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Correlates of Other Tobacco Use in a Community Sample of Young Adults

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Abstract

Background—young adult use of alternative nicotine and tobacco products (ANTPs) has increased dramatically since 2000. While recent studies address ANTP prevalence, relatively little is known about predictors of use. This secondary analysis examined demographic, personality, and other substance use factors as predictors of past month ANTP use.

Methods—community participants (n = 319; 51% female) completed an online survey during the initial stage of a larger study, for which all were required to have smoked cigarettes and consumed alcohol in the past month. The survey assessed demographics, impulsivity, and past-month frequency of cigarette, alcohol, and marijuana use.

Results—the majority (61%) of participants endorsed ANTP use in the past 30 days. The odds of ANTP use were associated with Caucasian ethnicity, younger age, more frequent alcohol use, and with the sensation seeking and positive urgency components of impulsivity.

Conclusion—these data suggest that ANTP use among young adults is a substantial problem, and that there is a need for interventions that target tobacco use generally rather than cigarette smoking only.

Keywords

tobacco; polytobacco; young adult; impulsivity

1. Introduction

Over several decades, accumulated knowledge about the health effects of cigarette smoking, combined with substantial regulatory and public health efforts, have led to a substantial reduction in the prevalence of cigarette smoking in the US [1]. However, recent surveys have shown a substantial increase in young adults' use of alternative nicotine and tobacco

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products (ANTPs; [2]). ANTPs include products that are long-established in the US (e.g., smokeless tobacco) as well as new products and those whose use has increased dramatically (e.g., e-cigarettes, hookah, cigarillos). ANTP use has more than doubled in the past 15 years [1]; this change is likely associated with increased access, lack of regulation [3], and misperceptions about the health consequences of ANTP relative to cigarette use [2, 4, 5].

While a number of recent studies have begun to shed light on the prevalence of ANTP use among young adults, relatively little is known about predictors of use. Factors that have been associated with young adult ANTP use include impulsivity, other substance use, cigarette use, male sex, family tobacco use, and White ethnicity [6–10]. However, the limited number of studies to date have tended to focus on one specific ANTP; additionally, the studies that have examined young adult ANTP use have consisted primarily of college samples. In the present study of predictors of ANTP use, we focused on demographic and other substance use predictors, as well as impulsivity. Impulsivity was chosen because we have previously shown that it prospectively predicts cigarette initiation [11], progression [12], and frequency [13] in adolescent and young adult samples.

The increasing rate of ANTP use among young adults has multiple potential negative consequences. First, most ANTPs appear to have adverse health effects, including increasing users' risk of cardiovascular and respiratory disease as well as cancer [14–17]. An additional concern is the potential impact of ANTP use on cigarette smoking. The prevalence of ANTP use is significantly higher among current smokers compared with non-smokers [18, 19]. It is possible that increased nicotine exposure from ANTP use may accelerate the trajectory of nicotine dependence and heighten the probability and rate of transition to heavier cigarette smoking [20]. Relatedly, ANTP use among non-smokers may promote smoking initiation. Recent data from the National Youth and Adult Tobacco Surveys indicate that intent to smoke conventional cigarettes was two times higher for non-smokers who had ever used e-cigarettes versus those who had never used e-cigarettes [21, 22].

The purpose of the present secondary analysis was to examine predictors of ANTP use in a community sample of young adult cigarette smokers. Based on previous findings, we hypothesized that demographic (male sex, younger age, Caucasian ethnicity) and individual difference (higher impulsivity, more frequent use of cigarettes, alcohol, and marijuana) factors would be associated with greater probability and greater frequency of ANTP use.

2. Materials and methods

2.1 Sample

Participants ($n = 319$, 51.1% female) were young adults ($M = 22.0$, $SD = 2.1$). In terms of race/ethnicity, 45.5% identified as non-Hispanic Caucasian, 27.0% as Hispanic or Latino, 12.9% as Asian American, and 7.8% as being from multiple racial or ethnic backgrounds. Eligibility for the parent study, which focused on motives for using alcohol and cigarettes together, included being 18–25 years old and having simultaneously used alcohol and cigarettes at least once in the past 30 days.

2.2 Procedure

Participants were recruited via online advertising in a local free newspaper for a study of predictors of simultaneous alcohol and tobacco use. Candidates completed a brief screening assessment of eligibility. Screens were reviewed by research staff, and individualized links to the survey were sent to those who were eligible. Participants indicated informed consent and completed surveys online via Survey Monkey (Palo Alto, CA), and were paid for their time. All procedures were approved by the University of California, San Diego Institutional Review Board.

2.3 Measures

Demographic variables were assessed at the beginning of the survey, including sex, age, and racial/ethnic background. For analytic purposes, race/ethnicity was dichotomized to compare participants who identified as non-Hispanic Caucasian to all other groups.

ANTP use was assessed with an item that asked participants to indicate whether they had used each of the following within the past 30 days: e-cigarettes, hookah or waterpipe, smokeless tobacco, snus, cigars or cigarillos, nicotine replacement products, or none of these.

Alcohol use was assessed via self-report of quantity and frequency of alcohol use for the past 30 days.

Marijuana use was assessed using a single item on which participants reported frequency of use over the past two weeks: not at all, 1–2 days, several days, more than half the days, or nearly every day.

Nicotine dependence was measured using the Cigarette Dependence Scale [23, 24], a 12-item scale that has been shown to differentiate between daily and intermittent smoking [25].

Smoking intentions were assessed with two items on which respondents estimated the likelihood that their smoking would increase in the future and the likelihood that they would develop a problem with smoking in the future. Both items were rated on a scale from 1 (strongly disagree) to 5 (strongly agree). Scores on these items were averaged to create a single smoking intent score.

Impulsivity was assessed via the short form of the UPPS-P Impulsive Behavior Scale [26]. The SUPPS-P includes four items from each of five subscales reflecting related but distinct facets of impulsivity: sensation seeking, lack of premeditation, lack of perseverance, and positive and negative urgency. Subscale scores were determined by calculating the mean of the items making up each subscale. Internal consistency was low for the lack of perseverance (Cronbach's $\alpha = 0.63$) and lack of premeditation ($\alpha = 0.53$) subscales, but acceptable for the sensation seeking ($\alpha = 0.77$) and positive ($\alpha = 0.83$) and negative ($\alpha = 0.80$) urgency subscales.

2.4 Analytic Plan

Two parallel analyses were conducted, with identical predictors: sex, age, ethnicity, impulsivity subscales, the number of days using cigarettes, alcohol in the past 30 days, and marijuana use in the past two weeks. To address the possibility that smokers may use ANTPs as part of a harm reduction or smoking cessation strategy, smoking intentions were also included in both models. The first analysis used binary logistic regression to determine the impact of the predictors on the probability of participants engaging in any ANTP use over the past 30 days. The second analysis used Poisson regression to model the association between the predictors and the number of different ANTP products used during the same period. All analyses were conducted using Intercooled Stata 13.0 (StataCorp LLP, College Station, TX).

3. Results

3.1 Preliminary Analyses

Demographic and descriptive statistics are shown in Table 1. The majority of participants (60.8%) endorsed use of at least one ANTP in the past 30 days. In terms of individual ANTPs, 39.2% reported past 30-day use of e-cigarettes, 39.8% hookah, and 27.6% cigars and/or cigarillos; 37.3% reported using two or more ANTPs. Among users of multiple ANTPs, the most common combinations were hookah and e-cigarettes ($n = 85$, 26.6%), hookah and cigars/cigarillos ($n = 53$, 16.6%), and cigars/cigarillos and e-cigarettes ($n = 47$, 14.7%). ANTP use was higher among males, college students, and recent marijuana users, but these differences were not significant in univariate tests. ANTP users were more likely to identify themselves as Caucasian [$\chi^2(1) = 6.63$, $p = .010$]. In terms of student status, 23% reported full-time and 1.6% part-time enrollment at four-year colleges or universities; 14.3% reported full-time and 9.1% part-time enrollment in two-year community college programs.

3.2 Primary Analyses

In the logistic model (see Table 2), the likelihood of ANTP use was not associated with sex, smoking intentions, or frequency of marijuana use. In terms of impulsivity, the effects of premeditation, perseverance, and negative urgency were not significant. As expected, there was a significant relationship between age and ANTP probability, such that each additional year was associated with a 19% decrease in the odds of past 30-day ANTP use. There was a significant effect of race/ethnicity, indicating that those who identified as Caucasian were more than twice as likely to report recent ANTP use. Frequency of alcohol use was also a significant predictor, such that each additional day of alcohol use increased the odds of using ANTP by 6%. Nicotine dependence was inversely related to ANTP use, with each additional point on the Cigarette Dependence Scale associated with a 20% lower likelihood of ANTP use. ANTP use was also associated with sensation seeking and positive urgency; one-point increases in the mean item score on these impulsivity subscales were associated with 76% and 46% increases in the odds of past 30-day ANTP use, respectively.

We also conducted separate *post hoc* analyses of predictors of the three most commonly used ANTPs. For e-cigarettes and hookah, results were similar to those reported above, in that use was significantly more common for Caucasians, more frequent alcohol users, and

those higher in sensation seeking and positive urgency. The odds of both e-cigarette and hookah use were marginally and inversely related to nicotine dependence. In contrast, the odds of recent cigar use were significantly related to male sex but not to other predictors.

In contrast to the previous analysis, the Poisson regression model (Table 3) of the number of different ANTPs used yielded few significant associations. Younger participants tended to report using a larger number of different ANTPs, and there was a trend toward more frequent alcohol users using more ANTPs. However, the number of different ANTPs used was not related to sex, ethnicity, cigarette or marijuana use, smoking intentions, or any of the components of impulsivity.

4. Discussion

The current study was a secondary analysis designed to examine correlates of the probability and frequency of recent ANTP use in a community sample of young adults aged 18–25. It was hypothesized that younger, male, Caucasian participants would report greater ANTP use. We also expected ANTP use to be associated with higher impulsivity and greater use of cigarettes, alcohol, and marijuana. Consistent with our hypotheses, findings indicated that participants who were younger, Caucasian, consumed alcohol more frequently, and had higher levels of sensation seeking and positive urgency were more likely to have used at least one ANTP in the past 30 days. The odds of ANTP use were not significantly associated with sex, cigarette or marijuana frequency, or the premeditation, perseverance, or negative urgency components of impulsivity. When we examined the number of different ANTPs used, only age was a significant predictor, such that younger participants tended to report using more ANTPs.

These findings are consistent with previous reports of substantial ANTP use among young adults who smoke cigarettes [27, 28]. However, the prevalence of ANTP use in these data was larger than previous reports, with the majority of the sample reporting ANTP use in the past month. The prevalence of past-month hookah, e-cigarette, and cigar use each exceeded 25%. Previous data have suggested that approximately 25% of smokers concurrently use any ANTP [27–29]. However, prevalence in the current study was comparable other more recent reports [30, 31]. Notably, while ANTP studies have often used college student samples, we found no differences in the prevalence of ANTP use or of specific products by student status.

To our knowledge, this was the first study to explore the influence of impulsivity on ANTP use among smokers. Sensation seeking [13, 32] and positive urgency [33, 34] have previously been associated with greater likelihood of cigarette smoking. However, unlike ANTP use in this study, cigarette smoking has also been consistently associated with negative urgency, suggesting that some smokers use cigarettes with the intention of ameliorating negative affect [11, 34]. In contrast, the fact that we found ANTP use to be associated with sensation seeking and positive but not negative urgency suggests that the motives for ANTP use among young adults may be primarily appetitive.

Interestingly, ANTP use was negatively associated with nicotine dependence, suggesting that ANTP users tended to be less experienced as cigarette smokers than those who did not

use ANTPs. Unfortunately, given the cross-sectional nature of the study, we were unable to determine whether ANTP use was associated with initial or increasing cigarette consumption, or whether these predicted subsequent ANTP initiation. The fact that recent ANTP use was associated with lower dependence, and was not associated with smoking intentions, suggests that it is unlikely that ANTP use was related to harm reduction or smoking cessation motives. However, it is possible that predictors of and motives for use may vary across ANTPs; our *post hoc* analyses indicated that predictors of hookah and e-cigarette use were comparable to predictors of ANTP use overall, but that these factors were generally not associated with cigar use. Other recent studies have suggested that predictors and motives vary across different nicotine and tobacco product use [35]. Some published data indicate that e-cigarette use may be associated with cessation motives, but not with cessation success [36, 37].

Some aspects of the design of this study limit the extent to which conclusions can be drawn. First, participation in the parent study required that subjects endorse consumption of alcohol and cigarettes during the past 30 days. Thus, the current sample excluded non-drinking smokers as well as non-smokers, both of whom may exhibit different patterns of ANTP use. The cross-sectional design and exclusion of former and never-smokers prevented us from examining the timing of ANTP versus cigarette uptake, and whether ANTPs may be used as a means of smoking cessation. Additionally, participants were not asked to reported quantity or frequency of ANTP use in the past 30 days; consequently we could not determine the extent of ANTP involvement. Similarly, we only assessed tobacco use over the past 30 days. Given the instability of alcohol and tobacco use in young adults [38], it is possible that the current data do not accurately reflect participants' general patterns of use.

In an online sample of young adults, 61% reported using ANTPs in the past 30 days. Cigarette smoking frequency was unrelated to ANTP use, consistent with the hypothesis that ANTPs do not reduce the harm associated with cigarette smoking [29]. Findings suggest problematic ANTP rates among young adults, regardless of student status. ANTP use was associated with reinforcement-seeking characteristics but not with those related to negative mood. This study indicates a need for interventions that target tobacco use generally rather than cigarettes specifically in order to accelerate the slowing decline in tobacco use among young adults in the United States [39]. Additional, longitudinal research is needed to provide a more complete understanding of the impact of ANTP use on cigarette initiation, progression and cessation, as well as the effects of cigarette smoking on ANTP initiation, progression and cessation.

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Highlights

- A community sample of 18–25 year olds with recent alcohol and cigarette use completed assessments of alternative nicotine and tobacco product (ANTP) use
- 61% of participants reported ANTP use in the past 30 days
- ANTP users tended to be Caucasian and younger
- ANTP users had higher levels of sensation seeking and positive urgency, and reported more frequent alcohol consumption
- ANTP use was inversely related to nicotine dependence and unrelated to future cigarette smoking intentions
- Findings suggest that young adult ANTP use is a substantial problem and not necessarily motivated by harm reduction motives
- There is a need for interventions that target tobacco use broadly rather than cigarette smoking only

Table 1

Demographics and descriptive statistics.

Variable	ANTP Use (n=194)	No ANTP Use (n=125)	Total (n=319)
Age	21.7 (2.1)	22.4 (1.9)	22.0 (2.1)
% Female	47.9%	56.0%	51.1%
% Caucasian	60.3%	45.6%	54.6%
% some college or higher	77.8%	82.4%	79.6%
% current student	53.6%	46.5%	52.0%
Past month drinking days	11.6 (7.3)	11.9 (8.5)	11.7 (7.8)
Past month cigarette days	18.9 (12.2)	18.2 (12.7)	18.6 (12.4)
Nicotine dependence	2.44 (1.47)	2.62 (1.51)	2.51 (1.49)
Smoking intentions	2.44 (1.08)	2.35 (1.08)	2.41 (1.08)
Any marijuana use past 2 weeks	56.2%	45.6%	52.0%
Used e-cigarettes	64.4%	0.0%	39.2%
Used hookah	65.5%	0.0%	39.8%
Used smokeless tobacco	9.8%	0.0%	6.0%
Used snus	2.1%	0.0%	1.3%
Used cigars/cigarillos	45.4%	0.0%	27.6%
Used nicotine replacement	3.1%	0.0%	1.9%

Table 2

Logistic regression model of the probability of past 30 day ANTP use.

Predictor	Coefficient	Std. Err.	z	Odds Ratio	95% c.i.	p-value
Sex	0.35	0.34	1.02	1.42	0.72, 2.77	.308
Age	-0.22	0.09	-2.40	0.81	0.67, 0.96	.016
Ethnicity	0.80	0.34	2.34	2.23	1.14, 4.37	.019
Nicotine dependence	-0.22	0.09	-2.56	0.80	0.68, 0.95	.011
Smoking intentions	0.12	0.14	0.89	1.13	0.87, 1.47	.374
Drinking days	0.06	0.02	2.31	1.06	1.01, 1.12	.021
Marijuana use	0.10	0.12	0.84	1.11	0.87, 1.41	.402
Premeditation	0.33	0.34	0.97	1.39	0.72, 2.69	.330
Perseverance	-0.07	0.35	-0.20	0.93	0.46, 1.86	.838
Sensation seeking	0.32	0.15	2.10	1.76	1.04, 2.98	.036
Positive urgency	0.26	0.11	2.26	1.46	1.05, 2.02	.024
Negative urgency	0.35	0.29	1.19	1.42	0.89, 2.51	.236

Table 3

Poisson regression model of the number of different ANTPs used.

Predictor	Coefficient	Std. Err.	z	p-value
Sex	0.01	0.01	0.11	.913
Age	-0.27	0.11	-2.48	.013
Ethnicity	0.02	0.03	0.46	.643
Nicotine dependence	-0.03	0.04	-0.92	.359
Smoking intentions	0.08	0.06	1.38	.169
Drinking days	0.05	0.03	1.81	.071
Marijuana use	0.05	0.04	1.48	.139
Premeditation	-0.01	0.03	-0.38	.704
Perseverance	-0.04	0.03	-1.37	.172
Sensation seeking	0.03	0.03	0.77	.442
Positive urgency	0.05	0.03	1.62	.106
Negative urgency	0.01	0.02	0.36	.715