Preventive Medicine 69 (2014) 307–311

Contents lists available at ScienceDirect

Preventive Medicine

journal homepage: www.elsevier.com/locate/ypmed

Disparities in tobacco use by sexual orientation among high school students

Sunday Azagba [a,b,*], Mark Asbridge [c], Donald Langille [c], Bruce Baskerville [a,b]

[a] Propel Centre for Population Health Impact, University of Waterloo, Canada
[b] School of Public Health and Health Systems, University of Waterloo, Canada
[c] Department of Community Health and Epidemiology, Dalhousie University, Canada

ARTICLE INFO

Available online 30 October 2014

Keywords:
Tobacco use
High school students
Prevalence
Sexual minority
Lesbian
Gay
Bisexual
Heterosexual

ABSTRACT

Objective. This study examined whether cigarette use is associated with sexual orientation among high school students.

Methods. Data were from a 2012 cross-sectional survey of 5994 students in grades 9, 10 and 12 attending public schools in Atlantic Canada. Multilevel logistic regression analysis was used to examine differences in cigarette use by sexual orientation.

Results. Lesbian, gay and bisexual adolescents (LGB) reported higher prevalence (22%) of daily cigarette use compared with heterosexuals (11%). Multilevel logistic regression analysis, controlling for standard covariates, found that LGB adolescents were more likely to be daily smokers than non-LGB adolescents (odds ratio 2.00, 95% confidence interval 1.50–2.68). Bisexual adolescents were at least twice more likely to be a smoker compared with heterosexual adolescents.

Conclusions. Prevalence of cigarette use was significantly higher among LGB adolescent students. Our results join a growing body of evidence indicating that sexual minorities are at heightened risk of tobacco use. Smoking cessation measures that specifically target this group may be beneficial given that there is no one size fits all approach.

Introduction

Despite decades of scientific evidence of the deleterious effects of tobacco use, smoking remains the main cause of preventable death worldwide (WHO, 2012). The majority of adult long-term smokers initiated smoking during adolescence (Johnston et al., 2012; Chassin et al., 1990; Khuder et al., 1999). Understanding the factors that contribute to smoking initiation during this transition period provides opportunity to reduce the overall disease burden attributable to smoking. While there has been progress in efforts to reduce smoking rates in recent years, at least in developed countries, there are concerns about the rate of smoking among sexual minorities (Marshal et al., 2008; Coker et al., 2010). There is accumulating evidence of high smoking rates among lesbian, gay, and bisexual (LGB) youth (Corliss et al., 2013; Marshal et al., 2008; Rath et al., 2013; Hagger-Johnson et al., 2013; Ortiz-Hernández et al., 2009).

A meta-analysis of 18 studies on sexual orientation and adolescent substance use found that LGB adolescents were significantly more likely to report substance use than heterosexual teens (Marshal et al., 2008). Data from the Growing Up Today Study showed that sexual minority youth compared with those who are completely heterosexual were more likely to initiate smoking at a younger age and had higher frequency of smoking (Corliss et al., 2013). There is also evidence that among LGB communities, and especially among lesbian and bisexual women, the marketing efforts of the tobacco industry are more intense and more effective (Dilley et al., 2008; Smith et al., 2006). Much of what is currently known about smoking prevalence among LGB adolescents comes from the United States. Poorer health outcomes among minorities may arise from stress due to prejudice and discrimination (Meyer, 2003), and sexual minority youth in the United States in states with low structural stigma are less likely to smoke (Hatzenbuehler et al., 2014). The level of societal acceptance of same-sex relationships differ between Canada and the United States, given the same-sex marriage legislation implemented across Canada in 2005. The objective of this study is to examine whether there are disparities in tobacco use by sexual orientation in Canadian high school students.

Methods

Participants

The present study is based on the 2012 Student Drug Use Survey in the Atlantic Provinces (SDUSAP). The SDUSAP is a representative cross-sectional

* Corresponding author at: Propel Centre for Population Health Impact, Faculty of Applied Health Sciences, University of Waterloo, 200 University Avenue West, Waterloo, Ontario N2L 3G1, Canada.
E-mail address: sazagba@uwaterloo.ca (S. Azagba).

http://dx.doi.org/10.1016/j.ypmed.2014.07.042
0091-7435/

survey of students in grades 7, 9, 10 and 12 attending public schools in the three Atlantic Provinces of Nova Scotia, New Brunswick, and Newfoundland & Labrador. Public school students in both Anglophone and Francophone schools were included in the sample. Excluded were private schools, schools on indigenous peoples' reserves, street-youth, school-leavers and students who were absent from school on the designated day of the survey. The sample design was a two-stage stratified cluster sample of randomly selected classes containing at least 20 students in each of the four surveyed grades within each health region in the three participating provinces. Parental consent was obtained in one of two ways depending on the school board. Some school boards required active parental consent for their child to take part in the survey, where a signed consent form was to be returned to the school. Other school boards required passive parental consent, whereby parents contacted the school if they did not want their child to take part in the survey. Finally, all students who did participate in the survey also gave individual/personal consent. Ethics approval was granted by the Dalhousie University Health Sciences Research Ethics Board. Ninety percent of students present on the day the survey was administered participated in the SDUSAP.

Dependent variable

Smoking behavior. Two binary variables that indicated smoking status in the past year were created: 1) current daily smokers represented those that smoked at least one cigarette per day in the past year and 2) ever daily smokers represented those that have smoked 100 or more cigarettes in their life time and had smoked at least one cigarette per day in the past year.

Independent variables

Sexual orientation was assessed from the question (Hatzenbuehler et al., 2014; Corliss et al., 2013): "Which of the following best describes your feelings? With response options of: i) 100% heterosexual (attracted to persons of the opposite sex), ii) mostly heterosexual, iii) bisexual (attracted to both males and females), iv) mostly homosexual, v) 100% homosexual (gay/lesbian; attracted to person of the same sex), and, vi) not sure. The "100% homosexual", "mostly homosexual", and "bisexual" responses were combined to form the LGB group. The "not sure" responses were excluded in the analysis.

The analysis also controlled for health and socio-demographic variables. Age was represented in continuous form (number of years). Sex (are you male or female?) was coded 1 for males and 0 for females. Parental (mother) education was categorized as post-secondary education, unknown, and less than post-secondary education (reference category). Due to sample size restrictions, students' living arrangement was coded as living with both parents vs. not living with both parents. Risk of depression was measured using a 12 item version of the Centers for Epidemiological Studies Depression Scale (CES-D) (Cronbach's alpha = 0.87) with a higher score indicating increased risk of depressive symptoms. We created three categories of depressive symptoms: very elevated (CES-D score 21 to 36), somewhat (CES-D score 12 to 20) and minimal (CES-D score 0 to 11) (Poulin et al., 2005). Sensation seeking among adolescents was measured using 4 items (Stephenson et al., 2003). Frequency of alcohol use was coded 1 for those that reported drinking alcohol at least once a week in the past year and 0 otherwise.

Statistical analysis

Given the nested structure of our data (students within school), multilevel logistic regression analysis was used to examine the disparities in cigarette use by sexual orientation. First, we determine between-school variability in smoking by estimating a null or empty model and an intraclass correlation $\left(\rho = \frac{\sigma_2^2}{\pi^2/_3 + \sigma_2^2}\right)$ is calculated. The null specification indicated statistically significant between-school variability ($\rho = 0.1589$, $p < 0.001$) in smoking. In the main analysis, examining the association between smoking and sexual attraction (LGB vs heterosexual), we minimally adjusted for age and sex, and then adjusted for all covariates. Model fit from a multilevel random intercept model and a model that allows a random slope on LGB were compared using a likelihood ratio test. The random slope model was not significantly different from the random intercept. Results from the random intercept model are reported in this study. We also separated LGB into lesbian or gay (LG) and bisexual in order not to mask the differences between LG and bisexuals (Hagger-Johnson et al., 2013; Barker et al., 2012; Saewyc, 2011; McCabe et al., 2005), however, these results should be interpreted with caution due to small sample size.

To determine effect modification by sex, a likelihood ratio test was performed for a model containing LGB, age and sex and a model that additionally contained an interaction term between LGB and sex. Also, significant effect modification by sex was found, therefore, analyses were stratified. We did not find any evidence of effect modification by socioeconomic status (mother education). All analyses are restricted to students in high school (grades 9, 10 and 12). Excluded from the analysis were the responses of students who reported using a fictitious drug, which was included in the survey to detect students not responding in a trustworthy fashion.

Results

Unweighted summary statistics for study variables are reported in Table 1. Of the 5994 high school students (grades 9, 10, 12), based on self-reported sexual attraction, about 93.8% (n = 5626) were classified as heterosexual, 4.4% (n = 263) were bisexual, and 1.8% (n = 105) were lesbian or gay. In the weighted descriptive analysis, 6.7% were LGB and 93.7% were heterosexual. The weighted prevalence estimates for cigarette use among adolescent students showed that approximately 22% of sexual minority students (LGB) reported daily cigarette use compared with 11% of heterosexuals Similar results were found for the prevalence of established smoking (LGB, 16% versus Heterosexual, 8%).

The results of the multilevel regression, reported in Table 2, indicate a statistically significant association between cigarette use and sexual orientation among high school students in Atlantic Canada. The minimally unadjusted analysis showed that LGB students compared to heterosexual students were more likely to be daily smokers (odds ratio [OR] 2.41, 95% confidence interval [CI] 1.83–3.17). Likewise, LGB students had higher odds of being daily smokers after controlling for age, sex, alcohol use, parent's education, living arrangement, sensation seeking, and risk of depression (OR 2.00, CI 1.50–2.68). The results show similar association between being an established cigarette smoker and sexual orientation. LGB students were significantly more likely to be established smokers than heterosexuals (minimally adjusted: OR 2.21, CI 1.63–3.01; fully adjusted; OR 1.87, CI 1.35–2.58). Analysis comparing lesbian or gay students versus heterosexual, and bisexual versus heterosexual are reported in Model 2. While the odds of being a smoker is higher for lesbian or gay students compared to heterosexual both in the minimally and fully adjusted models, the results were not statistically significant. Bisexual students were more likely to be a smoker compared to heterosexuals. In the minimally adjusted model, bisexuals were approximately 3.1 and 2.7 times more likely to be a daily smoker and established smoker respectively when compared to heterosexuals. These results remained statistically significant in the fully adjusted models.

Analyses stratified by sex are shown in Table 3. The results were largely different for males and females. While the results for females basically mirrored the results shown for the unstratified analysis in Table 2, the association was stronger for females. Lesbian or bisexual females were significantly more likely to be daily cigarette smokers than heterosexuals (OR 3.84, CI 2.72–5.41). In the fully adjusted model, higher odds of smoking were found for lesbian or bisexual students (OR 2.63, CI 1.83–3.78). Separate analyses comparing lesbians versus heterosexuals and bisexuals versus heterosexuals are shown in Model 2. Bisexual students had higher odds of reporting daily cigarette use in the past year when compared with heterosexuals (minimally adjusted: OR 4.39, CI 3.03–6.36; fully adjusted: OR 2.85, CI 1.93–4.21). There was no statistically significant difference in being a smoker between lesbians and heterosexuals with the exception of the minimally adjusted models, which were marginally significant. Among males, sexual orientation (gay or bisexual versus heterosexual, gay versus heterosexual, and bisexual versus heterosexual) was not significantly associated with smoking status.

Discussion

Identifying a subpopulation with heightened risk of tobacco use can inform an effective prevention strategy. One such population with