



Co-occurrence of tobacco product use, substance use, and mental health problems among youth: Findings from wave 1 (2013–2014) of the population assessment of tobacco and health (PATH) study

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HIGHLIGHTS

- Youth tobacco users were more likely to use alcohol or drugs compared to non-users.
- Youth tobacco users were more likely to have substance use and mental health problems.
- In particular, poly-tobacco use was strongly associated with substance use problems.
- Female tobacco users were more likely to have substance use and internalizing problems.
- Comprehensive interventions and treatments can effectively address youth comorbidities.

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ABSTRACT

Introduction: Cigarette use is associated with substance use and mental health problems among youth, but associations are unknown for non-cigarette tobacco product use, as well as the increasingly common poly-tobacco use.

Methods: The current study examined co-occurrence of substance use and mental health problems across tobacco products among 13,617 youth aged 12–17 years from Wave 1 (2013–2014) of the nationally representative Population Assessment of Tobacco and Health (PATH) Study. Participants self-reported ever cigarette, e-cigarette, smokeless tobacco, traditional cigar, cigarillo, filtered cigar, hookah, and other tobacco product use; alcohol, marijuana, and other drugs; and lifetime substance use, internalizing and externalizing problems.

Results: In multivariable regression analyses, use of each tobacco product was associated with substance use, particularly cigarillos and marijuana (AOR = 18.9, 95% CI: 15.3–23.4). Cigarette (AOR = 14.7, 95% CI: 11.8–18.2) and cigarillo (AOR = 8.1, 95% CI: 6.3–10.3) use were strongly associated with substance use problems and tobacco users were more likely to report internalizing (AOR = 1.6, 95% CI: 1.4–1.8) and externalizing (AOR = 1.4, 95% CI: 1.3–1.6) problems. Female tobacco users were more likely to have internalizing problems than male tobacco users. Poly-tobacco users were more likely than exclusive users to use substances (AOR = 3.4, 95% CI: 2.7–4.3) and have mental health (AOR = 1.2, 95% CI: 1.0–1.5) and substance use (AOR = 4.7, 95% CI: 3.4–6.6) problems.

Conclusions: Regardless of the tobacco product used, findings reveal high co-occurrence of substance use and

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mental health problems among youth tobacco users, especially poly-tobacco users. These findings suggest the need to address comorbidities among high risk youth in prevention and treatment settings.

1. Introduction

Although cigarette smoking has continually declined in the United States, cigarette use remains common among youth (Arrazola et al., 2015). Furthermore, national surveys show that use of non-cigarette products such as e-cigarettes, hookah, little cigars, and smokeless tobacco has become increasingly common (Arrazola et al., 2015; Johnston, O'Malley, Miech, Bachman, & Schulenberg, 2017; Kasza et al., 2017; Y. O. Lee, Hebert, Nonnemaker, & Kim, 2015). Previous research has found consistent associations with certain tobacco products (especially cigarettes), alcohol or drugs, and mental health problems among U.S. youth. No study to date has examined these associations across tobacco products, addictive substances, and internalizing and externalizing mental health problems in a nationally representative sample. Moreover, approximately four in ten current tobacco users report using two or more products (Kasza et al., 2017), but scant research has examined the role of poly-tobacco use in these associations.

While available research suggests that the strong association between cigarette use and substance use may extend across specific substances (Richter, Pugh, Smith, & Ball, 2017), this has never been examined in a systematic and comprehensive manner (Kandel, Yamaguchi, & Chen, 1992). This literature is limited not only by a narrow focus on alcohol and marijuana, but few studies focus on emerging tobacco products, such as e-cigarettes, cigar types and hookah, that are commonly used by American youth (Kasza et al., 2017). Additionally, a 2012 review found high co-occurrence of tobacco (mostly cigarettes) and marijuana among youth and young adults in the majority of cross-sectional and longitudinal studies examined (Ramo, Liu, & Prochaska, 2012). Other recent studies show that hookah (water pipe) use is similarly associated with greater marijuana use among U.S. high school seniors and college students (Goodwin et al., 2014; Palamar, Zhou, Sherman, & Weitzman, 2014). Emerging research on e-cigarettes has documented an association between e-cigarette use and use of alcohol, marijuana, and other illicit substances (Demissie, Everett Jones, Clayton, & King, 2017; Westling, Rusby, Crowley, & Light, 2017), although much of this research compares e-cigarette use to cigarette use or dual use of both cigarettes and e-cigarettes (Dunbar et al., 2017; Kristjansson, Mann, & Smith, 2017; McCabe, West, Veliz, & Boyd, 2017).

Similarly, the assessment of the association between youth tobacco use and mental health problems is generally limited to cigarette smoking. Studies suggest a positive association between youth tobacco use and internalizing problems including depressive symptoms (Lechner, Janssen, Kahler, Audrain-McGovern, & Leventhal, 2017; Leventhal et al., 2016; Mistry, Babu, Mahapatra, & McCarthy, 2014; Tercyak & Audrain, 2002) and anxiety (Marmorstein et al., 2010; Marmorstein, White, Loeber, & Stouthamer-Loeber, 2010; Zehe, Colder, Read, Wiczorek, & Lengua, 2013). Youth cigarette smoking has also been associated with externalizing disorders involving disruptive behavior, including conduct disorder (Armstrong & Costello, 2002; Colder et al., 2013; Leventhal et al., 2016; National Center for Chronic Disease Prevention and Health Promotion (US) Office on and Smoking Health, 2012), oppositional defiant disorder, and attention-deficit/hyperactivity disorder (ADHD) (Brinkman, Epstein, Aunger, Tamm, & Froehlich, 2015; Elkins, McGue, & Iacono, 2007; Groenman et al., 2013; S. S. Lee, Humphreys, Flory, Liu, & Glass, 2011). Moreover, although two nationally representative studies found that youth poly-tobacco use was associated with alcohol, marijuana, and other drug disorders (Cavazos-Rehg, Krauss, Spitznagel, Grucza, & Bierut, 2014;

Richter, Pugh, Smith, & Ball, 2017), these did not focus on co-occurring mental health problems.

Examining these associations across the full range of tobacco products used by American adolescents, a high-risk population for the onset and exacerbation of tobacco use, substance use, and mental health problems (Office of the Surgeon General, 2016; Robinson & Riggs, 2016), is essential. Therefore, using Wave 1 data from the Population Assessment of Tobacco and Health (PATH) Study, the present study examined co-occurrence of substance use, substance use problems, and mental health (internalizing and externalizing) problems across 12 tobacco products. This study further examined these associations by poly-tobacco use.

2. Methods

2.1. Study design and participants

The PATH Study is a nationally representative longitudinal study of 45,971 U.S. adults (18 years and older) and youth (12–17 years) designed to examine tobacco use and health. This paper reports Wave 1 (September 2013–December 2014) data from 13,617 youth participants with complete data on variables for the specific associations examined. Participants were recruited via an address-based, area-probability sampling approach, using an in-person household screener to select youth from households that oversampled adult tobacco users, young adults, and African-American adults. Generally, up to two youth were sampled per household. The weighting procedures adjusted for oversampling and nonresponse, allowing estimates to be representative of the non-institutionalized, civilian U.S. population. The weighted response rate among sampled youth was 78.4%.

After obtaining consent from parents and emancipated youth and assent from youth, data were collected using Audio-Computer Assisted Self-Interviews administered in English or Spanish. Detailed methodological information about the study design and protocol is available elsewhere (Hyland et al., 2017) and at <http://www.icpsr.umich.edu/icpsrweb/NAHDAP/series/606>. The study was conducted by Westat and approved by Westat's Institutional Review Board.

2.2. Measures

2.2.1. Tobacco use

Ever use of tobacco products was determined based on participants' responses to questions on lifetime use (dichotomized as no = 0, yes = 1) of the following: cigarettes, e-cigarettes, traditional cigars, cigarillos, filtered cigars, pipe, hookah, smokeless tobacco (i.e. loose snus, moist snuff, dip, spit, or chewing tobacco), snus pouches, kreteks, bidis, and dissolvable tobacco. A brief description and pictures of each product (except cigarettes) were shown to participants before being asked about the products. Additional questions were asked of cigar users to determine cigar type.

'Any tobacco use' was defined as ever using any tobacco product, 'any cigar use' was defined as ever using traditional cigars, cigarillos, or filtered cigars, and 'smokeless including snus' was defined as ever using smokeless tobacco or snus pouches. Among tobacco users, 'poly-use' of any tobacco was defined as ever use of any two or more of the following 8 tobacco product categories: cigarettes, e-cigarettes, any cigar, pipe, hookah, any type of smokeless tobacco (i.e., smokeless tobacco, snus pouches or dissolvable tobacco), kreteks, and bidis, versus exclusive use of any tobacco product, which was defined as ever use of only one of these 8 tobacco product categories. 'Poly-use' of cigarettes was defined

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