a potential risk for smoking with many being statistically significant. Mental distress (i.e., depression and anxiety) also showed a general pattern as a potential risk for smoking, except for lesbian and transgender/non-binary participants for anxiety. Regarding SGM-specific risks, SGM-related stigma and discrimination measures showed a mixed pattern of direction and significant results only for transgender/non-binary participants. Attending a drag show was a significant predictor of smoking status overall, for gay men, and for older adults. Neither social isolation nor identity concealment showed significant associations with smoking.

Resiliencies

Regarding universal resiliencies, advertising skepticism showed an overall significant association with not currently smoking and all effects were in the same direction, suggesting a protective effect. Regarding SGM-specific resiliencies, measures of identity centrality were not in a consistent direction and were not significant for any group. Social support showed a significant association for young adults in having people to talk with about being SGM and not currently smoking. For all groups and ages, the direction of the effects for having people to talk about being SGM suggested a potential protective effect. Effects for feeling supported by people who know you are LGBTQ and fitting in with other LGBTQ people were also in the same direction for young adults; however, for the total sample these results were mixed in direction and feeling supported was only statistically significant for bisexual participants.

DISCUSSION

Principal Findings

We identified patterns of risk and resilience that can inform understanding of the etiology of SGM smoking and intervention development. Our hypotheses were partially confirmed, albeit with diversity by sexual orientation identity, gender identity, and age. In itself, this is an important finding: There is a diversity of experiences with risk and resiliency *within* SGM populations. This pattern of results further suggests to us that interventions and policies designed to have a pro-equity effect (i.e., to reduce the inequity between SGM and majority counterparts) should consider the role of the social environment, social support, and tobacco marketing as well as stress from stigma and discrimination. We also consider the

pattern of results to tentatively suggest that there may not be a one-size-fits-all approach to SGM tobacco use interventions.

Findings in Context

Our findings show modest support of existing literature showing the role of psychosocial stress, stigma, and discrimination in tobacco use (Blosnich et al., 2013; McCabe et al., 2019); however, they suggest attention on resiliencies and social situations may be critically important for further investigation. The pattern of significance and direction of effect sizes for the substance-use-oriented social environment (risk) and for social support (resiliency) are striking as are the results for advertising skepticism (resiliency). They are not a focus of some of the primary theoretical frameworks used in SGM health (Fredriksen-Goldsen et al., 2014; Meyer, 2003), although substance-use-oriented social environments are an important part of syndemic theory (Stall, Friedman, & Catania, 2008) and both can be seen in the Social Determinants of LGBT Health Model (Northridge, McGrath, & Quan Krueger, 2007).

Prior work has found that SGM people are at increased risk of smoking due to disproportionate exposure to risk factors that are experienced regardless of sexual orientation and gender identity (e.g., mental distress) and for risk factors that are unique to SGM people (Blosnich et al., 2013). Our work affirms these findings. For example, we find significant associations with adverse childhood experiences (ACEs) and current smoking among some SGM people. Additionally, ACEs and mental distress showed patterns of significance for bisexual adults. Bisexual adults, and bisexual women in particular, have been found to be at higher risk for smoking and substance abuse than other SGM identities (Emory et al., 2016; McCabe et al., 2018). Strategies to better segment and target interventions to SGM populations may be warranted (Grier & Kumanyika, 2010; Kreuter et al., 2014).

Our findings support two other universal risk factors from the broader literature—the role of marketing (Stevens et al., 2004) and the role of social norms in which tobacco use is accepted as common. SGM young people are more likely to engage with online tobacco marketing (Soneji et al., 2019), and SGM people have historically been more susceptible to tobacco marketing (Dilley et al., 2008). Our findings regarding advertising skepticism being a protective factor are important for prevention, counter marketing, and cessation interventions. Our findings that SGM community participation was not a protective factor was contrary to our hypothesis; however, these findings could be explained by exposure to pro-tobacco norms in SGM community spaces as well as higher smoking prevalence among SGM peers. Prior research shows that there are pro-tobacco social norms in SGM communities (Offen, Smith, & Malone, 2008; Smith, Thomson, Offen, & Malone, 2008), and these norms mediate smoking among young adults (Hinds, Loukas, & Perry, 2019).

We were surprised to not find stronger and more consistent relationships between theory-informed measures across SGM subgroups and smoking behaviors. Some variability may be due to our use of single items, given most SGM-related scales were not feasible for use in our phone surveys due to their length and complexity. However, the pattern of results suggests future researchers should consider how aspects of SGM identities and experiences may simultaneously serve as sources of both risk for and protection against smoking. For example, if comfort with one's identity is linked with greater likelihood of attending SGM

bars, it may attenuate psychological stressors but amplify risk from exposure to smoking and tobacco marketing in a social environment (Gruskin et al., 2006). Similarly, internalized homophobia is a source of psychological stress but may reduce exposure to tobacco-friendly norms, SGM-targeted marketing, and participating in SGM-community events with high rates of smoking. Our study suggests that disentangling relationships between risk and resilience associated with different SGM identities is likely an important next step for intervention development, which is in agreement with prior systematic reviews (Berger & Mooney-Somers, 2017; Lee, Matthews, McCullen, & Melvin, 2014).

Strengths and Weaknesses

Our study is among the first national, probability-based studies to assess SGM-specific constructs such as internalized homophobia and concealment that are not available in public health surveillance surveys. A major strength of this study is that because the probability of selection could be calculated for every individual that started a chain of referral, we could construct and apply weights that accounted for all stages of selection and were adjusted for under-coverage, presence of partner dyads, and non-response. This method, in conjunction with using a raking method that leveraged data from a large, nationally-representative health survey, resulted in point estimates that can be considered representative of the SGM population in the U.S. Weighting was especially critical in this study given the oversampling of certain groups (e.g., smokers) and use of respondent driven sampling.

Given the importance of disentangling within group differences in smoking risks and resiliencies, we disaggregated our results by sexual orientation identity, gender identity, and age. We included transgender-identified individuals and analyzed results separately as there is a limited body of probability-based research for gender minority individuals; however, the sample size ($n=26$) in some cases made weighted estimates and associated confidence intervals sizably different from their unweighted counterparts (e.g., attendance of LGBTQ social gatherings). Our relatively small sample of transgender adults did not permit full stratification by both sexual orientation and gender identity. Future research would benefit from sampling a larger number of SGM individuals and, if using an RDS method, longer referral chains. Such an approach would result in a more diverse sample with the potential for greater statistical power.

Although our findings are somewhat limited by the total sample size, we present direction of effects and encourage the reader to consider our findings as a starting place for identifying future areas to focus upon. The pattern of results may be meaningful in the absence of statistical significance. While this study did not provide sufficient evidence to conclude significant associations between many of the risk factors and smoking, it is worth noting that this does not guarantee an absence of these associations in the target population. With a relatively small sample size and a complex sample design, we might not have had sufficient power to detect differences (particularly within strata). These risk factors should continue to be explored in future studies. Other limitations include our limited questionnaire length due to respondent burden concerns and thus our inability to utilize multi-item scales, the omission of households without phones (e.g., institutionalized populations), and that those who are willing to participate in a phone survey may be different than those who are not.

These risks and resiliencies can be considered in a life-course approach (Fredriksen-Goldsen et al., 2014), and future work would benefit from leveraging longitudinal approaches and a broader range of resiliency measures.

Conclusion

Understanding smoking inequities for SGM populations may require more attention to diversity within SGM populations and predictors beyond stress from stigma and discrimination. Researchers should consider focusing on intervening within social networks, on social norms, on marketing receptivity, and investigating pathways through which SGM identity can be a source of resilience and of risk at the same time.

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Table 1.Unweighted and weighted demographic characteristics, $N= 453$, SGM U.S. adults, 2017

| | Unweighted % (n) or $M \pm SD$ | Weighted % or M [95% CI] |
|--|-----------------------------------|-------------------------------|
| Gender | | |
| Male | 35.1% (159) | 52.8% [45.6, 60.1] |
| Female | 59.2% (268) | 43.2% [36.0, 50.3] |
| Transgender, non-binary, or queer with no sexual orientation specified | 5.7% (26) | 4.0% [0.6, 7.4] |
| Sexual orientation* | | |
| Straight | 0.4% (2) | 0.3% [0.0, 0.8] |
| Lesbian or gay | 59.8% (273) | 66.4% [60.5, 72.2] |
| Bisexual | 38.9% (176) | 33.1% [27.3, 39.0] |
| Not specified | 0.9% (4) | 0.2% [0.0, 0.4] |
| Age, years | 35.6 \pm 14.0 | 38.3 [35.6, 40.9] |
| Age category | | |
| 18–24 | 25.2% (114) | 24.6% [17.2, 31.9] |
| 25–44 | 49.0% (222) | 39.7% [32.4, 46.9] |
| 45–64 | 22.5% (102) | 29.4% [22.0, 36.8] |
| 65+ | 3.3% (15) | 6.4% [2.8, 10.0] |
| Race | | |
| White | 67.5% (305) | 68.2% [61.6, 74.7] |
| Black or African American | 20.8% (94) | 16.6% [11.0, 22.2] |
| American Indian or Alaska Native | 1.3% (6) | 1.3% [0.1, 2.5] |
| Asian | 2.0% (9) | 2.3% [0.3, 4.2] |
| Pacific Islander | 0.2% (1) | 1.1% [0.0, 3.0] |
| Other or Unknown | 8.2% (37) | 10.6% [6.5, 14.7] |
| Education | | |
| < High school (HS) | 3.3% (15) | 3.4% [0.9, 5.8] |
| G12 or GED, HS diploma | 24.3% (110) | 27.0% [20.5, 33.6] |
| Some college | 15.7% (71) | 15.9% [10.9, 20.9] |
| Associate's degree | 13.7% (62) | 10.5% [7.4, 13.6] |
| Bachelor's degree | 26.7% (121) | 26.7% [20.8, 32.6] |
| Graduate or professional degree | 16.3% (74) | 16.5% [11.8, 21.2] |
| Relationship Status | | |
| Married | 21.0% (95) | 20.6% [14.3, 26.9] |
| Divorced | 7.7% (35) | 7.1% [3.9, 10.3] |
| Widowed | 2.2% (10) | 1.2% [0.3, 2.1] |
| Separated | 1.8% (8) | 1.0% [0.1, 1.8] |
| Never married | 40.6% (184) | 47.2% [40.6, 53.7] |
| A member of an unmarried couple | 25.4% (115) | 21.8% [16.5, 27.1] |
| Other | 1.3% (6) | 1.1% [0.1, 2.1] |
| U.S. Census Region | | |

| | Unweighted % (n) or M ± SD | Weighted % or M [95% CI] |
|---------------------------|---|---|
| Northeast | 13.0% (59) | 17.8% [12.1, 23.5] |
| Midwest | 22.7% (103) | 20.3% [14.4, 26.2] |
| South | 51.0% (231) | 33.1% [26.2, 40.0] |
| West | 13.2% (60) | 28.8% [20.7, 36.9] |
| Current cigarette smoking | | |
| Current smoker | 28.5% (129) | 20.4% [15.9, 24.9] |
| Non-smoker | 71.5% (323) | 79.6% [75.1, 84.1] |

* Note: all 4 individuals not specifying their sexual orientation identified as transgender/non-binary or queer

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Table 2. Unadjusted odds ratios (ORs) for current smoking from standardized risks, SGM adults, N=453, 2017, USA, weighted

| Predictor Variable | Total Sample (N=453) | Lesbian (n = 129) | Gay (n = 134) | Bisexual (n = 164) | Transgender or non-binary (n = 26) |
|---|-------------------------------|--------------------------|-------------------------------|-------------------------------|------------------------------------|
| UNIVERSAL RISKS | | | | | |
| Adverse childhood events | | | | | |
| Food insecurity | 0.99 (0.77–1.18) | 0.77 (0.38–1.54) | 0.95 (0.60–1.49) | 1.04 (0.72–1.49) | 0.90 (0.38–2.14) |
| Substance abuse in the home | 1.24 (0.98–1.59) [†] | 0.85 (0.47–1.54) | 1.20 (0.75–1.91) | 1.45 (1.01–2.09) | 2.23 (1.12–4.43) |
| Physical abuse | 1.23 (0.98–1.56) [†] | 0.96 (0.55–1.67) | 1.22 (0.74–2.01) | 1.54 (1.07–2.24) | 0.88 (0.44–1.75) |
| Emotional abuse | 1.20 (0.93–1.55) | 0.77 (0.46–1.29) | 1.25 (0.71–2.20) | 1.55 (0.97–2.46) [†] | 1.25 (0.48–3.23) |
| Social environment, substance use oriented | | | | | |
| Hang out with people who smoke cigarettes | 5.25 (3.02–9.13) | 4.13 (1.68–10.10) | 5.03 (2.31–10.90) | 7.06 (2.69–18.50) | 3.14 (0.67–14.70) |
| Hang out with people who drink heavily | 1.55 (1.20–2.01) | 1.27 (0.75–2.13) | 2.01 (1.08–3.75) | 1.47 (0.99–2.18) [†] | 2.03 (0.78–5.32) |
| Hang out with people who use marijuana | 1.95 (1.44–2.64) | 1.87 (1.15–3.04) | 1.73 (0.94–3.18) [†] | 2.26 (1.43–3.60) | 2.95 (0.63–13.80) |
| Mental distress | | | | | |
| Kessler-6 3-item anxiety composite (α = .71) | 1.32 (0.98–1.77) [†] | 0.74 (0.41–1.36) | 1.52 (0.85–2.70) | 1.59 (1.05–2.42) | 0.69 (0.25–1.92) |
| Kessler-6 3-item depression composite (α = .78) | 1.41 (1.07–1.86) | 1.08 (0.63–1.85) | 1.36 (0.75–2.47) | 1.73 (1.22–2.47) | 1.66 (0.74–3.73) |
| SGM-SPECIFIC RISKS | | | | | |
| Stigma | | | | | |
| Heard LGBTQ people are not normal | 0.96 (0.75–1.23) | 0.78 (0.52–1.17) | 0.86 (0.55–1.35) | 1.17 (0.73–1.87) | 1.41 (0.43–4.64) |
| If possible, would choose NOT to be LGBT | 1.20 (0.92–1.56) | 0.35 (0.17–0.73) | 1.49 (0.99–2.23) [†] | 1.35 (0.91–1.99) | 0.66 (0.18–2.45) |
| Family hurt or embarrassed b/c LGBTQ | 0.88 (0.66–1.17) | 0.75 (0.42–1.32) | 0.81 (0.49–1.35) | 1.15 (0.78–1.70) | 0.69 (0.33–1.43) |
| Rejected by friend or family member b/c LGBTQ | 1.06 (0.82–1.38) | 0.77 (0.45–1.31) | 1.41 (0.79–2.52) | 1.01 (0.70–1.46) | 4.40 (1.37–14.20) |
| Discrimination | | | | | |
| Stare at you b/c LGBTQ | 1.10 (0.85–1.42) | 1.41 (0.87–2.29) | 1.29 (0.73–2.28) | 0.90 (0.57–1.42) | 1.11 (0.50–2.45) |
| Treat badly/exclude you b/c LGBTQ | 1.11 (0.84–1.47) | 0.70 (0.35–1.39) | 1.28 (0.78–2.12) | 1.10 (0.74–1.63) | 1.85 (0.86–4.01) |
| Treat badly/exclude you b/c of gender expression | 1.11 (0.85–1.44) | 1.04 (0.60–1.80) | 1.35 (0.80–2.27) | 0.86 (0.56–1.33) | 2.51 (0.95–6.61) [†] |
| Treated unfairly by an employer b/c LGBTQ | 1.13 (0.91–1.41) | 0.92 (0.57–1.47) | 0.95 (0.65–1.40) | 1.60 (0.98–2.61) [†] | 2.59 (1.09–6.16) |
| Subjected to slurs or jokes b/c LGBTQ | 1.04 (0.76–1.42) | 0.82 (0.46–1.43) | 1.41 (0.69–2.88) | 1.07 (0.73–1.58) | 0.52 (0.18–1.51) |
| Threatened or physically attacked b/c LGBTQ | 0.99 (0.76–1.30) | 1.36 (0.74–2.49) | 0.97 (0.64–1.48) | 0.76 (0.47–1.25) | 1.32 (0.65–2.68) |
| Social environment, substance use oriented | | | | | |

| Predictor Variable | Total Sample (N=453) | Lesbian (n = 129) | Gay (n = 134) | Bisexual (n = 164) | Transgender or non-binary (n = 26) |
|---|-------------------------|-------------------|-------------------------|--------------------|------------------------------------|
| <i>Attended a drag show in the past year</i> | 1.79 (1.09–2.96) | 2.40 (0.83–6.89) | 3.00 (1.09–8.29) | 0.86 (0.37–1.98) | 5.25 (0.60–46.30) |
| Social isolation | | | | | |
| Difficult to find new LGBTQ friends if you wanted | 0.79 (0.59–1.05) | 0.77 (0.42–1.40) | 0.71 (0.42–1.20) | 0.95 (0.63–1.42) | 0.41 (0.14–1.19) |
| Identity concealment | | | | | |
| Avoid talking about being LGBTQ with family | 0.89 (0.68–1.15) | 1.16 (0.63–2.11) | 0.71 (0.42–1.19) | 0.93 (0.64–1.37) | 0.08 (0.01–1.18) [‡] |
| Avoid talking about being LGBTQ with friends | 0.98 (0.77–1.25) | 1.10 (0.67–1.82) | 0.89 (0.52–1.50) | 0.87 (0.58–1.30) | 1.12 (0.32–3.90) |

Bold indicates $p < .05$, $\alpha =$ Cronbach's alpha;

[‡] $p < .08$; *italics* indicate dichotomous predictor; note that predictors are standardized and OR thus reflects predicted change for 1 standard deviation increase

Table 3.

Unadjusted odds ratios (ORs) for current non-smoking from standardized protective factors, SGM adults, N=453, 2017, USA, weighted

| Predictor Variable | Total Sample N = 453 | Lesbian n = 134 | Gay n = 129 | Bisexual n = 164 | Transgender or non-binary n = 26 |
|---|-------------------------------|------------------|------------------|-------------------------------|---------------------------------------|
| UNIVERSAL RESILIENCIES | | | | | |
| Advertising skepticism | | | | | |
| Thinks advertising is not truthful | 1.40 (1.07–1.85) | 1.43 (0.83–2.46) | 1.27 (0.74–2.18) | 1.45 (0.99–2.12) [‡] | 2.68 (0.94–7.63) [‡] |
| SGM-SPECIFIC RESILIENCIES | | | | | |
| Identity centrality | | | | | |
| Comfortable being LGBTQ | 1.01 (0.81–1.25) | 0.50 (0.19–1.28) | 0.67 (0.34–1.32) | 1.20 (0.91–1.58) | 1.65 (0.53–5.12) |
| Being LGBTQ is a central part of who you are | 1.13 (0.86–1.48) | 0.78 (0.41–1.48) | 1.29 (0.79–2.11) | 1.24 (0.84–1.82) | 0.33 (0.06–2.03) |
| Social support | | | | | |
| Have people you can talk to about being LGBTQ | 1.25 (0.98–1.59) [‡] | 1.42 (0.84–2.41) | 1.15 (0.71–1.86) | 1.17 (0.86–1.60) | 1.49 (0.54–4.08) |
| Feel supported by people who know you are LGBTQ | 1.22 (0.94–1.58) | 1.71 (0.84–2.32) | 0.66 (0.37–1.19) | 1.53 (1.11–2.11) | 1.23 (0.44–3.48) |
| Feel like you fit in with other LGBTQ people | 1.03 (0.78–1.36) | 1.25 (0.69–2.27) | 1.21 (0.70–2.09) | 0.78 (0.50–1.21) | 0.37 (0.07–1.87) |
| Community participation | | | | | |
| <i>Attended an LGBTQ pride parade in last year</i> | 1.03 (0.62–1.73) | 0.52 (0.18–1.48) | 0.95 (0.36–2.51) | 1.83 (0.79–4.24) | 0.36 (0.05–2.71) |
| <i>LGBTQ bar, party, or social gathering in last year</i> | 0.84 (0.47–1.50) | 0.65 (0.18–2.33) | 0.85 (0.30–2.39) | 0.93 (0.40–2.18) | 0.003 (0.00–0.04) [‡] |

Bold indicates p<.05,

[‡] p<.08; *italics* indicate dichotomous predictor; note that predictors are standardized and OR thus reflects predicted change for 1 standard deviation increase;

[‡] unweighted OR=1.14, p > .05

Table 4.

Unadjusted odds ratios (ORs) and 95% confidence intervals for current smoking (risks) and non-smoking (resiliencies) by age, SGM adults, N=453, 2017, weighted

| Standardized Predictor Variable | Young adults 18–24 (n = 114) | Older adults 25+ (n = 339) |
|---|-------------------------------|-------------------------------|
| UNIVERSAL RISKS | | |
| Outcome: Current Smoking | | |
| Adverse childhood events | | |
| Food insecurity | 0.78 (0.47–1.28) | 1.07 (0.79–1.43) |
| Substance abuse in the home | 1.67 (0.96–2.92) [†] | 1.15 (0.87–1.52) |
| Physical abuse | 2.03 (1.02–4.05) | 1.12 (0.86–1.45) |
| Emotional abuse | 1.35 (0.79–2.28) | 1.14 (0.85–1.53) |
| Social environment, substance use oriented | | |
| Hang out with people who smoke cigarettes | 4.92 (1.26–19.30) | 5.35 (3.14–9.10) |
| Hang out with people who drink heavily | 1.62 (0.98–2.66) [†] | 1.52 (1.12–2.06) |
| Hang out with people who use marijuana | 1.90 (1.04–3.47) | 2.00 (1.41–2.82) |
| Mental distress | | |
| Kessler-6 3-item anxiety composite | 1.01 (0.64–1.59) | 1.46 (0.99–2.15) [†] |
| Kessler-6 3-item depression composite | 1.41 (0.90–2.21) | 1.40 (0.99–1.98) [†] |
| SGM-SPECIFIC RISKS | | |
| Outcome: Current Smoking | | |
| Stigma | | |
| Heard LGBTQ people are not normal | 1.30 (0.80–2.11) | 0.87 (0.65–1.16) |
| If possible, would choose NOT to be LGBT | 1.30 (0.72–2.36) | 1.16 (0.90–1.50) |
| Family hurt or embarrassed b/c LGBTQ | 0.83 (0.48–1.42) | 0.90 (0.65–1.25) |
| Rejected by friend or family member b/c LGBTQ | 1.35 (0.87–2.11) | 0.99 (0.72–1.36) |
| Discrimination | | |
| Stare at you b/c LGBTQ | 0.99 (0.60–1.63) | 1.12 (0.84–1.50) |
| Treat badly or exclude you b/c LGBTQ | 1.59 (0.96–2.64) [†] | 0.96 (0.70–1.33) |
| Treat badly or exclude you b/c of gender expression | 1.09 (0.60–1.96) | 1.11 (0.84–1.48) |
| Treated unfairly by an employer b/c LGBTQ | 1.42 (0.85–2.37) | 1.08 (0.84–1.38) |
| Subjected to slurs or jokes b/c LGBTQ | 0.95 (0.59–1.52) | 1.07 (0.73–1.58) |
| Threatened or physically attacked b/c LGBTQ | 1.02 (0.57–1.80) | 1.00 (0.47–1.36) |
| Social environment, substance use oriented | | |
| <i>Attended a drag show in the past year</i> | 1.59 (0.54–4.70) | 1.86 (1.06–3.26) |
| Social isolation | | |
| Difficult to find new LGBTQ friends if you wanted | 0.79 (0.46–1.37) | 0.79 (0.57–1.09) |
| Identity concealment | | |
| Avoid talking about being LGBTQ with family | 0.80 (0.44–1.44) | 0.91 (0.68–1.21) |
| Avoid talking about being LGBTQ with friends | 1.19 (0.72–1.94) | 0.92 (0.70–1.21) |
| UNIVERSAL RESILIENCIES | | |
| Outcome: Current Non-Smoking | | |
| Advertising skepticism | | |
| Thinks advertising is not truthful | 2.19 (1.09–4.41) | 1.21 (0.89–1.63) |
| SGM-SPECIFIC RESILIENCIES | | |
| Outcome: Current Non-Smoking | | |

| Standardized Predictor Variable | Young adults 18–24 (n = 114) | Older adults 25+ (n = 339) |
|---|-------------------------------|----------------------------|
| Identity centrality | | |
| Comfortable being LGBTQ | 1.07 (0.77–1.49) | 0.96 (0.72–1.29) |
| Being LGBTQ is a central part of who you are | 1.33 (0.80–2.19) | 1.05 (0.77–1.42) |
| Social support | | |
| Have people you can talk to about being LGBTQ | 2.64 (1.37–5.12) | 1.14 (0.88–1.47) |
| Feel supported by people who know you are LGBTQ | 1.53 (0.98–2.39) [†] | 1.10 (0.81–1.50) |
| Feel like you fit in with other LGBTQ people | 1.13 (0.67–1.92) | 0.97 (0.71–1.34) |
| Community participation | | |
| <i>Attended an LGBTQ pride parade in last year</i> | 0.90 (0.30–2.69) | 1.09 (0.60–1.99) |
| <i>LGBTQ bar, party, or social gathering in last year</i> | 0.34 (0.09–1.23) | 1.10 (0.57–2.11) |

Bold indicates $p < .05$,

[†] $p < .08$; *italics* indicate dichotomous predictor; note that predictors are standardized and OR thus reflects predicted change for 1 standard deviation increase