



Short communication

Correlates of poly-tobacco use among youth and young adults: Findings from the Population Assessment of Tobacco and Health study, 2013–2014

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ABSTRACT

Introduction: Poly-tobacco use is common among youth and young adults. This study examined socio-demographic, tobacco-related, and substance use characteristics of poly-tobacco use compared to mono-tobacco use among youth and young adults (12–34 years) in the United States.

Methods: We conducted a descriptive analysis by age-group of 12898 youth (12–17 years), 8843 younger young adults (18–24 years), and 6081 older young adults (24–34 years) from the 2013–2014 Population Assessment of Tobacco and Health study. Multiple logistic regression modeling was conducted to assess the sociodemographic, tobacco-related, and substance use associations with current (past 30 days) tobacco use on a binary scale (poly-versus mono-tobacco use) among tobacco users.

Results: Between 2013 and 2014, 3.6% of youth, 21.7% of younger young adults, and 15.8% of older young adults were current poly-tobacco users in the general population. In the regression analyses, among youth tobacco users, heavy drinking was the only factor associated with higher odds of poly-tobacco use. Factors associated with higher odds of poly-tobacco use among younger young adults included being male, having less than high school diploma or GED, residing in the South, having 2 and ≥ 3 quit attempts, heavy drinking, and marijuana use. Residing in the South, older ages of exposure to tobacco use, and marijuana use were associated with higher odds of poly-tobacco use among older young adults.

Conclusions: Regardless of tobacco product type, poly-tobacco use was common among youth and young adults. Interventions designed to address factors associated with poly-tobacco use among youth and young adults are warranted.

1. Introduction

Poly-tobacco use, the concurrent utilization of two or more tobacco products, is increasingly common among youth and young adults (Harrell et al., 2016; Richardson et al., 2014) who are likely to be poly users of emerging tobacco products such as hookah, little cigars, cigarillos, and electronic cigarettes (e-cigarettes) (Kasza et al., 2017; Lee et al., 2014; Lee et al., 2015; Soneji et al., 2016). The increased use of emerging tobacco products can be partially attributable to the aggressive marketing practices of the tobacco industry (Mejia and Ling, 2010; Regan et al., 2012) and taking advantage of the misperception of lower harm of these products relative to cigarettes (Braun et al., 2012; Pearson et al., 2012; Sterling et al., 2013).

Epidemiological studies in the United States (US) show that tobacco use mainly occurs in adolescence, with 9 out of 10 daily cigarette smokers reporting first smoking by age 18 and 99% by age 26 (USDHHS, 2014). The continued use of tobacco products can predispose

young people to prolonged nicotine exposure and subsequently nicotine addiction (USDHHS, 2014), because their developing brain's reward system is altered thereby making them more vulnerable to dependence (McQuown et al., 2007). Nicotine dependence may increase the likelihood of young poly-tobacco users maturing into adult poly-tobacco users who delay quitting tobacco compared to adult mono-tobacco users (Henningfield et al., 2002; Soneji et al., 2016). Furthermore, compared to mono-tobacco use, poly-tobacco use may provide challenges for those willing to quit (Bombard et al., 2007; Wetter et al., 2002).

Previous research has examined the use of multiple tobacco products using different definitions ranging from use of cigarettes and any other tobacco product to use of ≥ 3 tobacco products, and some did not include e-cigarettes and hookah among tobacco products (Bombard et al., 2009; Bombard et al., 2007; Bombard et al., 2008; Lee et al., 2014; Lee et al., 2015). In this study, we applied an inclusive definition of the concurrent use of ≥ 2 tobacco products to show the importance of

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poly-tobacco use regardless of tobacco product type and emphasize this epidemic among young people in the US. We examined the cross-sectional associations between selected characteristics and poly-tobacco use among youth and young adults using data from the Population Assessment of Tobacco and Health (PATH) study.

2. Methods

2.1. Study sample

Data were from the restricted use files of Wave 1 of the PATH study, an ongoing longitudinal study of tobacco use trajectories and health outcomes, with an overall purpose to inform the Food and Drug Administration (FDA)'s regulatory policies on tobacco products (USDHHS, 2017).

A detailed methodology for the PATH study is described elsewhere (Hyland et al., 2016). Briefly, the PATH study is a nationally representative sample of 45,971 youth and adults aged ≥ 12 years. Survey responses were weighted to adjust for nonresponse, varying selection probabilities, and oversampling to reflect national estimates (USDHHS, 2017). This study was approved by the Institutional Review Board of Florida International University.

2.2. Measures

2.2.1. Outcome

The PATH Study inquired about cigarettes, e-cigarettes, cigars, cigarillos, little-filtered cigar, pipe, hookah, smokeless tobacco including snus, chewing tobacco, dip, moist snuff, and dissolvable tobacco. Bidis and kreteks were also examined in youth only. We classified subjects into current mono-tobacco users (use of only one tobacco product in the past 30 days) or current poly-tobacco users (concurrent use of ≥ 2 tobacco products in the past 30 days). A binary variable was derived to indicate respondents' tobacco status (0 = mono-tobacco use, 1 = poly-tobacco use).

2.2.2. Covariates

Using the PATH's theoretical framework of host, agent, vectors, and environment (Hyland et al., 2016), we selected covariates relevant to the study aim and those established in literature related to tobacco use among young people (Ambrose et al., 2015; Cohn et al., 2015; Hinds et al., 2017). We classified them into sociodemographic, tobacco-related, and substance use variables.

Sociodemographic variables included age, gender, sexual orientation, race/ethnicity, education (young adults), grade (youth), money received per week (youth), household income (young adults), employment status (young adults), census region, and self-perception of overall health.

Tobacco-related variables examined included age at first exposure to tobacco product (regardless of the specific type first used), tobacco products "come/come in flavors I like/liked", and advert appeal "the advertising for tobacco product appeals/appealed to me". The latter two variables were assessed for all tobacco products except for cigarettes, and single binary variables were derived for each (0 = no; 1 = yes). Quit attempts in the past 12 months were assessed among young adults (18–34 years) and categorized into 0, 1, 2 and ≥ 3 attempts.

Substance use variables assessed included marijuana and other drug use (Ritalin, painkillers, cocaine, methamphetamine, and heroin) within the past 30 days. Excessive alcohol consumption was assessed from 1) heavy drinking derived from number of days respondent had ≥ 1 alcoholic drink in last 30 days ($< 5/\geq 5$ days) and coded as no/yes and 2) high-risk drinking derived from average number of drinks per day, which was coded as no (< 4 drinks/day for females and < 5 drinks/day for males), and yes (≥ 4 drinks/day for females and ≥ 5 drinks/day for males) (USDHHS and USDA, 2015).

2.3. Statistical analyses

The characteristics of study participants were reported by tobacco status (non-, mono-, and poly-tobacco use) separately for youth (12–17 years), younger young adults (18–24 years), and older young adults (25–34 years). Replicate weights provided by the PATH study were used to obtain variance estimates using Fay's Method of Balanced Repeated Replication (BRR) with Fay's coefficient value of 0.3 as recommended by the PATH Study (USDHHS, 2017). Weighted percentages were reported with their confidence intervals (CIs). We reported proportions of common mono-tobacco products and poly-tobacco use combinations by age-groups. Next, we examined differences in proportions of the characteristics for tobacco users only (mono- and poly-tobacco) using Pearson chi-square test by age-groups. Factors with P values < 0.10 in the bivariate analyses were included in the binary logistic regression model. Gender stratification was conducted to identify factors associated with poly-tobacco use. We calculated adjusted odds ratios (ORs) with accompanying 95% confidence intervals (CIs) controlling for sociodemographic, tobacco-related, and substance use variables. A two-sided P value < 0.05 was considered statistically significant. Analyses were conducted using SAS version 9.4 statistical procedures (SAS Institute Inc., Cary, NC, USA), –PROC SURVEYFREQ and PROC SURVEYLOGISTIC with BRR method and Fay's correction of 0.3—that corrects for the complex survey design of the PATH study (USDHHS, 2017).

3. Results

In the general population, the prevalence of poly-tobacco use was 3.6% among youth, 21.7% among younger young adults, and 15.8% among older young adults. Mono-tobacco use was 4.8% among youth, 18.4% among younger young adults, and 21.1% among older young adults (Tables S1, S2 and S3). Cigarettes were the most common mono-tobacco product, while the most common combination for poly-tobacco use was cigarette and e-cigarette across age-groups (Tables S4, S5 and S6). The characteristics of tobacco users only (mono- and poly-tobacco use) were also reported for youth and young adults (Tables S7 and S8).

In Table 1, we reported the adjusted ORs and 95% CIs for poly-tobacco use compared to mono-tobacco use among youth overall and stratified by gender. Those who identified as other race had lower odds of poly-tobacco use, and heavy drinkers had higher odds of poly-tobacco use. A similar association was observed among males in the stratified analysis.

In Table 2, we reported the adjusted ORs and 95% CIs for poly-tobacco use compared to mono-tobacco use among younger and older young adults overall and stratified by gender. Among younger young adults, males, those having completed less than high school or GED, and those residing in the South had higher odds of poly-tobacco use. Additionally, those who reported 2 and ≥ 3 quit attempts, heavy drinking, and marijuana use had higher odds of poly-tobacco use. In the gender-stratified analysis, among males, being a high school graduate, having ≥ 3 quit attempts, heavy drinking and marijuana use had higher odds of poly-tobacco use.

Among older young adults, residing in the South had higher odds of poly-tobacco use, and stating that "tobacco comes in flavors I like" had lower odds of poly-tobacco use. Age at first exposure to tobacco product use at 18–24 years and 25–34 years had higher odds of poly-tobacco use. Further, marijuana use had higher odds of poly-tobacco use. In the gender-stratified analysis, in both males and females, age at first exposure to tobacco product use at 25–34 years and marijuana use had higher odds of poly-tobacco use (Table 2).

4. Discussion

This is the first study to examine factors associated with poly-tobacco use in a large, representative sample of US youth and young

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