Full length article

Risk of polysubstance use among sexual minority and heterosexual youth

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ARTICLE INFO	ABSTRACT
	Background: Relative to heterosexual youth, sexual minority youth exhibit increased substance use. Risk for polysubstance use, which magnifies drug-related harms, remains largely unexamined for sexual minority youth. This investigation used a nationally-representative dataset to compare polysubstance use patterns between sexual minority and heterosexual youth. *Methods:* The cross-sectional 2015 CDC's Youth Risk Behavior Surveillance System (N = 15,624) was utilized. Latent mixture modeling empirically identified subgroups of youth based on self-reported past-month use of alcohol, cigarettes, chewing tobacco/snus/snuff, cigars/cigarillos/little cigars, e-cigarettes, marijuana, and past-month binge drinking (all dichotomized: 0 = none; 1 = at least once). Adjusting for race/ethnicity, sex, and age, the risk for being in each substance-using class, was compared between youth who self-identified as heterosexual and gay/lesbian, bisexual, or "not sure." *Results:* Five classes were supported: "non-users" (68.19%), "alcohol users" (13.08%; elevated alcohol use and binge drinking probabilities), "nicotine/marijuana co-users" (5.80%; elevated nicotine and marijuana use), "poly-substance/e-cigarette users" (5.35%; elevated on all substances except tobacco-containing products), and "polysubstance/tobacco users" (7.59%; elevated for all substances). Relative to heterosexual youth, gay/lesbian-identified youth were at risk of being "nicotine and marijuana co-users", bisexual youth were at risk of being in all four substance-using classes, and the "not sure" youth were at risk of being "polysubstance/tobacco users." Select disparities were larger for youth who were also female or a minority race/ethnicity. *Conclusions:* Sexual minority youth, particularly bisexual youth, were at increased risk relative to heterosexual youth for polysubstance use. Polysubstance use warrants attention in substance use interventions, including interventions tailored for sexual minority youth.

1. Introduction

Alcohol, marijuana, and cigarettes are three of the most commonly used drugs among youth, with estimated usage rates in the past 30-days of 32.8%, 21.7%, and 10.8%, respectively (Kann, 2016). A subgroup of youth that appears to be at an increased risk of using alcohol, marijuana, and cigarettes is sexual minority youth (SMY) (Marshal et al., 2008). Youth who use these substances are at risk of several negative health and social outcomes, such as addiction, and poorer cognitive, social, and academic functioning (Hingson and Kenkel, 2004; Mathers et al., 2006; Volkow et al., 2014). These negative consequences are exacerbated when youth use a combination of these substances (Kelly et al., 2015; McKee and Weinberger, 2013; Moss et al., 2014; Ramo et al., 2012); however, the extent and risk of polysubstance use among SMY relative to heterosexual youth remains largely unexamined. Thus, this investigation uses a national epidemiological dataset to describe disparities in substance use patterns, including polysubstance use, associated with sexual orientation.

"Sexual minority" is a label used to describe an overarching group of individuals that identify with a sexual identity other than heterosexual, report same-sex attraction, and/or report same-sex sexual behavior. According to a meta-analytic investigation, SMY, including lesbian, gay, and bisexual youth, reported nearly three times more substance use than heterosexual youth (Marshal et al., 2008), which included tobacco (Austin et al., 2004; Cochran et al., 2002; Lampinen et al., 2006), alcohol (Robin et al., 2002; Whitbeck et al., 2004), and marijuana (Cochran et al., 2002; Lampinen et al., 2006). Notably, substance use risk differs within SMY, and highest use is typically seen for bisexual youth (Dermody et al., 2014; Kerr et al., 2015; Marshal et al., 2008). These disparities have persisted, as demonstrated by a recent analysis of a national epidemiological sample: the 2015 Youth Risk Behavior Surveillance System (YRBS), which found that SMY (i.e., combining lesbian, gay, and bisexual youth) reported higher recent alcohol, marijuana, and cigarette use than heterosexual youth (Kann et al., 2016).

The primary explanatory framework for understanding SMY

disparities is the Minority Stress Theory (Meyer, 2003). Minority Stress Theory proposes that discrimination, violence, and victimization due to a pervasive homophobic culture are the primary sources of stress and most probable core etiological causal mechanisms of health problems among sexual minority individuals, including substance use disparities. Consistent with this theory, a recent review of cross-sectional research supported associations between victimization, including both general victimization and sexual minority-related victimization, with alcohol, cigarette, and marijuana use (Goldbach et al., 2014).

While SMY has been shown to be at risk for alcohol, cigarette, and marijuana use independently, these findings may be partially explained by a subset of SMY who use multiple types of or all three substances. According to the syndemic model of disease burden (Singer, 2009), SMY who simultaneously experience several poor physical and social conditions would be expected to experience a full array of interconnected health and social problems. In fact, recent research suggests that SMY are at risk of polysubstance use (Dermody et al., 2016b; Kecojevic et al., 2017). Using a community-based cohort of US youth (n = 13,519), Kecojevic et al. (2017) identified individuals who reported any polysubstance in the past 12 months (i.e., any use of 3 or more legal or illicit substances). They found that SMY, particularly females, were at risk for past-year polysubstance use relative to completely heterosexual youth. Consistent findings have been supported in a sample of urban female youth (N = 2064) using mixture modeling. Mixture modeling is a person-centered analytic approach that can identify relatively homogenous substance use classes based on patterns of use of multiple substances. There are several advantages of using mixture modeling to identify polysubstance users, such as (1) empirically-determining underlying subgroups of individuals based on the intersection of multiple observed substance-using behaviors and (2) evaluating and considering various patterns of substance co-use and polysubstance use with varied risk profiles. Using this approach, Dermody et al. (2016b) identified five substance-using subgroups: non-users (72%), alcohol-only users (8%), marijuana/alcohol co-users (5%), cigarette/alcohol co-users (8%), and polysubstance users (7%). Relative to female heterosexual youth, female SMY were at an increased risk for being in each substance co-use and polysubstance use group compared to the non-users group. This initial evidence suggests that there is considerable overlap in these substance-using behaviors among SMY which could exacerbate the negative consequences of substance use.

An important next step is to attempt to replicate these polysubstance use disparities in a nationally-representative sample, as the few existing studies on SMY polysubstance use have relied on community samples (Dermody et al., 2016b; Kecojevic et al., 2017). The present investigation uses the aforementioned CDC's nationally-representative epidemiological sample of youth, YRBS. A novel contribution of this study is using a nationally-representative sample to evaluate polysubstance disparities between SMY and heterosexual youth using mixture modeling, which offers several advantages (described above) to accurately describe substance and polysubstance use patterns (including relative use of alcohol, marijuana, and a variety of nicotine-containing products (e.g., cigarettes, smokeless tobacco, e-cigarettes) and associated disparities. Consistent with prior research and the guiding minority stress and syndemic frameworks, it is hypothesized that SMY would be over-represented in the polysubstance group(s) compared to heterosexual youth.

Using a diverse large-scale nationally-representative sample and mixture modeling will also allow for evaluating disparities in various forms of substance and polysubstance use among subgroups of SMY and individuals with multiple, intersecting minority identities, which has not been fully addressed in prior research. Preliminary evidence supports larger SMY substance use disparities among racial minorities (Poteat et al., 2009) and, among SMY, a reduced protective effect of minority race/ethnicity on substance use (Talley et al., 2014); however, interactions between sexual orientation and race/ethnicity have not been evaluated for polysubstance use patterns. Furthermore, substance

use and polysubstance use disparities related to sexual orientation appear to be strongest for female youth (Corliss et al., 2008, 2012; Dermody et al., 2014; Kecojevic et al., 2017; Marshal et al., 2008) and bisexual youth (Dermody et al., 2014; Kecojevic et al., 2017; Kerr et al., 2015; Marshal et al., 2008). In line with prior research, it is expected that these substance use disparities will be exacerbated among youth who are bisexual, female or a racial minority.

2. Methods

2.1. Study participants and design

The study used the 2015 national school-based dataset, YRBS, conducted by the CDC's Youth Risk Behavior Surveillance System (Brener et al., 2013). A goal of the YRBS is to monitor key health and risk behaviors in adolescence, including substance use. In 2015, YRBS also included a sexual identity item in the national survey.

YRBS utilizes a three-stage, cluster sample design to produce a nationally-representative sample of students in grades 9–12 in the United States (U.S. high schools) as a whole (Brener et al., 2013). The first stage includes primary sampling units (PSUs) of large-sized counties or groups of smaller, adjacent counties. The second stage involves selecting schools from the PSUs. The targeted population is inclusive of public and private schools from all 50 states and the District of Columbia.

The YRBS is a self-administered survey on a computer-scannable questionnaire booklet/answer sheet. All participants are asked each question. A total of 15,624 participants completed the 2015 survey.

2.2. Measures

Demographic questions assessed each person's age, gender, race, and ethnicity. One item assessed sexual identity using the question "Which of the following best describes you?" with the following response options: "heterosexual (straight)", "gay or lesbian", "bisexual", and "not sure."

Cigarette use was assessed with the question: "During the past 30-days, on how many days did you smoke cigarettes?" Other tobacco product use was measured with: "During the past 30-days, on how many days did you use chewing tobacco, snuff, or dip, such as Redman, Levil Garrett, Beechnut, Skoal, Skoal Bandits, or Copenhagen?" (7 response options: "0 days" to "all 30-days") and "During the past 30-days, on how many days did you smoke cigars, cigarillos, or little cigars?" E-cigarette use was determined using "During the past 30-days, on how many days did you use an electronic vapor product?"

Alcohol use was assessed by asking: "During the past 30-days, on how many days did you have at least one drink of alcohol?" Each of these questions used the following 7-point Likert-scale response options: "0 days", "1 or 2 days", "3–5 days", "6–9 days", "10–19 days", "20–29 days", and "all 30-days." Binge drinking was assessed with the question: "During the past 30-days, on how many days did you have 5 or more drinks of alcohol in a row, that is, within a couple of hours?" with 7 response options including, "0 days", "1 day", "2 days", "3–5 days", "6–9 days", "10–19 days", and "20 or more days."

Recent marijuana use was measured with an item asking "During the past 30-days, how many times did you use marijuana?" with the following response options: "0 times", "1 or 2 times", "3–9 times", "10–19 times", "40 or more times."

2.3. Statistical analysis

All analyses were conducted using Mplus version 8 (Muthén and Muthén, 1998-2017; Muthén and Muthén, 1998). For all substance use measures, the analyzed variables were binary representing no use in the past 30-days (coded as '0') and any use (coded as '1'). Missing data were addressed using robust full information maximum likelihood (FIML)