Published in final edited form as:

Drug Alcohol Rev. 2019 January ; 38(1): 101–110. doi:10.1111/dar.12880.

Smoking Behaviors among Heterosexual and Sexual Minority Youth? Findings from 15 years of Provincially-Representative Data

Jessica N. Fish, PhD¹, Ryan J. Watson, PhD², Jacqueline Gahagan, PhD³, Carolyn M. Porta, PhD, MPH, FAAN⁴, Dominic Beaulieu-Prévost, PhD⁵, and Stephen T. Russell, PhD⁶

¹Department of Family Science, School of Public Health, University of Maryland, College Park, USA

²Department of Human Development and Family Studies, University of Connecticut, Storrs, USA

³Health Promotion Division, Faculty of Health, Dalhousie University, Halifax, Canada

⁴School of Nursing, University of Minnesota, Minneapolis, USA

⁵Department of Sexology, University of Quebec in Montreal, Montréal, Canada

⁶Department of Human Development and Family Sciences, University of Texas at Austin, Austin, USA

Abstract

Introduction and Aims.—Sexual identity disparities in smoking behaviors are well established; however, there is limited research on whether these disparities have diminished as the social and political landscape has changed for lesbian, gay and bisexual people. Thus, we examined changes in prevalence and sexual identity disparities in three smoking behaviors among Canadian adolescents from 1998 to 2013.

Methods.—Data are from the provincially representative British Columbia Adolescent Health Survey ($N = 99,373$). Using sex-stratified, age-adjusted logistic regression models, we estimated: (i) trends in lifetime cigarette use, early onset, and past 30-day use for heterosexual and three subgroups of sexual minority (i.e. mostly heterosexual, bisexual and gay/lesbian) youth; (ii) sexual identity disparities in these cigarette-related behaviors within each survey year (1998, 2003, 2008, 2013); and (iii) whether the size of the disparity has changed from 1998 to 2013.

Results.—Smoking has declined for all youth from 1998 to 2013, although less consistently for sexual minority youth. Within-year disparity estimates indicated elevated prevalence of cigarette use for sexual minority compared to heterosexual youth, particularly among females. Trends in sexual identity and smoking behaviors indicated that the degree of differences between heterosexual and sexual minority youth have remained stable or, in some case, widened.

Correspondence to Dr Jessica Fish, Department of Family Science, School of Public Health, University of Maryland, 1142 Valley Drive, College Park, MD 20742, USA. Tel: (301)-405-4008; jnfish@umd.edu.

CONFLICT OF INTERESTS

None to declare.

Heterosexual and sexual minority youth differences widened for early onset among sexual minority boys and lifetime and past 30-day use for sexual minority girls.

Conclusions.—Efforts to prevent smoking behaviors among youth should continue. Tailored preventive strategies for sexual minority youth might help address existing disparity gaps.

Keywords

LGB; adolescents; smoking behaviors; tobacco use; sexual minority; disparities; school health surveys

INTRODUCTION

Tobacco use is the leading preventable cause of death in the US and Canada [1,2]. Though rates of adolescent tobacco use have declined [3], sexual minority (e.g. lesbian, gay, bisexual [LGB] and same-sex attracted) youth and adults remain at elevated risk for cigarette use relative to heterosexual peers [4–6]. Nearly two decades of research suggest that sexual minority youth are more likely to be current smokers, start smoking at earlier ages, and smoke more frequently than heterosexual peers [4,5]. In a meta-analysis on sexual minority youth substance use, Marshal and colleagues [7] noted that sexual minority youth were over 4 times as likely as heterosexual youth to report lifetime cigarette use and over 2.75 times as likely to indicate use in the past 30 days. Though limited, longitudinal studies suggest that, along with elevated prevalence of cigarette use during adolescence, sexual minority youth demonstrate greater increases in smoking frequency across the transition to adulthood [8], leaving them vulnerable to nicotine dependence and smoking related morbidity and mortality across the life course [9,10].

It is well understood that a complex array of determinants of health, including age, socioeconomic status, sex, gender, among others, can impact on health outcomes across the life course [11]. However, the ways in which key determinants of health impact the health disparities and inequalities of sexual minority youth is less well understood. For example, higher rates of substance use among sexual minority youth are often attributed to experiences with anti-LGB stigma [12,13], including elevated rates of harassment and victimisation. Indeed, sexual minority youth are more likely than heterosexual youth to report experiencing bullying, harassment and victimisation [14,15]. Yet, paradoxically, there has been unprecedentedly swift changes in the social acceptance for LGB people in the US and Canada: In 2017, 62% of US adults support same-sex marriage compared 35% in 2002 [16]. Furthermore, younger cohorts express greater acceptance of LGB people than do older generations [16]. Nearly 75% of Millennials favour same sex marriage, compared to 56% of baby boomers. Along with changes in social acceptance, multiple states in the US and many provinces in Canada have instituted laws and policies protecting the rights of LGB youth and adults [17,18]. In this paper we hypothesize that these changes in the social acceptance and legislative protections of sexual minority youth contribute to a subsequent decline in smoking behaviour disparities between heterosexual and sexual minority youth.

In the current study, we used a provincially representative sample of Canadian youth to assess whether disparities in smoking behaviours between heterosexual and sexual minority

youth have changed amid growing social acceptance and protections for LGB people. Specifically, we assessed trends in the prevalence of lifetime cigarette use, early onset and past 30-day use for heterosexual youth and three subgroups of sexual minority youth on the basis of identity: mostly heterosexual, bisexual and lesbian/gay youth. We then estimated sexual identity disparities in these three smoking behaviours between heterosexual and sexual minority youth during the four survey periods. Finally, we tested whether smoking behaviour disparities between heterosexual and sexual minority youth have increased, decreased or remained stable since 1998. Data analyses were stratified by sex given previous research demonstrating more consistent tobacco-related disparities among women and to adhere to the Sex and Gender Equity in Research international guidelines [19].

METHODS

Design

Data are from the British Columbia Adolescent Health Survey (BCAHS). Conducted by the McCreary Centre Society, the BCAHS is a provincially-based cluster-stratified random classroom survey of Canadian public school students in grades 7–12 (aged 12 to 19; $M_{\text{age}} = 15$) to assess a variety of health and risk behaviours among youth in British Columbia. Data, collected from participating school districts, are stratified by grade and health service delivery area in the five health authorities to be regionally and provincially representative. Data are not longitudinal but are collected from a new cohort of youth at each wave. Data were weighted to account for non-response and differential probability of sampling and scaled to replicate provincial enrolment [20]. The University of British Columbia Behavioral Research Ethics Board approved the study under which these specific analyses were conducted (certificate # H12–00477).

Data were pooled from the 1998 ($n = 22,858$), 2003 ($n = 29,323$), 2008 ($n = 25,254$) and 2013 ($n = 21,938$) surveys to assess trends in cigarette use behaviours. The original sample included a total of 115,573 youth. In this study, we analysed data from students in schools that participated in at least three of the four survey years and who provided a valid response to sexual identity and cigarette use items, which brought the final analytic sample to $N = 99,373$ across all four waves ($n = 48,410$ boys; $n = 50,963$ girls). Most of the 16,200 students not part of the final analytic sample were excluded for having attended a school that did not participate in at least three of the four survey waves. Prevalence of sexual identity by survey year are presented in Table 1.

Measures

Sex.—Participants indicated whether they self-identified as male or female.

Sexual Identity.—For the purposes of our study, we assessed sexual minority status with a single item that assessed sexual identity: “People have different feelings about themselves when it comes to questions of being attracted to other people. Which of the following best describes your feelings?” Response options in 1998–2008 were *100% heterosexual (attracted to persons of the opposite sex)*; *Mostly heterosexual*; *Bisexual (attracted to both boys and girls)*; *Mostly homosexual*; *100% homosexual (gay/lesbian; attracted to persons of*

the same sex); and *not sure*. The 2013 survey response options included: *Completely heterosexual*; *Mostly heterosexual*; *Bisexual*; *Mostly homosexual*; *Completely homosexual*; *Questioning*; and *I don't have attractions*. Following recommendations based on previous psychometric evaluation with the BCAHS, [23] we merged those reporting “not sure” (1998–2008), “questioning” (2013), and “I don't have attractions” (2013) with heterosexual identified youth. Depending on the survey year, those who reported being “mostly homosexual” were combined with individuals who reported “100% homosexual” or “completely homosexual” identities.

Lifetime cigarette use.—Youth reported lifetime use by responding *no* = 0 or *yes* = 1 to “Have you ever tried cigarette smoking, even one or two puffs?”

Age at first cigarette use.—Participants who indicated cigarette use were asked, “How old were you when you smoked a whole cigarette for the first time?” Responses were recoded to reflect those who had used cigarettes at *12 or younger* = 1 and those who stated that their first use was *after the age of 12* = 0.

Past 30-day cigarette use.—Youth responded to the question “During the past 30 days, on how many days did you smoke cigarettes?” Responses were recoded to reflect youth who had (*yes* = 1) or had not (*no* = 0) smoked in the past 30 days.

Age.—Participants' indicated their age in years.

Analytic Approach

Data analyses were conducted using SPSS Complex Samples 22 in order to apply survey weights and account for the complex sampling design. Our data analysis began with crosstabs to assess whether the prevalence of cigarette use changed across years of analysis (i.e. 1998, 2003, 2008 and 2013) within sexual identity subgroups. This preliminary investigation provided valuable information on the stability or change in trends within-groups that inform later interpretation of comparative analyses. Next, we estimated disparities in cigarette use outcomes by sexual identity within each data collection year, adjusted for age. Finally, we used logistic regression with year-by-sexual identity interaction terms to test whether the disparity between heterosexual and sexual minority youth widened, declined or stay the same in the survey years since 1998. Comparing absolute measures of disparities can be misleading because age variability across samples can influence changes in trends across years [22]. Yet, odds ratios cannot be compared across samples [23], and cannot track the scope of a disparity across years. Therefore, to test whether trends of smoking behaviours have changed over time, we computed an interaction term between the year of survey administration and sexual identity in a logistic regression framework, while adjusting for age. This year-by-sexual-identity product term is presented as an odds ratio (OR), which estimates the OR of a smoking behaviour for a particular subgroup in a given year, relative to the same identity in 2013 (our reference year). In each of our models, the reference year reflects the most recent survey collection to allow us to infer changes in smoking behaviour from a historical perspective. To do this, however, we had to invert the estimated OR to reflect changes from past to present. In this framework, an estimated OR

for the interaction term above 1 indicates a widening disparity from earlier years relative to the reference year, and an OR below 1 indicates a declining disparity for that behaviour from earlier years for that specific sexual identity, relative to the reference year. Essentially, this modelling technique produces an age-adjusted year-by-sexual identity product term that estimates the change or stability in the disparity of the smoking behaviour over time. A more detailed outline of this approach is available elsewhere [24].

RESULTS

Prevalence and Trends by Sexual Identity

Age-adjusted prevalence of lifetime cigarette use, age of first use and past 30-day use statistically declined across all survey years for heterosexual boys and girls (see Table 2). Comparatively, mostly heterosexual, bisexual and self-identified gay boys showed less consistent declines between preceding years and 2013: exceptions include past 30-day use for bisexual and gay boys and lifetime use for gay boys. Notably, there was an increase in the proportion of gay boys indicating early onset from 2003 to 2013. Sexual minority girls also demonstrated consistent declines in lifetime tobacco use, though these declines were less robust compared to heterosexual girls. Bisexual and lesbian girls also demonstrated statistical declines in early onset from 1998 to 2013. Overall, sexual minority girls showed relatively little decline in past 30-day use.

Disparities in Smoking Behaviours between Sexual Minority and Heterosexual Youth across Years

Within-year estimates of sexual identity differences in smoking behaviours for boys indicated that mostly heterosexual and bisexual boys were at higher risk for lifetime cigarette use relative to heterosexual boys in 2008 and 2013 (see Table 3). Compared to heterosexual boys, gay and bisexual boys were statistically more likely than heterosexual boys to try cigarettes before the age of 13 in 2008 and 2013. Bisexual and gay boys were also more likely than heterosexual boys to indicate past 30-day cigarette use across all survey years, with the exception of gay boys in 2003.

Bisexual girls had greater odds of all smoking behaviours compared to heterosexual girls for all survey years with the exception of early onset in 2003. Lesbian and mostly heterosexual girls were more likely than heterosexual girls to report lifetime cigarette use and past 30-day use in 2008 and 2013. Lesbian girls were also more likely to report earlier age of onset than heterosexual girls in 1998 and 2008, whereas mostly heterosexual girls indicated lower age of first use in 1998 and 2003. At no point across survey years did sexual minority boys or girls indicate statistically lower odds of smoking behaviours.

Trends in Smoking Behaviour Disparities over Time

Sexual identity by year age-adjusted odds ratios are presented in Table 4. For bisexual boys, the disparities in lifetime cigarette use increased from 1998 to 2013. Early onset disparities increased from 2003 to 2013 for gay and bisexual boys, as well as for gay boys from 1998 to 2013.

Disparities in lifetime alcohol use increased from 1998 to 2013 for mostly heterosexual and bisexual girls. Sexual identity disparities in early onset declined for lesbian girls from 1998 to 2013. Disparities in past 30-day cigarette use increased for mostly heterosexual girls from 1998 and 2003 to 2013, as well as for bisexual girls from 1998 to 2003.

DISCUSSION

This study presents, to our knowledge, the longest running examination of disparities in smoking behaviour between heterosexual and sexual minority youth using a provincially-representative sample of British Columbia adolescents between 1998 and 2013. Overall, findings suggest that, despite growing social and political acceptance of LGB people in North America, sexual minority youth demonstrate important disparities in smoking behaviour. Particularly concerning is that some of our comparisons indicate that sexual identity differences in specific smoking behaviours have widened from past to present; namely lifetime use and early onset for bisexual boys from 1998 and 2003 to 2013, respectively, early onset for gay boys from 1998 and 2003 to 2013, and lifetime use and past 30-day use for mostly heterosexual (from 1998 and 2003 to 2013) and bisexual girls (from 1998 to 2013).

Not unlike previous studies [24,25], our results suggest promising declines in the prevalence of lifetime cigarette use, early onset and past 30-day use among adolescents. Results, however, also indicate that the declines in these behaviours over the last 15 years are more prominent for heterosexual youth relative to sexual minority youth. That is, despite overall declines in smoking behaviours across years, sexual minority males and females had smaller declines than their heterosexual peers. Interestingly, Deacon and Mooney-Somers [26] present similar findings regarding the dampened reduction in smoking among young Australian women (aged 16–24). Furthermore, we noted that when significant within-sexual-identity prevalence declines were present, the size of the effect of these declines were less robust for sexual minority relative to heterosexual youth. Age-adjusted trends, for example, indicated that heterosexual boys were 66% less likely to report past 30-day use in 2013 relative to 1998, whereas bisexual boys were only 49% less likely to report recent use.

Based on a growing body of research which demonstrates the association between anti-LGB stigma and substance use among sexual minority youth [27,28] and the changing social and political landscape with regards to LGB people in North America, we hypothesized differences in smoking behaviours among sexual identity groups of youth would diminish from 1998 to 2013. Yet, our results do not support this hypothesis. Instead, our findings suggest that differences between heterosexual and sexual minority youth in lifetime cigarette use, early onset and past 30-days cigarette use have, by and large, remained stable, and in some cases widened. Out of a total 54 sexual identity disparities, 44 did not change, 10 increased—five among sexual minority boys and five among sexual minority girls—and one disparity decreased (age of onset between heterosexual and lesbian girls from 1998 to 2013).

These findings suggest that while we are experiencing greater social acceptance, changing attitudes and policies regarding LGB people in North America, these advances have not translated into a decline in health disparities for sexual minority youth. A key consideration

in this regard is to better understand the ways in which health and social policies are specifically evaluated in relation to their intended (or unintended) impacts on LGB youth health outcomes, such as tobacco policies [27,29,30]. Accordingly, both environmental and social determinants of health such as engagement with community, neighbourhoods, health and social programs among LGB youth need to be contextualised in furthering our understanding of the types in tobacco cessation interventions that address fundamental disparities and marginalisation facing sexual minority populations.[31]

Although not directly testable with our data, one possible explanation is the developmental clash between increased societal acceptance and the developmental timing of social regulation among peers.[32] Specifically, research demonstrates a decline in the age at which LGB youth first disclose their sexual identities [32], in part due to greater social acceptance and visibility of LGB people in the broader society: a trend supported by the decline in the prevalence of heterosexuality in our data (see Table 1). Young adolescents, however, are more likely than older adolescents to espouse prejudicial attitudes, homophobia behaviour, and the regulation of sexuality and gender expression [33–35]. Thus, despite greater social acceptance of LGB people, youth remain vulnerable to these prejudiced experiences and associated substance use [32].

Interestingly, with the exception of early onset, bisexual and mostly heterosexual boys and girls are those who are reporting greater disparities in lifetime and past 30-day cigarette use. Indeed, studies have identified higher risk for substance use among bisexual relative to both heterosexual and gay/lesbian youth [7]. Importantly, our findings suggest that the relative risk for bisexual and mostly heterosexual youth is increasing over time, a fact which justifies focused research and programming efforts. Youth and adults who identify as bisexual often report biphobia from both the heterosexual majority as well as their gay/lesbian peers [36]. Therefore, these experiences of biphobia and stigma may translate into greater substance use. Alternatively, it may be that social acceptance of sexual minorities may differentially benefit those who identify as gay/lesbian compared to those who identify as mostly heterosexual and bisexual.

Ultimately, our findings point to the need for focused research and programs on the mechanism that drive smoking behaviour disparities between heterosexual and sexual minority youth. Recent meta-analytic studies indicate an increase in sexual minority youth experiences of school-based victimisation [14] and that sexual minority youth substance use is largely driven by these experiences [28]. Thus, health and social programs and policies that specifically address the contextual factors contributing to anti-LGB discrimination and homophobic bullying in school may help to reduce these experiences and subsequent smoking [37,38]. One clinical-control trial conducted on young adult gay men indicated that treatment approaches focused on reducing minority stress led to improved mental health and reduced substance use [39]; therefore, it may be beneficial to have focused programs for sexual minority youth where issues of discrimination, victimisation and health coping strategies are discussed.

Our findings should be considered in relation to several study limitations. First, we used a single item to measure sexual identity, yet sexual identity health disparities have been known

to vary across measures of sexual minority status (reports of sexual identity, attraction and behaviour are not always aligned). Thus, trends using other measures of sexual orientation or patterns across measures of sexual minority status [40] could add important insight about trends in smoking behaviours among sexual minority youth. Second, data were collected using Statistics Canada's measure for ethnicity, which precludes the use of a race/ethnicity variable that provides mutually exclusive categories for the analytic adjustment of model. These data also reflect the experience of youth within one Canadian province; given that LGB-related laws and policies vary across provinces, and countries, findings may not be generalizable to youth in other Canadian provinces or other countries. Finally, the BCAHS is a school-based survey, thus youth who were not enrolled—youth disproportionately likely to be LGB (i.e. youth experiencing homelessness [41,42], school pushout [43] and who skip school because they feel unsafe [44])—were not represented in these data.

Overall, our findings demonstrate that smoking is declining among Canadian youth. However, despite growing social acceptance of LGB people in North America, sexual identity disparities in smoking have remained largely unchanged, and in some cases have widened, suggesting that sexual minority youth health disparities remain a significant public health concern. The continued inclusion of sexual identity measures in studies of youth may help to elucidate the impact of these social changes over time. Researchers should continue to explore how these contextual changes can impact on health behaviours and related health outcomes among sexual minority youth. In the meantime, the implementation of LGB-youth focused policies and interventions that consider the interpersonal and intrapersonal factors as well as the contextual and environmental determinants of health in reducing sexual orientation disparities in smoking behaviours are warranted.

ACKNOWLEDGEMENTS

This study was funded by grants #CPP 86374 and #MOP 119472 (awarded to Dr Elizabeth Saewyc) from the Canadian Institutes of Health Research. The authors acknowledge the McCreary Centre Society (<http://www.mcs.bc.ca>) for access to the British Columbia Adolescent Health Survey, and Dr Elizabeth Saewyc for her leadership related to the data collection, paper conceptualisation, and other various mentorship for this project. JNF was funded by the National Institute on Alcohol Abuse and Alcoholism, F32AA023138. JNF and STR also received support from grant P2CHD042849, Population Research Center, awarded to the Population Research Center at The University of Texas at Austin by the Eunice Kennedy Shriver National Institute of Child Health and Human Development. JNF gratefully acknowledges support from the Eunice Kennedy Shriver National Center for Child Health and Human Development grant P2C-HD041041, Maryland Population Research Center. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health. S.T.R. also acknowledges support from the Priscilla Pond Flawn Endowment at the University of Texas at Austin.

References

1. Baliunas D, Patra J, Rehm J, Popova S, Kaiserman M, Taylor B. Smoking-attributable mortality and expected years of life lost in Canada 2002: conclusions for prevention and policy. *Chronic Dis Can* 2007;27:154–62. [PubMed: 17623561]
2. Yoon PW, Bastian B, Anderson RN, Collins JL, Jaffe HW, et al. Potentially preventable deaths from the five leading causes of death—United States, 2008–2010. *MMWR Morb Mortal Wkly Rep* 2014;63:369–74. [PubMed: 24785982]
3. Johnston LD, O'Malley PM, Miech RA, Bachman JG, Schulenberg JE. monitoring the future national survey results on drug use 1975–2015: overview, key findings on adolescent drug use [Internet]. Ann Arbor, MI: Institute for Social Research, The University of Michigan; [cited 2017

Jul 27]. Available from: <http://www.monitoringthefuture.org/pubs/monographs/mtf-overview2015.pdf>

4. Corliss HL, Wadler BM, Jun H-J, Rosario M, Wypij D, Frazier AL, et al. Sexual-orientation disparities in cigarette smoking in a longitudinal cohort study of adolescents. *Nicotine Tob Res* 2012;15:213–22. [PubMed: 22581940]
5. Rosario M, Corliss HL, Everett BG, Reisner SL, Austin SB, Buchting FO, et al. Sexual orientation disparities in cancer-related risk behaviors of tobacco, alcohol, sexual behaviors, and diet and physical activity: pooled Youth Risk Behavior Surveys. *Am J Public Health* 2013;104:245–54. [PubMed: 24328632]
6. Wheldon CW, Kaufman AR, Kasza KA, Moser RP. Tobacco use among adults by sexual orientation: findings from the population assessment of tobacco and health study. *LGBT Health* 2018;5:33–44. [PubMed: 29324177]
7. Marshal MP, Friedman MS, Stall R, King KM, Miles J, Gold MA, et al. Sexual orientation and adolescent substance use: a meta-analysis and methodological review. *Addiction* 2008;103:546–56. [PubMed: 18339100]
8. Marshal MP, Friedman MS, Stall R, Thompson AL. Individual trajectories of substance use in lesbian, gay and bisexual youth and heterosexual youth. *Addiction* 2009;104:974–81. [PubMed: 19344440]
9. Goldberg S, Strutz KL, Herring AA, Halpern CT. Risk of substance abuse and dependence among young adult sexual minority groups using a multidimensional measure of sexual orientation. *Public Health Rep* 2013;128:144–52. [PubMed: 23633729]
10. Centers for Disease Control and Prevention (CDC). Smoking-attributable mortality, years of potential life lost, and productivity losses--United States, 2000–2004. *MMWR Morb Mortal Wkly Rep* 2008;57:1226–8. [PubMed: 19008791]
11. Public Health Agency of Canada. Social determinants of health and health inequalities [Internet]. 2018 [cited 2018 Oct 23]. Available from: <https://www.canada.ca/en/public-health/services/health-promotion/population-health/what-determines-health.html>
12. Meyer IH. Prejudice as stress: conceptual and measurement problems. *Am J Public Health* 2003;93:262–5. [PubMed: 12554580]
13. Hatzenbuehler ML. How does sexual minority stigma “get under the skin”? A psychological mediation framework. *Psychol Bull* 2009;135:707–30. [PubMed: 19702379]
14. Toomey RB, Russell ST. The role of sexual orientation in school-based victimization: a meta-analysis. *Youth Soc* 2016;48:176–201. [PubMed: 26997680]
15. Kann L, Kinchen S, Shanklin SL, Flint KH, Kawkins J, Harris WA, et al. Youth risk behavior surveillance--United States, 2013. *MMWR Suppl* 2014;63:1–168.
16. Pew Research Center. Changing Attitudes on Gay Marriage [Internet]. 2017 [cited 2018 Apr 3]. Available from: <http://www.pewforum.org/fact-sheet/changing-attitudes-on-gay-marriage/>
17. Hurley M Sexual orientation and legal rights: a chronological overview (PRB 04–13E) [Internet]. Ottawa: Library of Parliament; 2005 [cited 2016 Jun 20]. Available from: <http://www.lop.parl.gc.ca/content/lop/researchpublications/prb0413-e.htm>
18. Gay, Lesbian, and Straight Education Network. Enumearted anti-bullying laws by state [Internet]. GLSEN 2016 [cited 2016 Jun 20]. Available from: <http://www.glsen.org/article/state-maps>
19. Heidari S, Babor TF, De Castro P, Tort S, Curno M. Sex and gender equity in research: rationale for the SAGER guidelines and recommended use. *Res. Integr. Peer Rev.* 2016;1:2. [PubMed: 29451543]
20. Saewyc E, Green R. Survey methodology for the 2008 BC adolescent health survey IV. Vancouver, BC, Canada: McCreary Centre Society; 2009.
21. Saewyc EM, Konishi C, Rose HA, Homma Y. School-based strategies to reduce suicidal ideation, suicide attempts, and discrimination among sexual minority and heterosexual adolescents in Western Canada. *Int J Child Youth Family Stud* 2014;5:89–112. [PubMed: 26793284]
22. Asada Y On the choice of absolute or relative inequality measures. *Milbank Q.* 2010;88:616–22. [PubMed: 21166871]
23. Altman DG, Bland JM. Interaction revisited: the difference between two estimates. *BMJ* 2003;326:219. [PubMed: 12543843]

24. Homma Y, Saewyc E, Zumbo BD. Is it getting better? An analytical method to test trends in health disparities, with tobacco use among sexual minority vs. heterosexual youth as an example. *Int J Equity Health* 2016;15:1. [PubMed: 26728322]
25. Watson RJ, Lewis NM, Fish JN, Goodenow C. Sexual minority youth continue to smoke cigarettes earlier and more often than heterosexuals: Findings from population-based data. *Drug Alcohol Depend* 2018;184:64–70. [PubMed: 29402681]
26. Deacon RM, Mooney-Somers J. Smoking prevalence among lesbian, bisexual and queer women in Sydney remains high: analysis of trends and correlates. *Drug Alcohol Rev* 2017;36:546–54. [PubMed: 28211962]
27. Hatzenbuehler ML, Jun H-J, Corliss HL, Austin SB. Structural stigma and cigarette smoking in a prospective cohort study of sexual minority and heterosexual youth. *Ann Behav Med* 2014;47:48–56. [PubMed: 24136092]
28. Goldbach JT, Tanner-Smith EE, Bagwell M, Dunlap S. Minority stress and substance use in sexual minority adolescents: a meta-analysis. *Prev Sci* 2014;15:350–63. [PubMed: 23605479]
29. Berger I, Mooney-Somers J. Smoking cessation programs for lesbian, gay, bisexual, transgender, and intersex people: a content-based systematic review. *Nicotine Tob Res* 2017;19:1408–17. [PubMed: 27613909]
30. Hatzenbuehler ML, Pachankis JE. Stigma and minority stress as social determinants of health among lesbian, gay, bisexual, and transgender youth: research evidence and clinical implications. *Pediatr Clin* 2016;63:985–97.
31. Lewis NM. Researching LGB health and social policy: methodological issues and future directions. *J Public Health Policy* 2017;38:80–7. [PubMed: 28275248]
32. Russell ST, Fish JN. Mental health in lesbian, gay, bisexual, and transgender (LGBT) youth. *Annu Rev Clin Psychol* 2016;12:465–87. [PubMed: 26772206]
33. Mulvey KL, Killen M. Challenging gender stereotypes: resistance and exclusion. *Child Dev* 2015;86:681–94. [PubMed: 25382748]
34. Poteat VP, Anderson CJ. Developmental changes in sexual prejudice from early to late adolescence: the effects of gender, race, and ideology on different patterns of change. *Dev Psychol* 2012;48:1403–15. [PubMed: 22250998]
35. Robinson JP, Espelage DL. Peer victimization and sexual risk differences between lesbian, gay, bisexual, transgender, or questioning and nontransgender heterosexual youths in grades 7–12. *Am. J. Public Health* 2013;103:1810–9. [PubMed: 23947999]
36. Israel T, Mohr JJ. Attitudes toward bisexual women and men. *J. Bisexuality* 2004;4:117–34.
37. Hatzenbuehler ML, Schwab-Reese L, Ranapurwala SI, Hertz MF, Ramirez MR. Adassociations between antibullying policies and bullying in 25 states. *JAMA Pediatr* 2015;169:e152411. [PubMed: 26437015]
38. Marx RA, Kettrey HH. Gay-straight alliances are associated with lower levels of school-based victimization of lgbtq+ youth: a systematic review and meta-analysis. *J. Youth Adolesc* 2016;45:1269–82. [PubMed: 27221632]
39. Pachankis JE, Hatzenbuehler ML, Rendina HJ, Safren SA, Parsons JT. LGB-affirmative cognitive-behavioral therapy for young adult gay and bisexual men: A randomized controlled trial of a transdiagnostic minority stress approach. *J Consult Clin Psychol* 2015;83:875–89. [PubMed: 26147563]
40. Fish JN, Pasley K. Sexual (Minority) Trajectories, mental health, and alcohol use: a longitudinal study of youth as they transition to adulthood. *J Youth Adolesc* 2015;44:1508–27. [PubMed: 25956289]
41. Durso LE, Gates GJ. Serving our youth: findings from a national survey of services providers working with lesbian, gay, bisexual and transgender youth who are homeless or at risk of becoming homeless. *eScholarship* [Internet] 2012 [cited 2016 Jun 21]. Available from: <http://escholarship.org/uc/item/80x75033>
42. Rosario M, Schrimshaw EW, Hunter J. Homelessness among lesbian, gay, and bisexual youth: implications for subsequent internalizing and externalizing symptoms. *J Youth Adolesc* 2012;41:544–60. [PubMed: 21656284]

43. Snapp SD, Russell ST. Discipline disparities for lgbtq youth: challenges that perpetuate disparities and strategies to overcome them In: Skiba RJ, Mediratta K, Rausch MK, editors. *Inequality in School Discipline: Research and Practice to Reduce Disparities*. New York: Palgrave Macmillan US; 2016 p. 207–23.
44. Baams L, Talmage CA, Russell ST. Economic costs of bias-based bullying. *Sch Psychol Q* 2017;32:422–33. [PubMed: 28661165]

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Figure 1.

Unadjusted trends in smoking behaviors among students grades 7–12 from 1998 to 2013

Table 1.

Sample by sexual identity and survey year in the British Columbia Adolescent Health Survey

	1998		2003		2008		2013	
	n	%	n	%	n	%	n	%
BOYS								
Heterosexual	10,223	94.20%	13,880	95.57%	11,573	94.27%	10,024	93.18%
Mostly heterosexual	418	3.85%	432	2.97%	459	3.74%	463	4.30%
Bisexual	127	1.17%	122	0.84%	141	1.15%	153	1.42%
Gay	84	0.77%	89	0.61%	104	0.85%	118	1.10%
GIRLS								
Heterosexual	10,829	90.20%	13,013	87.93%	11,268	86.83%	9,601	85.88%
Mostly heterosexual	919	7.65%	1,304	8.81%	1,200	9.25%	1,019	9.11%
Bisexual	217	1.81%	428	2.89%	444	3.42%	468	4.19%
Lesbian	41	0.34%	55	0.37%	65	0.50%	92	0.82%

Notes: Sample sizes are unweighted Ns; Percents are weighted.

Trends in lifetime cigarette use, early onset, and past 30-day use from 1998 to 2013 among students grades 7–12 by sexual identity

Table 2.

	Unadjusted Prevalence Comparison				Trend Comparison			
	1998	2003	2008	2013	1998 v. 2013	2003 v. 2013	2008 v. 2013	2008 v. 2013
	%	%	%	%	<i>aOR</i> ^a (95% CI)	<i>aOR</i> ^a (95% CI)	<i>aOR</i> ^a (95% CI)	<i>aOR</i> ^a (95% CI)
Boys								
<i>Lifetime use</i>								
Heterosexual	53.7	31.0	25.0	22.4	0.21 (0.19, 0.23)	0.64 (0.58, 0.69)		0.87 (0.80, 0.94)
Mostly heterosexual	58.8	31.3	34.7	28.6	0.22 (0.16, 0.30)	0.84 (0.56, 1.25)		0.75 (0.55, 1.03)
Bisexual	53.1	41.5	42.7	39.9	0.49 (0.31, 0.78)	0.93 (0.56, 1.54)		0.88 (0.55, 1.42)
Gay	60.1	37.9	39.2	22.7	0.19 (0.12, 0.30)	0.49 (0.26, 0.92)		0.46 (0.28, 0.74)
<i>Early onset (< 13)</i>								
Heterosexual	55.1	43.8	27.3	19.8	0.24 (0.20, 0.27)	0.29 (0.25, 0.35)		0.69 (0.59, 0.81)
Mostly heterosexual	47.4	45.6	23.5	21.4	0.30 (0.18, 0.50)	0.30 (0.16, 0.56)		0.90 (0.52, 1.55)
Bisexual	62.7	25.9	51.7	31.0	0.36 (0.21, 0.61)	1.41 (0.73, 2.70)		0.48 (0.29, 0.81)
Gay	67.8	37.8	51.2	56.0	0.82 (0.33, 2.04)	2.87 (1.26, 6.52)		1.45 (0.53, 3.97)
<i>Past 30-day use</i>								
Heterosexual	22.0	11.5	11.7	9.7	0.34 (0.30, 0.39)	0.84 (0.74, 0.96)		0.81 (0.72, 0.90)
Mostly heterosexual	28.0	12.8	17.0	13.5	0.35 (0.24, 0.53)	1.06 (0.67, 1.67)		0.78 (0.52, 1.18)
Bisexual	33.4	25.2	26.7	23.1	0.51 (0.30, 0.86)	0.89 (0.51, 1.53)		0.83 (0.52, 1.32)
Gay	37.1	23.6	23.5	14.7	0.29 (0.17, 0.49)	0.57 (0.26, 1.23)		0.57 (0.31, 1.02)
Girls								
<i>Lifetime use</i>								
Heterosexual	56.3	34.8	24.8	17.6	0.14 (0.13, 0.15)	0.37 (0.34, 0.41)		0.65 (0.60, 0.71)
Mostly heterosexual	64.2	53.6	44.5	34.4	0.27 (0.22, 0.34)	0.43 (0.35, 0.54)		0.63 (0.52, 0.76)
Bisexual	71.2	62.5	57.3	44.5	0.32 (0.22, 0.46)	0.48 (0.34, 0.68)		0.58 (0.45, 0.76)
Lesbian	68.6	48.6	44.8	36.2	0.16 (0.09, 0.29)	0.46 (0.23, 0.92)		0.69 (0.43, 1.12)
<i>Early onset (< 13)</i>								
Heterosexual	52.4	43.7	26.9	17.9	0.23 (0.20, 0.27)	0.28 (0.24, 0.33)		0.63 (0.53, 0.75)
Mostly heterosexual	52.6	47.8	25.6	20.7	0.22 (0.16, 0.32)	0.28 (0.20, 0.39)		0.81 (0.58, 1.15)
Bisexual	66.5	51.2	45.9	31.8	0.20 (0.13, 0.31)	0.43 (0.31, 0.61)		0.55 (0.38, 0.80)

	Unadjusted Prevalence Comparison				Trend Comparison			
	1998	2003	2008	2013	1998 v. 2013	2003 v. 2013	2008 v. 2013	
	%	%	%	%	aOR ^a (95% CI)	aOR ^a (95% CI)	aOR ^a (95% CI)	
Lesbian	86.1	49.1	41.9	20.1	0.04 (0.02, 0.10)	0.30 (0.22, 0.42)	0.32 (0.23, 0.45)	
<i>Past 30-day use</i>								
Heterosexual	26.1	12.9	10.2	8.3	0.24 (0.21, 0.27)	0.60 (0.53, 0.67)	0.81 (0.72, 0.91)	
Mostly heterosexual	36.4	22.9	22.5	19.2	0.41 (0.32, 0.53)	0.80 (0.63, 1.01)	0.81 (0.64, 1.02)	
Bisexual	49.7	33.4	38.7	29.0	0.41 (0.28, 0.60)	0.82 (0.60, 1.11)	0.64 (0.48, 0.86)	
Lesbian	39.3	16.1	28.1	21.4	0.35 (0.17, 0.71)	1.26 (0.72, 2.18)	0.70 (0.42, 1.19)	

Note. Data were weighted and adjusted for age. OR in bold indicates $P < 0.05$. aOR, adjusted odds ratio; CI, confidence interval

Odds ratios and 95% confidence intervals for cigarette use by year (1998–2013) among students grades 7–12: Comparisons by sexual identity

Table 3

	Boys				Girls			
	1998 <i>aOR</i> (95% CI)	2003 <i>aOR</i> (95% CI)	2008 <i>aOR</i> (95% CI)	2013 <i>aOR</i> (95% CI)	1998 <i>aOR</i> (95% CI)	2003 <i>aOR</i> (95% CI)	2008 <i>aOR</i> (95% CI)	2013 <i>aOR</i> (95% CI)
Lifetime use								
Heterosexual [ref]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Mostly heterosexual	1.09 (0.86, 1.37)	0.88 (0.64, 1.21)	1.37 (1.10 , 1.70)	1.13 (0.89, 1.43)	1.11 (0.94, 1.30)	1.78 (1.51, 2.09)	2.17 (1.88 , 2.49)	2.02 (1.72 , 2.37)
Bisexual	1.01 (0.62, 1.63)	1.38 (0.84, 2.27)	1.98 (1.28 , 3.05)	1.96 (1.34 , 2.86)	1.62 (1.13 , 2.34)	2.63 (1.83 , 3.77)	3.86 (3.07 , 4.84)	3.28 (2.62 , 4.11)
Gay/Lesbian	1.17 (0.66, 2.05)	0.99 (0.53, 1.87)	1.56 (0.96, 2.51)	0.75 (0.47, 1.19)	1.82 (0.82, 4.22)	1.83 (0.89, 3.76)	2.17 (1.22 , 3.84)	2.26 (1.45 , 3.53)
Early onset								
Heterosexual [ref]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Mostly heterosexual	0.97 (0.62, 1.50)	1.17 (0.69, 1.98)	0.90 (0.56, 1.45)	1.19 (0.76, 1.87)	1.46 (1.09 , 1.95)	1.35 (1.03 , 1.76)	1.01 (0.77, 1.32)	1.35 (0.99, 1.85)
Bisexual	1.26 (0.70, 2.25)	0.42 (0.17, 1.06)	2.78 (1.46 , 5.30)	1.94 (1.13 , 3.33)	2.56 (1.60 , 4.11)	1.35 (0.98, 1.87)	2.39 (1.70 , 3.36)	2.08 (1.49 , 2.91)
Gay/Lesbian	1.92 (0.84, 4.36)	0.72 (0.27, 1.89)	3.12 (1.45 , 6.71)	6.36 (2.73 , 14.80)	6.69 (2.26 , 19.81)	1.25 (0.42, 3.77)	2.53 (1.02 , 6.24)	1.39 (0.62, 3.10)
Past 30-day use								
Heterosexual [ref]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Mostly heterosexual	1.23 (0.94, 1.62)	0.98 (0.65, 1.48)	1.29 (0.95, 1.75)	1.23 (0.92, 1.64)	1.34 (1.11, 1.63)	1.67 (1.39, 2.01)	2.29 (1.85 , 2.73)	2.25 (1.85 , 2.73)
Bisexual	1.91 (1.15 , 3.17)	2.35 (1.35 , 4.09)	2.39 (1.55 , 3.67)	2.43 (1.58 , 3.74)	2.46 (1.69 , 3.58)	2.89 (2.15 , 3.89)	5.23 (4.16 , 6.58)	3.97 (3.09 , 5.09)
Gay/Lesbian	1.94 (1.05 , 3.57)	1.76 (0.79, 3.91)	1.82 (1.07 , 1.49)	1.27 (0.75, 2.14)	1.95 (0.94, 4.06)	1.29 (0.61, 2.69)	3.04 (1.62 , 5.69)	2.63 (1.54 , 4.47)

Note. Data were weighted and adjusted for age. 95% confidence intervals are in parentheses, Odd ratio in bold indicates $P < 0.05$

Table 4

Trends in cigarette use among students grades 7–12: Interactions between sexual identity and year

	Male	Female
	aOR (95% CI)	aOR (95% CI)
<i>Lifetime use</i>		
Heterosexual x Year 2013 _[ref]		
Mostly heterosexual x Year 2008	0.87 (0.63, 1.19)	0.96 (0.78, 1.18)
Mostly heterosexual x Year 2003	1.32 (0.90, 1.96)	1.14 (0.91, 1.43)
Mostly heterosexual x Year 1998	1.11 (0.80, 1.53)	1.90 (1.51, 2.38)
Bisexual x Year 2008	1.01 (0.57, 1.79)	0.85 (0.62, 1.17)
Bisexual x Year 2003	1.43 (0.78, 2.63)	1.25 (0.82, 1.89)
Bisexual x Year 1998	1.97 (1.06, 3.65)	2.06 (1.34, 3.16)
Gay/lesbian x Year 2008	0.52 (0.27, 1.01)	1.07 (0.52, 2.22)
Gay/lesbian x Year 2003	0.79 (0.37, 1.68)	1.26 (0.55, 2.92)
Gay/lesbian x Year 1998	0.70 (0.34, 1.45)	1.12 (0.48, 3.09)
<i>Early onset</i>		
Heterosexual x Year 2013 _[ref]		
Mostly heterosexual x Year 2008	1.32 (0.69, 2.53)	1.32 (0.88, 1.96)
Mostly heterosexual x Year 2003	0.98 (0.48, 2.00)	0.95 (0.63, 1.44)
Mostly heterosexual x Year 1998	1.26 (0.68, 2.34)	0.93 (0.62, 1.41)
Bisexual x Year 2008	0.69 (0.30, 1.57)	0.87 (0.55, 1.39)
Bisexual x Year 2003	4.75 (1.54, 14.65)	1.53 (0.96, 2.43)
Bisexual x Year 1998	1.51 (0.69, 3.31)	0.83 (0.47, 1.47)
Gay/lesbian x Year 2008	2.01 (0.66, 6.15)	0.54 (0.16, 1.78)
Gay/lesbian x Year 2003	9.00 (2.42, 33.45)	1.03 (0.28, 4.15)
Gay/lesbian x Year 1998	3.31 (1.05, 10.49)	0.21 (0.06, 0.79)
<i>Past 30-day use</i>		
Heterosexual x Year 2013 _[ref]		
Mostly heterosexual x Year 2008	0.07 (0.64, 1.47)	0.99 (0.77, 1.28)
Mostly heterosexual x Year 2003	1.26 (0.77, 2.05)	1.33 (1.02, 1.73)
Mostly heterosexual x Year 1998	1.03 (0.69, 1.53)	1.70 (1.29, 2.23)
Bisexual x Year 2008	1.03 (0.56, 1.88)	0.76 (0.54, 1.07)
Bisexual x Year 2003	1.04 (0.53, 2.07)	1.36 (0.93, 1.99)
Bisexual x Year 1998	1.27 (0.65, 2.48)	1.63 (1.04, 2.55)
Gay/lesbian x Year 2008	0.72 (0.34, 1.50)	0.88 (0.38, 2.00)
Gay/lesbian x Year 2003	0.72 (0.29, 1.81)	2.05 (0.83, 5.08)
Gay/lesbian x Year 1998	0.68 (0.30, 1.51)	1.35 (0.54, 3.34)

Note. Data were weighted and adjusted for age. Odds ratios in bold indicates $P < 0.05$. ref: Reference group 2013; Models included sexual identity, age, ethnicity, survey year and identity-by-year interaction. aOR, adjusted odds ratio; CI, confidence interval.